Modes of the Finite

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Part Two

Modes of Energy

Section 1

Energy

Chapter 1

The form of activity

We come now to a discussion about single, individual finite activities themselves—which in practice will turn out to be either parts or aspects of that complex finite being called a body or even of a system of bodies; but it would be useful to look at the single act first, because in fact it is limited in complex ways, and at various levels.

Here, we are going to be combining, as it were, three branches of what used to be taught in philosophy: metaphysics (the study of being as such), natural theology (the study of the infinite being), and philosophy of nature (the study of being as material). The last area is included because it turns out that the "materialness" of what is material is its measurability, which (as we will see) is a level of limitation of being.

We saw already in the preceding Part that our perceptions are not simply similar among themselves as forms of consciousness (as opposed, e.g., to periods of consciousness) and as reactions as opposed to spontaneous, but that *some* forms are similar among themselves as forms and different from other sets of forms of consciousness. We now have to explore the implications of this with respect to what it reveals about existence.

What I am speaking of here is the fact that we can *classify* our

reactions into groups of similar *types* of reactions, the most obvious being seeing, hearing, smelling, tasting, and the various kinds of "feeling": felling pressure, pain, heat, cold, etc. It is not my purpose here to try to make an exhaustive list of all of the ways we can group these reactions, but just to mention that we have them.

The first thing to note, I suppose, is also something that deals with what was said in the preceding Part: that we never have any of these reactions in isolation. Each of them is always included within some more complex consciousness which is the consciousness I am having at the moment, and I "abstract" them, as Aristotle would say, by recalling other moments of consciousness which are similar in one respect with the one I am having and different in other respects, as well as by noticing that I have different organs or nerves in different parts of my body which seem to be responsible for the different aspects of the complex reactions. Thus, I can shine light on the back of my head and get no response at all; but when I shine it into my eyes, I get the "seeing" type of response, and so on.

But this means that we must proceed a little cautiously here. In practice, we must discover whether the aspects of the conscious forms by which they fall into different classes are due to the different organs by which we react to existence or differences in the existences themselves. We already saw one case where the reaction "getting hot" was at least in some cases due to an existence *not*, apparently, different in kind from the class of reactions called "seeing." In other cases (such as feeling the heat of the air of a room or the heat of some hot object you are holding) this does not seem to be the case, since what scientists think you are reacting to in these cases is the degree of vibration of the molecules, not electromagnetic radiation. Again, some if not all of these questions can be answered by devising instruments.

Fortunately, as philosophers, we don't have to worry about the

details of these investigations; all that need concern us is *the fact that certain similarities among **only some** of our forms of consciousness cannot be explained except on the grounds that the existences in question are similar*.

Let me define a term here that might be helpful:

An *external sensation* is the aspect of a perception which reacts to a single activity or aspect of an object.

A *perception* is a complex unity of external sensations.

As we will see in another part of this treatise (on living bodies), sensations are a special type of form of consciousness, one which has what might be called an "energy-component" (which in fact is the electrical output of a nerve or nerve-complex in the brain). Sensations as such, therefore, include perceptions and also acts of imagining and emotions; sensations are distinguished from acts of understanding, which cannot have this energy-component—for reasons we don't have to go into here. Acts of understanding, of course, are those conscious acts by which we know the relationships between sensations and between the objects perceptions point to.

This is the reason I have used the term "external sensation" here and not simply "sensation"; "external sensation" is what the Scholastics use to refer to the aspect of a perception which points to a distinct act of some object, or which is the response to input from one of the "five senses."

What I am trying to say here is that you can't actually have an external sensation as such. You can't, for instance, have an act of consciousness which is *just* seeing a color. The color will be seen as a certain shaped area of color at a certain distance from you and integrated within a moment of consciousness that contains many other things in the visual field (even if isolated, it will *appear* as

surrounded by blackness), various auditory and tactile sensations, recognition of the color as familiar, an emotional overtone connected with it as it appears, and so on.

The reason for this is that the brain has a good deal of energy in it all the time (which, as we said, is why we can imagine), and the nerves are active in a kind of rhythmic pulse throughout the brain. Any input from one of the senses goes not simply to the particular nerves in question, but also spreads through the brain, integrating that input with other information coming in and information that is stored.

Hence, even though we can actually map out which areas of the brain receive input (mainly) from the various sense receptors and so on, this does not mean that the *consciousness* ever separates itself into consciousness of just this isolated input. So even though the various distinct energies that come into the brain are, as it were, first, still, what is first *to us* is the complex *perception,* and we *know* the inputs from comparison of perceptions and noticing relationships among them. You might say that individual acts are "ontologically prior" in our consciousness, but "phenomenologically posterior." We will see in the next chapter that the individual acts are actually "ontologically posterior" in the object itself; they form, as Hegel seems to have seen, a kind of "middle" between the subject and the object, one which in itself is not "really real."

But this need not trouble us, because we are aware that our knowledge of objects is not direct, but through that process of circumventing the subjectivity of our consciousness by adverting to it as the effect on the subject of the object in question.[1]

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[1]We don't do this consciously, at least after our very first few experiences. *In fact,* as we learn to distinguish perceiving from imagining, we move from regarding the *contents* of consciousness as "what's there" to recognizing that the contents of

And we can be assured from our own experience and from science that different sensations, by and large, are due to *real differences* in the objects. Sounds (air vibrations) cannot be "reduced" to colors (electromagnetic radiation), with the difference accounted for by differences in the organs that receive them. Hence, sounds are *different kinds of acts* from colors.

It is enough for our purposes, as I said, to know *the fact that* this happens, without bothering about how often it does, because we are looking for what can be said about existence, and this fact means that there *are* real analogies among groups of existences by which they are the same as *some* other existences and different from others.

And since we know that we can get at these real differences at least sometimes, and since we are not interested in correcting errors here, but in discussing the implications of what is actually reported by the "true" sensations, then *for our purposes "external sensation" from now on will mean those sensations (aspects of forms of consciousness) which* ***do in fact*** *point to or "talk about" real differences among the existences in question.*

That is, we are simply ignoring the sensations of light and radiant heat as not relevant to our investigation, any more than the colorblind person's reaction to red and green is relevant to an investigation into the nature of color. There is nothing underhanded in this, because what we are interested in is what sensations tell us *when they do* point to differences in the existences, not when they seem to but don't.

With that out of the way, then, let us make a definition:

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consciousness are "in here," and some of them (perceptions) point also to what's "out there," while others (imaginings) do not. But we've done this quite a while before we reach the age of five or six, and from then on, we simply recognize perceptions as "talking about" the real world and imaginings as "made up." And we do this, as I said, by noting the relative vividness of the sensation.

The *form of existence* is the analogy among existences by which they fall into groups of existences similar among themselves and different from others.

It seems reasonable to use the term "form of existence" here, since we normally tend to talk this way when we are speaking of the *kind* of being, but stressing the limitation of it to being "only this kind."

But those who know Scholastic philosophy, and especially Aristotelians, should be aware of what we are doing. For Scholastics, following Aristotle, the "form" was the "form of the matter," not of the existence; indeed, for Aristotle, what is translated as "form" *was* the existence of the matter: its activity. Aristotle found no distinction between the form or aspect and the existence.

With Plotinus, however, who tried to combine Plato and Aristotle, the form or Aspect was a limited "participation" in the One, and the material object was a limited participation in the Aspect; and St. Thomas took this up and made "potency" into what limited (or perhaps the limitation of) "act," and so the form limited the existence and the matter limited the form. But he still followed Aristotle and spoke of the form as the form of the matter, not the form of the existence.

I have three difficulties with this Thomistic approach. First of all, I don't think "potency" is a useful term here, because if form is (as we will see) a limitation, then it isn't "power to act," really; it isn't anything at all—and it certainly isn't "ability to receive," because there's nothing there until the "receiving" has been done, and even afterwards, there's only the "received" as less than itself. (Not that Thomists would necessarily deny this; I am talking about the impression the terminology gives.)

1: The form of activity

Secondly, for this reason, "potency" or "limitation" *must not be thought of* as "that which limits," as if it *explained* the limited being from within. And that it *is* thought of as explaining the being is clear from the "material cause," which "explains the material being by limiting it," and answers the question, "why is it this case of X?" But the limit itself can't explain anything because it doesn't exist; it is simply *the fact that* there is no more of the existence than this. *As* limit *it is the problem,* not the "explanation"; it is precisely the *un*intelligibility of the existence, which demands a cause.

So *that which limits* any finite being is not its limit, but God[2]. We saw that any finite being is unintelligible if you try to describe it by itself; it contradicts itself because it is less than itself, and the limit is simply the lessness or the leaving out of some of itself. Hence, "potency" as "limiting act" cannot be "that which limits" the act, but rather the fact that the act is limited—and if this sounds like a quibble, there is all the difference in the world hidden in it.

Thirdly, this faulty approach is perpetuated by thinking of the form as the form "of the matter," which is nothing but its limit, even in Scholasticism: "matter" is "pure potency," or in other words, nothing but limitation. Hence, there isn't any matter for the form to be the form "of"; the matter is the matter of the form, not the other way round. Talking about the form of the matter is like talking about

[2]For those Thomists who would object, "Well yes, but that's the *efficient* cause, not the *material* cause," my answer is that what you are calling the "material cause" is precisely the *effect,* and is not a cause *at all.* An unintelligibility cannot be cause of anything. If you want to carp, I suppose, you could say that this particular unintelligibility is the cause of our *knowing* things as "individuated," and I would agree. But that is not the limitation *itself* so much as *the fact that* the existence in question is not all there is to existence. Hence, I think this sense of "cause" just muddies the waters.

the table of the surface rather than the surface of the table (i.e. as if the surface "received" the wood and shaped it); what's *there* is the (surfaced) table, not the "tabled surface." Similarly, what's "out there" is the formed existence, not the existing form.

With that possible confusion disposed of, then, what can we conclude about the form of existence?

Conclusion 1: The form of existence is a mode of the finiteness of existence.

Why is this? Because what makes green objects similar only to each other and different from other objects cannot, obviously, be existence (as existing they are analogous to all objects); hence, it must be some limitation of the existence.

But what this means is that the form of existence is *not* a "something" at all, but simply *the fact that* existences are limited in such a way that they fall into categories; and a *given* form of existence simply means *similarity in limitation* of a group of existences.

This, I think, calls for another technical definition; and here I borrow a term from Spinoza, but give it a meaning perhaps only remotely connected with what he meant by it:

A *mode* of the finiteness of something is something about the finiteness of something by which it is analogous to only some other finite existences.

We will see, for example, that quantity is another mode of the finiteness of beings: it is the "level" of limitation by which each individual case of a given form of existence is *different* from every other one. We have also seen three modes of the finiteness of

consciousness already.[3]

But to return to the mode of finiteness I call the "form of existence," color is the fact that existences are limited in such a way that this group of existences affects our eyes and spectrometers; sound is the fact that existences are limited in such a way that they affect ears and microphones—and so on.

Well, but what *is* the form? Really, it is the fact that color *cannot do anything but* affect my eyes rather than my ears; it is an *inability* of the existence to do more than this. This is another reason I don't like the term "potency" when referring to limitation; limitation is an *impotence*, not a potency; the limitation specifies rather what can't be done rather than what is done; it is the existence which is the "doing"; the doing "only this type" of activity is the existence as "formed," and the form is the "onliness," which is nothing at all.

What I am saying is simply that heat is a different kind of activity from sound; but the "heatness" of heat is not something in addition to the activity, "which limits" it to being heat; the "heatness" (the form) is the fact that it's this kind of activity *and not* anything else; and the fact that different objects are hot simply means that they are all (in one respect) acting in the same way, not that the "heatness" is anything real.

Hence, the form of activity is not an intelligibility at all; it is a mystery, a real nothing; the fact is that heat is activity, but not any more than heat-type activity, not that the activity has a "heatness" somehow "attached" to it. It is absolutely imperative to grasp this, or everything that is said from now on in this book will be incomprehensible.

I am stressing this because what I am getting at here is that the

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[3]That is, "formed consciousness" the "period" of consciousness, and "my" consciousness as opposed to yours.

fact that you can *describe* something with a given term does not mean that the term makes what you describe *intelligible*; what you are describing with the term "form of existence" is a precise type of *un*intelligibility of what causes our perceptions.

Scientists are apt to fall into this trap, and this is why I am warning you against it: the fact that you can put names on something doesn't mean either (1) that the name necessarily refers to something in itself real, or (2) that the name makes what it points to intelligible. For instance, scientists are apt to think that, since the evidence before us indicates that there was an evolutionary development based on the laws of probability operating on genetics, therefore chance "explains" evolution and makes it intelligible. It is no more made intelligible by this than the fact that bodies fall down and not up is made intelligible by being this fact. Chance is just a way of saying that there is *no* explanation for something, as we will see later.

Before we go on, I think I should mention that there is not going to be the neat sort of classification in my view that there is in Aristotle or the Scholasticism which followed him. With Aristotle, the form was the aspect (translated in Latin as "species") which put the object into its "real niche," while the genus (Greek for "kind" or "class") was supposed to have come from the matter. Thus, for Aristotle, "quadruped" was something you got from noticing the "stuff" horses and dogs were made of, and "horse" was the act of this "quadrupedal stuff" in one case, and "dog" was the act in another case—giving us what became biological genus and species, of course.

I think, however, that Aristotle was dead wrong in talking about a "stuff" that things were "made of" as "matter" (things are "made of" existence, if anything); and "matter" belongs on the level of finiteness by which numbers apply to objects and acts.

But what this means for me is that *there can be various levels of*

formal limitation, by which objects belong to smaller and smaller subclasses (i.e. are related to fewer and fewer other objects) *before we get down to the level of limitation by which a given object is unique.*

That is, since the "form" is not a reality in itself anyway, and is simply an in itself unknown similarity among how some objects are limited, and is due to the indirect way in which we know about objects, then I see no reason for asserting with traditional Scholasticism that there are "really" only two levels of limitation (called "form" and "matter" or perhaps more generally—as we will see shortly—"form" and "quantity").

The traditional view has had a great deal of trouble in dealing, for example, with sexual differences between humans. If the "form" is "humanity," then obviously the difference between men and women has to be on the level of the "matter" or "body," or in other words be quantitative—from which it follows that one sex is "greater" or "more human" than the other. I think that observation does not support this. There may very well be evidence for saying that a very talented human being is "more human" (less limited in his humanity) than a crippled moron—though I hasten to add that this implies nothing with respect to rights or how each should be treated—but Plato's contention in *Republic* that "men can do anything that women can do and do it better" is pure prejudice, which at the time had nothing but the fact that women were forbidden to do most things to support it. No, it seems that women are different *qualitatively* from men, not quantitatively, and so there are different levels of formal limitation.

Hence, **a limitation is *formal* when it is a *qualitative* limitation, and not one to which numbers apply meaningfully.**

That is, we call things "qualitatively" different when (a) numbers

do not apply to the differences (they are not differences in degree) and (b) we can *classify* objects (put them in groups) because of the "quality" as an "aspect" of the object.

That is, the quality or form (the two henceforward will mean the same thing) is the *similarity in limitation* which is in fact the *aspect* by which the objects in question are similar. Aspects, then, are really just similarities in limitation—with one exception; the "aspect" of *existence* by which all objects are similar as objects is not, of course, a similarity in limitation, but a similarity in the fact that they are all active (or the cause of a perception).

That is, the existence is the "aspect" of an object by which it is related to a mind (by which it is the cause of some form of consciousness); but it is only in a kind of secondary sense, really, an aspect by which objects are similar to *each other,* and it does *not* imply that you can classify objects as "existing" as opposed to the other class of "imaginary" ones. The reason for this is that there is nothing which *"is imaginary."* Imaginary "objects" are not "objects" at all; they are nothing whatsoever. All there is is the form of the *consciousness* (which in itself, of course, is an existence).

It is the confusion of existence as an aspect which leads to problems like the "ontological argument." Existence *is* an aspect, because it is the "hook" by which the object (which is acting on the consciousness) is related to consciousness; and, of course, since all objects known are related to consciousness as its cause, then they are all similar as existing.

But *as* an aspect it is unique[4]; every other aspect, obviously, is some kind of *finiteness* of existence, by which objects are either (a) unlike any other object, (b) like some objects and unlike others, or

[4]Or rather, it and the "transcendental properties of being" are unique, because they are all ways of describing existence in its relation to the mind.

(c) related in some other way besides likeness to some other objects. Hence, with every other aspect, you can say that the object "has" the aspect (in the sense that it is limited in this way or to this degree); but with existence, you *can't* say that the object "has" existence; because it *is* the existence.

That is, to say that an object "has" existence is a very bad way of speaking, for two reasons: first, because it implies that the object is the "essence-as-different-from-existence": that there is something about the object which "has" existence in a parallel sense to the sense that there is something about the object which "has" color or "has" forty degrees. But this would give you a kind of real essence which is opposed to and "receives" existence.

Secondly, it seems to imply that there are objects which don't exist, which makes the form of imagining into a kind of "object," so that you can speak of "unicorns that don't have existence" as if you were actually talking about a something which lacked existence. But this is nonsense; the "unicorn" *is* the aspect of the *act of imagining* by which it is *this* act (i.e., it is the finiteness or form of this conscious act itself); its existence is the act of imagining, and *it* is *not an object at all*.

Those philosophers who say, "Existence is not a predicate," therefore, are basically right; but unfortunately they can't explain why existence should seem so naturally to *be* a predicate. I think my view of existence as "the object looked on as the cause of perception" shows why existence is an aspect, but at the same time why it is not an aspect like any other.

The same, of course, applies to goodness as an aspect of an object; it is "the object looked at as living up to my expectations for it"; and so it is just as bad to say that an object "has" goodness as to say that it "has" existence. Neither goodness nor existence is a mode of the finiteness of an object, but simply the foundation within it of its

relation to our consciousness of it: the "hook" by which we can talk about its being so related.

You will notice that what we are doing here is in one sense clearing up difficulties and errors that have cropped up in the course of philosophical investigations. In another sense, we are keeping things obscure when they should be obscure, and not pretending, as I said, that the fact that we can put names on things implies that we know what these names refer to.

Remember when I was speaking several chapters ago about the theorem that similar effects have analogous causes, I pointed out that all you know is *that* the causes are the same *somehow*, but you don't know how. When we were discussing finiteness, it became clear that we simply could not divide up what is finite into one "characteristic" that "is possessed in common" by the finite things and another one which "each has distinguishing it from the others."

If we think of the form as an "aspect" in this sense of "something distinguishable" in the object, we fall back into this fallacy. The form *is* the existence as less than itself, qualitatively. Heat is an *existence* which is a different *kind of existence* from sound; but there is no "heatness" as distinct from the existence.

I hope that I have now belabored this sufficiently. In any case, since the form of existence is a mode of the finiteness of existence, we can draw the following conclusion:

Conclusion 2: God is not a form of existence.

That is, God does not exist in any *way* at all; he *is* existence, not a kind of existence. In God, existence is absolutely *unqualified*.

I think it can be seen a little more easily here why God is not finite if he is not the only being that there is. Infinite existence means *unqualified* existence, not "all of existence" in the sense of the sum

total of existing beings.

But since all of our input into our brains is by way of our sense organs, each of which is built to react to a different form of existence, then it will follow that

Conclusion 3: God cannot be perceived.

He can be known, but only as the cause of something which we directly perceive; but in order to be perceived, he would have to be some form of activity.

This does not mean that God cannot act directly on our minds, so that we can "know him as he is," as St. John says in his first letter. But this knowledge, if it ever should occur, would have to be a kind of mystical knowledge, and be completely unrelatable to anything else except a kind of general awareness "knowing an object" and not making up whatever this kind of consciousness is—a general awareness of knowing and of being passive in the knowing; but beyond this, it would be "contentless," because any other kind of contents would be a definite *form* of consciousness which would "point to" some distinct finite existence.

Chapter 2

Quantity

But there seems to be a kind or level of limitation that probably deserves the name of another mode of finiteness: that sort of limitation by which we can apply numbers to acts and objects.

Quantity **is the mode of finiteness by which numbers apply to activities.**

It is obviously a mode of finiteness, because any number always implies "no more than this," since the number system is such that for any number there is always a greater number. Hence, whatever the form of consciousness that "reports" a number refers to in the object, it has to be a limit of "muchness," whatever that is.

It is obvious, I think (and we are about to explore the implications of this), that at least in most cases, quantity applies to a *form* of existence; we measure heat, light, motion, weight, size, and so on, rather than "existence"; and on the face of it it would sound peculiar, to say the least, to claim that one object has "twelve degrees of existence," while some other object is "twenty units of existence."

So the first question to ask is whether quantity can be a direct limitation of existence, or whether the mode of finiteness called the "form of existence" is what the limitation called "quantity" applies to—which sounds strange, because it makes quantity a kind of

limitation of a limitation, or a nothingness of a nothingness of something. Of course, if this is the case, the solution to the problem is that the quantity would not really be the limit of the limit itself, but of the formed *existence* as formed.

In any case, if quantity could be a direct limitation of existence, then this would mean that there was an existence which was similar to other existences in being "two" or "three" or "six" or "one," or whatever the number its quantity as perceived "pointed to." It would be analogous to all forms of existence which also had this number; but it itself would be something like an "absolute two" (or an "absolute three," or whatever).

But how could such a thing be perceived? First of all, it couldn't be a *countable* two, because this would imply two *distinct* existences—or at least distinct parts of some object, each of which could be *considered* as a distinct existence. That is, the kind of "two" that describes "being conscious" and "being conscious of being conscious" is, as we have so often said, a description of *one and the same* reality, because each "part" is contained within the other and contains the other within it, so that there is no distinction between "them"; but that means that the *number* two does not really describe this sort of thing (because it "means" the same thing as the number One in this case).

Further, "two" would not really describe the same idea as shared by two people, say. If both of us are thinking, "Being is analogous," then how many ideas "Being is analogous" are there? In one sense two, because each of us is thinking of it; but in another sense, it is (to the extent that we agree) *identically the same idea* that each of us "has." It would be silly to count the number of people in a class and find out that ten of them understood a given proposition, and then say that there were "ten" of that idea in the classroom.

This seems to indicate that something like an "absolute two"

really doesn't make any sense, at least when discussing countability. We can recognize "red" when we see it, but we can recognize the "countable two" if we recognize *many objects*. That is, if there are two in this countable sense, "it" is not *a* Two, but *there are* two. Hence, this is a sense of quantity which relates (many) objects, and so it is nonsense to talk of existence as directly limited by quantity in this sense.[5]

But that leaves us with what might be called a "measurable two" as opposed to a "countable two": such as two *degrees* rather than two things. The point here is that 72 degrees of heat is not a "piling up" of little units of heat, each of which is distinct from the others, as if they were in a stack; it is a *limit* to—shall we call it the "strength"?—of the heat; or a speed of 50 miles an hour is not a summation of 50 single miles an hour, but a limit on how fast you are traveling. Here it is obvious that the quantity applies to a *single* act, and is a limit of it, rather than a relation between acts.

But with quantities of this sort, the only way numbers can actually be put on them is in fact by *comparing* them to some measuring instrument on which numbers have been *arbitrarily* marked. The number itself is objectively meaningless, as can be seen from the fact that 32 degrees of heat (Fahrenheit) is zero degrees (Celsius), or that 50 miles per hour is 73 feet per second. Where the zero is put on the measuring scale and how big the measuring units are determines what the actual number of the measured act will be. But more than this, if the act to be measured has to be compared with an instrument, then *the instrument has to be comparable to it,* implying that it

[5]This, of course, means that Plato's notion that forms and quantities are "the realities themselves" and it is the individual which "shares" in them is false. Aristotle properly saw that it is the *individual* which is "really real," and these aspects are things that are true *of* it.

has to be the same *form* of activity. You can't measure heat in miles per hour or speed in calories; or as the saying is, "you can't compare apples and oranges"—to which I would add "except as desirable objects," in which case they are assumed to have (at least to you) some common form of existence[6].

But the point here is that measurable quantity also implies a common *form* of existence between the measured and the instrument, and so an "absolute two" here also is meaningless.

Hence, we may take it that

Conclusion 4: Quantity is a limitation of a form of existence.

That is, when something is measurable, it is limited on two levels: it is limited *qualitatively* to being some *kind* of activity; and the kind of activity in question has differences *between different instances of it*; and these differences are what allows us to attach a number to each of the forms of activity in relation to the "degrees" of the other forms of activity. The assumption is that differences in quantity imply *differences within the same form of activity.*

Just as existences differ from each other in form, meaning that each is limited to being this kind of existence and no other, so a given form of existence (heat, say) is limited to being in one case 72

[6]But that "form of existence," unfortunately is "value," by which they lead to a more or less important goal—which is your evaluative idea of the "real you" and is your *expectations* for your future. Actually, this opens up the whole field of economics, in which qualitatively distinct things are compared quantitatively; but the comparison is *subjective,* not objective, and varies even with a given person a different times. We will get into this subject much later; but in point of fact, it makes "mathematical economics" a farce. Market economics is much more mob psychology than it is something measurable. There is simply no such thing as the "objective degree of desirability" that an object "has." .

degrees of heat, and in another case 55 degrees of heat, and so on. The different temperatures are *differences in the heat,* not something that is "attached" to it; they are the fact that in each case there is *no more* of it than there is.

Note this: it is a very important point: *In the case of a given form of existence various instances of which have different quantities, the form of existence is* ***not the same*** *in each case; it is* ***different,*** *but in quantity.*

That is, the different quantities indicate that the *forms of existence in question are* ***analogous;*** it does *not* indicate that they are identical, and "have" different degrees; the quantity, as a finiteness *of the form* of existence, is precisely a *difference in the form,* not a "something" that it has tacked on to it; it is the fact that the form of existence in question is limited to being not all of what it could be, and hence it is an "impotence" of the form to be itself, just as the form is an "impotence" of the existence to be itself.

This needs stressing, because in Scholastic philosophy, it is assumed that forms of existence are "univocal," not analogous: that is, that the form of existence in each case is identically the same as the form in all other cases, and the difference in the various objects comes from what the form is "received in": either the body as a whole (as in the case of the "accidental forms") or the matter (as in the case of the "substantial form"). So a Scholastic would argue that *as* humans we are all the same; and what I am saying here is that *as* humans we are all *similar,* but "to be human" in my case *means* something different (though not wholly different) from what it means in your case; and the difference is precisely the "degree" of humanity that each of us "possesses." (Can we actually have "degrees of humanity"? Yes indeed, as we will see in the next section.)

What I am saying is that just as the form of existence is *precisely the difference* ***in the existence*** from what it would otherwise be;

because the existence, after all, all there is to the object; so the quantity of the form of existence is the difference *in the form* from what it would otherwise be.

I gave a model to picture existence with its form: a ball of wood, where the spherical surface is the difference in the wood making it a ball of wood and not, for example, an egg. To picture the level of existence called "quantity," imagine a cube of wood. Now the *surface itself* has *edges*. That is, if you go along the surface and come to the edge, you have to change direction or you will move off the cube altogether. Now of course, the edge doesn't have any more reality than the surface does; all there really is in the cube is wood. But a cube is a different sort of surface from a continuous type of surface like a sphere, which has no "special places" on it where you would have to do something different to stay on the surface. So the edge *is* the surface of the wood at that point; but it is also *the fact that* the surface *leaves off* in this direction—in a sense analogous to the way the wood leaves off at the surface; and of course, as a "leaving off," the surface and its edge are nothing but the wood itself.

Similarly, any form of activity that is limited quantitatively is only just activity; but it is activity that is simultaneously *only this kind* of activity and *only this much of* this kind of activity.

There is no law, of course, that says that a form of activity *has* to have this "extra" limitation on it; and in fact, later on we will conclude that there are forms of activity (consciousness is one) which cannot be limited quantitatively.

Let me say just a word about what in Thomism is called "quantity." In ancient and medieval times, about all you could measure was size or weight; and so quantity was not looked on by Aristotle or St. Thomas as the limit of a form, but as a form, which was called the "extension"—and St. Thomas tacked on the other

quantity of "weight," which he didn't do much of anything with. They thought that this particular "accidental form" was intimately related to the "matter" of the body as a whole, and became a kind of intermediary between the body as such and the other "accidental forms" which somehow "inhered" in the body (the "substance") by way of the quantity or extension.

Some contemporary Thomists, such as Fr. Hoenen, have tried to reduce all the quantities we have now in physics and chemistry to variations on extension; but I think they have produced a *tour de force* of reasoning which ultimately fails. What they missed, I think, is that "accidental forms" can have a limit, just as the "substantial form" can; and in fact the sum total of the quantities of the "accidental forms" is a kind of manifestation of the limit of the "substantial form," which is the "matter" of the body. There are just too many ways to measure too many things to say that every degree of everything is just a way of describing the size of the body.

Actually, as we will see later, extension or size *is* a form of activity, but one which *has* a quantitative limit; it isn't quantity itself.

But to return to where we were, since quantity is a limitation, then it follows that

Conclusion 5: God has no quantity.

God's activity is infinite activity; but just as "infinite" in God's case means "unqualified" (no form), it means *un*quantified. God's does *not* have *an infinite* ***amount*** *of activity*; numbers do not apply to this activity at all.

To see what I am driving at here, God's infinite activity is to quantified (measurable) activity as colorlessness is to color. If you say that air is colorless, you do not mean it is black (the color that an object is when it re-radiates none of the light falling on it), or white

(the color it is when it re-radiates all of the light falling on it); you mean that it doesn't "do" what color "does" at all. It isn't no color (black) and it isn't all colors (white) and it isn't any color in between. "Colorless" means that color-terms cannot be used to describe the object.

Similarly, God's infinite activity is not an activity that has the quantity that is expressed by ∞ (the sideways figure eight—"infinity"), which means "a quantity greater than any one you can name." Why? Because a quantity is a *limit*, and God simply is not limited.

Nor, of course, is God's activity zero in quantity, any more than glass is black because it has no color. God's activity is infinite in the sense that to ask "How much of it is there?" is to ask a question that is as meaningless as "How heavy is blue?".

When I was defining "energy" I also defined "spiritual activity." The reason for using this term is that what is "spiritual" is in ordinary speech opposed to what is "material"; and it turns out (as we will see) that what makes a body a body is that the activity uniting its parts has a quantity (which in fact was what was "pointed to" by the old philosophical use of "matter"). Hence, the "spiritual" really is the "unquantified" or "unmeasurable."

If this is what "spiritual" means, then, of course, as I said, there is at least one spiritual act: God. I said that we would conclude that there are also spiritual *forms* of activity; but whether there are or not is not really at issue at the moment. The way they could be discovered, however, would be to show that *if* you tried to describe the act in terms of a quantity (i.e. as "this much and no more") it would contradict itself. For example, you would have to show that, no matter what quantity it had, it would have to have a quantity greater than that one. And this is the way we will in fact argue in the next Part of this treatise when discussing the implications of

"knowing that you know" as being a "reduplication" of the act of knowing.

But suffice it here to say that *if* there is such a thing as a finite spiritual act, it is an act which is describable qualitatively *but not* (in any meaningful sense) quantitatively; numbers do not apply to it *in principle*.

I am stressing this here because it is a kind of dogma of contemporary science that anything real is measurable; that is, in order for something to be *objectively* knowable as *factually existing*, it has to be measurable; any unmeasurable "reality" is actually only a projection of fantasy onto the world by way of a version of the "ontological argument."

This dogma came about, as I have already said so often, by the mistake of Galileo and Descartes in calling "truth" the matching of the perception with the object, and their assumption that the two matched when measurable forms as measurable were in question. But as I have also said, it is known in science now that the quantity cannot in fact be measured "as it is out there," so that the quantity *as known* exactly matches the objective quantity—and in quantum physics, this discrepancy is a discrepancy in principle, not something due to the crudity of the measuring instrument; and something similar can be said in General Relativity.

The dogma is also reinforced by Kant's "refutation" of the "out thereness" of any aspect of perception; and I tried to show how his explanation was inadequate in the preceding Part.

So it is enough for our purposes here to reiterate that the dogma of science that whatever is real is at least in principle measurable is a dogma that is based on faulty *philosophy*, and has nothing to do with science itself. And so let us pursue the even tenor of our ways and let the scientists sneer at us because we dare to talk about the spiritual as objective. At least we know what we are talking about now.

2: Quantity

Before going on to define energy, let me point out something that is suggested by the assumption that a given act could have many forms and by the model of the cube, whose edges themselves have corners, which seem to be limitations of the edges: It may be possible for an act to be limited *quantitatively* in more than one way also.

This is a very mysterious area of things. But it does seem that, for example, light is limited in wave length (which is perceived as hue) and the amplitude of the wave (which is perceived as brightness); motion is limited in distance and speed; heat can be measured by temperature and calories, etc.

One might explain the apparent double quantification of an act as being a measure, in the one case, of the limit of the act in itself, and in the other case of the limit the act has *as* the act of some body; but this does not always seem to be the case. For instance, in talking of motion, the velocity of the motion (which is its limitation "in itself," so to speak) can be further limited to being a degree of *acceleration*, in which the *velocity itself* is increasing or decreasing. Acceleration would sound like a description of an activity very much along the lines of the corner of the edge of the surface of a cube. And, of course, acceleration doesn't need to be constant either; and if it varies in a regular fashion, then it would also have a speed of variation, and so there would be a further level of "meta-acceleration" that would have its own number.

The point, I suppose, is that once you admit that existence is limited, and that the limited existence can be further limited, there is in principle no limit to the number of limitations of limitations there could be.

Chapter 3

Energy

We are now deep into the overlap between philosophy and physics, and so it will be necessary to relate some of the things I am saying to what is said in physics.

First, let me make a philosophical definition:

***Energy* is any activity that is limited quantitatively**

***Spiritual activity* is any activity that is not limited quantitatively.**

For now, we are postponing the question of whether there *are* any (finite) forms of spiritual activity.[7]

But what is to be noted here is that energy *means* is activity or existence; but the term "energy" will *not* apply to *spiritual* existence, because the only acts that can be called "energy" are *measurable* acts. Energy is *like* spiritual acts in that both energy and spiritual activity

[7]We have, of course, seen (and will formally conclude soon) that *God* cannot be energy because energy implies (quantitative) limitation, and God is not limited in any way and *a fortiori* to any degree. But whether there are acts that are *forms* of activity but unquantified will have to wait until considerably later, when we discuss consciousness. And I am going to argue there that the reason we know that consciousness is spiritual is that you get into a contradiction if you try to apply numbers to the act.

are "energetic"; but it is unlike spiritual activity in that energy is always some form of activity that has a quantity, and so is in principle measurable, whether or not you actually have an instrument that can measure it. Spiritual activity is not "unmeasurable" for practical reasons, but because it doesn't have what measurement measures.

Since energy has a quantity, we can conclude that

Conclusion 6: Energy always is some *form* of activity.

The reason, of course, is that quantity limits a form of activity, and is not a direct limitation of activity. The "form of activity" is then called the "form of energy"; and thus we have different forms of energy which have such names as heat, light, electricity, magnetism, nuclear (the "strong force"), gravity, etc. These are all different *kinds* of energy, in that they are all activities and all of them "have what it takes" to be measured. And since they are called "forms of energy," this indicates that the term "energy" itself refers to the existence, not the quantity.

From this, of course, it follows that

Conclusion 7: Energy is an analogous term.

It has the same analogy as "existence" has, of course; and what this amounts to is that the term "energy" *means* something different each time it is used; but all the different instances of it are in some unknown way similar, both in their being "energetic" and in their being measurable.

Since "energy" is *measurable* existence, we can also draw the following conclusion:

Conclusion 8: God is not energy, nor is his existence or activity energy.

This, of course, is obviously true; but it needs stressing, because "energy" is such a "good" term (understandably, because it refers to the existence of the measurable), and so we want to apply it to God, who's got everything "good." But in our investigation, God isn't what we would like him to be, but what we know he must be, based on what is necessary to account for finite existence. And energy is by definition finite. To say that God's existence is "infinite energy" would be to say that God's existence has an unlimited limit, which is absurd.

There is obviously no such thing as infinite energy, precisely because quantity is a limit, and "energy" applies to an act only when it *has* a quantitative limit.[8]

Now then, what is the relation of this definition I gave to energy to the definition in physics, which on the elementary level is "the capacity for doing work," which will do for our purposes? Physics is not simply interested in what energy *is,* but wants actually to measure it to find out *how much of it* there is.

It turns out, however, that you can't actually measure how much energy there actually *is* locked up in a body, because energy is activity, not something static; and so you have to make it actually

[8]Thus, the mathematical symbol 4, which is usually called "infinity" does not and cannot exist. And mathematicians stress that when you have it, it always has an arrow before it, which means that the quantity in question *becomes* always larger and larger (or smaller and smaller) "without limit," in the sense of "whatever number it reaches, it always *could* be greater (or less). And so they say that a given quantity "becomes infinite" rather than that it "approaches infinity." And the reason is, of course, that then "infinity" would be a goal beyond which the quantity could not go; but the quantity in question is so defined that *no* goal is possible for it.

"do something" until it is used up, after which, of course, you know how much energy there *was,* because there's now none left.

And that is the relation of energy to "work," which is defined as "force exerted over a distance." The distance, as something static, is measurable, and the force can be measured by the amount of resistance the object "worked on" has to it; and so once you find how much work was done, you find out how much energy there was in the body that was doing the work.

What this amounts to is this: *Work* (in the sense physics speaks of it) is *energy as the effect of some other energy*. That is, it is some quantified activity which is *in practice measurable*, and is "produced" by the activity of some body on the body that has the "work done on it," (the one that has been moved the distance in question). And if this is what work is, then the *energy* you are trying to measure is *the cause of work*.

Both of these are actually energy: quantified activity; but only the former is *called* "energy" in physics, because it is the one you have to use devious means to measure, and it's what you get as the result of your laboratory work. But in point of fact, the two of them are equivalent (in fact, their quantities are defined in such a way that they *have* to be equivalent); and so they show up on the right-hand side and the left-hand side of an equation such as the following

$$F \cdot x = mv^2/2$$

Where the left is the work (the product of force and distance) and the right is the energy ("kinetic energy" or the motion itself).

And of course, the *force* is *the causality energy exerts on some body*. That is, it is the "instantaneous interaction" between the two bodies: the one with the energy you want indirectly to measure (the causer) and the one that has work done on it (what is affected).

Another way of saying this is that *force* is *causality as quantified*, and of course as such it is a quantified *relation* between the cause and the effect, and also between the causer (the body which is going to be doing the work) and what is affected (the body that is going to be moving).

Mathematically, this relation shows up as what is called a "derivative," and looks like this:

$$F = mv\ dv/dx,$$

where the right-hand side is the *being affected* of the body, in which we find the derivative expressing the "tendency to move" at this point (which looks like an "infinitesimal momentum" divided by an "infinitesimal distance"). The idea is that if there is a continuous variation in the relationship between momentum and distance, then in this case the fraction $0/0$ can have a definite meaning; and that "limit" is what is expressed by the apparent fraction of the derivative.

The "m" in the equation is the *amount of the tendency to resist a change of motion*, and is called the "mass"; it is not really the "bulk" or "stuffness" of the object, but precisely the degree of this tendency the object has *not* to change its condition of rest or movement (its "inertia").

But why is the derivative as I stated it in relation to distance and not time, as appears the physics textbooks? This will become clearer in the next section, when we discuss change and time's relation to change; it turns out that the "time" in the equation, which is supposed to be an "independent variable," is not independent at all, but is a ratio which as such doesn't exist and is in fact derived from other variables which are in fact what is observed when you are looking at a clock. And when you eliminate the duplications, it turns out that the derivative is with respect to distance, not time.

3: Energy

This allows me to predict from this philosophical way of looking at energy, force, and work, that if this theory is taken into account by physicists, a theory might emerge that is might give a more accurate description of what is going on "out there." This philosophical theory predicts that mass, length, and time *shouldn't* be the "fundamental constants" in terms of which everything else is thought of; the fundamentals should be energy, force, and velocity—the last of which can be measured *directly,* by the way, and needs no "clock."[9] The "fundamental constants" in Newton's physics were based on seventeenth-century *philosophy of nature,* which in many ways was a faulty description of bodies.

But to give an example of what I am saying, when you separate out the variables in the equation above to get a "differential equation," what you get is this:

$$F\,dx = mv\,dv,$$

which clearly shows the relation to the work-energy equation above; the left-hand side is now "the tendency to do work," and the right-hand side is "the tendency to move"; the work equation comes from expanding this tendency into a finite distance ("integrating").

Since the different instances of a given form of energy mean that all the energies in that form are analogous *among themselves* and *different* from other forms of energy, it would not be surprising that we could come up with the following conclusion:

Conclusion 9: The quantities of one form of energy will not

[9]You do it, for instance, when you read the speedometer dial in your car. This does not have a little clock and a little ruler; it is the *speed itself* that creates the force that moves the needle.

apply to another form of energy in a simple way, but will be only analogous to them.

And this is verified by physics. It turns out that energy of one form can be transformed into energy of a different form, as when you take the electricity in your flashlight's battery and convert it into light, or take heat in your automobile's engine and convert it into motion.

But in this transformation of energy from one form of existence into another—and this is what the conclusion above says—the quantities will not transfer over so that "two" of the first form will turn out to be "two" of the second form.

But what that amounts to is that if you are going to have an *equation,* in which the *quantities* on the left-hand side are *equal* to the quantities on the right-hand side, then *you have to keep track of what* ***qualities*** *the quantities* ***belong to,*** because the numbers themselves are meaningless, since they are not absolute.

To show what I am saying, take the force equation above (only this time, let us give it its traditional form, using time):

$$F = mv\ dv/dt$$

In physics, you have to write its application something like this:

2 dyne = 1 gm x 2 cm/sec x 1 cm/sec x 1/1sec

What are all those funny words? The "dynes" are units of force, the "grams" units of mass, the "centimeters per second" units of velocity, and of course the "seconds" units of time.

And what a physicist now does is multiply out all of the "units," so that the equation looks like:

$$2 \text{ dyne} = 2 \text{ gm cm}^2/\text{sec}^2,$$

which means that the units of force "convert" into the units of mass, length, and time in that complicated way; and if you don't do "mathematics" with the *qualities* (the "units"), then the mathematics with the numbers will not come out right. This is why physics teachers become very upset when their students leave the units out of their equations.

When you integrate the force equation, you get this, as we said:

$$F x = m v^2/2$$

which becomes in units (ignoring any numbers that may be attached to them):

$$\text{dyne cm} = \text{gm cm}^2/\text{sec}^2,$$

and substituting the equivalent units for "dynes" that we discovered above, we get:

$$\text{gm cm}^2/\text{sec}^2 = \text{gm cm}^2/\text{sec}^2,$$

where the square of the *cm* on the left side is due to the two *cm*'s multiplied together, one of which was "hidden" in the "dyne" equivalent. In any case, the substitution shows that the equation "balances" *qualitatively,* so to speak; and as long as the numbers that belong with these qualities also "balance," the equation describes the energies "out there" with their quantities.

Chapter 4

Fields

There is one particular type of energy which needs special discussion, since it has all sorts of implications for the world which we perceive. This peculiar energy is called a *field*.

A *field* is a form of energy which simultaneously possesses an infinity of quantities, any one of which defines some definite aspect of the field.

It is very hard to describe a field "as it is," so to speak, but in a kind of rough-and-ready way, what I am talking about would be something like the gravitational field around a body, where the actual gravitational attraction toward that body gets weaker (i.e. has a different quantity) the farther out you get—or the radiation field of light coming from a light bulb, where the light gets dimmer (has a different quantity) the farther you are from the bulb.

Once again, we are in a kind of double-quantity situation: there is a quantity that depends on the "fieldness" of the field itself (in ordinary terms, how far away you are from the center), and then there is the "total energy" in the field in comparison with other fields of the same type. If you take the gravitational field, for instance, then the "falling off" of the strength of the field is the same for both the earth and the sun (in both cases the strength lessens as the square of

the distance from the center of the object); but obviously, the actual effect the sun's field has on an object a million miles away from it is vastly different from the effect the much less massive earth has on an object a million miles away.

But let us ignore this difference in "total energy" for the moment, and concentrate on what is implied in the set of quantities that constitute the "fieldness" of the field. I said that at a given distance from the source, the field will have a given percentage of its total force, if it acts on something; implying, of course, that a given percentage of its total energy occurs at that distance from the source. And this in turn implies that the energy which is the field is "spread out" through the field in such a way that less and less of it is "there" farther and farther away from the "epicenter" of the field.

But this, as I said, is a kind of intuitive way of looking at the field, because it implies a sort of reality (space) into which the field "spreads." But if reality is *activity,* this space is one of those contradictions that is supposed to be "existing there" without doing anything; and so what is probably the case is that *fields constitute the reality of the space "in which" they are supposed to be, rather than the other way round*. After all, how would you know about space unless it *acted on* you? And how could it do that if it's just "sitting there"?

This is why contemporary physics has got itself into a number of conundrums: because it assumes that space (and its components, distance and position) are a "something" that can be measured, using rulers—without realizing that when you use a ruler you are using a system which has *internal* fields that establish the internal distances of the parts from each other; and so distance, far from being "primitive," turns out to be a very sophisticated combination of field-acts. And as Relativity and quantum physics have shown, you can't establish what the "real position" of something is "in space." What I am going to offer here is an interpretation of distance,

position, and space that can solve the problems.

What I am saying, then, is that we should take the *field* as the reality (because we know it is an act), and take it as a *reality that as a field has a set of quantities that correspond to the real numbers.* If you pick out one of these quantities, *this* is what *establishes* your distance from the source of the field. In other words, the quantity of energy in the field isn't *at* this distance from it; the distance—as real—*is nothing more than* the quantity of the field's energy as a field. The distance is a characteristic of the field (its quantity) rather than being a "something" the field is "in."

But let me get this a little closer to actual physics by defining the following:

The *potential* of a field is one of the quantities of its energy.

In physics, the potential is defined as the work it would take to move a unit probe (an object which has one unit of its ability to be affected by the field in question) from infinitely far away "to the point in question." Well, work is how you find out what energy you have; and this device is a way of stating how much energy is in the field "at this point."

Actually, of course, all you are doing is picking out a quantity of the field's energy, and *this* defines the "point" which is the field's potential. Now the potential deals with a *real* field, and so the potential of the sun's gravitational field will be greater than the potential of the earth's gravitational field "at the same point," in proportion to how much stronger the total gravitational energy of the sun is than the earth. In order to get the potential of the field *as a field,* you would have to have a "unit source" of energy as well as a "unit probe"; and then, of course the potential would *define* the "point in the field" (or rather, the sphere—or other

configuration—of identical quantity of energy).

This is a book of philosophy, not physics, and so it isn't my purpose to get into all the complications of this, even were I capable of it. Let me just note that the potentials of a magnetic field (which has a bipolar source) has a different configuration (a different shape) from that of, say, an electrical field. And, in fact, the internal fields inside objects have very complex configurations, as you can see from looking at the shape of a human body. What you are looking at is the way the internal fields "shape" the internal energy in such a way as to exclude other objects from the body.

Chapter 5

Distance, position, and space

Now then, the distance from one object to another is obviously a *relation* between the two objects. In our intuitive way of grasping things, it is something "between" the objects; but on the other hand, if all you are talking about is the distance between them, then obviously the distance is the *nothing* between two objects: it is a certain quantity of nothingness.

Aristotle noticed this, and therefore held that there can't be any empty space; because if there is nothing between two bodies, then obviously they are in contact—unless you want to say that there is *a* nothing between them, and a quantified nothing at that, which is absurd.

People laugh at Aristotle nowadays, because physicists talk about empty space as measurable; but of course, he was absolutely right. There can't be measurable nothingness between real objects. *This* sort of "real nothing" isn't like the "real nothing" that is the form of existence or the quantity itself, because forms and quantities are *limits*, implying something to be limited. But in the case of the "emptiness" between objects, there is supposedly nothing at all there—and not only that, but it has a quantity.

And in point of fact, we know that there *isn't* nothing between objects; their fields precisely are "spread out" through the whole of

"empty space," filling it with various quantities of *actual energy*. It's only if you assume that the fields "aren't real" that you wind up with space being "empty" and have the paradox of a measurable real nothing—not to mention the fact that material objects actually act on things that they have no sort of contact with at all.

Hence, the distance "between" objects is not in reality a nothing between them that gets measured, it is a *real relation* between them; and *as* a real relation, it is obviously *the action of one upon the other, or the interaction of the two of them*.

And since we know that two objects "at a distance" from one another have fields by which each actually acts on the other, then we have a reality which gives us *precisely the separation* of each from the other, depending on how strongly the field of each acts on the other.

Hence,

The *real distance* from one body to another is the force that that body's field is exerting on the other. This real distance takes into account the actual amount of total energy in the field and the ability to be affected by the other body, and so it is the actual force that is being exerted. So, the *real* gravitational distance from the sun to the earth is the *amount of the gravitational attraction the sun has on the earth*. The *real* distance from the earth to the sun is *much less* than from the sun to the earth, because (of course) the earth is "pulling" the sun with much less force than the sun is "pulling" the earth—and the "pulling" is the real distance.

While your mind is boggling with the fact that the real distance from A to B can be (and generally is) different from the real distance from B to A, let me further boggle it by observing that *a given object can have many fields; and each of these fields will establish a real distance to other objects, which may not be the same as the real distance of some other field*.

5: Distance, position, and space

That is, the real *gravitational* distance from the sun to the earth is one thing; the real *magnetic* distance is probably something else, because the sun's magnetic field doesn't have the same quantity as its gravitational field; and similarly, the sun's distance based on its radiation field of light will be different from either—and, of course, the distance from the earth to the sun in each of these cases will be different from the distance from the sun to the earth.

All of this can be made conceptually more manageable, however, if we make this abstraction:

The *abstract real distance* from one body to another is the *causality* (the force) one exerts on the other, assuming a "unit source" and a "unit affected object"; or it is the force of the field as a field.

In this case, of course, the abstract real gravitational distance from the sun to the earth would be the same as the abstract real distance from the earth to the sun, since the difference in "total strengths" of the fields is eliminated. It does not necessarily follow, however (if, for instance, different fields have different configurations), that the distance of one type of field will be the same as the distance with respect to some other type of field.

Einstein, in fact, was working on a "unified field theory," and died without being able to come up with one; and that probably is because different sorts of fields *establish* different distances; and so you can only talk about *the* distance between two objects if you assume that it is a distance *with respect to a certain abstract field*.

In other words, distance and position are even more relative than General Relativity supposes; what the distance *is* depends not only on what you pick as your source, but the *kind* of field you are talking about when finding the distance.

Notice that in *real* distance, the quantity is *greater* the *nearer* you

are to the source of the field, and less the farther you are away. That is to say, "more force" defines what "nearer" means in reality, and "less" what "far" means. And that makes sense; the farther you are away, the less the "influence." Precisely.

But because we are accustomed to measuring distance with rulers and not instruments for registering force, we think of the distance as greater the farther apart the objects are. But the ruler, as I said, is a set of internal fields with internal distances, and so it isn't giving you a true picture of what is *really* the "between" of two distant objects—which is what they are *doing* to each other.

The relation between real distance (in a gravitational field) and "ruler-distance" would be expressed by the following equation:

$$d = (-G\, m_1 m_2 / D)^{1/2},$$

where d is the "ruler-distance," $-G$ is the "gravitation constant," m_1 and m_2 the masses of the two bodies, and D the real abstract gravitational distance (the force). Of course, this is nothing but Newton's Law of Universal Gravitation solved for "r" and using "d" and "D" instead of "r" and "F." The point is that the "ruler-distance" is *not* what is "out there"; what is on the *right-hand* side of the equation is what is objective; the left-hand side is, if you will, one way that it is perceived.

Would descriptions of physical interactions be simpler if real distances were taken into account, and "ruler-distances" ignored? This theory would predict that they would be; but it takes a real wrench in a person's customary approach to physics to be able to deal with distances as forces and not to introduce rulers and coordinate systems surreptitiously.

Because of course, coordinate systems—which organize distances and positions in terms of ruler-distances—don't refer to anything at

all, as General Relativity shows so well. The only thing that's *real* about objects at a distance from each other is *how they interact*; the complications of the tensor calculus are ways of relating this interaction to the observer's coordinate system—and my philosophical prediction here is that you don't necessarily have to do this.

What I am saying is that if you know *the forces that objects are actually exerting on each other by their fields,* then, based on the quantities of these forces and the tendencies they have toward motion, you can discover the "force-configuration" of the bodies at the end of the process (or at a later stage in it), and from this derive their "ruler-distance" configuration if you want to. Given the fact that the total energy in a system is constant, then how this energy distributes itself within the system will depend on how it is being "traded off" by the various elements in the system (which "trading off" is precisely what the forces are). So you don't really need coordinate systems to know what is *really* going on in the system, provided you are willing to sacrifice what the activity *looks like* to an observer sitting somewhere with respect to it.

Obviously, you've got to make observations somehow, to learn what the initial instability of the system is. But what I am saying here is that you can translate (by something like the equation above) this observation into the internal energy-state of the system, after which you don't need to *observe* what is happening in it as it happens, insofar as the physics of the "happening" is known; and you can then check the results of your mathematical calculations of what happens by another observation at the end of the process. This is actually what physicists do now, except that it *seems* from things like the calculus that you are "observing" all throughout the change. But the definite integral, for instance, only gives you the results after definite limits are reached, and what happened "in between" is not really

known from the calculation itself.

But let us leave this sort of thing to any physicist who might be interested in verifying our theory of philosophy and take the next philosophical step: Since distance is a relation between two bodies, and we have defined real distance as being the relation called "causality"; and since we saw that this same relation can be looked on the other way as "being affected," it should follow that there is some kind of reverse distance-term that would refer to the relation looked at in this way. And, in fact, there is:

The *position* of a body is its being-affected by some other body's field.

That is, it is the same as the distance, only considered passively—which, when you think of it, is what you mean when you are talking about "where" something is, because you can only point out where it is in terms of its distance from something. What it means here is that it is the *tendency to do something in response to the field acting on it,* which shows up in equations as the "derivative," or the "tendency to change," while the distance shows up as the force of the field that is producing this tendency.

Note, by the way, that if the field does *not* produce some tendency to change, then as far as the body is concerned, *it is nowhere with respect to that field*; it is not "at a distance" from the source of the field at all—with respect to that particular field. Thus, glass, which is not acted on by light, is not at a radiation-distance from the source of the light, because as far as the light is concerned, the glass doesn't "know" that the light is there; it's as if, for it, the light didn't exist; and the light just passes *through* the glass as if *it weren't there*. Precisely. It *isn't* there for the light, if our definition of position is true.

So this apparently abstruse definition of position actually makes sense out of physical interactions. To be "somewhere," you must first of all be somewhere *with respect to some object* which has a field, as Einstein showed so well in both of his theories of Relativity. "Absolute position," or "position in absolute space" is meaningless; and this, on my theory (and Einstein's too, if you look at it) is because position involves an *interaction of objects*. But secondly—and here I go beyond Einstein, who was still concerned with "observation" and actually the radiation field of the light getting information to the observer—to be "somewhere" you must actually *be being acted on* by the field; and this means that we can be "somewhere" with respect, say, to the *gravitational* field of the sun, but nowhere with respect to the *light* field of the sun (as glass is).

And, of course, this also would imply that you can be in different positions at the same time with respect to the same body, if the body has different fields exerting different forces upon you.

There is no mystery in all of this if you consider position as being nothing but the *being acted on by a force,* which is the only reality it *could* have as a passive relation that is measurable; it only becomes esoteric and mysterious if you think of position *as we perceive it,* as "out there in my visual space"; but this, of course, is your *subjective impression* that is the *effect on your eyes* of the field-interactions of bodies, and is not a "copy" of the relation that is "out there" at all. That is, "position-as-you-perceive-it" is no more "like" real position than "red-as-you-perceive-it" is a copy of the electromagnetic radiation.

And that position-as-perceived is not the same as position-as-real is obvious in that two objects almost in the line of sight appear very close together, while if you were to change your viewpoint you would see that they were very far apart; objects closer to you appear farther apart *from each other* than the same objects seen from the

same angle if they are farther away from you—and so on. What's real is what they are *doing* to each other, not what they look like as "beside" each other.

Position, of course, as being-affected, will also have the same two sorts of definitions as distance:

Real position **is the actual tendency to change based on the actual force and the object's actual tendency to respond to the force.** ***Real abstract position*** **will be the tendency to change of "unit objects," abstracting from anything but the fields as such.**

I don't think I have to spend many words on this distinction; it is the same one as with distance.

But one of the interesting things is that this notion of what position *really* "points to out there" is the perfectly simple solution of a dilemma that quantum physics has got itself into recently: that a body can be "in two positions at the same time, but in only one of the positions that it's in," apparently depending on how you decide to observe it.

I am referring to what is called the "Aharonov-Bohm" experiment dealing with interference of light. A beam of light is split into two beams, each of which is then bounced back off a mirror back to the place where they are combined into one beam again. When they are combined, the two parts then "interfere" with each other, and the resulting pattern on a screen is a series of bright and dark stripes or circles. The actual pattern you get will depend on whether the paths after the split are the same length or not, and what the difference in length is.

Now it turns out that it is in principle possible (if not in practice, but analogous experiments can be done) to dim the light so much that a single photon (unit of light) is in the apparatus at a time; and

so if the interference pattern occurs after you've been running the experiment this way for a while, this has to mean that *each* photon split in two, and half of it went down each path.

But this sounds anomalous, because a photon is supposed to be a unit; and so if you put a detecting instrument on the path after the split (to see if you can detect half a photon because it will have half the energy), something interesting happens. First of all, what you detect is the *whole* photon in *one or the other of the paths* at any given time, but never in both; and secondly, the fact that you have introduced the detecting mechanism into the path interferes with what we can call the "dynamic length" of the path just enough to make it "vibrate," as it were, so that the interference pattern is messed up.

So what this means is that *if* you detect where the photon is, it is in only *one* of the two possible paths, *and* there is no interference pattern (which is consistent with the photons' being in one or other path at a time at random, but not both); but if you *don't* detect the photon (if you turn off your detecting apparatus), then you get the interference pattern, which is possible only if *each* photon went down *both* paths at once.

To complicate things, you could put another beam-splitter in the place of one of the mirrors and split the split beam, bringing the split parts back together into the path of the original split, and then the two together again at the target; and you could do this as many times as you want, so that it took five minutes, say, for the photon to make its complicated journey. And if in this case, three minutes after you started the apparatus, you changed your mind about the experiment (deciding to make it now a detecting experiment and not an interference one), you would get the same results as above; it would now not have an interference pattern, and the photon would be in only one of the paths it could be in. On the other hand, if you

turned off the detecting apparatus, you would get the interference pattern, which means that the photon went down all the paths and split itself four or eight or however many ways.

But what is fascinating about this is that *in principle you could make your decision long after the first "split" into separate beams, where the photon had to make* ***its*** *"decision" on whether to go down one path or both*. So the decision itself *after the fact* determines, apparently, *what the photon did in the past*.

No wonder physicists find this incomprehensible.

But, as I say, the answer is simple. What do you mean by "going down both paths"? That the photon "bounces off" the mirrors at the ends of the paths, or in other words *is affected by the surroundings of the paths*. But what happens when you *detect* the photon? You make it *act on* something in the paths, and give up energy to it. So in the one case, the photon is *reacting* to the surroundings, and in the other the photon is *acting on* them.

It may very well be that a single photon cannot *act on* anything without using *all* of its energy somehow, in which case, it can't act on the instruments in both paths, but only one of them. But it is quite possible that a photon can *be affected* by more than one thing.

And to put this in the perspective of position, what this means is that *the photon is in position with respect to the surroundings, but not all the surroundings can be in position with respect to the photon*.

That is, if you want to know where the photon *really* is during the experiment, it is in both paths, because they are doing something *to* it. On the other hand, if you want to know which path is *actually* in position with respect to the photon, then you have to make it *act on* something in the path; but that action it performs prevents it from being acted on in the same way as if it is not using up its energy in affecting the surroundings.

There was an actual analogous experiment by Mullinstedt using

electrons, in which he demonstrated that a solenoid *between* the two paths that the electron traveled *affected the interference pattern* when the interference pattern option was chosen—which, of course, means that the electron was not only in position with respect to the paths but with respect to what was between them too.

And this sort of thing is also consistent with what Einstein showed in the General Relativity Theory, that light *can be affected* by strong gravitational fields; but because light has no "rest mass," *it itself* cannot affect (gravitationally) other objects. Hence, light is in position with respect, say, to the sun; but the sun is *not* in position with respect to the light that is traveling by it.

As I say, there is no necessary reason for saying that if something can be affected *by* a field that it has to have a field by which it can affect the causer; and if being in position *means* being affected to some degree by a field, then it follows that A can be in position with respect to B, while B is not in position with respect to A.

So if you want, my theory of position predicts something like the Aharonov-Bohm experiment and Einstein's bending of (massless) light in the presence of very massive objects. And I know of no other theory that doesn't try to solve either of these peculiarities *physically*; the "solutions" seem always to involve rather silly excursions into the epistemology of how subjective observation is, and a confusion of the act of observing with what is observed.

Let me now say a word about the Aristotelian and Scholastic notion of position. Aristotle, of course, had no notion of fields; and with his idea that there is no such thing as empty space between objects, then it followed for him that everything between objects was filled with some continuous (fluid) body like air, water or "aether." He therefore defined the "place" or position of a body as "the surface of the body surrounding (and touching) it"; as, for instance, your place is the surface of the air that is in contact with your body.

5: Distance, position, and space

Unfortunately, we know now that, though space may be "filled" with fields, it almost certainly is not filled with any *body* (or, for one thing, there could be a meaning to the "absolute position" of something, which seems, because of Michelson and Morely's experiments with light, impossible). Hence, his definition (which wasn't very useful for purposes of measurement anyway) doesn't seem to be worth bothering with in the present age.

So it seems reasonable to say that the reality of position is a being affected (to a certain degree) by some field; in which case, we can make the following conclusion about God:

Conclusion 10: God is not in any position.

What? God is nowhere? No; to say that God is nowhere would be like saying glass is black because it is colorless. God is positionless, not "nowhere." But then isn't God everywhere? No. This would be like saying that glass is white because it's not no color and it's not some definite color, but is all colors; but glass is colorless, not white. Besides, if God were everywhere, this would mean that he is *affected* by everything's fields, and we saw that God can't be affected by anything at all.

Scholastic philosophers and Theologians say that God is "where" his effects are. But if that is the case, then you would have to say that *every* body that has a field is "everywhere," because its field *actually* has an effect (however small) throughout the whole universe. But it is silly to say that I am in my back yard where my dog is because my gravitational field is exerting a pull on my dog.

So this "active" notion of position (which would allow you to say that "God is everywhere") actually makes a mockery of what "being in a position" means, because then everything is everywhere.

Hence, God is *not* everywhere, not nowhere, not somewhere, not

here, not there, not up, not down, not in the sky, not in you, not in the earth. Position terms do not apply to God, any more than color-terms apply to glass. And just as to say that glass has no color (is colorless) does not mean that glass doesn't exist, similarly to say that God is positionless does not mean that God doesn't exist. He doesn't exist *anywhere*, that's all.[10]

But a while ago I brought up the idea of space. What is it?

Obviously, it is not "space-as-perceived": that "volume" in which we see things distributed. As a reality it is one of two things:

The space around an object* is its field.** This energy would establish a set of *potential* positions objects could be in with respect to that field. ***Space taken absolutely, however, is in reality simply **the sum of all positions.**

That is, space is simply the passive-component of the field-interactions of all bodies. Once you have counted all bodies and seen how they are affected by all other bodies, then you have the whole of any reality that could correspond to what our notion of "space" "points to."

It follows from this, of course, that space is *finite*—not surprisingly, if it is something measurable; but it also means that the objects that are farthest away from each other (whose field-force-interactions are weakest) are still at a *finite distance* from each other; and so space is also finite *in size*. Einstein, for other reasons, said also that space is finite in size (what he meant by space is the set of paths that things could move in—which are curved, and the largest circle defines the size of space in his sense).

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[10]And therefore, if this is right, Leibniz' notion that "everything that exists exists somewhere and somewhen" is false.

Furthermore, space can *increase* in size or extent, if the outermost objects move farther apart from each other. Both Blair and Einstein, then, hold that space can (and in fact does) expand. But then what does it expand into? Nothing. Of course. It doesn't expand *into* anything at all; what it seems to expand "into" is that imaginary "receptacle" which is the "real nothing" of space-as-we-perceive-it. Space doesn't expand into anything; it just expands. But what is outside it? There isn't anything outside it, because "to be outside it" would mean that there was a *position* "out there," which obviously would by definition be *inside* it if it is the sum of all positions.

Then where is space? It isn't anywhere; and, of course, it isn't nowhere either. You can't use a position-term referring to "where" the sum total of *all* positions "is." To ask where space is would be like asking how hot heat is (i.e. not how hot some definite *case* of heat is but what temperature heat *itself* has). Plato occasionally fell into traps like this.

Having defined position and space, we can also make the following definition:

The *place* of a body is its positions with respect to the other bodies around it.

That is, the "place" of something would be the total effect *all* the bodies are having on it at the moment; the "resultant being-affected" or tendency to change based on the combined field-forces of all of them.

Place is this combined field-force looked on passively. If you look at it actively (so that you get a "resultant force"), then you find something interesting:

The *angle* is the combined distances of many objects to a

given object.

The simplest case of an angle is the combined distances of two objects with respect to some object, or the "resultant force" that expressed what the two of them *together* are doing to it.

Once again, physics tends to look on this backwards, in terms of the observation. In physics, the "resultant force" is said to *depend* on (a) the force of each body, and (b) the angle between them. What I am saying is that this "resultant force" *establishes* the angle, because it is the only *reality* that the angle has; the other angle depends on your arbitrary coordinate system.

What I mean is something like this: a "straight angle" in which the two sources of the fields are on "opposite sides" of the affected body is the angle at which the resultant force is the minimum; a zero angle is the angle at which the combined forces are the maximum. In between, the resultant force defines angles between zero and the straight angle.

But in the real world, there isn't just the angle like those above, since there will be more than two objects acting on the one in question. Hence, the angle will actually be n-dimensional (like the "solid angle" in solid geometry, only with an n-dimensional geometry, which obviously can't be pictured).

Of course, since in the real world there are no coordinate systems, there are as many "dimensions" in the real world as there are interactions; and even in the physics of bodies-as-perceived, there aren't just three dimensions: to describe a moving particle, which can rotate as well as move, you need six dimensions even in "coordinate physics." So I am not going to say anything about dimensions.

Finally, this view of distance and position gives a conclusion which contradicts the so-called self-evident first principle of medieval philosophy that "action at a distance is impossible." In order to hold

this principle, you would either have to say that the object with the field is *in the place where* it is affecting the object apparently at a distance (which as I said earlier about God makes "being in a position" meaningless, because then everything is everywhere), or you have to deny that objects have effects through their fields on objects that are at a distance from them. It seems to me that the latter flies in the face of the evidence, and the former is nonsense; and so action at a distance is not only possible, it happens all the time.

But now it is time to pass on to the complex units that we call bodies.

5: Distance, position, and space

5: Distance, position, and space

Section 2
Bodies

5: Distance, position, and space

Chapter 1

"Substance and accident"

We have so far been dealing in metaphysics with the question of how one something (existence, or in the preceding section a form of existence) can be multiple; and we saw that the answer to how there can be many different instances of the same thing was that each of them was a limited case of whatever was limited.

We are now going to be asking the opposite question: How is it that something that is many realities can be really one something? What has not been clearly recognized in philosophy up to this point is that there are two senses to this question: (1) how it is that many *parts* can all exist together as a single whole, and (2) how it is that many *behaviors* can each be the behavior of a single object. It is not surprising that the two should be confused, because it isn't at first glance clear that there is a distinction between them (since a part as real has to be an *act* of some sort, and a behavior is also an act), and because in fact the second is a consequence of the first.

This is, of course, the "substance and accident" controversy, which has caused so much trouble philosophically throughout history. Because it is an effect, there have been any number of attempts to explain it away, some more successful than others; but even Kant, who did a pretty good (but unsuccessful) job, realized that we can't help thinking in terms of substances (bodies, things)

that perform various acts (accidents, behaviors).

I suppose you could say that Plato was the one who provoked the issue, by holding, in a sense, its opposite: that what we call the "behaviors" of something or its "properties" were in fact Aspects in their own right, existing (in a spiritual way) independently of the objects that "had" them. The objects were nothing but participants in the Aspects, or visible examples of them. A given object could participate, however, in many Aspects at the same time, which made us think (erroneously, for Plato) that the body was what was "really real" and that the Aspects were characteristics *of* it, and not the other way round.

It was Aristotle (holding the "erroneous" view) who gave us "substance and accident," though these two terms in the Greek really mean "reality and the accompaniment" of it; "substance" (what "stands under") was a bad Latin translation based on what Aristotle said in some places, that the reality was "underneath" the accompanying acts; but in other places he indicated that what was "underneath," really, was matter, and the reality should be considered the power to perform the accompaniments; that it was the primary act, and the accompaniments were secondary acts that followed from it and revealed it.

Aristotle was interested in the question of how something can be some given thing without actually doing what was implied at the moment: for instance, how a human being can be a seeing thing when he has his eyes closed or is asleep. He is a seeing thing because he has the *power* to see, even if he is not performing the *act* of seeing; and this power (in this case, the life of the human) is some kind of act that makes the body the kind of body it is (remember, for Aristotle, the act *is* the form).

Scholasticism developed this into calling the "substance" what "exists in itself and not in something else as a subject of inherence,"

and the "accident" as what "exists in something else as in a subject of inherence." The idea here was that the "accident" had a kind of existence, but it was (as we would say today) the existence *of* the "substance," as color, for instance, never exists except as the color *of* some body (which is what "really exists").

Descartes interpreted "exists in itself" as meaning "exists independently," and so to him a "substance" was something you had a clear and distinct idea of (i.e. you knew what it was and your knowledge of it didn't involve your knowledge of anything else—it was independently known). Every substance, however, was known through an attribute which defined it; thus mind was a substance clearly and distinctly known through the attribute of thought, and body was a substance clearly and distinctly known through the attribute of extension, which had nothing to do with thought, and vice versa—hence, mind and body were distinct substances.

Now this has very little to do, actually, with what Aristotle was driving at with his distinction between the reality of something and its accompaniments; because the terms of the problem shifted, with Descartes, from how we are to account for what causes our perceptions into what the *logical consequences are* of our *concept* of "independent." And the result was, not surprisingly, that "substance" now took on different senses, depending on how "independent" was interpreted.

Spinoza, for instance, interpreted "independent" as meaning "needing nothing else to exist"; in which case, there is only one substance, God, and everything else is either a (dependent) mode or an attribute of that one substance. Leibniz interpreted "independent" as "not being affected by anything," and so there were many substances (the "monads,") which were created (willed to exist, so to speak) by God, the Monad of monads, but which had actually no effect on each other (though they were picked out so that

they would "fit together" just as if they were acting on each other).

Also not surprisingly, this sort of thing was looked on as just a silly word-game by more down-to-earth philosophers, like Locke and Hume, who said that just because the *notion* "dependence" demands the "independent" this doesn't mean anything necessarily in the world we have experience of—and we certainly don't *see* "substances" walking around; we see collections of properties. So why bother with this invisible glue sticking them together? Why (to use Dewey's example) say that there is a "rose behind" the scent, the color, the texture, the shape, and so on? The rose *is*—and is nothing but—its scent, color, texture and all the rest. You lose nothing by this except some mystical, unchanging something-or-other that is supposed to be "behind" what we see.

(Incidentally, these empiricists thought of "substance" also as "what remains the same through a change," and thus produced another oversimplification of the sophisticated Scholastic position, and a straw man that it was easy to knock down. But we will see more of this particular effect in the next chapter; at the moment we are concerned with the effect that *at any given moment* it seems that we are confronted with multiple units.)

It was Kant who did most to discredit "substance," because he explained why we tend to *think* that there is a rose "behind" this set of characteristics (and there isn't just the set of characteristics that happen to be together). He asserted that when we organize the data of sensation into a perception, we necessarily have to organize it through time, putting one "dot" of sensation after another. But since the *sequence* of time is not important here (if you start with the scent and add the texture, you get the same perception as if you start with the texture and add the scent), the "time-through-which" you organize the sensations into a single perception shows up as a "something or other underneath" them, and gives us our inescapable

conviction that the various properties are characteristics of one substance, which appears as a kind of mysterious, unchanging, "basic reality" of which the sensations are characteristics.

For all these reasons, the notion now of "substance" is looked on as one of those pseudo-issues that come from formulating the problem in the wrong way. This is another bit of damage Descartes did by his superficial understanding of the philosophical tradition he repudiated.

But that something like "substance" has to be reinstated is clear from the fact that, against Hume and Dewey, it is impossible to explain, if there are only sets of properties, why *some* of these sets belong together, and the properties can't trade each other off into new "substances" at the will of the perceiver. That is, why can't you pull the color and the texture of the rose out of the vase and leave the shape still there? Why is it that if you lift the rose out, then *all* of the properties that seem to "belong to" it come out together, and *leave behind* that "set of properties" that you call the properties "of" the vase? And why, if you lift the vase up, can't you make the table come up along with it, by calling the vase-table just one substance—if all the vase is and all the table is are just a set of properties that don't "stick together" *in reality* in any way?

And this, of course, refutes Kant also. If *I* am the one who organizes the sensations into a single perception, then why *can't* I organize the vase and the table into a vase-table? The fact that the vase's properties are organized *only into this set* and this set *excludes* any other properties that don't belong to it indicates that it is not the "universal subjective organizer" (the "I think") that *separates* the various objects in my (single) visual field into different multiple units. The necessity to *exclude* the properties of the table from the properties unified into the vase *must* come from *outside* my mind, or my mind performs opposite tasks at once.

Chapter 2

Bodies

So the phenomenological grounds for saying that there is a real effect here are these: our perceptions at any one moment seem to be perceptions of *many distinct* objects, each of which is *both* many different acts *and* some kind of unification of these acts, such that a given set of acts "belongs to it" and not to other objects in my perception at that time.

And, as I was just saying, the problem can't be dissolved consistently, because (a) it is impossible to deny that in our experience there are these collections that "go around together," and (b) since these multiple units are only parts of the total experience at any given moment, then the (one) mind can't account for the *many* multiple units, or an identical cause would be the explanation of different effects.

Hence, there has to be some "glue" "out there" that explains why this set of acts "belongs together" as *only this set,* and that set of acts belongs together as only that set.

Let me now make a few definitions:

A *set* is any multiplicity that is experienced as or considered as a unit A *member* is one of the multiplicity that make up the set.

Sets, then, can be "units" that are recognized to have no real unification about them, and are simply *considered* as units because we

choose to lump all the objects together. Thus, we recognize that there is no *real* unity in the set of all red objects just because each of them happens to be red; if you paint one of them green, this makes no objective, real difference to any of the others, and the only thing it does to the set is make it one member less than it was.

Of course, sets can also be real units; the human body, for instance, can be thought of as a set of cells or a set of organs. "Set" is the largest class of multiple units: it includes within it both those multiple units that have no real unification and the units that are somehow objectively one as well as being objectively many.

The next smallest category is the *system*.

A *system* is a multiplicity that acts in some way as a unit. An *element* is one of the multiplicity that makes up a system.

So a system is a set in which there is a *real* unity of some sort (since it *acts* as a unit as well—obviously—as acting as a multiplicity). Thus, the solar system is not just a set of heavenly bodies; there is the gravitational interaction among the sun and its planets that makes the whole system go through space together, and which is such that moving the earth to a different orbit would disturb the orbits of all the other planets to some degree. Hence, the bodies in the solar system have a *real effect* on each other, or a real interaction with each other; and this makes them behave, to some extent, as a unit.

Clearly, then, the difference between a mere set and a system is *some kind of unifying activity*. This would have to be the case, or the unity could not be something real. The fallacy in the views of Hume, Kant, and Dewey can be seen in the fact that logically speaking they could talk about nothing but sets, and it would be impossible to distinguish something like the solar system from the set of left-handed people, whose "unity" is just a fact about each of them.

In many systems, the unifying activity is even observable and measurable. We can, for instance, measure the gravitational attraction of the sun for the earth, and can pretty well "map out" the gravitational field of the sun and the place that the planets have in this field.

It seems reasonable to say that any field establishes a system as soon as it acts on any other object. But of course there are other acts besides fields that make systems out of objects. A society is a system of human beings who are unified (i.e. interact with each other and behave together) by the laws or the expectations of the group as such: the constitution of the society, whether this is written or not, is the unifying activity of the society. Even something like a family or a car pool has a set of expectations for the members and it is this that makes it a what the sociologists call a "group" and not a haphazard gathering. (Note, however, that in a society, the individuals are called "members" rather than "elements" to stress that in *this* system the individuals are what is important and what the system is really "for"). That the constitution is something *active* is clear from the fact that when the laws are not enforced (i.e. made to affect the behavior of the members), the society falls apart.

But, of course, there are systems and systems. Some are so loosely knit that they might as well be sets, like the people that happen to be traveling together on an airplane, where the only "interaction" they have with each other is the common courtesy any person owes another; they are not "working together" in any real sense to get to a "common goal." Other systems, however, are so tightly unified that to think of them as a plurality of interacting objects is ludicrous: an animal, for instance. If you kick a dog in the hind quarters, you find its teeth in your leg, not because there is a "linkage" between the two, but because the *dog* has been attacked, and the *dog* responds.

2: Bodies

A *body* is a system whose unity predominates over its multiplicity. A *part* is one of the multiplicity in the body.

It should be clear from the definitions of system and body that a body is a special case of a system; but while there is a clear difference between a mere set and a system (because the set has no unifying activity and the system does), there is no obvious dividing line between a mere system and a body.

One could argue, for example, that a desk is a body, because all the pieces of wood that make it up are screwed and glued together, and it "goes around" as a unit. But on the other hand, the pieces of wood themselves are not really different in any significant way by being attached to the other pieces. The same could be said, actually, for the different molecules that make up a given piece of wood. If you break it apart, then what was attached is no longer attached, that is all; but the molecules themselves are still what they were.

On the other hand, if you "break" a *single* molecule of wood, you don't have wood at all any more, but carbon, hydrogen, and oxygen, which have entirely different properties from wood. So something in the way these atoms are "attached together" makes the system *behave in an entirely different way* from the mere sum of the parts, as in a board of wood.

Hence, it would seem obvious that if there is to be a dividing line between a system and a body, then the molecule is definitely on the "body" side of the line. And this can give us a criterion for distinguishing bodies from mere systems:

Conclusion 1: A system is a body if its behavior as a unit is significantly different from the behavior of its parts.

But why call a tightly knit system a "body" and not something

like a "thing"? The reason for this, as we will see, is that a body is something material, not spiritual, and it seems that spiritual things cannot have *parts* in the sense that a system or body would have.

That is, in order for something to be a system or a body, each of whatever is "multiple" about it (the element or the part) has to be *distinct* from the others and *connected* to them by some activity. But spiritual acts, since they have no quantity, do not have this distinctness and separation. We saw that consciousness, while in some sense it is not the same as being-conscious-of-being-conscious, it still contains that "other" act within it while *it* is contained within the "other" one, so that the "two" of them are as much one as two. This is not a system of two interconnected acts, since each *is* in reality the other one.

Hence, it would seem that in order for there to be the distinctness which would make for a *real* multiplicity as well as a real unification, there has to be limitation on the level of quantity.

And if this is true, then we can say the following:

Conclusion 2: God is not a system nor a body.

If God is a multiple unit in any sense, he is a multiple unit in the sense that each "part" *is* the whole or contains the whole (and every other "part") within it, while it is contained within the whole and within every other "part," so that what is many is in reality one and the same thing[11].

[11]Thus, when Jesus said, "The Father and I are one and the same thing" in John's Report of the Good News, he explained this a few paragraphs later in saying, "believe the deeds, so that you will recognize and know that I am in the Father and the Father is in me." If what we said above is true, this is a description of Jesus and the Father as spiritual. Of course, Jesus, as having "emptied himself" into acting in a quantified way (i.e. having restricted his infinite activity down to not doing more than human

But getting back to bodies, just as there may be disputes about whether a given object is a body or a system, there is also no clear-cut way of saying what a *part* of a body is. Are the parts of the human body, for instance, the various "systems" within it, like the circulatory system, the digestive system, the nervous system, or are they the organs that make up these systems, or the cells, or the molecules in the cells, or the atoms, or the subatomic particles, or what?

The answer, I think, lies in what you want to focus on in considering the body as a multiple unit. Any body big enough to be observable with the naked eye actually has many subunits within it (at the very least, atoms), each of which could be considered a kind of body in its own right, except for the fact that it is unified into the larger unit, which is what "really acts" as a unit.

The ultimate parts, I suppose, would be the single acts (like electricity, magnetism, the "strong force," and so on) which are unified into the various subatomic "particles," when then are unified

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activity—as is conceivable, since what can do more can do less simply by *not* doing all it can) is also a body and a real multiplicity really unified. In *that* sense "the Father is greater than I am."

The reason I am putting this sort of thing here in a work of philosophy is that, though the evidence for Jesus' being God is not philosophical (it is the evidence that the New Testament tells what really happened, and the evidence in it that Jesus' statements and behavior are only explainable if he is in fact God), the obviously it has to be possible for God to be a human being, and any philosophical theory would have to leave this possibility open.

Not, I hasten to add, that it is the job of philosophy to leave open the possibility of the truth of Christian revelation; it must be true to itself absolutely and not "fudge the facts"; but there is certainly nothing wrong with pointing out that philosophy, honestly pursued, *does in fact* show how Jesus' claims could be true—and I think illuminates them, while they in turn illuminate some of the darker areas of philosophical investigation.

by their interactions with each other into the atoms, which interact to form the units that are molecules, which then (in living bodies) are unified into cells, and then organs, and then systems of organs, and then finally the body, the whole.

But if what you are talking about is a *body* and not a mere system—something like a dog, for instance—then the *unifying activity*[12] *of the whole permeates, predominates over, and governs all of these subunits,* because in fact the body "behaves" more as a unit than as an interconnected multiplicity. Hence, which of the subunits is to be taken as "what is unified" by the unifying activity of the whole is arbitrary—and so depends on the convenience of the investigator.

That is, it may be, for some purposes, that it would be better to consider a dog to be a unified multiplicity of cells; but for some other purpose it might be better to consider it as a unified multiplicity of organs; or if you want to consider the dog as analogous to other physical bodies, then it would be more reasonable to look on it as a unified multiplicity of molecules or atoms, and so on. Any of these is a valid way of looking at the dog, since they are all unified by the *primary* interaction, which is whatever makes the dog as a whole act primarily as a unit.

And this is particularly evident in living things like dogs, because the initial cell, once it is "activated" by fertilization, actually *builds* the other cells with their differences and constructs them into organs and systems of organs which are distributed throughout the body in

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[12]This term "unifying activity" and later "unifying energy" (because it always *is* a form of energy, is what replaces the Scholastic "substantial form." In one sense, the two are not exactly equivalent, since as *energy,* it also is limited quantitatively, and the particular quantitative limitation of the unifying energy is what Aristotle (and especially St. Thomas) were referring to as "matter," as we will see later. Of course, *as* energy, it always "has" a form; as we will see just below, it is the different forms of the unifying activity which define the different kinds of bodies, not the parts that make them up.

such a way that they are all "functional": that is, they exist and act *for* the body as a whole first and foremost, and themselves secondarily. In fact, if they start acting to the detriment of the body, as in cancer, the body as a whole produces acts (from other parts) that destroy them and keep the body as a whole intact.[13]

Let us look at this unifying activity a bit. First of all, it would seem that what the unifying activity is is the *interaction* of the parts: what they are doing to each other to "hold together" so that the whole thing behaves primarily as a unit. This would mean that, from the point of view of one part, the body is a system, and the unifying activity is a kind of "behavior" of that part (a sort of property of it) by which it acts on the other parts and is acted on by them. From the point of view of the part, in other words, the unifying energy appears as a kind of set of forces interconnecting it with the other parts.

The reason for saying that the unifying activity is an interaction of the parts comes first from what we know of systems that are not things, like the solar system, where what unifies the elements is their interaction with each other; and secondly from the fact that the unifying activity has to permeate the parts so that it also is involved in the unification of the subunits of the parts themselves to some extent—which implies that it enters into the makeup of the parts themselves instead of being something that glues them together and is externally imposed on each of them.

Thus, if you mix hydrogen and oxygen, what you have is first of all a system: a gaseous mixture of hydrogen and oxygen, with each molecule of hydrogen and oxygen connected gravitationally with the others. But if you pass a spark through the mixture, then you get

[13]It can't always in practice achieve this, of course, as we can see from the cancers that eventually kill the body, making it no longer behave as a unity—and in the process kill themselves, since *they* can exist only as (recalcitrant) parts of the body.

water, which is liquid at room temperature and has behaviors that belong to the compound as a whole.

But the hydrogen and the oxygen, in forming the compound, *give up* some of their energy (which is released in the heat of the explosion); and this shows that neither the hydrogen nor the oxygen *behaves as it did* when it was hydrogen or oxygen; each atom *loses some of its identity,* and "shares" its electrons somehow with the other atoms in the compound, so that there is a new kind of energy-field in the whole compound in certain places of which we find elements of what used to be the hydrogen (its nucleus, for instance) and the oxygen.

It is this new "shape of the internal space": this internal field, which can be considered as a "trading" of energy between the parts, that is the unifying activity that makes the compound now a water molecule and not a mixture of hydrogen and oxygen. But this "internal space" is *all through* the molecule, the chemists insist, and is not something that just connects the atoms, as if it were a kind of string tying them together; it has *borrowed* from them in such a way that as parts they are not what they were when they were not parts. Since, for example, the electrons now "orbit" the entire molecule, then if you break the molecule up again into hydrogen and oxygen, you won't necessarily get *the same* atoms that went into the molecule. Each will have the right number of electrons, but they won't necessarily be the electrons that it had originally. Forming a molecule and breaking it up again is like cashing in four quarters for a dollar and then cashing in the dollar for four quarters; you get four quarters back, but not the same ones.

I stress this, because it is all too easy to see a body as a mere system of bodies that are "held together" by forces, and to think that what it "really is" is the parts that it is made up of, and the interaction is external to the parts and is simply imposed on them.

But if what you are talking about is a *body* and not a system, this interaction, not the parts, is what is *primary* about the body.

And this again can be seen from living bodies, where the parts wear out and are replaced with other parts of the same type, and the body continues to be the same body. We all completely renew our skin, they say, every seven years; but the new molecules we have that make up the new skin cells make very little difference to the body as a whole; the body remains one and the same, even if the parts come and go.

This is not quite true, however, and it is another effect which we will consider in the next chapter; because different parts (for example, more of them) will necessarily have to enter into the interaction, and so the interaction itself will have to be *somehow* different. But for now, what I am getting at is that it isn't the *parts* that define what body you are talking about, it is *how the parts are behaving together as a unit*.

Let me emphasize this and say why it needs emphasizing: ***The "material fallacy"* is the fallacy of considering the parts (the material) as what is primarily the body; what makes the body what it is is its unification, not the parts or what it is "made of."**

The reason this fallacy is so widespread is that physics, which is supposed to be "the science of all sciences" looks on bodies as *systems* of interconnected parts; and therefore from its point of view, what is primary is the parts—which have various forces interconnecting them. Thus, physics considers chemical molecules "nothing but" a certain configuration in space of atoms, which are configurations of subatomic particles; and the impression given is that the configuration is some kind of accidental way in which the elements happen to be arranged.

But of course, from that point of view, the chemical bond (which establishes the internal space of the molecule) is secondary to the

subatomic particles, which are what the molecule "really is," and so a water molecule is not really all that different from a mixture of hydrogen and oxygen, except that the forces are rearranged and stronger than before.

But this ignores the fact that the molecule is *completely different* from its component parts, and they themselves are enormously different from what they would be if they weren't parts of it.

And in fact, the material fallacy is self-destructive, because the subatomic particles are only "configurations" of the "basic forces" (energies): electricity, magnetism, etc. But in that case, what a body is "made of" is energy. The assumption in the material fallacy is that if you can get these energies *out* of a body or system by breaking it up, then these are the only forms of energy there "really are." But of course, that is absurd. Energy can be transformed into different forms; and when electricity and magnetism get transformed into an electron and a positron, for instance, we get a *new form* of energy, the *mass,* which is not "just a configuration" of electricity and magnetism.

Similarly, the binding energy of an atom is a *new form* of energy (its internal field), with which electricity has a great deal to do, but which it is not the same as (since an electrical field extends outward through the universe, and the internal field in an atom precisely stops and is "tied up" in the protons and electrons). It is a *falsification* to look at the internal field of an atom as "merely a configuration" of the force connecting the subatomic particles.

I hasten to say that it is a falsification to consider it *merely* in this way. It *is*, of course (among other things) a configuration of the interactions of the parts of the body. But when you are talking about the internal field of an *atom,* it *controls* the whole thing in a sense entirely different from the sense in which the gravitational field of the solar system "controls" the behavior of the sun and the planets.

2: Bodies

So there is nothing *wrong* with physics taking the point of view of considering bodies as systems, because they *are* systems. What is wrong is considering this point of view as the "real" or even "more true" point of view. In the case of a body, it is a *secondary* point of view, no matter how true it is; and the *real* energy defining the body is the *unifying energy*; it is not the "component energies" at all, because these component energies are *subordinate to and controlled by* the unifying energy.

But of course, if the unifying energy *is* the interaction of the parts, then we can draw the following conclusion:

Conclusion 3: A body acts as a whole in and through its parts.

That is, it is bound to be simultaneously true that when the *body* does something, some *part or parts* does something; the body can't do anything "by itself," without having some "mechanism," some part, do the act. The reason for this is that the body is (a) the parts, and (b) the interaction of the parts. But since the interaction *is* the act of the parts connecting each other into the dynamic unit, then obviously, if the body acts, then it is a part acting *as* interconnected with the other parts.

Thus, when I open my eyes and see something, *I* see, but *my eyes and brain* do the seeing. But they don't see "by themselves," because the seeing is affected by the state my whole body is in, to such an extent that if I am concentrating deeply, the information can be getting into my eyes and brain, but no consciousness occurs, and so on. My unifying activity cannot see "by itself" either, however; it can only see if it has eyes that are intact in their functioning.

Similarly, when I get a virus, which cheats my cells into becoming factories for manufacturing virus particles, my body fights this virus *by making antibodies* which attack it; the unifying activity can't

destroy the virus just by itself. Or if I receive a transplanted heart, my unifying activity "recognizes" the heart as not a part of my body by means of certain "detector cells" and then the interacting parts by their interaction create cells that attack the foreign object to destroy it. Fortunately, since I need some kind of pump for my blood, I can block this self-defeating rejection by destroying the parts that do the job of rejecting.

This intimate relationship between the parts and the unification shows that Plato's notion that the "soul" or what makes the living body a unit is not a "something" that gets into the body the way a pilot sits in a ship, directing it; the unifying activity is *the way the parts themselves are behaving as together*. So here we have no Cartesian "ghost in a machine" the "ghost" comes from the parts and is the way the parts behave together; it is just that, in a body, this interactive behavior is what is *primary* about the body, and more "important" than what the parts are doing "for themselves."

Now then, since there are different *kinds* of bodies, and especially different kinds of bodies that have the same parts (and even the same number of the same kinds of parts), we can draw our next conclusion:

Conclusion 4: The form of the unifying activity defines the kind of body.

Thus, there are different kinds of sugars, sucrose, dextrose, fructose, and so on, all of which are made up of six atoms of carbon, six atoms of oxygen, and twelve atoms of hydrogen ($C_6H_{12}O_6$); but they behave differently because of the way these atoms are "configured": that is, because of the *way* they are interacting or the shape of their internal fields.

But there isn't actually all that much difference among sugars; but

when you get to dogs, cats, and other mammals, you can see the vast differences which depend, not on the parts, but upon the way the parts are interacting. If you take a dog and a cat, say, that weigh the same, you will find that the number of molecules in each body is for practical purposes the same, and the proportion of each element (carbon, hydrogen, nitrogen, oxygen, phosphorus, etc.) is the same in each case. The difference does *not* come from what the dog and cat are made *of*, but from how these parts are *arranged* to form the body. Remember, the initial cell *builds* the whole body and distributes the elements into the organs, which this whole *as* unified in this way needs in order *to behave as a whole* in the particular way it behaves: as a dog in one case and a cat in the other.

And, as I said, the parts keep getting sloughed off and replaced with other parts of the same type; and the body, even if it becomes different in some sense, doesn't become a different *kind* of body. And the reason for this is—and has to be, if you think about it—that the *kind* of interaction among the parts *remains the same kind* of interaction throughout (even though it may differ, for instance, in degree at various stages of the animal's development).

Hence, the conclusion above is valid: what makes a body a given kind of body is the *type* of interaction among its parts, or the form of the unifying activity, not the parts themselves[14].

It would follow from this that as long as the parts are interacting in a given *way,* the body is the kind of body in question, whether it *looks* superficially like other bodies of the same type or not. Because, for instance, Black human beings can unite sexually with White humans and produce offspring that are also fertile, and, so to speak, neither black nor white, we can argue that Blacks and Whites have *basically the same kind of unifying activity,* and so are the same kind

[14]And here is where the unifying energy and "substantial form" coincide.

of body—even though skin color, hair texture, and various other characteristics are different.

Similarly, a young child is one and the same thing as the adult he turns into, even though he increases his energy-level as a whole, and even acquires new acts (like sexual potency) in the process, and even though as a child he looks quite different from the way he will look as an adult. But there doesn't seem to be enough of a change at puberty so that it is reasonable to say that he has turned into a different *kind* of thing.

On the other hand, a caterpillar seems to be organized in a *quite different way* from the same body when it is a butterfly. And, in fact, there is no gradual development of the caterpillar into the butterfly; it grows first of all into a larger and larger caterpillar; and then at some stage something triggers a mechanism by which the body completely rebuilds itself, with new organs and a new metabolism and so on. Hence, even though the caterpillar-butterfly is, through its life, one and the same (individual) body, it is *two different kinds of bodies* in the larval and adult stages; the parts are interacting in different *ways*.

This, actually, can lead to a solution to the abortion question, which turns on whether the embryo and fetus are actually human beings or (a) parts of the mother or (b) in a prehuman condition, the way a caterpillar is a different kind of thing from the butterfly it will be.

If the embryo or fetus were a *part* of the mother, then it would be subsumed into the whole body and be acting *for* the body as a whole. But from the very beginning, embryos make their host organism sick; and the developing embryo and fetus will take chemicals from the mother (calcium, for instance) that she needs and develop at her expense if she doesn't ingest enough calcium for both. It is also now known that the mother's body tends to reject the

embryo at the beginning, and that this parasite creates mechanisms to block the mother's rejection. Hence, there is all kinds of evidence for saying that the embryo or fetus is a *foreign parasite or at best a symbiote, and not a part of the mother's body at all.*

If the embryo or fetus were in a pre-human state, then it would have a different *kind* of unifying activity, which would adapt it (presumably) to its life inside the uterus; and at birth there would be a metamorphosis analogous to that of the metamorphosis of the caterpillar into the butterfly.

But the organs the embryo develops from the very beginning (the eye, for instance, which is one of the very first organs visible) make no sense for its life inside the uterus, but only for its life outside. The only organ that adapts it to its life in the uterus is the umbilical cord, which, of course, is sloughed off at birth; but all the rest are the same organs that the baby has, and are adapted for the baby's life, and in fact are an encumbrance in the uterus as the fetus grows—as any woman who gets a kick from her fetus can testify.

But since it is the parts *as interacting* that build the organs, then it is obvious that the *way* the parts are interacting determines what the parts are to be, since the organs are built for the behavior of the body as a whole. But since the organs that are built by the embryo and fetus are the same organs with the same functions as the adult human being, it follows that *the way the embryo is organized is from the very beginning the same form of unifying energy as the adult human.*

Therefore, from the time of fertilization of the human ovum (when its organization as an ovum is disrupted and it starts developing toward adulthood), the body is *a human being.*

Either that, or there is no real difference between dogs and cats and it's merely a matter of "personal choice" whether dogs are the same as cats or not, and there's nothing objective about it. Dogs are

different from cats, not because of what they are made of, but because of the form of their unifying activity, which we can argue to from the basic shape of the body and the functions of the various organs. But if that is the case, then you must, by the reasoning above, conclude that fetuses are not "fetuses," but human beings.

Because, however, there is a controversy about whether fetuses are human (as there used to be about whether Blacks or Jews are human), we can draw the following conclusion:

Conclusion 5: The unifying activity of a body is not observable from outside it.

And this would have to be the case. The unifying activity is simply the interaction of the parts which makes the body *one* body. It follows from this that if the unifying activity were to be "observable" (and so *act on* the observer), it would have to integrate the observer into the body, making him a part of it.

And, as I mentioned when discussing the transplanted heart, what the body as unified actually does is *exclude* what does not belong to it (what isn't a part of it) from the body; hence, the unifying activity not only *unifies* the body, it *separates* it from other bodies.

This, of course, occurs also in the inanimate realm, and it is why you can't put your hand through the table when you lean on it. It is not that the wood of the table is *continuous,* but that the internal field of the wood (the unifying activity) is such that it does not allow your hand (which has its own internal field, of course) to "get in the spaces between the atoms" and so pass through the wood.

Of course, wood is porous, and so there are some bodies that can go through the wood without disrupting its organization; so this exclusion is not absolute. And obviously pregnant women show, some bodies can have totally different bodies inside them. And this,

of course, is also true when we harbor parasites like tapeworms inside our bodies. The point, however, is that these "inside" bodies are still really excluded from the body as such; they just happen to occupy part of the place that the larger body occupies, and its interaction occurs "around" them, as it were, as if it were a doughnut and they were in the hole.

To take the next step, since there are many instances of the same kind of body, and since the kind of body is defined by the kind of unifying activity, are the many individual bodies simply the fact that there are many cases of parts unified in exactly the same way, or do the unifications differ in each case? That is, is the unifying activity a kind of spiritual act—a pure form of activity holding the parts together—or does it itself have a quantity?

The answer, it seems, is clear if we consider living bodies, which grow. Provided we don't have the case of a metamorphosis, like a caterpillar into a butterfly, we have every reason to believe that the growing organism has the same *kind* of unifying activity throughout; but the body *as a whole* has different behaviors and different degrees of behavior through its life, so that at the beginning it can do much less and many fewer acts than it can do later.

But if the acts depend (as it seems they would have to) not only on the parts (which are there from the beginning) but on their interaction, then it would seem that the interaction itself has to be different later from what it was before. But since it is the same *kind* of interaction, then there must be a *difference within the same kind of interaction*, and this sort of thing is the definition of quantity.

Furthermore, even in inanimate bodies, different bodies seem to have different "powers" as a whole, even if they have the same parts. There are atoms, for instance, which have received extra energy and are moving around faster than other atoms that have the same parts. And, in fact, the color of a body is explained in physics by the fact

that the body absorbs energy, which "knocks the electron from its ground-state shell" into a high energy state which is unstable, and then it "falls back" into its ground state. Now this "state" has to do with its *interaction* with the nucleus, or its position in the internal field of the body; and this interaction is, of course, the unifying activity of the body. Hence, the interaction must be susceptible of degrees while remaining basically the same kind of interaction, which means that it has a quantity.

Of course, it stands to reason that the interaction of the parts of a body is a form of energy; but since it isn't directly observable from outside, we have to have *observable evidence* that would settle the question of whether the body is unified by a spiritual act or whether the act is a form of energy, with a quantity.

But it seems that the evidence above settles it, and so we can draw this conclusion:

Conclusion 6:The unifying activity of a body is a form of energy (with a quantity).

There are a couple of peculiarities here to be noted. First of all, even though it is a form of energy and is *in principle* measurable, *it will not in practice be able to be measured,* because of Conclusion 5 above: that it is not observable from outside.

That is, you couldn't get a measuring instrument inside the body to measure it, because the instrument would not be a *part* of the body, and so would not be interacting with the other parts, in which case, how could it measure the interaction? At best, even if you could get the instrument inside, it would be "inside" in the sense that the fetus is inside the mother or the air is inside the hole in the doughnut; it wouldn't be "inside" in the sense that a part is inside (integrated into) the body.

This is not, however, to say that you can't make a stab at measuring the unifying energy *in*directly, since it *is* energy and has a quantity. For instance, you can note the difference in *total* energy of the parts as not integrated into the body and the total energy of the body, and the difference will obviously have something to do with the unifying energy.

But this is by no means a simple indicator, as is shown by the fact that the total energy in a water molecule is *considerably less* than the total energy of two atoms of hydrogen + one atom of oxygen taken separately. You "add" them together into a body and the result is less (and the excess, of course, is given off as heat).

But how can that be? Simply that the atoms *lose their reality as atoms* when they are in the molecule; it is *not* a system of interconnected atoms. And, of course, if they lose their identity as atoms, then each of them *as* a part doesn't need all the energy it needed to be a *body* in its own right; and so it doesn't just "connect itself" to the other atoms with its field, but "gives up" all the energy it doesn't need—some of it to the construction of the new internal field, and the rest just dumped into the surroundings.

So how much energy is given up to the internal field *itself* is not obvious from the difference in total energies, because we don't know how much energy is lost out of each component when it alters itself from being a body to being a part of a different body.

This, of course, is another indication that the material fallacy is a fallacy.

While I am on this subject, would it be possible for a spiritual act to unite a body? There does not seem to be anything that would prevent it; and, in fact, in the next part of this book, when we deal with conscious life, we will find that the only reasonable explanation for a body's being able to perform a conscious act (which is in some sense spiritual as "doing itself over again" more than once while

being only one act) is that it is organized in a way that is spiritual, but which in one of its "reduplications" of itself it restricts itself quantitatively, uniting the parts of the body. This is not a contradiction, since what can do more can do less, presumably; and so a spiritual act can "empty itself" to doing no more than a certain amount[15].

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[15]What about the question implied in "This is my body," which Jesus said at the Last Supper? Could the piece of bread be "transubstantiated" into what actually *is* his body? Presumably it could, if what we are saying is true, but not in the same sense as traditional Thomism has it: that the "substance" is Jesus, but the "appearances" are those of the bread. The appearances are the *behaviors* of the bread, and what this view seems to be saying is that Jesus "behaves like" bread (e.g. radiates out light from a certain area of space, interacts gravitationally with the surroundings, etc.) just. as if he were bread—which of course he could do if he is divine; but there's no bread there at all.

That's a possibility. But what the discussion above suggests is another one: Jesus *takes over the act of unifying the parts that make up the bread*. And since the unifying act is what defines the body as such, then the atoms and so on are not interacting *as* bread, because Jesus himself has replaced this interaction by copying it. But that means that the wafer *is in fact Jesus,* just as the water molecule is water, not hydrogen and oxygen. In this view, the parts would be there, but the *whole* is Jesus, and therefore the name of this body is Jesus, not "bread." But of course, since Jesus is imitating the *way* in which the parts are unified, then the *behavior* of this body would be that of bread and not a human being.

And, of course, insofar as the different wafers are in different places (i.e. acted on differently by different surroundings), then the bodies which are Jesus would be in different places. But since it is one and the same Jesus who is integrating *each* of these wafers as his body, then each is his body and all are his body; and his body is in different places simultaneously. And, for instance, if you break one wafer, then each of the two fragments is also unified by Jesus, and so each is now his body.

On this view, the wafer would cease to be his body when the parts were no longer capable of supporting the "bread" type of interaction, as, for example, when the digestive process breaks up the bread. Then what were parts now become bodies or component parts of other bodies, just as the parts of bread would.

It seems to me that this description would make it "truer" that the wafer is the body of Jesus, because there is a real body there, and not a Jesus hiding behind

Chapter 3

"Matter"

I think the discussion I am about to engage in deserves a chapter to itself, even though I don't intend to use in my philosophical system the term that is its title (which is why it is in quotes). In past writings, I have defined the quantity of the unifying energy as "matter," and have been at pains to distinguish it from the material (the parts) that make up the body; but it only causes confusion and is not necessary; and so I finally decided that "matter," is a term that should be dropped from my philosophical vocabulary.

Let me give some of the history of the term, and show why it seems to "point to" the quantity of the unifying energy more than anything else.

Aristotle was the first to use it, meaning by it the "stuff" or "material" that bodies were "made of," which he called "potentially" the body in question. Thus, a wooden statue *is* (is active as) a statue and is "of" wood; so it is wood that is acting as Hermes, say. A human being is flesh and bones and so on active as human; and so on. So the wood is the "matter" of the statue and the flesh and

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appearances. .

This is not to say, of course, that this theory *establishes* the truth of the "transubstantiation"; it is just that, if you believe it (on other grounds), then you are not necessarily believing in an absurdity.

bones the "matter" of the human. But of course wood "is" in some sense wood, and what *it* is made of is (according to Aristotle) some mixture of earth, air, fire, and water; and earth itself "is" something, and so it is made of—what? When you are back this far, the "matter" has no name or no form, and so the "ultimate matter" (which the Scholastics called "prime matter") is just "pure potency."

For Aristotle, the form limited the matter to being a "this," because it made it *act as* "this kind of body." Later Scholastics clarified things somewhat in distinguishing the "substantial form" from an "accidental form," so that the "statue" was not a kind of *body,* but only an (accidental) *shape* of wood; and the wood, in this case would be the "kind of body," meaning that the elements (earth, air, etc.) were the "proximate matter," and these were forms in some sense of "prime matter."

But with Plotinus, the form didn't limit the matter, the matter limited the form or Aspect; and so the "potency" meant what "received" the Form; but this still made it the form of the matter.

One of the things we must be aware of in all this is that the ancients thought of bodies as continuous, not as discrete parts separated in space and interacting at a distance from each other with internal fields. Wood, for instance, didn't have a lump of earth connected to two lumps of air and one of water; it was more like a mixture, as when you mix red paint and green paint and get brown paint all the way through. That is, earth and air and water, when they all act together ("as one") in a certain way, are wood, which is through and through wood, with earth, air, and water in every part of it.

In any case, after Plotinus, the matter was "potency" because it limited the form or Aspect, which in itself is unlimited. Aristotle had held that the matter "individualized" the body, because of course the lump of "stuff" that acted a certain way made the act this individual

case of wood, or whatever. But the post-Plotinian Scholastic notion now meant that the individualization of the Form was due to the limitation by the matter.

You can see why the matter became a kind of "something which limited" instead of being just the limitation itself, because, even though in the last analysis it was just "stuffness" and had no form, still, "stuff" is "there," isn't it? And so, even though logically, "prime matter" doesn't exist and is just the ultimate limitation of some body, it was still thought of as what "received" the form, and the form was thought of as the form "of" the matter.

And matter as "stuff" was also obviously what had "extension" (equated with quantity) connected with it, because again "stuff" is what "spreads out."

So in Thomism, the "substantial form" limited the existence and the matter limited the substantial form, giving you the substance, whose first accident as a material substance was extension, and the other accidents "inhered" in the extended substance.

Of course, Descartes muddied the waters with his "clear and distinct ideas" and the notion that the only thing that a body had as a body was extension, so that matter and extension now meant the same thing.

But we need not go into this further, I think.

Now if the quantity of the unifying energy is the ultimate limitation on the act unifying the body, then it would seem obvious that a body is *this* individual body because it is a *limited instance* of the particular kind of body. In other words, what makes the body an individual of a certain kind of body is the *particular degree of unification* of the body.

But why not the parts? Because parts can come and go and the body is still this individual body. Presumably, you don't have most of the chemicals that actually made up your body a number of years

ago, and yet your body is still one and the same individual, because it is (any old) parts *united with this unifying energy*. Hence, what makes your body distinctively *this* one is not the humanity of your unifying energy, but the "thisness" of the particular *case* of humanity it is—and that, of course, is its limitation in degree.

So if matter is (a) limitation of what makes the body the kind of body it is, and (b) what accounts for the individual instance of a given kind of body; then obviously what is being "pointed to" by the term is *not* the parts (the "material" of the body) but the *quantity of the unifying energy*.

Hence, what was actually referred to by the Scholastic notion of matter, once the atomic nature of bodies was known, was not the "stuff" at all, but *how strongly the parts were held together*.

But common usage of "matter" makes us think of the "stuff" things are "made of" (which would "point to" the parts more than anything else), or to the body as such (as in "What is the behavior of an electrical field in matter?").

So to keep the term "matter" and refer by it to the quantity of the internal field (the amount of the unifying energy) means having to stress that it is not to be thought of as "stuff" or "material" at all; and for those who are not familiar with the tradition, why take a term and give it a meaning so very different from what everyone else means by it?

And it seems to me that this objection is quite reasonable—the more reasonable because of my experience in having really bright students struggle with the term. And since it is just as easy to talk about the quantity of the unifying energy, then I will simply not use "matter" any more.

However, before dropping the subject, it can now be seen why I defined "the spiritual" as "what is not limited quantitatively." If "materiality" comes from the fact that the body is unified by an act

which *has* a quantity, then obviously what is not quantified would be what is not material—which is what everyone understands "spiritual" to deal with.

It can also be seen now why I called a body a "body" and not a "thing." If the parts are going to interact with fields, then, as we saw, they will interact to some *degree*, which means that the *whole* will be "material," or a body.

But then doesn't that mean that there are no spiritual analogates to bodies? No spiritual multiple units? Right. Every "part," as I have said, of what is spiritual permeates every other part, and there is no distinction in reality between the part and the whole, because what is spiritual, if it is multiple at all, "reduplicates itself" without being actually more than one act.

To make a transition, then, to our investigation, we can draw the following conclusion:

Conclusion 7: The quantity of the unifying energy is related to the total quantity of all the energies that make up the body.

This could give rise to the "conservation of matter." Matter, of course, is not here "stuff" but whatever it is that accounts for or is "behind" the *total* quantity of all the energies of the body. Hence, when two bodies interact and trade energy off, there is a total amount of energy in both of them, governed by (or connected to) the quantity of unifying energy of each. If one gains energy, then this means also that its unification is also more energetic; but by the same token, it implies (since it has to get this extra total energy from somewhere) that the other body has to lose at least that much energy; and so that body's unifying energy will be that much weaker.

So the "conservation of matter" as a law of physics just means that if you add up the total quantity of energy before the exchange and

the total quantity after the exchange (making the proper conversion factors so that the actual numbers are equivalent), then they will be the same.

So there is no difference between "conservation of matter" and "conservation of energy" on this showing. If "conservation of matter" means "conservation of *mass*," then we know from relativity theory that mass is *not* conserved. Mass is just a form of energy (gravitational energy or resistance to force), and is not "stuff"; so there is nothing surprising in having it converted into other forms of energy or in having it suddenly come into existence from massless things like light (in "pair production")[16].

There is also something else we can say based on our discussion above about "matter" as being what individuates within a "species," putting this together with the fact that "matter" in that sense "points to" the quantity of the unifying energy:

Conclusion 8: The quantity of the unifying energy accounts for there being many different bodies of the same kind.

Since the type of body is explained by the form of its unifying energy, and since, as we saw, its "thisness" is not accounted for by the parts that are unified (because they can come and go and the body remains the individual body), then obviously what makes a given body *this* one and no other is the *degree* this type of unifying energy has—just as what makes one case of heat different from another is not where it is (which is intrinsically irrelevant), but the fact that this one is one temperature and the other is a different

[16]This hints at another common notion of "matter": what is "heavy" or "bulky." But we now know that weight is actually the *interaction* of the form of energy called "mass" with the gravitational field (one of the properties of mass) of another body.

temperature.

That seems obvious enough, until you think of its implications: it means that, for instance, two different human beings are *different precisely because they differ in the degree of their humanity*. In other words, the proposition "All men are created equal" is exactly the *opposite* of what is the case. *No* human being is the *equal* of any other one; each of us lives at *a different level* of humanity from anyone else.

People tend to resist this, because they think "to be less human" means "not to be as good as the next person," and therefore implies some kind of lack in dignity or rights or in respect due to oneself in relation to someone else. But of course, it doesn't imply this at all *unless* one attaches "dignity" or "rights" to the *degree* of internal energy the body has, allowing the body to perform more acts or perform them more intensely—which is all this "level of humanity" means.

It is perfectly obvious that some people are more talented than others; and it is also, when you think about it, obvious that this means that they have more internal energy than others, and bodies that are so constructed that acts that are difficult for most people are easy for them. But the unifying energy is precisely what sets the limits to the total energy of the body, and what (in humans, certainly, and in living bodies generally) constructs the parts which then give greater or lesser facility to the acts implied in the parts. The unifying energy, for instance, constructs an eyeball that is either the perfect shape for seeing accurately, or is more or less an oval, in which case the person is myopic or has astigmatism or some other visual impairment.

The truth behind "all men are created equal" is not that everyone exists to the same degree of humanity, but that *rights and respect have nothing to do with the level or degree of humanity we in fact exist at*. Not to get into a long discussion here, since it belongs with the

implications of making free choices, what is behind this is that *because,* as free, *we decide for ourselves* (to some extent) *what our individual expression of humanity is to be* (our "life style," which amounts to what *level* of humanity we are to exist at), then *the fact that we can do this is what demands respect and gives us rights,* not the level we happen to exist at.

That is, since the quantity of my unifying energy is (within limits) *not predetermined for me genetically,*, but is determined *by my choice* (which ultimately is the *form* of my unifying energy, only in its spiritual "dimension"), then obviously I should be allowed to do this for myself, and must not be treated as if my energy-level allowed me to be used or despised by other people.

So it's not the fact that we *exist at* different energy levels that gives us rights and demands that we be respected by others; it is the fact that we *control our level of existence* that does so. Hence, the respect for anyone is to be "equal," whether the person's genetic limits give him a great deal of control over himself or only a small amount; he still has control over himself.

In the human being, then, what is predetermined is not *a* quantity for the unifying energy, but a *range of quantities,* among which one can choose the quantity he wishes to be "his," and how he is to express himself humanly. Thus, a person who is very talented naturally in mathematics might be interested in basketball and neglect his mathematical talent and develop his (perhaps mediocre) natural abilities in basketball to their fullest extent. The fact that he should not be prevented from doing this is what we mean by "his right" to do it. And this is connected with the fact that for a human being, the final state (the goal) is not "built in," but depends on what the person chooses as what is his "good"—which, as we saw, is subjective.

So "all men are created equal" really means "no one should

impose his idea of what is 'good for a person' on anyone else." This does not mean, I hasten to add, that you can't prevent a person from doing *wrong,* if it involves doing *harm* to someone else (basically, violating someone else's rights); what it means it that you are not to presume to say to any human being, "You're wasting your life; I know what the real you is, and you're not living up to your potential." Every human has the right not to have to live up to his potential; but he should be given the opportunity to live up to it if he chooses.

This is a difficult saying; and I should comment here that it doesn't apply to children. Children must be forced to do things that they don't want to do as they are growing, precisely so that when their bodies are basically mature and their experience is sufficient to realize what the *concrete* implications of their choice of a lifestyle is, they will *be able* then to live up to the choice they make for themselves, and won't have opportunities (in practice) cut off because their physical or mental growth has been stunted. This is the tragedy of the poor schools we find in ghettos, or of "permissive" education in general. Teachers who don't challenge students and make them sweat (including those teachers who "want them to feel good about themselves") produce high-school graduates who can't even read—and how can they become doctors or engineers if they then see that this is what they would want to be? By pretending that they have the rights of adults, adults are violating the children's *future* rights.

Let me make one remark about the unifying energy and the parts before going on to the body and its properties. Newton looked on the solar system as a number of bodies connected by gravitational forces; but this didn't describe the behavior of the system with perfect accuracy (though the discrepancy between the way it is and the way Newton's description says it should be is so small as not to

have been observed until the twentieth century).

Einstein's General Theory of Relativity describes the solar system better, in terms of a "warping of space-time" into a non-Euclidean geometry in the presence of massive objects. What this looks very much like is as if you were to say, "Let's not consider the sun and the planets as a system of interconnected bodies; let's look on it instead as a kind of body, with an internal field and parts at various energy levels within it, each (to a not very significant extent) giving up something of itself to behave as a part of the body."

It might be that if this point of view were taken, then something like Einstein's description would emerge, without the really self-contradictory idea in his theory that space (nothingness) is actually *shaped* in some way "between" objects, and there is *no* force connecting them. The field is not nothing; but it doesn't follow that it is a force that has the *Newtonian* configuration. This would also free us from Einstein's epistemological confusion that acceleration is *the same as* force, where he is confusing being-affected with causality—which *are* the same relation, but looked at from different points of view. What he is saying is very much like saying that if the distance between New York and Los Angeles is the same, then you're traveling to Los Angeles from New York no matter which way you're going.

I personally believe that if Einstein and others had stuck to physics rather than venturing into epistemology (with "principles" like the "identity of indiscernibles") there would now be a lot less confusion in the upper reaches of the science.

3: "Matter"

Chapter 4

Properties

You would think that we have been discussing the "substance and accident" issue all this time; and in a sense we have, but in terms of parts and their unification into a whole, which in medieval times was not really much of an issue, given the notion that "matter" was a continuous "stuff."

In medieval times, the effect that was most noticed was that of the body and its many different *behaviors,* each of which was recognized as in some sense the "existence" of the body, but at the same time not all there was to the body's existence—and in fact, the body existed somehow independently of any (and even all?) of these acts it performed.

It was this effect which Hume and the empiricists tried to explain away by denying the real single existence of the body, and saying that it was nothing but a collection of "attributes" that happened to be together. We saw that this leaves the "togetherness" of a given set inexplicable.

We have seen how the "many" in a body gets organized into a unit, so that each part gives up its identity as a body (and some of its energy) and exists now *as* the unit primarily and itself only secondarily. That is, the existence of the part as a part is now *outside*

itself in the existence of the unifying energy of the body as a whole; it exists, but its existence has to some extent been "taken over" by what is beyond it which has made it subordinate to the unit, which is now what "really" exists.

This is obviously another mode of the finiteness of a finite object, because the part contains its own opposite (the whole insofar as the part is unified into it) "within" it in a sense—at least within its meaning, defining it as a part—and yet simultaneously outside and beyond it, so that it *is not* the whole, which is what it "really" is.

But this works the other way, too; because the unifying energy simultaneously is the "one" energy uniting all the parts, and yet is a kind of "behavior" of *each* part connecting itself to each of the others, and so is a kind of "set" of internal forces. So the unifier contains "manyness" as defining it as what it is, or it leaves out of itself something of what it is to be itself.

And the result is, of course, a multiple unit, whose unity is "in" its multiplicity and whose multiplicity is "in" its unity. This is true of both systems and bodies, the only difference between them being that a system is a unified multiplicity and a body is a multiple unit.

Not surprisingly, when this multiple unit *acts,* it will behave in such a way that it reveals this self-contradictoriness about itself; and here we have the "substance-accident" issue or the body and its properties.

A *property* is a way a body acts as a whole: i.e. as these parts with this unifying energy.

First note what we were saying about finiteness: the *one* body *acts as a unit* with *many* acts (many behaviors); and these many acts reveal and *act as* the unit; they don't exist "on their own"; they are the (various) existences (because, remember, existence is activity) *of*

the (one) body. These acts are not parts united into the whole; they are the ways the body acts *because* it is parts united into a whole.

That is, the properties are the observable acts or behaviors of a body. These are what act on our senses, and as "going around together" make us conclude that there is an *object* "out there" that is behaving in various ways, because we *compare* the effects (the external sensations) with those of other objects and find similarities and differences and other relations among the objects because of the external sensations we have of them. For instance, that grass and trees are green but not the same size.

How much of this is due to our indirect way of knowing things by comparing effects and arguing to similar relations among the causes, and how much is due to the object itself? Who can say, since we can't know about objects except by comparing effects. The point is that what we say about the object as multiply one is *true*, (provided we are careful and don't go beyond the evidence) even though the way it appears to us is not a copy of the multiple unity it has. Much of reality-as-it-is will necessarily be mysterious to us; but that should not prevent us from saying what can be said about it based on its effects on us.

And so, because we recognize the body as a *unit*, then these acts are recognized as acts *of* the body and not acts in their own right. The green-activity of the grass, for instance is not a "something"; it is *how the grass is responding as a whole to light falling on it*. That is, the color is an act *of* the grass, and is not, really, the light which is re-radiated; the color is rather the "re-radiating" itself: the absorption of energy by the grass, giving it too much energy to exist as grass, and the ridding itself of this energy back into the environment.

But it does this to (white) light falling on it because it is *this particular set of atoms configured in this particular way,* not because it just has these parts, nor because it has this particular unification,

but for *both* reasons. When chemical changes occur in it in autumn, it turns yellow, because the parts are now different, though it is still grass (which implies that, though the *form* of the unifying energy is the same in one sense, it must exist to a different degree).

Hence, the property "points to" *both* the parts and the unifying energy: to the whole *as* a whole. If you cut your arm off, your body is still organized humanly (though your severed arm isn't); but you don't have the same properties you had before: you can't pick up things the way you used to[17].

Because the term "property" may cause a little confusion, let me make a distinction based on the contemporary meaning of the term "substance" and not its Scholastic one:

A *substance* is a kind of body.

A *property of a substance* is an act of a body because it is the kind of body which it is.

A *property of a body* is an act it performs because it is the individual body which it is.

In chemistry a "substance" is a *kind* of body, not an individual body. Thus, sulfur is a "substance," hydrogen is a "substance," and so on, and so are "compounds" like water or sulfur dioxide called "substances." So what is now called a "substance" is not an individual, but a *kind* of body. Obviously, then, the form of the unifying energy makes the body the *substance* which it is; the form of the unifying energy considered as limited quantitatively makes the body the *individual body* which it is.

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[17]Note the interesting fact that if you sever the "arm" of a starfish, it *is* still organized as a starfish, and grows the rest of the body, while the original starfish grows a new arm.

Hence, the acts characterizing a given *kind* of body will be the "properties of the substance," and will correspond pretty much to what we think of when we think of "properties" in general: the spectrum, the valence, the color (if it is distinctive), the size, the shape, etc., etc. Note that color would not be a property of the substance "human being," because you can be black or white or brown and still human; color in that case is a *racial* property, not a property of the substance.

The properties of the *body,* however, are what we normally think of as the "behaviors" of the body, because not all cases of the substance behave in this way, and so the act in question isn't what the body is doing as the particular kind of thing it is, but is an individual act of the particular individual body.

These properties of the body are what have traditionally been called "accidents," or sometimes "operations." What I am stressing in calling them "properties" is that there is nothing accidental about them; the body doesn't just "happen" to "have" a certain trait; it is *doing* something, and it is doing something *because of its internal construction, given the circumstances it is in*.[18]

This is certainly true of inanimate bodies; whenever they act, they are responding to the energy around them in a way that is in principle predictable; and so there is nothing "accidental" or "capricious" in their action, even if it is something like movement to another position in some field. But it is also true of apparently capricious actions we perform, as when we jump up and down and click our heels together "just for the hell of it." This action was

[18]"Accident" (*accidens*) is the Latin translations of Aristotle's word that means "accompaniment." The idea is that it is something that sort of "happens to" (*accidit)* be present "in" the substance. A "property" is a "proper accident," meaning that it is "proper" that this happens to be in the substance; and so it doesn't *just* happen to be there. My contention is that there are *no* acts that the body "just happens" to perform.

either determined by an overflow of some joyous emotion, or was the result of a deliberate decision to do something gratuitous; but in neither case was it "accidental."

Hence, it is better to look on *any* act of a body as a *property* that reveals the body; either it reveals the body as being a given kind of body, in which case it is a property of the substance in question, or it doesn't, in which case it is a property, but a property of the body (or, as I mentioned, when there are subclasses like race, it can be a property of that subclass).

Conclusion 9: Properties of bodies are always acts, and in fact forms of activity.

This would have to be the case, because if they were "just there," there would be no way we could know them, since to know them they must either act on our senses directly (in which case they are obviously acting), or react to something we do to the body (in which case they are acting in response to our action), or act on us indirectly (in which case they make a difference in—and so act on—what acts directly on us so that we are aware of them).

They have to be *forms* of activity because the body itself (which has a unifying energy, with a form of activity) is a substance; and since this means that it is no *other* than this kind of substance, it can't perform an absolutely unlimited act, which would be what a "formless" property would be. That should be obvious[19].

[19]Clearly, if Jesus is in fact God, then the act which organizes his body is the Infinite Act; in which case, Jesus can "perform" the Infinite Act. But it would be a little difficult to call this a "property" in any meaningful sense, since it would be identical with the act unifying the body insofar as that act was not "emptied" and did not restrict itself to being just human activity.

It would also seem that a property would have to be a form of energy, with a quantity of its own. This, however, would not absolutely be necessary *if* the body were organized with a form of activity which was either totally spiritual (as, for example, if an angel were to restrict himself to acting only humanly and organize material elements into a body), or was a spiritual act (as in normal human beings) which by nature "duplicated" itself also as a form of energy—or even (as in animals) was a spiritual act which could not act without such a "duplication." We will see the evidence that there must be such spiritual-acts-with-energy-dimensions in the next Part. Here, I am pointing out that their spirituality would allow them to be able to perform an act which had no quantity and was not therefore a form of energy, but a spiritual form of activity.

But if a body is organized with a form of (what is merely) *energy,*[20] then presumably it is quantitatively limited *as a whole,* because obviously all of its parts are also bundles of energy and have quantities—and hence there is some kind of total quantity for the body as a whole. In that case, it does not seem possible for it to perform an act which is *infinitely beyond* any form of energy: i.e. one which is not limited at this level at all. To have a quantity means "to be able to do this much *and no more*"; and that implies that the act cannot exceed the limit of its total quantity.

Hence, we can say this:

Conclusion 10: Properties of inanimate bodies are always forms of energy.

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[20]What turns out, in other words, to be an inanimate, or at least non-conscious, body. What I am getting at is that this would not be true of conscious bodies, since their organization is in some sense spiritual, as we will see in the next Part.

What is an "inanimate body"? Obviously, one which is not alive. Since we are nearing the end of this Part of the treatise, and the next Part deals with life, it would be well to define "inanimate" here, to prepare for the distinction to come.

An *inanimate body* is a body in which the *quantity* of the unifying energy has a determining role in what it is.

As can be seen from the hints given above, a living body seems to operate from the "top down," in a sense. In animals and human beings, the unifying activity is spiritual, and "duplicates itself" once in a limited way, making it "also" in some sense a form of energy; and this allows the animal or human to escape domination by the quantity of its energy-dimension. But even in non-sentient living bodies, the body seems to exist at an energy-level that is "too high" to be explained by the energy in the parts that formed it (physically, it is unstable), and so the form of the unifying energy seems to have "control" in some sense over how much of it there is to be, or how strong it is to be—and this is what makes the body live, as opposed to simply doing what inanimate bodies do.

And, of course, if this is the case, then it means that what makes an inanimate body inanimate and not living is that in it the total quantity imposes definite limits on what the body can do; and this is what is meant above by saying that it has a "determining role" in what the body is.

We will see more of this very shortly. But first, let us draw a general conclusion about properties and the body which performs them:

Conclusion 11: Properties reveal what the body is.

4: Properties

Since they are acts of the body as a whole, and don't exist in their own right, then obviously their "ofness" means that they *are* the existence of the body—though no one of them is the *complete* existence of it. The body "empties itself" into its property, as it were, while remaining more than just this act; they are a special mode of the finiteness of that multiple unit which is the body.

But since the body is not just "the actor" of its properties, and is the parts united with the particular unifying energy, then it would be useful to have a term that refers to the body, not as parts united, but precisely as "the actor" and as revealed by its properties.

***The nature* of a body is the body insofar as it performs or can perform a property.**

In other words, the "nature" of a body is the body looked on as the *power* to do something or other—which, of course, would be one of its properties. Thus, it is the nature of sodium to radiate out light in the yellow part of the spectrum when excited; it is the nature of the human being to see or talk; it is the nature of my dog to bark when someone leaves or comes home; it is my nature to write books on philosophy.

This last sounds a little strange, so let me make a distinction parallel to the one I made about properties:

***The nature of a substance* is the body insofar as it performs properties of the substance.**

***The nature of an individual body* is the body insofar as it performs any act of that body.**

We usually think of "nature" in relation to what we usually think of as a "property"; and a "property" is usually used in the sense of a

"property of the substance."

Thus, it sounds quite sensible to say that the spectral lines of sulfur reveal the "nature" of sulfur, and the ability of humans to see reveals the "nature of the human being." But it becomes a little less normal to talk about the "nature" of my dog to bark when I come home, because we think of the nature as a kind of "fixed" something-or-other about the body, and not something capricious. And to say that it is my "nature" to make a given remark seems, for that reason, to imply that I was somehow "compelled by my internal makeup" to do it and "I couldn't help it, because it was my nature to do it."

But in point of fact, if I *do* make the remark, it is because I am so constructed that I *can* do it if I want to (and also, presumably, can refuse to do it if I don't want to, as we will see); and so it is because of my *nature* that I made the remark, even though in my case this does *not* imply that I "had to" do it because of my nature.

In other words, "nature" ordinarily has that "deterministic" sense to it because of the fact that we think of *properties* (normally) only in the sense of "properties of the substance" and use "acts" or "behavior" or "accidents" to refer to what the body as an individual does. What I am stressing in using "property" in both senses is that the capriciousness or "accidentalness" implied in the latter way of seeing things is *false*. These *are* properties, and reveal the body that is performing them, just as much as the properties of the substance do; it is just that in this case, they do not reveal the *kind* of body that is acting, but the *individual*.

That is, a person who steals has the *nature* of a thief. You can't say, "Well, he stole, but he's not a thief," unless you mean by the term "a person who has the *vice* of (habitually) stealing." Maybe he isn't a *vicious* thief, but he's a thief *in that act*, because the act *can't be divorced from the body which performs it*. And this is what I am

getting at by the notion of the "nature of the body."

Note that this means that you can't "love the sinner and hate the sin," if that attitude implies that you divorce the sin from the sinner, as if it "just happened" and hasn't poisoned him with it. True, the sinner is not *simply* the sin, because the sin is an "emptying" of himself into this act, which is not his only act; but it *is* his and it *is a way he exists*. So for him to say, "I am telling a lie but I'm not a liar" is for him to utter another lie in that very statement, because he knows that the telling of a lie makes him "a person who is telling a lie," and that's what a liar is.

Hence, this notion of the "nature of the body" and the "property of the body" is a way of stressing the intimacy that there is between the (one) body and its (many) acts; that the one body "explodes," as it were, or finitizes itself into its many properties, each of which *is* itself *as less than itself,* and in fact *all* of which together are itself as less than itself, since it is *also* the parts united into the whole—and this unification of the parts is not a property, but the body looked on in a different sense.

From this we can make the following conclusion:

Conclusion 12: The properties do not exhaust the reality of the body.

This is another way of saying that the *nature* of the body is not all there is to the body. There is its "bodiness," the parts united to the whole.

That is, even were it possible to list absolutely all the properties of a body, including its properties *as* a body as well as those of it as a substance, you would still be "left" with the parts united into the whole, which would not be on the list.

Hence, the properties are a *finiteness* of the body; they reveal its

nature; but while the nature *is* the whole, *it is not all there is to the whole*. The body is not *adequately* described as "the power to do A_1, A_2, ... A_n" even if this list includes every act the body ever does.

It is well to emphasize this, because science tends to confuse the body with its properties. For instance, "death" is *defined* in medicine as "the cessation of brain activity," as if the act (the property) that shows up on an electroencephalograph *were* the life of the body, instead of *one* of the acts that *reveals* the life of the body, and one of the ones whose lack *reveals* that the body is *not organized in a living way* any more, which is what death really is. That is, a corpse is obviously an inanimate body which *used to be* a living body; and "death" means "turning into a corpse," not "ceasing to have brain activity."

Hence, while the property *is* the body, it also *is not* the body, and the body both is and is not its property or the sum of its properties. It is not surprising for science to confuse the property with the body, since (a) the property is precisely observable and the internal structure—often revealed by the property in some sense—is not, and (b) the property is the existence of the body as a whole body. But the point is that it is a *finiteness* of the existence of the body; and the mystery of the finite is something that scientists don't like to confront, because as an effect, opposite statements can be made at the same time; and scientists, while they are quite at home with the effects that belong to their own field, get very impatient with effects that belong to other fields—particularly philosophy—and dismiss them as "word games."

But in the last analysis, it is simply silly to say that death *is* cessation of brain function, if for no other reason than that if this were the case, then as soon as the brain stopped acting, the body would be dead; and people have been known to recover from a minute or two of a flat electroencephalogram. So the "definition" of

death had to be extended to "cessation of brain function for twenty minutes" or some (more or less arbitrary) length of time, where the length of time now becomes crucial in "defining" death; and it is clear to anyone who doesn't have his head cast in concrete that a length of time is not what "life" or "death" *means*.

What is going on there is that if the brain stops functioning for ten minutes or so, it begins to decay; but decay occurs when the body is not acting at its "super-high" energy level and is falling back to its ground state as a physico-chemical system—which, of course, *implies* (but does not *mean*) that it is no longer organized in a "super-energetic" way but only as an inanimate body. Hence, the *decay* of the brain, which is necessary for life function, *reveals* the death of the body, but *is not what the death of the body means*, and the flat electroencephalogram for twenty minutes reveals that the brain by this time has begun to decay—and so is at a second remove from what the death actually is.

In other words, a *conditio sine qua non* is not the same as what it is a necessary condition *for*, or air would be life. Without air, we can't live; but this doesn't mean that air is our life. This kind of mistake was initiated by Hume, who, in his debunking of "causality," turned the fallacy of "post hoc ergo propter hoc" into the very definition of causality itself. We saw this in Section 2. One of its implications is to say that there isn't any "substance" (in the old sense of the body itself), and there's just the "collection of attributes," which of course makes the property the same as the body. Scientists are still in the clutches of the seductive oversimplifications of Hume; and this has led them to make all kinds of silly statements—that, because they are so patently silly, they think are profound.

I should say a word about the Aristotelian notion of "nature," which is responsible for our ordinary meaning of the term. First of all, he talks about "nature" in the sense of "what is not artificial," as

in "The study of nature is fascinating." What he means (and so do we) in this sense is what exists and acts because of the sources within the bodies, and what does not have its configuration imposed on it by the choice of some human (or otherwise intellectual, but finite) designer. Thus, a computer is not part of nature, because it is man-made; and an ecology is "natural" only if it is left alone and isn't tampered with.

His other sense of "nature" is the sense in which you talk of "the nature of" something; and it is very close to what I meant by the nature of a substance. It is the internal source of behavior; but for Aristotle it is a rather stable internal source, giving rise to properties of the substance or of some *class* of things (such as race). He speaks of habits as "second nature," meaning that after they are acquired, they lead to predictable acts in predictable situations, and are almost like properties of the substance. Thus, stealing would be "natural" to a person who has the vice of thievery, but would not be "natural" to a person who has never stolen before, and might even be contrary to his "nature" if he had cultivated the virtue of honesty.

Obviously, then, Aristotle's definition of "nature" would exclude what I called the "nature of the body" which accounts for the particular act in question.

But here I must answer the possible objection to my using "the nature of the body" for these individual acts. It would seem that *no* act could be "unnatural" in that sense. That is true. For an act to be contrary to the nature of the *body* would be for the body to perform an act which it could not perform.

But an act can contradict the nature of the *substance,* if it is such that, though it *can* be done by bodies of this type, it is for some reason not *consistent* with bodies of this type. Thus, it is unnatural for a human body to have a cancer, in which cells grow without regard for the body as a whole. But, of course, this is because something in

the cancerous cells is blocking their regulation by the unifying energy, and the unifying energy is therefore *incapable* of doing what it would normally be expected to be doing—or it is limited more than normal.

It is also possible for a person *deliberately* to perform an act which may be consistent with himself from one point of view, but is inconsistent from another. For instance, if I tell a lie, the statement I make is perfectly consistent with the use of my vocal cords to make sounds and my pharynx to shape them into articulate sounds; and it may very well be consistent with the English language. But I state *as* a fact something that I know *is not* a fact; and so I contradict the act as a factual statement. This is contrary to the nature of *factual communication,* using "nature" now in the sense of "what factual communication means." In *that* sense, the act is "unnatural," because it pretends to be something that in fact it is not; but it is not "unnatural" in the sense that I can't do it.

This sense of "unnatural" is used in "Natural law" theory of immorality; but since it is such a very tenuous sense of "natural" and "nature," I do not use it in my own ethical theory, which is a version, as we will see, of natural law ethics.

In any case, if I lie, then in my sense I am revealing my nature as a liar in this case; and if I have heretofore cultivated truthfulness, this act is contrary to what my nature *used* to be; but once it is done—and while it is being done, my nature is not *just* that of a truth-teller any more.

Let me now make a couple of additional definitions that might be helpful:

An *intrinsic* property is a property that the body has as not reacting to some activity acting on it.

A *reactive* property is a property that the body performs when

reacting to some activity acting on it.

Thus, the size of a body, its shape, and in living bodies things like remembering or thinking (when not "provoked" by seeing something that reminds you of something) or any spontaneous act would be intrinsic properties, either of the substance or the body as an individual. The weight of a body (its response to a gravitational pull), the color, the position, or in living bodies acts like seeing, or even emotions like fear of some object would be reactive properties, because they are a response to some energy coming into the body from outside.

A couple of definitions dealing with a couple of intrinsic properties:

The *size* of a body is the distance between its outermost parts.

The "outermost" parts, of course, will be those exerting the *least* field-force on each other; because "distance" here is to be taken in the sense defined earlier: the force of a field. Obviously, the distance in this case will be the *internal* distance of the unifying energy (which is the internal field that unites the body).

This is the property called "extension" by the Scholastics, who defined it as "having parts outside of parts." That is, there have to be distances within the body for it to be extended.

This leaves open the possibility that there can be bodies that have no size at all, because they don't have parts at distances from each other. And there probably are such bodies: free electrons or protons, for instance. A proton is more massive than an electron, but it isn't necessarily "bigger." What each seems to be is the source of an electrical field, which can (within the limits of the uncertainty principle) be located in space, and which, because the field grows

stronger and stronger the closer you get to its center, has a "scattering profile" of repulsion of particles of opposite charge—which, however, gets smaller the more energetic the particles fired at it gets.

I am not saying that electrons and protons have no size, because they might be configurations of quarks at distances from each other; but it certainly looks as if they are sizeless.

The *shape* of a body is its internal field with the parts in position in that field.

That is, the size of the body is just the distance of the parts that are farthest apart; but if you take *all* the parts and their distribution in the field, you get the *configuration* of the body; and "spatial configuration" is another way of saying "shape."

The *mass* of a body is the property of the body by which it acts gravitationally.

You could say that it was its gravitational field and not be far wrong. Mass also is the property by which the body resists a change of motion, as Newton said; but basically what this means is that it resists changing *the gravitational interaction it is having* with other bodies; that is, once it is in equilibrium gravitationally, it tends to stay that way unless forced out of it by the introduction of outside energy.

Of course, since God is not a body, we can say the following:

Conclusion 13: God has no size, shape, or mass, or any other property, strictly so-called.

That is, any "property" God has has to be a way of describing existence itself, taken absolutely without qualification or quantification. But it is not an "act" he performs; because "all" of his acts are just the one act: Absolute Existence.

Note that if God is sizeless, this does *not* mean that he is a point, because a point has no size *but does have position*, and we saw that God is not in any position. It is just that "How big is God?" is a meaningless question, which "immensity" does not really answer any more than "tininess[21]."

[21] Actually, the Scholastic notion of the "immensity" of God is precisely this notion that there is no *real* size to God; but it wanted to emphasize that God was "beyond" mere size.

Chapter 5

Inanimate bodies

Before getting into the last section of this Part, which deals with change, let me just say a few words about the properties bodies have *because* they are inanimate and not alive.

I said above that bodies are inanimate because they are "controlled" by their total quantity. This seems to be what is revealed by the properties of inanimate bodies as distinguished from living ones; but in a sense, this has to be proved, and an attempt will be made in the beginning of the next Part. All I am trying to do here is list the properties that are known from physics and chemistry which seem to be those that bodies have as bodies. Living bodies also have them, but living bodies have other ones in addition (such as nutrition) which at least in part contradict the implications of their nature as bodies, as we will see.

The properties of inanimate bodies as such can be more or less deduced from what in physics is called the "second law of thermodynamics," which has various formulations, but basically says that in interactions among physical bodies, some energy is always lost out of the system of the two bodies. There is another way to formulate it that systems that interact tend by their nature to get less organized, but that leads to complexities we don't need to consider, since it is really another way of saying, when all is said and done, what is said in the first formulation.

In any case, the first thing this implies is this:

Conclusion 14: The natural state of an inanimate body is the lowest energy-level compatible with its form of the unifying energy.

In the next chapter we will discuss instability and equilibrium; but we can be a bit proleptic here and say that the "equilibrium" condition of a body is the one that (a) it will tend toward if it isn't in it, and (b) it will stay at if it is. It's the one it "wants" to be in, or its natural condition.

What the second law of thermodynamics says is that the natural tendency of a body *as* a body is to go *from higher to lower* energy, which implies, first of all, the conclusion above: the energy-level it is "comfortable with" or it is "seeking" is the *least* amount of energy it can have.

If it's at its lowest energy level, then of course it will stay there, because the *direction* of any change in inanimate bodies is to *lose* energy; and it hasn't got any more to give up and still be the body in question. And of course, it can't give itself more energy, because "to be at a given energy level" means "to have this much *and no more,*" and so it doesn't have any more energy to give itself.

Presumably, it could *get* more energy from outside; but since its spontaneous tendency is to give up rather than acquire energy (this is what the law says), then as an inanimate body it only acquires energy when this energy is *forced into it* from outside; it doesn't go looking for extra energy. Your car doesn't suck up gas from the tank unless you force it to do so by putting your foot on the accelerator; and it certainly doesn't drive itself to the gas station when the gas in tank gets low.

People have developed machines which plug themselves into

energy sources when their internal energy drops below a certain point; but note here that these machines are running *because they are unstable,* which means that they *still* have an *excess* of energy inside them (in their batteries, for instance) which is *dissipating itself* into the other components of the machine, which make the whole system move toward the battery charger and plug itself in. Let the machine run down totally, and all the parts are intact; but it won't plug itself in any more. It's completely happy with being a non-running machine. Hence, the machine is just running because it's been pumped up into an unstable condition, and the battery is really just a way of delaying or slowing down the release of the excess energy that it is trying to get rid of so that it can go back to just sitting there. So even these machines have as the natural state the lowest energy level, when they are doing the *least* that this particular set of components can do.[22]

But this also implies:

Conclusion 15: Instability in an inanimate body always means an *excess* of total energy.

An inanimate body is never in an "unnatural" (unstable) condition because it has *too little* total energy. It *can't* have less energy than the "ground state" and be that kind of body (obviously if the ground state is as we saw the least total energy); and its natural condition is precisely this ground state. Hence, it will be unstable

[22]Of course, when it plugs itself in, it is simply in a condition to absorb the *release* of energy from the electric line, which itself is "trying" to get back to its ground state, or its state of no excess energy. When *it* is not forced into an "excited state" by the generators, it runs down and stops, and our little machine's plugging itself in is now an exercise in futility.

only at a *higher* energy level than its ground state, and so will tend downward rather than upward. It can be forced to acquire extra energy, as when you charge a battery; but once it has this, it will be unstable, and will tend back down to its ground state[23].

The following will also be true:

Conclusion 16: An inanimate body will be performing at any given moment all of the properties it can perform at that moment.

The reason for this is that the properties reveal the body; and either this body is unstable (in which case it is *doing something* to get rid of the excess energy and has a reactive property), or it is in equilibrium, in which case it has the least energy it can have and still be that body.

Now if in its ground state it *could* be performing a property that it isn't in fact performing, this would imply some extra internal energy that is not manifesting itself in a property (because it could be doing this act also with the energy it has available at the moment); but that extra property would reveal it as more energetic than it is revealed to be at the moment, which is a contradiction, since it is at its lowest energy level.

That is, a body which is not doing what it can be doing has to have extra energy "in reserve" that it is not revealing in a property. This is quite possible in a body (batteries have extra energy that they are not revealing), but not of one at its lowest energy-level, simply by definition.

But then if it is not at its lowest energy level, it is (if inanimate)

[23]Unless the release of the energy is blocked, as when the terminals of the battery are not connected to anything (ultimately, to each other).

unstable, in which case (a) it is doing something to get there, and so has a reactive property (as when the battery is connected to a light bulb, which it lights), or (b) it is blocked somehow from getting rid of its excess energy (as when you don't connect the battery to anything), in which case it is *incapable* of doing what its natural tendency is to do. Therefore, whether the inanimate body is in equilibrium or not, it will always be doing all that it *can* do in the state it is in.

Conclusion 17: What an inanimate body will do will be predictable based on the total energy of the body.

The idea here is that if you have an exhaustive knowledge of the "initial conditions" of any unstable system, you know where it is going to wind up and how it is going to get there. And the point here is that, since the instability depends on the *amount* of excess energy in the system, then these determining initial conditions amount to this: *how much excess energy is in the system or body.*

This is not a hard-and-fast rule, for various reasons; but basically what it means is this: The inanimate body will be doing all it can do based on the energy-state it happens to have (equilibrium or instability) and the surrounding objects acting on it or capable of being acted on by it.

If, of course, it is in its ground state, then its future is predictable because it is going to stay that way. But if it is unstable, then it will tend to lose its excess energy. Here is where variations come in. It is a law of energy that "energy follows the path of least resistance," which means that a body tends to lose energy *as fast as* it can; something that stands to reason if its excess energy means that it is in an unstable—and therefore self-contradictory—condition.

But that means that if you know what the most efficient way is for

this body to dissipate its excess energy, you know what it is going to do; because it will take that route.

Variations come in two forms in inanimate bodies: (a) There may be a number of ways of getting rid of energy which are equally efficient, for practical purposes, and it may be that the body can't dissipate its energy in all of them at once. In this case, the *range* of things it can do is predictable, but not *which act* within this range. For instance, If you put a ball on the tip of a cone which has three channels for the ball to roll down, it is not predictable *which* of the channels will be used[24], but only that one of them will be; and in the long run, that each will be used a third of the time. Or (b) it may be that there are several different states for minimum-energy (ground) states, and all of them have the same total energy. For instance, a die that is rolled will stop with one face uppermost (because its minimum-energy condition is to be resting on a face); but since all six faces are compatible with this minimum-energy state, then which face is uppermost on any given throw is not predictable, only that in the long run any given face will be uppermost one-sixth of the time.

I might point out that, as quantum mechanics and catastrophe theory shows, it may very well be that the particular route taken or the particular final state may not be predictable *even in principle*; that is, even if all the forces acting on the object were known. There is nothing in the nature of an unstable body that says (a) that methods of dissipating excess energy *cannot* be exactly equal in ease, or (b) that anything has to determine a given one rather than another in a given case. Obviously, it will be unlikely that all avenues of getting rid of excess energy will be absolutely exactly equal; and so in general (at least in the macroscopic realm), the path will be determined by

[24]This is supposing that you place the ball on the *very* tip, and initially it isn't "leaning" more in one direction than another.

the route of quickest dissipation. But, however hard this may be to swallow for the determinist, there is nothing that says this general rule is universal. The donkey trapped between equally attractive bales of hay will not starve; it is just that you can't even in principle tell which he will begin eating if they are equally attractive (of course, "equally attractive" would have to take into account such esoterica as whether he was a left-eye-dominant or a right-eye-dominant donkey). But to pursue this further would be asinine.

It can be seen, I think, why physics and chemistry (which are the sciences that deal with inanimate bodies) are so heavily mathematical. Inanimate bodies are *controlled* by their quantity; and so in order to know about them, you have to know the quantities of the energy you are dealing with. And as Conclusion 17 shows, once you know this, then you can not only tell the present condition of the body, you can predict its future condition too; and, except for the variations in equally probable states or routes, the better you know the quantities, the more accurate your predictions.

But let us now look more closely to see what is involved in anything's changing.

5: Inanimate bodies

Section 3
Change

Chapter 1

Change itself

Most sciences deal mainly with changes, probably because change is the most obvious example of an effect. In a change, something becomes not what it was; but since it is *something* which becomes, then in some sense it still is what it was.

That is, a change is not simply a substitution. When the magician puts the handkerchief into the hat and pulls out the rabbit, the idea is to make it look as if the handkerchief changed into the rabbit; but we know that what he did was substitute a rabbit for the handkerchief when we weren't looking; and the rabbit used to be a rabbit, not a handkerchief, and the handkerchief (wherever it is) is still a handkerchief. There was a change, of course, but only a change in position of the two objects, not the change the magician created the illusion of.

But the points up the fact that there has to be some *continuity* for there to be a change; there has to be some sense in which you can say that what (now) isn't what it was must still in some sense be what it was. And, of course, you have to be able to say that this whatever-it-was-and-is is somehow *not* what it was, or you just have persistence, not change.

There are two possibilities of what might be called semi-changes: absolute beginning to exist (what some call "creation from nothing"), and absolute annihilation. Obviously, these are not

changes in the sense we were just speaking of, because in the case of absolute beginning (if it happens), there is no "before" state that the being "came from," and in annihilation, the object didn't "turn into" anything, so that there is no "after" condition it "became."

A *change* is an act by which one and the same thing becomes different from itself.

The difference between a change and simple finiteness, then, is that the changing object *makes itself* different from itself, whereas in the case of finiteness, it simply *is* different from what it *means to be* itself, in that it is less than its full reality. To those who say, "Well, the changing object doesn't 'make itself' be different, it *is made* to be different," I answer that even if in every case the change has an external cause (which does not seem to be the case in every sense of the term), still, in "being made" different, obviously it is *acting* differently, but *in response to* the action on it; and so it is still "making itself" be different, only now not *by* itself.

Note, however, that though it makes itself different from itself, *it must remain itself,* or we have something like substitution (or annihilation of one object and absolute beginning of another which has no relation to it) and not change. So it makes itself be both different from and the same as itself.

Obviously, then, change is a mode of finiteness, because in order to change, a being must contain what it is not within it. In fact, if you look back at our discussion of the finite, we arrived at finiteness from a consideration of our consciousness *precisely as changing*: as being one and the same consciousness all the time, but as being different consciousnesses at different times.

Chapter 2

Change and materiality

The very first article I ever published in philosophy was a discussion of change. At the time, I thought I had it figured out, but was a little shaky on accidental change; so I started investigating substance and accident, and very quickly realized I had to discover how we knew accidents in order to know what we were talking about when we referred to them. But to approach this, I had to find a more empirical way of looking at things than the traditional Thomism that I was working out of; and my background in physics led to an early version of the theory of cause that makes up the second section of this book. Then when I started looking at reality, It seemed to me that I had a decent handle on substance and accident now; and I got pretty well through to the point where I began investigating change once again—and when I got there, I realized that change was what I least understood.

Since that time, my idea of the finite has been refined considerably; and now I would be hard-pressed to name what I least understand about things; somehow, the more I go into them, the more incomprehensible they get.

But let us push on, and let me give you my latest ignorance on the subject of change. Maybe you will be able to do something with it.

First of all, is change something that occurs only in bodies, or can

God and spirits change too?

I think we can draw the first conclusion immediately:

Conclusion 1: God cannot change at all.

Process philosophers and Theologians notwithstanding, in order for God to be able to change, he would either have to acquire some reality that before the change he lacked (which means that he is finite before the change, and so isn't God), or he has to lack some reality afterwards that he had before.

This would mean that God would become finite; but since the finite is impossible without an infinite existence, God couldn't *become* finite; because if he did, then there would be no infinite existence to cause any finite existence, and everything would go out of existence, including the finite being that used to be God[25]. But we saw that annihilation isn't a change.

Further, nothing outside God could make or induce him to go out of existence (which is what to "become finite" would be in his case), because he cannot be affected by anything, as we saw. So if he were to do this, it would have to be a free choice on his part.

I find it difficult to see that the free choice to cease existing would

[25]Of course, I exclude here the case in which God, in one of his spiritual "reduplications" of himself (since a spirit is many "acts" that are really one and the same) could make one (or perhaps more) of these "reduplications" a finite activity, as I believe happened in the case of Jesus. Just as when we sleep, our spiritual activity no longer exists as such, but the "reduplication" of it as the unifying energy of our body does, and this *is*, in fact, the spiritual act which later wakes up to consciousness. There is nothing contradictory in God's doing such a thing and becoming a human being while still being God. I am trying to establish by this that Jesus *is* God; I am simplyu saying that you can't prove he *can't* be.

be impossible for God[26]; but it seems to me that it is, to put it mildly, highly unlikely, given the tendency of any being to preserve itself, and given that this tendency becomes more and more marked the higher you go in existence.

Human beings who commit suicide do want to cease existing, it is true; but this is because their situation is so bad that it is impossible for them to do what they want—which is another way of saying that they lack an act which they consider extremely important. Hence, for the suicide, non-existence is the lesser of two evils, not a good that motivates his choice. But since God is infinite activity, this cannot apply to him.

But since humans *can* choose to cease to exist, I would think that God would also be as free as they are; but I would also think that the exercise of this freedom in such a perverse fashion would be out of the question for God; and in any case, I don't imagine the theoretical possibility should cause anyone sleepless nights[27].

But if God can't change, then he can't be in any real sense "in process" or "becoming," because this implies *some real* difference in him. Then how can there be "process philosophers" like Hegel, Whitehead, Hartshorn, and so on? Because they think that existence *is* process or development; and they seem all to have some version of

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[26]Though it might be, as St. Thomas would hold. It may be that God's existence is in fact "necessary," and the one thing "doable" that he is incapable of doing would be to stop existing. Of course, even if he could stop existing, why would he? And you also have the conundrum that, since God is not in time, then his decision to stop existing (which of course is identical with his act of going out of existence is also eternal—in which case, nothing at all, temporal or eternal, exists.

[27]Quite possibly, some of the angels thought that his becoming human and dying for his creatures was acting in a pretty "perverse" fashion. I'm pretty sure if I were God, I'd have let mankind rot.

Hegel's notion that existence (or reality) contains its own opposite within it, so that the infinite is finite as well as infinite, what is is what is not as well as what is, and so on.

What I tried to show in Chapter 6 of Section 3 of the preceding Part is that this view mistakes reality *as finite* for reality *as such*. Granted, all the reality we come into direct contact with is finite and contains its own opposite within it, this containing of the opposite does not make it *make sense,* but is precisely an *un*intelligibility that needs explaining—and in the case of the finite as such, needs explaining by something that does not have the same unintelligibility, or by God.

What has happened with process philosophers is that they have *accepted* the unintelligibility of the finite as "Well, that's the way things are"; and having accepted it, they have *adjusted their minds to it,* by something like the following syllogism. "What contains its own opposite within itself is what is real; what is real makes sense; therefore, what contains its own opposite within itself makes sense."

This is true, of course; but it needs a distinction. What contains its own opposite within itself *is real*; what is real makes sense *either by itself or by a cause*; therefore, what contains its own opposite within itself makes sense either by itself or by a cause.

The fallacy of the first premise is the same as saying "A horse is something that has four legs," and assuming that because this is true, all four-legged things are horses. What is finite is real, but this does not entail that what is finite is *what is real,* which would imply that what is real is finite. And the fallacy of the second premise, of course, is that it doesn't follow that "what makes sense" has to make sense *by itself*.

But this kind of fallacy is very common, actually, especially dealing with the first premises in an investigation, or the first principles of a science. Since you have to start somewhere, then you have to start by

accepting some facts without question. Of course, if these facts are facts, then they can serve as your "ultimate causes"; but if they are your starting-point, then *for you* they are to be taken as "immediately evident," and hence as making sense by themselves and things not to be questioned.

Many physicists, for instance, when confronted with the "big bang" notion of the beginning of the universe, refuse to consider the conundrum connected with the whole universe's being unstable at the beginning and exploding, which would imply *something* before it and beyond it which either got it into an unstable condition or "created it out of nothing." Some quite legitimately say, "That problem (though a real problem) is not one physics is equipped to handle," because it calls into question some of the first principles of physics (like the law of conservation of mass-energy). But there are others who say, "What's the problem? The big bang happened, and if it did, it did. So why do you feel the need to 'explain' it?" What these latter physicists don't realize is that the "need to explain" it is the same need that drives them to "explain" the expansion of the universe as coming from a big bang in the first place. You could just as easily say, "So the universe is expanding. Why do you feel the need to say that it started with an explosion?"

What I am saying here is that process philosophers have fallen into the same trap. Since process happens, then you can *take it*, if you want, as a first principle in investigating what follows from it. But if you do so, you do not therefore baptize it into making sense by itself. Process still contains within it a contradiction, and that which contradicts itself precisely does *not* make sense by itself, as your own further investigations (using this fact to make sense out of the otherwise unintelligible facts that depend on it) establishes.

The other thing that spurs on process philosophy is that it is assumed that if you aren't changing, you aren't active. But as was

seen as early as Aristotle, though change is the most obvious case of activity, it is by no means what activity *means*. In fact, every change, as Aristotle also saw, is a *defective* kind of activity, because it is not really what it is, since it is "headed somewhere."

To show that not every activity is a change, consider what the chair I am sitting on is doing to the floor. It is clearly pushing it downward, because if you move it, you see that it has made a slight dent in the tiles of the floor, and so has compressed them. But once it has reached the point where the force acting to compress the floor is exactly balanced by the elastic restoring force of the floor tile pushing upward, then no further *change* occurs, though both forces *keep acting* on each other or (a) the chair would fall through the floor or (b) the floor would push the chair back up. And that the interaction is still going on is seen from the fact that if you do remove the chair, the floor tends to restore itself to something like its original shape. So once the equilibrium is reached, the *activity* doesn't stop even though the *change* does. It is this inability to recognize *stable* activity as *activity* which makes process philosophers look down their noses at Scholastics as "thinking that being is static," and at the same time of falling into the same trap that Heraclitus fell into, which was shown as irrational by Parmenides and thoroughly analyzed and refuted by Aristotle.

In any case, if process is change, and change involves finiteness, and finiteness must be explained by what is not finite, then God cannot change, even though—or precisely because—he is infinitely active already. He can't "do something else" because he is already doing all there is to do[28].

[28]He who is God, of course, changed *as* a human being, if Jesus is God; but these alterations of the humanity of Jesus make no difference to the infinite reality which expresses itself in that way in one of its "duplications" of itself; they are eternally

But now what about pure finite spirits, if there are any? If they are to change at all, there must be something in them which can establish a continuity between the "before" and the "after" conditions.

But this "something" can't be the existence, because suppose some spirit were annihilated and another one (with no connection to him) created. Each would exist; but the fact that the second one exists obviously does not *connect* him to the first one, any more than the fact that you exist and I exist makes us the same thing[29]. The form is precisely that about one existence which allows us to say that the existence is *not* the same as another existence in the sense of the fact of their separation into two different beings; and so the "existence" is not something common which establishes that they are "the same thing" and so if one form of existence disappears and then another one begins to exist, the second one is not "the same thing" in any sense as the first.

So one spirit can't "turn into" another one. But a spirit is *one* act, "reduplicating" itself if there is any plurality at all about it, and is not a system of interconnected parts (as we saw in the last Section). That is, each "part" contains all the others within it and is contained within each of the others, so that there is really only one act. Obviously, then, it follows that *any* change to *any* "property" of this pure form of existence would mean a difference of *that form of existence,* meaning that it is afterwards a different form of

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present to the Godhead just as everything else is. If this does not seem to make sense, then insofar as I understand it, it means that eternity is timelessness, not "always." But I will let the Theologians worry about this.

[29]As some philosophers, beginning with Parmenides and I suppose ending (so far) with Hegel have thought.

existence—which is what we just established is not possible.

That is, there is no meaning in a spirit of a "partial" change, because, not having anything but the form of existence which (as spiritual) exhausts what it means to be that kind of existence, there is no way it could be "somewhat" different. To be "somewhat" different, it would have to be limited so that it could be both different and still itself. But that kind of limitation of form is quantity, and we no longer have a spirit any more.

Hence, the Scholastics were wrong, when they thought that spirits couldn't change "substantially" (into different spirits) but could change "accidentally," thinking now one thought and now another, for instance, as we do. With us, the brain allows this by shutting off consciousness and regulating it; but insofar as things are *conscious,* they are *totally within themselves,* and "thinking now one thought and now another" with an angel would be the equivalent of your actually consciously seeing (as opposed to reacting visually) without being aware that you were consciously seeing, or of thinking a thought without thinking that you were thinking it. The Scholastics didn't realize that unconsciousness depends on the body, because they didn't, I suppose, think through the metaphysical implications of "complete reflection" by which we are conscious of being conscious.

So it doesn't seem as if finite but pure spirits can change in any way either; though, of course, they could absolutely come into existence and also absolutely go out of existence if God so willed, because as forms of existence, their existence is in itself a contradiction and depends absolutely on God.

Another way of saying this is that a pure spirit is doing all that that *form* of activity can do; and since it is limited to being only that form of activity, then it is doing all that it can do, and so can't do anything else.

2: Change and materiality

Hence, let us make this a formal conclusion:

Conclusion 2: A pure spirit or pure form of existence cannot change at all.

This is not, however, to say that he can't "have" something like what we call "properties," though (1) would have all of them throughout the whole of his existence, and (2) each "property" would contain the whole being within it, because in fact it would be identical with the whole being. This, however, would not prevent a pure spirit from *having different effects* on, say, the world, which would occur at different times. The cause, remember, is not affected in its reality by the fact that it has some effect (though you can't *call* it a cause unless it has one; but this is a pure name, not indicating a difference in it from what it was before. And, as we will see fairly shortly, time is not something things are *in*, but a relational property of things: the fact that certain processes are interconnected. Hence, if an angel, say, wanted to have an effect on some historical person, he would simply produce the effect on that person in the circumstances he wanted the person to be affected, one of which is the time this particular thing happens to that person. Thus, he would eternally, so to speak, have an effect that occurs at this particular time[30].

[30]I realize that St. Thomas makes a distinction between the "eternity" of God and the "aeviternity" of angels. First of all, he thought that angels *began* to exist, though their "duration" is outside of time, in some sense, and is, of course, created (i.e. caused) by God. They do not cease to exist once having been created, since in their nature they have nothing that would make them stop existing, and God would not annihilate something he created to not go out of existence. So they have a kind of "semi-eternity." I think, however, that it makes more sense to say that pure finite spirits (if there are any) do not *begin* to exist, though their existence, of course, is a

Needless to say, it is all very mysterious; but then, *any* being is fraught with mystery, including all material beings, which "contain" a limitation that is not themselves as not different from themselves. One must open one's mind to wonder if one wants to explore philosophical issues honestly.

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created one, and a free one, which is "already," so to speak, making the decision to be itself.

That is, the devils (always supposing they exist) freely decided to exist; but they did not make this decision *after* existing in a different way (which would put them in time), any more than God was sitting there in heaven bored until he decided to create the world. So I think "eternity" is a term that also applies to pure finite spirits.

Chapter 3:

Instability

In any case, if my reasoning is correct, then in order to change, something has to be a body (or system of bodies, of course). This seems like the most reasonable candidate for change anyway, since it is a multiple unit, and so some of it can perdure, establishing the continuity between its past and its future, while ways in which it is organized can disappear and come into being.

Aristotle explained change in terms of "being in potency" and "being active[31]," where "being in potency" means "being deprived of" some activity (and so having an end outside it, in the sense of outside the state it is in at the moment), while being active means "possessing its end within it," in the sense that it is then in the state that would be expected of it (or is doing what its internal structure demands for it)[32].

But what on earth is the "privation" of the act, which is the "privation" of a *definite* act and is not simple finiteness? That is, if you heat wood, then at some point (the combustion heat) it is

[31]Yes, being "active," and not "being in act" in the sense of being "actual" or "complete" or "fully real." Aristotle caught the notion of reality as activity.

[32]This "possessing the end inside it" is the meaning of Aristotle's *entelecheia*, which is also translated "actuality."

"deprived" of the act of ashes and carbon dioxide and so on—and of no other act whatever (it is not "deprived" of being a horse). Well, it *needs* to be the products of combustion now. Yes, but what is it in its structure that is this "need"?

This Aristotle does not really address, and with his notion of "matter" as "stuff," I suppose he didn't really have to; though it is a little odd that matter as "potency" for being what it actually is doing can somehow be "potency" for doing something else while it isn't actually doing that something else. That is when the being is *in* potency, by the way in Aristotle. When your matter is the ability to be what you are, then it is "potency" to be you, but you are not "in potency" to be what you are.

In any case, Aristotle's view of what being "in potency" is is a little vague, to say the least[33].

So here is what I think is going on, expressed in a couple of definitions.

***Equilibrium* is the condition of a body in which its unifying energy has the quantity that it can exist with,** and consequently it is the condition of a body in which its *total energy* is what can be "expected" of it based on the amount of its unifying energy.

Immediately, we can draw the following conclusion:

Conclusion 3: A body in equilibrium will stay that way if left to itself.

Actually, it is the "staying that way" that is what the physicists and chemists think of when they talk of "equilibrium"; but since the term

[33]And is made even vaguer by the abominable translations most people are confronted with.

means "being in balance," then obviously the tendency to remain in equilibrium is a characteristic of what is in equilibrium rather than the definition of it. To define equilibrium as "staying as it is" is another one of those instances like defining "death" as "cessation of brain activity" and taking a property as the essence.

But it is clear that staying as it is will be what happens when something is in equilibrium, because there is nothing internal that would get it out of its condition.

Note that what I said in the preceding chapter makes sense out of this characteristic of equilibrium in inanimate bodies. Since their equilibrium is the minimum energy-level they can have as the particular kind of body in question, and since their only spontaneous tendency to change involves a tendency to lose energy, then at their lowest energy-level, there is nothing they can do except stay the same.

I hasten to reiterate, however, that this does not mean that the body is inactive. Equilibrium is *precisely activity, but stable activity.* That is, in an atom, for instance, in its ground state, there is activity going on between the protons and the electrons, which can be considered as a constant kind of "exchange" of energy (and can even be expressed as an exchange of particles) among them. But this "tossing back and forth" happens in such a way that for every "particle" that goes one way there is one going the other way, or for every loss there is a corresponding gain; and so no *change* is taking place, really; there is no *difference,* though there is *doing*.

There may, therefore, be acts that look like changes, but are in fact acts in equilibrium. How do you tell the difference?

Conclusion 4: A body in equilibrium will not either gain or lose energy.

3: Instability

If the energy level remains the same, then the body is simply being active; it only changes when there is either a net gain in it afterwards or a net loss. This, as we will see, is also true when the body becomes a different kind of body or even a multiplicity of bodies, as when you burn wood and it turns into carbon dioxide, water, and ashes. These products of combustion have a different energy-level from the wood as it existed at the beginning of the change (as can be seen from the heat given off as "free"—wasted—energy).

However, any "change" which is *cyclic*, where the body which is "changing" returns exactly to its original condition, and where this cycle keeps repeating itself, is not a change at all, but an *activity in equilibrium*. It seems to be a change, because within the cycle, it looks as if there is a loss or gain of energy; but the energy is being traded off within the system (which is, of course, a unit) and so *is maintained* in the system, as can be seen from the fact that the part that lost the energy regains it in the course of the cycle.

Thus, "changes" which can be expressed by sine curves in physics are actually acts in equilibrium, not change.

However, if the sine curve has what they call an "envelope" in which the amplitude diminishes, then a real change is going on, because energy is being lost or gained. The "envelope" is the real change, and the sine curve expresses the internal activity that is doing the job of getting rid of the energy in the way expressed by the envelope.

For practical purposes, *systems* in the "real world," as they say, always act in sine curves with envelopes, for the reason that a system is an interconnection of bodies acting on each other, which means that each is doing work; and in doing work, as the Second Law of Thermodynamics says, some energy is lost out of the system.

Thus, it is only the "perfect" pendulum which swings back *exactly*

to where it was when it started; but any real pendulum will lose energy because of friction at the point at which it is suspended, friction against the air as it moves, and so on—which, of course, is why you have to wind your grandfather clock, even though so little energy is lost that it goes on for days on a winding.

Similarly, the earth-moon system is slowing down the rotation of the earth because of the pull backwards by the revolving moon, while at the same time the earth is making the revolution of the moon speed up a bit, which brings it into an orbit closer to the earth, and so on; so even though it seems as if the planetary bodies are moving in perfectly cyclical orbits, this is not actually so; they are not at their lowest energy-level, and are actually adjusting themselves downward, imperceptibly, millennium by millennium.

On this point, Newton's First Law of Motion (that a body at rest will remain at rest or one in motion will keep moving in a straight line at a constant speed) is one of those abstractions like the "perfect pendulum." It is supposedly what *would* happen if the body were not acted on by *any force whatever from any other body;* but in the real world, this would mean that no other body could exert a gravitational or electrical or other pull on it, which in turn would mean (as we saw when discussing position) that it would be nowhere—in which case, as we will see, it becomes meaningless to say that it is moving.

But that aside, Newton's First Law does not apply in the real world, because every body is subject to many forces. Newton got it from noticing that the more you reduce the effect of these forces (insofar as you are able) the more a moving body tends to maintain its speed and direction. But of course this can only be tested by using horizontal motion on the earth, because you can't get rid of earth's gravity, which is significant. Even in orbiting spacecraft, in which things are "weightless," this is true, because the motions of objects

in the spacecraft are observed in relation to the spacecraft to be weightless because everything is falling together, not because gravity has been turned off.

But further discussion of this needs a closer look at movement. For now, what I am saying is that in systems, interactions always involve a loss of energy, and so it is only in bodies, if anywhere, that you will get cycles that are actually equilibrium—and there is even a question there[34].

I might point out that inanimate bodies are bound to look static in equilibrium when compared with living bodies, because the living body is *both* a physico-chemical body (with, consequently, its equilibrium as such at its minimum energy-level), *and,* as living, a body that tends to maintain as its special equilibrium an energy-level higher than this ground state. But since the equilibrium as alive is *unstable* from the point of view of the body as a physico-chemical system, this "maintenance" will take the form of actually gaining and losing energy in a kind of cyclic way[35], and so there will be real changes going on, even though the changes will "hover around" a certain definite high level of energy. But more of that in the next Part.

But having mentioned a body's being unstable, let us now pass on to a definition of this opposite of equilibrium, which will attempt to show what Aristotle was "pointing to" by something's being "in

[34]I suppose, of course, that you could say that pure spirits are eternally "in equilibrium," because their activity never changes. But "equilibrium" is contrasted with "changing," and properly applies only to something that *can* change: that is, a body.

[35]But not a real cycle, as in a pendulum, where energy is neither gained nor lost. I am talking here about the body's actually losing energy, and then absorbing a replacement from the environment (as when you breathe or eat).

potency."

***Instability* is the condition in which the unifying energy has a quantity that it cannot exist with in that form.** Or, alternatively, it is a condition in which the *total amount* of the energy of the body is *different from* the amount that is compatible with that body's being that *kind* of body.

We said that the total energy of the body reflects the amount of the unifying energy, because the unifying energy has to hold the parts together and make them behave in and for the unit; hence, if the parts have more energy, it is going to need more energy to do the job of unifying the parts. Hence, if the parts have "too much" or "too little" total energy, then this will have to be reflected in some kind of a *strain* on the energy unifying them; and this strain is instability.

The underlying assumption of this view of the internal cause explaining why a change begins in a body is that *every body has a definite energy-level that is compatible with it and that is its equilibrium*.

For inanimate bodies, this is the minimum for the particular form of unifying energy in question (or the kind of body in question). For inanimate bodies, of course, this would also mean that two bodies in *absolute* equilibrium would be totally indistinguishable. "They" could not even be in different places, because to be in a position means to be acted on by other bodies' fields, which of course would involve being unstable to however minimal a degree. A body in absolute

equilibrium would have to be in no position at all[36].

What this amounts to is that no body we are aware of is in absolute equilibrium; but to the extent that physical bodies approach their equilibrium, then bodies of the same kind are indistinguishable from one another. This is another advantage that physics and chemistry have over the life sciences: Since living bodies' equilibria are at a high (and physically unstable) energy-level, there is no *one* energy-level implied as equilibrium in any given form of life; the same kind of living body can exist in equilibrium at all sorts of energy levels, within a certain range (too little or too much energy destroys it as living, of course).

In any case, when this equilibrium energy-level is disturbed, either by absorption of energy (as is always the case in inanimate bodies, and sometimes in living ones also), or by losing energy so that the internal energy is too low for the equilibrium (which only happens in living bodies), the body cannot exist—and so, of course, it

[36]Presumably, if there is a return to life after death for our bodies, then they would then be in absolute equilibrium (though as living, not at their lowest possible energy-level; they would somehow have their energy "closed off" so that they could neither lose nor gain any). In that case, they would not be able to be affected by their surroundings, and consequently would not be in any position. But since a cause is not as such affected by having an effect on something, this does not mean that such bodies could not have effects on the earth. Thus, Jesus could "come through the locked door" after his return to life, because the door could not affect his body. But he could be seen by his students because he could have an effect on them. Evidently, though, his body was quite different from what it was before his death, if John is reporting accurately when he says of the students' facing Jesus at the lake, "And no one dared ask him who he was, because they knew it was the Master." .

immediately goes out of existence as in this condition[37].

Instability, then, is not a *state*; it cannot be, because it involves an internal *contradiction*: the body cannot exist at the energy-level it now exists at. Hence, *as soon as* instability occurs, it vanishes.

This does not mean, however, that it vanishes all at once, so that instantaneously the unstable body is back in equilibrium; it may be that the energy can't be got rid of in one fell swoop, or that there isn't enough energy around to absorb to regain the high-energy equilibrium all at once. In these cases, the *degree* of instability vanishes, or lessens *in the direction of* the equilibrium implied in it.

[37]There is a version of this in inanimate bodies, however, in what are called "endothermic" reactions. Sometimes, the instability reached (by lowering the energy level) is such that the equilibrium it now "points toward" involves a *higher* energy-level, in which case, it sucks up energy from the environment. It is all very mysterious, but it is the physical basis for the possibility of living bodies. The difference is that the inanimate body is always *forced* into instability by energy introduced into it, while a living body (as physically unstable) *loses* energy and then spontaneously produces the proper "endothermic" process.

Chapter 4

Direction and purpose

This allows us to see what is "pointed to" by the term "direction." Since instability is self-contradictory, and a body cannot exist as unstable, and since equilibrium is a state in which there is no internal contradiction, then obviously we can draw this conclusion:

Conclusion 5: The direction of any change is always and only from instability to equilibrium.

This needs a bit of discussion. First of all, what about the transition from equilibrium to instability; isn't that a change? In one sense, I suppose you could say it is, but in another, it isn't. Clearly the energy-level of the changing body is different when it is unstable from what it was an instant ago before it absorbed the energy; and so in that sense, there has been a change "toward" instability.

But that is not really an accurate way of looking at it. *As soon as* the body absorbs the energy, and even *while* energy is being forced into it, *it is getting rid of it*. Consider what happens as you press your foot on the accelerator of the car, making the engine run faster and faster. You are feeding energy into this system, and feeding more and more, making it more and more unstable, and so making it give off more and more energy. But it is *not* tending toward being more and

more unstable; as soon as you feed *any* fuel to it, it begins to run, which is its way of *getting rid* of the excess energy; and the more fuel you feed, the greater the contradiction between the instability it now has, and the more work it does to get rid of this excess energy. Hence, from the very beginning, the tendency of the changing body is *to return to* its ground state, not to become more unstable; it is just that it keeps being "attacked," as it were, by more and more of this outside energy, and so it looks as if it is in a process toward greater instability, when in fact its own process is in the other direction.

Similarly, when you cook your soup, the heat of the pan makes the soup hotter—which is an instability, as can be seen from the fact that if you take the pan off the burner, the whole system cools down. What is going on is that the electricity in the burner excites the molecules of metal, giving them too much kinetic energy; they get rid of this by hitting the molecules of the pan, which then get too much energy, and start hitting the molecules of the soup (and the air outside the pan too, of course, as you can feel if you put your hand near it), which then become unstable and bang into each other harder and harder as more and more energy gets bumped into them. But these collisions get rid of this excess energy by hitting the air, which carries off the excess; and once you take the system off the stove and stop feeding energy into it, the energy is rather quickly dispersed out of the soup.

Something else goes on, however, in the soup, if you're actually cooking it and not simply warming it up. Some of the bodies you put into it are just not there afterwards; they have got combined into new bodies by the heat that is applied to them. That is, there has been a chemical change, and new chemical substances have been formed out of the substances that were the raw ingredients. Baked bread, for instance, tastes different from the raw dough, because in fact it is a different *kind* of body after it is baked.

4: Direction and purpose

But we will see this distinction shortly. For now, let us note that the change *as such* starts from the instability and goes *toward* equilibrium.

Direction **means a change insofar as it is going from instability to equilibrium.**

The direction is the "towardness" of the change (or its "fromness" if you want to look at it the other way). Notice that "direction in space" insofar as it is a *direction* and not just a space relation involves (at least an implicit) *movement* from the beginning-point to the end-point. Of course, the "directions" from the origin in coordinate systems are just mental devices that do not correspond to anything in reality, as I said earlier when talking about distance and position.

Direction, of course, is what "vector quantities" have in mathematics. In the non-technical sense that physicists learn, vectors are numbers that have "magnitude (quantity) and direction"; in rather purer mathematics, they are "ordered pairs of numbers," where it makes a difference which one comes first. This latter is an abstraction of the notion of "from" and "to," which of course is what we were just talking about when we spoke of direction. Hence, every vector contains an implicit change from the first number toward the second, usually illustrated by an arrow pointing from the first to the second (or a little arrow written over the number itself, if there is only one, in which case, you are supposed to know where the beginning and the end are).

Notice that energy itself in physics is a *scalar* (non-vector, ordinary) quantity, while force is a vector. And this fits with what we have been saying. Energy *as such* is equilibrium and is not headed anywhere; it has no direction, but just *is*. Force, on the other hand,

is, like acceleration (also a vector) the *causality* of energy, its tendency to produce a change in what is affected (the accelerating body); and so it will have a direction.

In physics, when you integrate the force equations, you come up with work on the left-hand side; which as a "dot-product" or scalar product turns into a scalar (because the work is just the amount of energy used, and obviously as used up it is not headed anywhere); while on the right-hand side, you get the *square* of the velocity in the kinetic energy; and so even if there is velocity there, this product is also a scalar (because what you are interested in is the amount of energy, not where the body is moving to).

But the fact that the change always points to some equilibrium allows us to define another important term:

***Purpose* is the equilibrium that a change is directed towards.**

First, distinguish the purpose clearly from the direction. The *direction* is "to *get to* the purpose"; the *purpose* is the end itself, the goal where the change stops. It is equilibrium, of course, because every body changes because it is unstable, and every instability implies an equilibrium it is directed towards; and once this equilibrium is reached, then *that* change stops—though, of course, if the body is unstable in different ways at the same time (which is not only possible, but usually happens), it still might be changing in other directions.

For instance, a body might be falling and also getting colder; as unstable gravitationally, its direction is downward, and its purpose is the lowest place it can be in that field (the closest to the center of the other body it can get to); as getting colder, it has an excess of heat energy, which it is dissipating into its surroundings, and the purpose of that change is the temperature which is the same as that of the

surroundings ("thermal equilibrium"). This same body might also be reading this book while falling and cooling off, and the purpose of that change is the knowledge acquired by it; and it might be digesting food while all this is going on, and the purpose of *that* change is the biological equilibrium of having the "right" total internal energy. And so on.

The point is that, while a body might be constantly changing, you can still define a *given* change in terms of a given instability; and that particular instability always implies a *given* equilibrium which stops that particular change, and toward which that particular change is directed.

Hence, we can draw the following conclusion:

Conclusion 6: Every change has a purpose.

A body cannot change unless it is unstable; but since to be unstable is to be in self-contradiction, unable to exist as such, then the instability necessarily has an equilibrium that it is directed toward. And this equilibrium is its purpose.

In principle, the purpose of any change could be known, provided you knew what the instability was; but in practice it is not quite so simple.

Actually, one of the things that makes physics and chemistry so powerful as sciences is precisely that, since these two sciences deal with inanimate bodies, and since the instability in inanimate bodies is always an *excess* of energy, and since the equilibrium of an inanimate body will always be the minimum energy-level for the configuration in question, and since inanimate bodies of a given type in equilibrium are indistinguishable from each other, then by knowing "the initial conditions" (how much excess energy there is in this instability, and so on), and by watching what happens a couple

of times to a body in these initial conditions, you know what the purpose of this change is, and you can predict that it will be the purpose of *any* body of this type under these conditions.

Physicists, however, don't like to talk in terms of purposes, even though they are constantly talking about predictable results—and "purpose" in the sense I defined it is nothing but the (in principle) predictable result of a change. The reason they don't is that it sounds as if the bodies "have a motive" while they are changing and "choose" to be at the purpose—or that somebody (God) is choosing for them—when in fact all that is going on is that a strain in the internal structure is righting itself, or excess energy is being got rid of.

This reluctance to look on changes "teleologically" (with reference to their end or purpose) is legitimate, given the history of the concept of purpose.

Actually, the original notion of "purpose" was more or less like what our definition states: the one the scientists have no use for: the human sense of purpose, which is the end *chosen* in making a given choice, as when I say, "I am going to finish writing this book," and then have as my purpose the finished book.

Aristotle gave the term "purpose" the purely metaphysical (or mechanical, if you will) meaning I defined it to have above, as simply the end of a change (or in his terms, the end of "being in potency," which, as you recall, meant the body's having its end "outside" it in some sense). And he pointed out that this was the *primary* meaning of the term, and human purpose (implying knowledge of the end and a deliberate choosing to get there) was a derived sense.

I think he was basically right. In my terms, this is what the relation between the two senses is: The purpose is always the equilibrium toward which some instability is directed. What happens in human beings, however, is that, because they can conceive by

using imagination states of affairs (either in themselves or in other bodies) that are not the same as the way things are—as we saw in the section dealing with truth and goodness—then they can take this imaginary ideal and *use it to cause an instability within themselves, which instability now has as its purpose that ideal*[38].

That is, when you make a *choice* as opposed to simply evaluating a situation (and complaining, for instance, that it's not good), you use the ideal, which doesn't exist, as the basis for rearranging the internal energy you have (which is too high anyway for physical equilibrium) and *making yourself unstable* with an instability that has the ideal now as its (physical) purpose.

So the human sense of purpose is not really in itself different from the metaphysical (or, if you will, the "physical") sense I defined above; the only difference between human beings that "act for a purpose" and other changing bodies is *how the instability got there*; once it's there, the whole thing occurs automatically. This can be seen from the fact that if you choose to put your hand up to your face, your choice just creates the instability of your hand's not being at your face; but how your body goes about removing this instability is something your mind, really, has nothing to do with. In general, you don't even know how it happens at all; it just happens.

Hence, human purpose in the sense of "having a motive or goal" merely deals with how you become unstable by means of your

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[38]The idea here, as you will see in the next Part, is that living bodies, as existing at a super-high energy level (above their physico-chemical "ground state"), have some excess *internal* energy that they can "play around with." The human spirit uses this residual energy in the brain and directs it into certain motor nerves, setting up instabilities in them which lead to action of various organs of the body; and thus, a living body can *initiate* changes in itself, as Aristotle saw. So the goal you conceive for yourself, *insofar* as it is such as to produce this instability, turns out to be the *purpose* of the (physical) change you set up as the purpose in the sense of the "motive."

internal energy, and not with what your body does with this instability and how it reaches the goal; so that the main sense of "purpose" is just what Aristotle said it was: (to use my terminology) the equilibrium implied in any instability.

However, since "purpose" does have these two senses, and since everyone before Hume thought that "goodness" was something objective; and since Aristotle muddied the waters (as we saw in discussing goodness in Chapter 10 of Section 5 of the first Part) by saying that the "end" or purpose was "the good" (because, after all, things naturally tended toward the end), then it wasn't surprising that Christian thinkers should confuse the two senses of purpose and bring "God's purpose" into the picture.

The argument, begun by Augustine and developed further by St. Thomas, went something like this: Bodies tend to act in predictable ways when they change; they do not change at random, but given instabilities have always the same purpose for the same kind of body. Hence, changes tend toward an end in an intelligible way (because predictable and not random). But the end is the good. Hence, bodies tend toward their good in an intelligible way. But unintelligent bodies cannot know what is good for them or do anything in an intelligent way; *as* unintelligent, they would act randomly. Therefore, they must be *directed* from outside themselves toward these purposes which are their good. But whatever is doing the directing, if it is not intelligent, must be directed ultimately by something which *is* intelligent, or the effect is greater than its cause. Therefore, what directs unintelligent beings toward rational goals must be some intelligent being. But since these bodies are directed to their goals *by their nature* (and not some outside force), then this "outside intelligent director" must be the Being which causes them to have this nature; and since this is the cause of their (finite) existence, this Being is God. Therefore, God directs all bodies toward

their goal, which is their good.

There are, unfortunately, several flaws in this reasoning. First of all, it does not follow that an unintelli*gent* being cannot act in an intelli*gible* way. What "intelligent" means (certainly in this context) is "capable of seeing a state that does not exist and causing an instability whose purpose is that state"—or "knowing and choosing goals for a body," if you prefer.

But what is intelligible is "what can be understood" or in this case, "what is constant and not random." Now there is no *effect* in what is constant that says that it is inexplicable *unless produced by something which can know ideals.* All "constant" means is "the same all the time."

Hence, all we have to do to assume that a given instability in a given body has a given purpose is assume (a) that the body's structure (i.e. its parts and the form of the unifying energy) remains the same; and (b) that the "initial conditions" for the change are the same in all the cases in question (i.e. that the *amount* of internal energy over the equilibrium is the same in all cases). If we assume that the same type of body with the same excess energy will get rid of it in the same way, then we have all we need to account for the predictability and constancy of the change, without assuming that some being had to "choose for" it what its "purpose" was (i.e. that it had to have a purpose in the *human* sense in whatever was making it change)[39].

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[39]Of course, whatever accounts for its finite existence (i.e. God) would *also* account for its structure as finite (since the "structure" is, in the last analysis, the complex limitation of existence which it "has"); in which case, the stable structure and the "initial conditions" are built into it; and so its tendency toward *this* equilibrium under *these* conditions was in fact caused by God. In this sense, the Scholastics are right. The problem I have with this is that it doesn't explain *why* it has this tendency and no other, since God is the cause of *finiteness as such,* and only secondarily of the

That is, suppose an inanimate body had no intelligent being directing it. Then it would either act randomly (as some do, such as dice) or constantly. What I was saying above is that (a) there is no reason for saying that it *must* always act randomly and that (b) if you assume that it is identifiable as the same body throughout the change, then this implies a constancy, which would lead you to expect a constancy in the change—which would make constancy of purpose *intelligible* without resorting to anything intelli*gent* being its director.

The example of dice is instructive in this regard. The die when thrown operates randomly, because there is nothing in the throw making a given face appear on top as the purpose of the throw. But we know that in the long run, any given face will appear on top one-sixth of the time *simply because the die has six faces* and the instability is such that the minimum-energy state for a moving die is to be at rest with a face on the bottom[40]. Hence, the purpose of the throw

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specific finiteness things have (which definiteness is *also* caused by other creatures).

[40]This preservation from total randomness, by the way, is *not* a logical necessity. There is no reason why, if a die has six sides, it cannot operate *totally* randomly, so that in the long run it is not predictable that the one-spot will appear on top one-sixth of the time. The reasoning goes this way: There is no reason why the one-spot should be the one to appear on the first throw (obviously). But the first throw is not in any way *connected* with the second, and so there is no reason for it to appear on the second, and the same goes for the third, the fourth, the fifth, and so on to infinity. There is no *reason,* therefore, given even an infinity of throws, why the one-spot should *ever* appear on top. For those who say, "Given an infinity of throws, all possibilities will eventually have to be realized," I answer that the one-spot's appearing not at all, or only once, or whatever number of times, is, as I just showed, a real possibility; but if it appears not at all, this contradicts its appearing once or one-sixth of the time. That would mean that contradictory possibilities would have to be realized, which of course is a violation of the Principle of Contradiction—on which logic and mathematics, by the way, is based.

(because of the shape of the die) is being at rest with a face on the bottom (and its opposite uppermost). But there is *no* purpose that tells you *which* face it will be (or the throw was precisely *not* random). That is, you could throw the die in such a way that you started with the "one" on top in your palm and it rolled over four times and wound up with the "one" on top when it came to rest. But that would be cheating, of course, because the throw now is not random.

So we now have a change that is purposeless in some respect—which calls into question the notion that the Maker is "directing" every change toward its purpose, which is its good. True, you *could* argue that if you knew all about the initial conditions, you could predict what face would wind up on top, and so the purpose is there, but just not knowable. But while this may apply to the die, there are indications from quantum mechanics and catastrophe theory that there are changes where this determination of the purpose from the initial conditions is in principle impossible.

But notice that, even not knowing the purpose of any given throw, *we know that in the long run* the "one" will appear on top a sixth of the time *simply because we know that the die has six faces all the time*.

Hence, the purpose of a whole *disconnected* series of changes is

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The point is that, however much it might "stand to reason" that the one-spot in the long run will appear one-sixth of the time (because the die always has six and only six faces) you can't say that there's *mathematical necessity* in the laws of probability; it's just that the material universe is so constructed that they work (and the "law of averages" where a run of three hundred one's in a row means that it "stands to reason" that its coming up on the next throw is extremely unlikely—because three hundred one appearances of the one on top is *much* more unlikely than three hundred—doesn't work. Why? Both "stand to reason," but the universe is just constructed that way. So, interestingly, the laws of probability are *empirical* laws, not strictly mathematical ones.

known *because of the knowledge of a constancy in the body,* without our assuming that God is actually directing this body to make the "one" come up a sixth of the time for throws that have no connection with each other.

And so the point of the predictability is *simply the constancy of the operating body*, and does not of itself have anything to do with "being directed toward a goal by something that chose the goal."

Hence, the fact that changes in a given type of body lead toward predictable goals does not imply that they are directed toward their goals by what is intelligent and chooses the goal for them.

Secondly, if the goal is "the good," then we get into all the difficulties we saw in Section 5 of the first Part of "hidden goodnesses" in destructive changes, and in the contradiction implied in reversible changes, where what is better (the new goal) is what was worse (because it is what existed before the change in the opposite direction).

From all of this it follows that you can't argue (as St. Thomas did in his "fifth way" to demonstrate God's existence) that the constancy of changes in unintelligent bodies imply an intelligent director, who wills them to achieve their "good."

And what soured physicists ever since Galileo on this notion of teleology was precisely this dragging of God into the picture; because no matter how something changed, the "teleologist" would say, "Well, obviously God willed it to be this way, and if he did, then he had a reason for it, and the reason means that it's better this way."

True, if a change happens, then it means that God wills it to happen as it happens, because a change is obviously a finite act, and as such it must be caused to be what it is by God. But the only "reason" God has for any finite act is *that it be what it is.* He can't have any *purpose* for it beyond this, because this would mean that he would be *dependent* on its becoming whatever it became; and God

can't be dependent on anything finite. Hence, God does not "want" the change to happen "because it is better this way." As we saw in Section 5, "better" and "worse" are meaningless except from a *human* point of view; and so all that God's causing the change to happen means is that it happens as it happens (and this implies as dependent for its specification *on its structure and its instability*). It's just *the fact that the change is finite* that brings God into the picture; anything else about it necessarily would have to have a *different* cause, because it would be a different effect from finiteness as such, and different effects necessarily have different causes.

So yes, there is something about changes and their teleology that involves God: the fact that the change is a finite act, and the structure and instability are also finite acts.

I should mention here, however, that there is something other than constancy or predictability in changes in the world that would lead one to say that God has got something to do with them. The Second Law of Thermodynamics says that inanimate bodies tend toward lower-energy states; and it also says as interpreted in physics that this means that things go from more organized toward less organized. But if you look at evolution, even the evolution of inanimate bodies, the basic direction is toward *more* organized bodies—exactly the opposite of what you would expect from looking at things "by themselves." This deviation from the "natural" direction needs explaining somehow.

We will see more of this in the next Part when we include living bodies in our look at evolution; but the point I am making is that while any given change is perfectly consistent with the Second Law of Thermodynamics, it is still true that the basic direction of evolution is the *reverse* of what you would expect from that Law. It is as if a die were thrown a million times and came up with the "one" on top every time. It *could* happen; but anybody who had any sense

would tend to look at the die to see if someone had loaded it.

Hence, there is very strong evidence in evolution that the dice have been loaded; and since this tendency is in the universe as a total system, then it sounds as if the one who caused it to be what it is is the one who did the loading[41].

With that out of the way, let me now draw another conclusion based on the notion of purpose as I defined it:

Conclusion 7: Equilibrium has no purpose.

Any body in equilibrium does not have a "goal" or purpose. It just *is*. Equilibrium sometimes *is a purpose,* if it is the equilibrium that ends a change; but it never *has* one; it is complete in itself; it is simply finite existence; it is what it is, and it stays what it is; it has no direction or "tendency"; it just is.

Well, but everything has a purpose, doesn't it? No. This is obviously false. Even those who hold it (those who talk about "God's purpose" for everything and say, "You wouldn't be here if God didn't have a purpose for putting you here") don't think that *God* has a purpose. He just is, even if, for them, he is the purpose of everything else.

No, what *has* a purpose, presumably, has not achieved its purpose,

[41]I should mention that physics counters that we don't know of this tendency in the universe as a whole, because we don't know if stars with planets are scattered through the universe, or whether our earth is unique; and with so many billions of stars, it is not unlikely that by chance this anomalous reversal of the basic tendency of evolution would appear in some small pocket. This is true, and is why the argument I gave is no "proof" for God. But it should be said that there really shouldn't even be stars, if the universe began with an explosion; the detritus of that Big Bang should have distributed itself evenly throughout space, with perhaps only a very few stars, which would then burn themselves out. So the case is by no means closed.

and so is *incomplete* until it has achieved its purpose. But this means that it is *unstable*. What else could it mean? But then, of course, it is precisely *not* in equilibrium; and once it achieves its purpose, then it (in that respect) has no further purpose and is intelligible in itself (or if you want to get picky is as finite intelligible in itself and through God as the cause of its finiteness).

Hence, all changes have purposes, and only changes have purposes. Equilibrium has no purpose and needs none.

Having discussed what instability implies with respect to the equilibrium to follow it, what about what it implies with respect to its preceding equilibrium?

It would seem that we could immediately draw another conclusion, that every change needs some external cause to get the body from instability into equilibrium; but it turns out that things aren't quite that simple.

This external cause putting something into instability is, of course, what has historically been called the "efficient cause," and is for practical purposes the only thing that anyone is referring to nowadays by the term "cause" itself.

The argument, which we find in St. Thomas's Second Way to demonstrate God's existence, is that no being can put itself into "potency," because "being in potency" means to *lack* an act, and only a being "in act" can cause something; therefore, any being "in potency" has to have an external cause for its being in potency.

And even in our terms this seems obvious; because if the being has too much energy to exist in this form, then obviously it couldn't have given itself this excess of energy; and so it needs an external cause.

This is true. And since inanimate bodies are unstable only when they have too much energy, we can in fact draw this conclusion:

4: Direction and purpose

Conclusion 8: Any instability in an inanimate body has to have been introduced from outside it.

If this efficient cause is itself energy from a body—the efficient causer (it doesn't need to be, notice, because a spiritual act, as active, can cause changes)—then obviously, this causer will have to be a body which is *giving off* energy, and so is going from a higher to a lower energy state—or in other words, it has to be a body which is itself unstable, or is changing.

And this is especially true if the efficient causer is an inanimate body, because the same argument applies.

Note, as St. Thomas says in his first way, that it is perfectly true that this retrogression cannot involve an infinite number of causers like this, because if you look at just the effect (unstable because of too much energy) and its immediate causer (unstable because of too much energy) then the *combination* of the two has an excess of energy over equilibrium, and therefore, the combination is not explicable.

If there were an infinite number of these unstable causers, then the whole infinite set would be *unstable* with an excess of energy over its equilibrium, and so would be impossible (because instability, remember, is a self-contradictory condition, and contradictions can't exist by themselves). Hence, there has to be a "first causer" of any series of unstable inanimate bodies causing (by their sloughing off of excess energy) instability in other unstable inanimate bodies.

It sounds, then, as if St. Thomas' first and second ways of demonstrating God's existence were valid. Then why did we bother to go through the elaborate rigmarole in Section 4 of the first Part?

Because the argument does not in fact lead to the existence of an *infinite* being, but only to one that (a) can cause a change, and (b) is not causing it by its instability.

4: Direction and purpose

But living bodies *exist in equilibrium* at a high energy state, which is unstable from the point of view of the physics and chemistry of the body (i.e. the biological equilibrium is *above* ground-state equilibrium). Hence, they can, while still in equilibrium, *rearrange* this "physical excess" of energy within themselves, and so can *initiate their own changes,* and so do things which give off energy—which they then recoup by actively "sucking it in" from the environment.

Hence, although it seems that St. Thomas' argument leads to the existence of God, all it does is lead to the existence of a living being[42]. And, in fact, when I decide to type at my keyboard, I set in motion (by my choice) a series of electrical impulses to my finger muscles, which then tap out the letters, and these instabilities in the keys create instabilities in the contacts below them, which then make the circuits unstable, which put letters on the screen and onto the disk. My choice is the "first mover" of this series of changes, and as soon as I say, "Enough for one day! I'm tired!" the whole series stops, because the excess energy is not being poured into the computer, and it falls back to its ground state.

Now you *could* argue that the whole universe (if its evolution even remotely resembles what astronomers say it was) was once inanimate (because stars are too hot for living bodies to exist, and there had to be stars before planets); and if it all began in a Big Bang, then obviously what "banged" was an unstable inanimate body, and something or other had to get it into that condition.

But this is still no proof, because of two possibilities: First, what

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[42]Actually, this is not quite true, since non-human living beings only have acts which are in some sense energy (though surpassing the limitations of their quantity, as we will see). But human choices are spiritual acts, having no quantity in themselves; and yet the clearly can initiate the rearranging of energy in the brain, which then causes the change in the body. Unlike God, however, they cannot directly initiate changes *outside* their own body.

got it into its initial instability could be a living being—or even an unstable body—beyond it (after all, our argument for God's existence does not rule out the possibility that we might have *begun* to exist as the product of some super-body beyond the Einsteinian curved space, and so nowhere with respect to it). Secondly, depending on the total mass of the universe, it may be that the universe is alternately expanding and contracting cyclically, and the Big Bang is just one of its phases of internal trade-off of the same amount of energy. In this second case, the universe is in equilibrium, not unstable, and so needs no efficient cause.

Still, *if* the universe as a whole is unstable, then obviously *something* beyond the universe either "made it from nothing" or got what was in equilibrium out of equilibrium by pouring an excess of energy into it. The point is that you can't automatically call that being God, because such a being does not need to be infinite to do the job.

Now then, the only thing left to mention before taking a look at the actual act of changing is to make explicit something I have already referred to: that there are two different *kinds* of changes.

A *substantial* change is a change in which the body afterwards is a different kind of body.

An *accidental* change is a change in which the body afterwards, while different, is still the same kind of body.

Obviously, in the case of an accidental change, the form of the unifying energy is such that its excess quantity does not split the body apart; the body is able to get rid of the excess energy and return to its ground state (or as nearly as possible, given that *some* energy is coming at it all the time) while keeping the same basic configuration

of the body.

In the case of the substantial change, the instability is such that the unifying energy cannot cope with the amount, and so the body must be reconfigured, with a structure that can deal with the amount of energy in question. Thus the body becomes one or more different kinds of bodies, with a different kind of unifying energy; and very often, this new body (or these new bodies) exist at a very different energy-level from the original unstable body; but the restructuring is able to get rid of the excess—and we have something like an explosion.

For instance, the very first experiment in chemistry I performed was to heat mercuric oxide in a test tube. The first thing that happened was that the powder got hotter: an accidental change. The energy added to the molecules was not great enough so that they couldn't release it by moving and hitting each other more and more vigorously; which is what the heat was.

But when a critical temperature was reached, the molecules added so much energy to each other as they hit each other that it was no longer possible for them to exist as mercuric oxide; and so the molecules "broke apart" into mercury and oxygen; and oxygen, of course, as a gas, can handle much more heat, and so can mercury as a metal.

Note that a given interaction between bodies can be a substantial change on the part of one of the bodies and an accidental change on the part of the other. When you eat an oyster, say, and it gets into your digestive system, the oyster stops being organized as an oyster (and so it undergoes a substantial change); but the parts of the oyster and a good deal of its energy is absorbed into your body, replacing worn-out parts and increasing your total energy up to (let us hope) your biological equilibrium level; and this is an accidental change for you, since you obviously are still a human being throughout the

process of increase of energy.

Observe that, since you are a unit, the oyster (or parts of it) *become you*. You do not "have" an oyster "inside" you except for that brief time before it gets digested (or really the briefer time before it dies). Once it is assimilated, there is only one body there, and that is you. You are not, as I have stressed, what you are made of; you are parts united with the special unifying energy that is your unique unification of material.

4: Direction and purpose

Chapter 5

Process

Let us now look at the act of changing, which is called "process". A good deal of controversy has arisen over this in reading ancient texts, because "process" (*kinesis*) has been translated "movement," which is only one kind of process, though perhaps the most obvious. But Newton's First Law of Motion (that a moving body, left to itself, will continue moving at a constant speed in a straight line) seems to say that movement is not a change, but an act in equilibrium; and so the waters have been muddied when people look at Aristotle or St. Thomas in the light of Newton.

But first of all, both Aristotle and St. Thomas admitted the existence of acts that look like processes and are not, where no change is really going on. They called these "acts of a being in act," such as actually thinking of something you already know, like two and two are four. You actively possess that knowledge, and so you have not been become different by calling it up from within you. Hence, if it could be shown that movement (changing position) involved no real difference in the body, they would have no problem with saying that it wasn't a process. We will see, however, that "in the real world," as they say, movement is in fact a process. What Newton did was make an abstraction from real-world situations.

In any case, what they meant by *kinesis* (or "motus" for St.

Thomas) was "the act of a being in potency insofar as it is in potency." That is, it is what an *unstable* body is doing to get itself out of instability. Obviously, any body which is maintaining its energy is not "in process," then.

It sounds as if their definition is reasonable, and so let us make a similar one of our own:

***Process* is the act by which an unstable body regains its equilibrium.** Or, if you want to put it metaphysically, ***process* is a change as a property of some body.**

In other words, process is the act itself of changing. In the view advanced above, this would mean that the body in question is either gaining or losing energy; and the process is the act of acquiring or giving up energy.

It follows from this that process is always a "vector" activity, since it will necessarily have a direction (from instability to the purpose); and it also implies what Aristotle said, that process is an "incomplete" activity, since it is the act by which a body goes from a state of incompleteness to its equilibrium.

Let us put this into a formal conclusion::

Conclusion 9: All processes have a definite purpose, and processes are the only acts that have a purpose.

As Aristotle also said, even though process is not activity in the fullest sense, it is the most *obvious* case of "doing something," because the body in process is becoming different because of its process, while activity in equilibrium *seems* to be "doing nothing" because the body is just staying the same. It was Aristotle's genius to realize that a body that is staying the same is actively maintaining

itself, and that this self-maintenance is the ontologically prior meaning to "activity," while the activity by which the body gets to equilibrium is a second-rate kind of activity in reality.

Since processes involve instability, then it is also obvious that we can say the following:

Conclusion 10: Purely spiritual beings do not undergo process.

There may be (and, as we will see, there are) processes in the spiritual dimensions of bodies that are organized with a basically spiritual act, provided that this spiritual act also has in one of its "reduplications" of itself a quantity. We know, for instance, that we acquire knowledge, and that our consciousness changes; but it does so because one of its "dimensions" is the nerve-energy in the brain, which undergoes changes. We will see more of this in the next Part. But if one is talking about a *pure* spirit, there is no sense in which it is unstable, and hence its activity is necessarily in equilibrium.

Process philosophers, of course, will have none of this, because for them "being" is "becoming"; and this, of course, is because they have missed the Aristotelian insight I spoke of just above, that process is not coextensive with "activity," and in fact, since it implies instability and self-contradiction, is an activity that does not make sense by itself, let alone being the activity that is supposedly the intelligibility of everything. But I don't think we have to belabor this.

Since process is the act of a body, it won't be surprising to find that it is itself a form of energy, with a quantity. But process, since it begins somewhere and ends somewhere, has actually two quantities, one dealing with the difference between the beginning and the end, and the other the quantity of the act of getting from one to the other. These two are actually independent of one another, and not

reducible to each other. Let us define them:

The *length* of a process is the difference in energy level between the initial instability and the final equilibrium.

The *velocity* of the process is the quantity of the process as an act.

You can see that the two quantities are independent of each other if you consider going from Boston to New York at thirty miles an hour as opposed to sixty miles an hour or five hundred miles an hour. The length of the process is the same in each case (Boston to New York); but the velocity is very different.

The same is true of other processes than movement, like heating water. You can bring water from freezing to boiling at a rapid rate (velocity), or slowly; but the length of the process is the same. And, of course, you can heat water from zero to fifty degrees Celsius at the same rate as you heat it from zero to a hundred.

But how is the distance between Boston and New York a difference in energy levels? Because you are in different positions with respect to the gravitational fields of your surroundings. Perhaps with respect to the earth's center there is no change to speak of in energy-level; but there certainly is with respect to the pull of the Empire State Building. Obviously, in the case of travel on the earth's surface, the sensory notion of distance ("distance-as-it-appears") is more convenient to work with than energy-distance (which is the reality the former is based on); but in physics, the energy-distance is actually the more meaningful concept.

The reason for this is that in physics, the length of the process is the *net* result of the change, and differences internally that cancel each other out are ignored in the final analysis. Thus, in looking at

going from Boston to New York in relation to the earth's gravitational field, the difference in elevation between the two cities is the length of the process; because every time you go down a hill, the work you did in going up is canceled by the work gravity is doing to your car in pulling it down; and so the net work is the actual length of the process. Similarly, if you heat some water and then let it cool and then heat it up and so on, the length of the process of heating is the difference between where it started and where it ended.

This does, however, indicate a different characteristic of a process that we should take into account:

The *path* of the process is the process considered as a number of smaller processes added together.

It is the confusion of the path of the process with either the length of the process or the process itself that has led to a number of conundrums in philosophy, notably Zeno's paradoxes.

For instance, Zeno allegedly proved that it is impossible to move across a room, because before you get there, you have to get half-way; and before you get half-way, you have to get half of that distance, and so on. Before you even take the first step, you have to move half of that distance, and before you move any finite distance at all, you have to have moved half of it; and so it is not possible to move at all.

The mathematical notion of the "limit" does not, in spite of the mathematicians, solve this problem. In the first place, they set it up another way: in order to get to the other side of the room, you have to go half-way first, and then half of the remaining distance, and then half of that, and so on; and there is always a finite distance between you and the other wall.

But then they say that this reduces to the series ($1/2 + 1/4 + 1/8 + \ldots 1/2^n \ldots$), which sum becomes a fraction closer and closer to 1 the larger *n* becomes; and hence the "limit" of that series is 1. But the fact that 1 is the limit doesn't tell you that you'll ever *get* there; it just says that 1 (the other side of the room) is (a) the place you'll never get *beyond*, and (b) the place you can get as close to as you want, but never will reach[43].

In other words, the "limit" just defines where the other side of the room *is*; but it doesn't allow you to reach it—unless there is a "last" number.

What is the fallacy here? It is that of thinking of the process as *actually* made up of smaller processes added together; it is the confusion of the process with its *path*.

If you walk across the room, then at the beginning of the process, you set up an instability in yourself *whose purpose is being at the other*

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[43]The notion that the distance from the other wall "approaches zero" and the leap to the "epsilon neighborhood" introduces a self-contradictory "fudge factor," implying that the number which is the limit (if it is believed to be reached) is "as close as you want" to the other side. But of course, if there is *any* finite distance between where you are and the other side, then there is still an *infinite* distance, in the sense that you still have an infinity of halves of the remaining distance to go. The mathematical solution to this is that the derivative (the limit) is in fact an exact amount, equal to the fraction 0/0, which is the *only* time in which division by zero is not a contradiction. The trouble is that, in itself, the inverse operation, 0 x n = n, where n is any number you want to name. What the calculus does is show that in certain cases there are processes that make the fraction constantly closer to 0/0, and give evidence of never going beyond this fraction; and so *in these cases* (the ones in which the calculus applies) the number has a definite quantity. For example, if you are traveling at a constant 30 miles per hour, then in ½ hour, you will have traveled 15 miles, in 1/4, 7.5 miles, and so on; so when the time *reaches* zero (at an instant), you are still "traveling through that point" at 30 mph.

What I am saying is that, though Leibniz's and Newton's notions of the derivative "worked," the theory "explaining" it is defective.

side of the room, not half-way. The process that then occurs is *one* act, not a series of them; it does not stop half-way and then resume (unless you set up a new instability in yourself by deciding to stop, of course). It is only by *imagining* this one process as if it were a series of processes each of which stopped half-way toward its goal that you get into a problem; but obviously, this is to falsify what the process is, because its goal is the *end,* not some intermediary point. That is, you pass through the half-way point, and are never at it, because you are still unstable there.

That is another of Zeno's paradoxes, by the way, because *at* any point, you are at rest, and he asserts that this is true of every point in the path, and so you are never moving. But you are never *at* any point in the path, since the point has no size, and so you have passed through it as soon as you "get there." The fallacy here is that of understanding the points of the path as if they were end-points, when the path-points as such are imaginary.

That is, a process, as one act, is no more a series of small processes than is your weight a series of one-pound weights added together, in such a way that for you to be your weight, you would have to be half of it and then half of the rest of it, and then half of that, and so on. No, your weight is your weight, and the fact that you can *measure* it as if it were a series of smaller weights added together does not *make* it a series of them. Or a sound of 80 decibels is not a sound of 40 decibels + a sound of 20 decibels + a sound of 10 decibels + a sound of 5 decibels, and so on. It is a sound that has a quantity; and the fact that we think of this quantity as a sum of units does not alter what the quantity is. In the same way, the act of walking across the room, or any process, is one act, and its length is *one* quantity, not a series of them, no matter how we might break it up in thought to measure it.

We get into trouble with processes rather than with the "static"

acts in equilibrium like color, mass, temperature, and so on, because we think of processes as going "through time," while the others are all there "all at once," and so the former seem to be a heap of quantities and the latter don't. But this is looking at things backwards, actually, because as we will see shortly, time is derived from comparing processes, and is not something you measure processes "against."

But before we do this, we have to mention the other quantity of the process: its velocity. I say "velocity," not "speed," because "velocity" in physics is the vector concept, which includes direction, and speed is just the number that belongs on this velocity; and since process is always directed, velocity is the correct term to use.

The length of the process is a scalar quantity, because it is a simple difference in energy, and it doesn't really matter which is the beginning and which the end; the directedness of the velocity takes care of that. That is, if you heat water to fifty degrees hotter, the length of the process is the same as if you cool it to fifty degrees cooler; whether you are heating or cooling is taken care of by the act itself—the process—with its directedness.

The point that is really significant about the velocity of a process is that it can be *directly* measured, and doesn't have to be measured indirectly by looking at a clock. Since the process is an *act*, it can exert *force* on some measuring instrument to show how "strong" it is—which is, of course, its quantity as a process, or the speed of its velocity.

For instance, the speedometer of your car (which, you will note, measures speed, not velocity, since it doesn't care whether you are going forward or backing up) does not use a little clock; as the wheel turns faster and faster, some of its energy creates greater and greater force on the instrument, which makes the needle go higher; and the force (and hence the position of the needle) is proportional to the

speed at which the wheel is turning and so the speed at which the car is moving. Hence, the speedometer is not really measuring "miles per hour" or "kilometers per hour"; it is really measuring something like "vels," which are then *interpreted* in terms of a ratio between the length of the process (miles) and something that is happening on a clock.

Chapter 6

Time

This is important, because it is impossible to understand what is going on in the clock itself if we don't see that velocity is a quantity that can be measured directly.

Historically speaking, the reason velocity got thought of as a ratio between length of a process and time is that Galileo discovered the law of falling bodies (that they all fall at the rate of 32 feet per square second) by *timing* the balls he was letting roll down an inclined plane—as the story, at least, has it, by singing a tune, since timepieces in his day didn't measure time as accurately as musical tunes did. He found (a) that all of them fell at the same rate, whatever their weight, and (b) that the farther they fell, the faster they fell, so that if they fell two feet the first second, they fell four the second, nine the third, and so on. Hence, the rate of their fall was learned in terms of the time it took them to fall a certain distance; and we have thought of "rate" in these terms ever since.

But if you look at why he was singing his tune or why you would use a clock for this purpose, you find, first of all, that the tune had a *regular beat,* and the clock has regular ticks (even if they're so close together in electronic clocks that we couldn't hear them). Secondly, you find a definite progression of these beats or ticks so that you can count them. In a clock, of course, they begin to repeat like the number system (they actually come from the Babylonian 12-based

numbers) to make them easy to count.

The tune, we can now see, was a clock. With a clock, you have a *process* which you can "set" to "begin" at any point you wish, and "end" at any point you wish, since *this* kind of process is actually a series of smaller ones added together that you can count, and it keeps going as long as you want.

Of course, you have to have the "clicks" of the clock be closer together than the process you want to measure, because in between the clicks, the clock is useless. You can't use an hourglass to time a three-minute egg, because the hourglass takes an hour for the sand to fall through, and so its "clicks" are an hour apart). Since we now measure processes so accurately, we have to have atomic clocks, which are clicking at an astounding frequency.

At any rate, when you are "timing" something, you "start" your clock (i.e. note where it is) at the beginning of the process, and "stop" it when the process you are trying to measure stops. You then note—what? Something about the process in terms of the *length* of the clock's process.

Now what you know about the clock's process is that it has a *regular* series of "clicks"; if its mechanism works irregularly, it is useless as a clock. But what does this "regular" mean? Simply that *the velocity of the clock's process is constant*. It doesn't really matter what the velocity *is*; in fact, since it is a series of processes that begin and end, added together, in one sense it isn't really *a* process at all. The point is that the "process" has to have what is known to be a constant velocity, even if the actual speed it has is irrelevant.

And as sand timers show, clocks can be actual processes, as long as they are (a) constant, and (b) have beginning and end-points that can be matched with the process you are "timing." It is just that regularly spaced "clicks" that are close together allow you to time more things than processes like falling sand (which works as a timer

because sand has the characteristic of having grains all the same size, so that a given number fit through the constriction at once).

So timing is actually comparing *two* processes, and measuring one against the *length* of the other. Now since both processes have both length and velocity, let us see what the comparison looks like:

$$L_c/V_c = l_m/v_m$$

What this says is that the *ratio* between the length of the clock's process and its velocity will be the same as the ratio between the two quantities of the measured process. But since the velocity of the clock's process is a constant, it can be ignored in the calculation, and you can express the ratio between the two quantities of the measured process in terms solely of the length of the clock's process.

That is, we have to agree on our "units of time" and compare our clocks so that what registers an hour of *length* on your clock will register an hour of length on mine. This is easy enough if the velocities are constant; we just adjust the length. For instance, 60 ticks on your grandfather's clock will be the equivalent of 300 ticks of my watch or perhaps 3 million ticks of your very accurate chronograph; we just make the numbers roll over at the proper number of ticks so that all of them say that this particular length is "five minutes."

Once this is done, then we need not bother any more with the velocity of the clock's process, and it's length then becomes the "time" which measures the *ratio* between the length and the velocity of other processes—which quantities, as I said, are independent of one another; but the ratio between them will relate to the length of this standard process.

Hence, time is *not* something "out there" at all; it is not something "primitive" "within which" things happen. It is a very

sophisticated concept which involves comparing processes and their quantities and ignoring the velocity of the standard process (the clock) in order to use its length as a kind of measuring-stick for the ratio between the quantities of other processes.

It is not, therefore, surprising that primitive cultures, who have felt no particular need to compare the quantities of processes, have no sense of time, or a very fuzzy one. Of course, their "standard process," generally speaking, is the day, the month, and the year; and during the day there are the divisions of forenoon, noon, and afternoon, which in an agricultural or hunting culture, do well enough for practically all purposes. It isn't that they're stupid, or that they haven't "discovered the reality of time." It's that the only processes they're interested in comparing are so slow that measurement in terms of days and months is all that is needed.

But what, then, is time?

The *time of a given process* is the ratio between its length and its velocity.

***Time* as *that which measures processes* is the length of a process with a standard, constant velocity, used to measure the time (in the previous sense) of another process.**

Physicists make this same distinction, and use the capital T to indicate the "internal time" or "period" of a process, and the lower-case t to indicate the time that is measured by a clock.

But now that we have seen what the clock is doing as a measuring instrument and what it is measuring, we can say some things about time.

Conclusion 11: Time is not real.

Time is no more real than the sameness among all red objects is a real connection between them. In the first place, the time within a given process is not real, because the length of the process does not depend on or determine its velocity. You can go very quickly or slowly from Cincinnati to Dayton without changing the distance at all; and you can travel any distance at 55 miles an hour. It just happens that the particular process you are interested in has this particular distance and this particular velocity.

And since the time measured by clocks is a comparison of these *ratios,* really, then obviously this is just another mental relation and does not correspond to any real connection between things. It just happens, for instance, that if you are traveling between Cincinnati and Dayton at 55 miles an hour (we have no other term for the velocity), then your clock will register that an hour has passed; that is, that your clock's process is such that the little hand has passed from the 3 to the 4.

And this analysis of time makes sense in terms of physics. It used to be thought that time was something "primitive," against which everything else could be measured; but Einstein showed that this was not so, even in the Special Theory of Relativity. There, he demonstrated that even "absolute simultaneity" was a meaningless term; if two people were moving with respect to each other, then events observed to be "simultaneous" to one would not be simultaneous to the other observer—and nobody was privileged, so that he saw the "real time" when they happened.

The reason for this is that the conveying of the information to each observer is a process, which, of course, has its own length and velocity. Einstein's assumption is that the velocity of light through space is for any observer the same as for any other one; hence, differences in length light travels will involve different travel-times for the light. Naturally, then, if one observer is at rest with respect to

two events, while the other is moving toward one of them, then the one moving will not see them as at the same time if the one at rest with respect to them does. Einstein's point is that you can't pick either of them as the "correct" one, or the one who is "really" at rest.

This is not at all surprising if time is the way you compare processes outside you with the process that is going on in your clock. Time in that sense is a *way of observing*, not a "something" that is measured, really; what is measured is the process, but in its relation to *your* standard process.

It is for this same reason, as Einstein pointed out, if you are moving with respect to me and I look at your clock and mine and we both read exactly twelve o'clock, and then I look a half hour later (by my clock) at your clock (now at a different distance from me), your clock will read *less* than twelve thirty. But by the same token, you, looking at my clock at the time when yours says twelve thirty will (because of the same difference in transmission-distances) will read my clock as saying *less* than twelve thirty. Both clocks are going slower than each other. This makes sense if you try to figure it out; it's just that the time-lag of the transmission of information goes both ways.

Hence, time cannot be a "something" that is measured by clocks; it is simply a way of observing the ratio between the length and velocity of another process in terms of a standard process. And the result, as both of Einstein's Relativity Theories shows, is that if you try to "fix up" what the clocks say to compensate for the relative movement of the "reference frames," especially when you try to take acceleration into account, you come up with some very complicated mathematics indeed. But the *processes* are still what they are; and it was this "invariance" that Einstein kept constant as he tried to show what a given process or movement would *look like* from the point of

view of various reference-frames in motion with respect to it and each other.

But it is possible that these complications are not necessary. Why, if velocities can be measured directly, and especially if clocks *suppose* that velocities can be measured (because otherwise how would you know that the clock's velocity is constant?), do you have to go through all this indirection to find the velocity of the process, which is what you were interested in in the first place? Just read the speedometer, and think in terms of "vels," not "miles per hour."

This won't always work, of course, especially with processes at a distance from oneself—which is where Einsteinian physics becomes relevant. Nevertheless, it is worth exploring a little, if only to get free of the mind-set that thinks that all processes have to be measured in terms of clocks.

I mentioned that acceleration was the quantity of the change of quantity of a process. Hence, a given process involving acceleration can be used to time *itself,* because obviously the lengths of the processes are the same, and the two velocities are what differ (the "average velocity" and the acceleration).

In terms of time, this is what velocity is:

$$v = dx/dt$$

where the "dx" and "dt" are the "zero" of length of the process and its time measured on a clock respectively (i.e. they are the "tendency" of the process to have a length at any point in the process)[44].

[44]It is this type of number that I was referring to as the "derivative" in the calculus, which is the particular 0/0 that is approached as a limit. The dx and dt are the "fudge factor" I mentioned, implying that the number *isn't* zero, but an "infinitesimal bit"

In terms of time, acceleration is this:

$$a = dv/dt$$

or in other words, the tendency of the velocity to increase or decrease at any point in the process. These "infinitesimals" behave like algebraic quantities, and so we can solve for dt, and get:

$$dt = dx/v = dv/a$$

And since this equation shows that the two fractions are equal to each other as well as to dt, then we can simply eliminate the dt, and we have got rid of the clock time, and have the two "internal times" of the same process now related to each other.

If we now bring the v's together on one side, we get:

$$a\,dx = v\,dv$$

and to perform a bit of the magic we promised a while back when talking about Newton's force equations, let us solve this for *a,* leaving it alone on the left side, so that we see what acceleration looks like in terms of v (the "average velocity") and dv (the tendency of the velocity to change at this point):

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beyond it, so that the fraction makes sense. But an "infinitesimal bit" is a contradiction in terms, as I showed. In my system the "dx" refers to the zero approached in distance, and the "dt" the zero approached in the time; or, at that point, it is the *tendency* to move (since *at* that point, of course, an actual movement is a contradiction, because movement is a process that goes *between* "points.") Remember, "a point in a process" is part of the *path,* not the *act* of the process, which goes constantly to the end and then stops. That's why Aristotle said that the solution to Zeno's paradoxes was to walk across the room.

$$a = v\, dv/dx$$

Now then, taking Newton's equation for force:

$$F = m\, a$$

and substituting for *a,* we get:

$$F = m\, v\, dv/dx$$

and separating the variables, we have:

$$F\, dx = v\, dv$$

which is the differential form of Newton's energy equation, which integrates into the work equation:

$$F \int x = mv^2/2$$

which we saw earlier. It can now be seen that all I did was eliminate the indirection of the clock, and relate the various quantities of the process to each other directly; and adding force and mass, Newton's energy equation fell out of it perfectly naturally.

Prediction: If clock-time were eliminated as an "independent variable" from physical equations, they would turn out to be simpler.

In order to get from real-world observations to the type of equation where you could eliminate clocks, you might have to do some fancy footwork; but once you got the process in relation to

itself, as I have shown, the time only adds an unnecessary complication to the mathematics. And the preliminary steps to "get an equation into proper form" can be quite tricky, as any student of physics knows; so I am not proposing anything strange here.

I don't know how much clutter this would eliminate, because I am not a physicist; but the equation above (and certainly the logic above) indicates that there is a good deal that could be got rid of. And if in fact some enterprising physicist tries this business of thinking of acceleration in terms only of distance (length of process) and velocity and finds that the mathematics of physics shows more clearly what is going on, this would be a pretty good empirical verification that this philosophical view is on the right track.

And if you add to this thinking of the "distance" as the length of the process, meaning the difference in energy-levels, so that it is an amount of energy, this might get rid of some more detritus based on seventeenth-century philosophy.

It is quite possible that present-day physics, with its reference-frames and coordinate systems and its dependence on clock-time, is complicated because it is introducing the complications itself, not because what it is describing is complicated. After all, if you insist in looking at the dog in my back yard by looking into a mirror that is attached to a telescope that focuses on another mirror which is then attached to another telescope that undoes all that the first apparatus did, you are going to need funding to finance what could be achieved by just looking out the window.

I'm not pretending that all of present-day physics is smoke and mirrors; just that some of it may be. And if we care about what physics is describing and the facts it is getting at more than we care about "prestige," it is, I would think, at least worth a try to see if I am right.

Before going on to discuss movement, let me draw a conclusion

which in itself is obvious, but has certainly caused confusion through the centuries:

Conclusion 12: God is not in time.

This, as I say, is obvious. Since God is an act in absolute equilibrium, then he does not have any "internal time," nor is it possible to time his act with any clock or compare it with processes that are going on.

The traditional name for God's act as not in time is "eternal." But you have to be careful here; because "eternal" is usually thought to mean "always," in the sense of "at all times," and God does not always exist, any more than glass is white because it is colorless. What "eternal" means is that *time words do not apply to God*. Note that the term "colorless" means that it is nonsense to ask, "What color is it?" If you say, "It is no color," then it is black, because black is the absence of color (within the category "color"; black is the "zero" of color, so to speak, not colorlessness. Similarly, if you say it is "all colors," then you would have to say it is white; but glass is not white. Nor is it any other color, even if you see colored objects through it; they don't color *it* at all (because color implies absorbing and re-radiating out different wave lengths of light, and light just passes through it "as is."

My point is that if you can understand what you mean by "colorless," you can understand the timelessness of eternity.

No time words apply to God—or to finite pure spirits, either. Hence, God does not always exist (just as glass is not white), God does not now exist (just as the glass is green because you see the green yard through it), God did not exist in the past or yesterday (for the same reason), he will not exist tomorrow or in the future, he does not never exist (just as glass is not black). To ask "When did

God do X?" is to ask a meaningless question, analogous to "What color is freedom?"—since God's activity, of course, is simple existence, identical with himself, and so any act of God is eternal, because in fact it is the Eternal Act.

But some people ask, "Well, if time began with the Big Bang (it did), then what was God doing before this?" God wasn't doing anything "before" the first moment of time, because in the first place there is no "before" the first moment of time, and secondly God's act is not temporal at all.

But doesn't God now know what I'm going to be doing tomorrow? No. God does not know anything "now." God eternally knows (as we will see) what I am going to be doing tomorrow, but this doesn't mean he "always" knows it, or that he knows it "before" it happens. He knows it timelessly (This would be analogous to seeing something green *through* glass); and he knows it *as* it happens: that is, he knows it as happening *when* and *how* it happens; but he doesn't know it *at the time when* it happens, or before, or after; he knows it timelessly.

Furthermore, he eternally *causes* it to happen as the finite act which it is, which means that he eternally (timelessly) causes it to happen when it happens (i.e. as related to the other processes which it is in fact related to) and how it happens (e.g. as dependent on the finite causes it is dependent on). But of course, this can't mean that he "always" causes it to happen then, or that he caused it to happen "from 'way back before the beginning of things'"; his causality, like his knowledge, or like anything about him, can't be put into a time or a period.

The fact that the *effects* of his acts are temporal doesn't mean that his *act of causing* them has to be temporal, any more than the fact that the effects of his act are material means that the act of causing them has to be material. The cause, as we saw long ago, cannot be

like its effect. The temporality of changing bodies is a characteristic they have because they are in process and finite, and there are more of them than one, and so the quantities of their processes can be matched up the way we match up their colors or shapes or other properties they have. But this does not imply anything with respect to the one who causes them to be the finite acts which they are.

Many of the arguments against God's existence are actually based on a confusion of eternity with "always" or "beforehand." I have hinted at some of them above, and have given the grounds for straightening out the confusion, which can be stated in this way, if you want an aphorism: "Eternity is to time as colorlessness is to color." If someone asks you, "Yes, but if God did this, he had to do it at *some* time, didn't he?" you answer, "If glass exists, it has to be *some* color, doesn't it?"[45]

Let me mention one difficulty that really bothers people, and show that it is based on the assumption that time is some kind of a reality, and that it contradicts itself.

People tend to say, "But how can God know the future? It hasn't happened yet; it doesn't exist." But we know the past, and in the sense that the future doesn't exist, the past doesn't either. Does it?

Don't be too quick to say, "Of course it doesn't." If the past doesn't exist, and the future doesn't either, then all that exists is the present. But when is the present? As soon as you name it, you are naming the past, which doesn't exist. If you pronounce the words "the present moment" then all that exists is the syllable you are pronouncing, not the phrase. You can't even say, "All that exists is the present" if all that exists is the present.

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[45]So now it can be seen that Leibniz's "axiom" that "whatever happens, happens somewhere and somewhen" is true *only* if you define "happen" as "an act that begins" or a process. Spiritual acts do not happen "anywhere" or "anywhen."

So to say that the past doesn't exist any more is to fall into the trap that Zeno fell into when he said that no body is moving because it's at rest at any point along its movement (and therefore at every one), and what's at rest isn't moving. To say that the past doesn't exist any more is to take *the comparison of processes,* especially the minute measurement of this comparison, as if it were "the real reality of everything" and to make the processes themselves "unreal," because of course a process doesn't occur if all that exists is the present; processes happen *through* time, not *at* a time. And all that "happening through time" really means is that *from the point of view of some observer,* their beginning points (instabilities) and end-points (equilibria) match.

Hence, the past exists. Of course it does; we know it does because we have experienced it and can distinguish it from what is imaginary. My wedding is a *real* event, not something I made up.

Well yes, but it's not happening *now.* Of course not. But the "nowness" or the "thenness" is a tag that belongs to *it,* not something absolute—like saying that it took place in Boston, not Cincinnati; it just matches it up with other processes than the ones that connect together now. That is, saying that it's not happening now doesn't make it unreal now, any more than saying that a wedding now happening in Boston is unreal because it's not taking place in Cincinnati, where I happen to be.

But the *future* doesn't exist. Of course it does. What I am going to be doing tomorrow is what *in fact* I will be doing tomorrow; and that is what is real. But I don't know what I am going to be doing tomorrow. So what? I don't remember what I did ten years ago on this date. Does that mean that what happened did not happen? Well yes, but I can *control* what happens tomorrow. So? I controlled what happened on my wedding day too. Does the fact that it *happened* mean that it *had* to happen that way? And does the fact that I will

freely decide to skip breakfast tomorrow mean that it won't happen that way because it is free? What will happen *will in fact happen as it in fact will happen,* just as with any real event.

Well yes, but it *hasn't* happened, so it doesn't *really* exist—yet. True, it doesn't exist *yet,* any more than the past exists *still*. But that doesn't mean it doesn't *exist*. The time is a *tag* that is put on it, and putting the tag on it or not does not take it from what is real and put it into what is imaginary.

And in fact, as Einstein shows, what is *future* for one observer can be *present* for another and *past* for a third. We can even experience this in the everyday world. Everyone gets all excited about New Year's Day happening in Japan when it's still last year over here. When is New Year's Day, actually? Is it now New Year's because we get TV signals from Japan, and it's New Year's there here? Which of us is right? And the answer, of course, is Yes.

What I am saying is that *future* events do exist, and are not even future from some observers' point of view; and if that can happen even on earth for a few minutes or hours—if it happens at all—then this shows that the time is not something that makes something real or removes it from reality.

The point of all of this is that time is a *way of observing* events (processes); from which it follows that it is observer-dependent and not something real; and so we shouldn't confuse "happening at some time" with "being real."

Chapter 7

Movement

Now then, let us look at the most obvious case of process, which, as I said, Newton said is not a process at all when its velocity is constant: movement. Was Newton right?

The question can be answered if we can find some way that an object could be *observed* to be in motion when no change in energy-level was happening.

First of all, if a body were completely "left to itself" it could not either move or be observed to move, because there would be nothing by which it could be said to be "in a position" and (since there would be no observer) nothing by which it could be observed to be in a position either.

That is, the whole universe does not move, because there is nothing outside it which could establish that it is "now in this place and now in that," either from an ontological or an observational point of view.

So we need at least two objects (or one body with parts) in order for something to be said to move at all. Let us first make our bodies points, so that they have no size.

Now if the distance between them changes, then obviously movement can be observed, at least in principle (though in practice it would be hard to see how you could tell whether a *point* was "nearer" or "farther away" if there was nothing else in the universe).

But of course, if they are real bodies, they have mass, and hence there is a *real* distance (force) between them, and this effect each has on the other is different. Hence, movement toward or away from each other is a real process.

So it is not possible for an body to "move in a straight line" whether at a constant velocity or not, without there being a *real* change in the energy-level of some body's field; and so Newton's First Law of Motion is impossible as stated.

But if the distance does not change, you could think that one could move in a circle about the other. (We will eliminate the complication that Newton's physics would say that this circular orbit involves acceleration and hence is a change; if Einstein is right, it need not be.) But since both are points, which have no "sides," this would not be observable as movement. Hence, with two point-objects, the only *observable* movement would be one which also involved a real change of energy-levels.

Note that if you introduce a third body, you could observe that one of your original two was moving in a circle around the other one. But then the distance between at least one of these "observed" bodies and the third one would have to be really changing in order for this to happen; and so once again movement would be observable as such only if there is a real change of energy-levels going on.

Note also that if there is any movement observable from the third body, there will be a movement observable from each of the other two; each will observe at least one other body as moving. Let us say that the distance between the third body and the first is constant, and the second is seen as moving around the first from the point of view of the third. The first will then see the second and third bodies change positions with respect to each other, though not with respect to itself, and the second will see a change in position of the third but not of the first.

If we return to two bodies and give one size, letting the other orbit in a circle around its center, we will now be able to observe the motion from any point on the first body except the center itself. We will see the orbiting body "rise" and "set" over the other parts of the first body. But in actuality, the orbiting body's field will exert a greater force on the side of the first body that is closer to it, and a lesser force on the side farther away; and as the earth-moon system shows, it will tend to start the first body rotating.

So there is a real change going on, even though the orbiting body is moving in a perfect circle and there is no change in the distance between the bodies' *centers*. But is the orbiting body "really" orbiting? There is no way to tell, because from its point of view, what is happening is that it is stationary, and the other body is simply *rotating* at a fixed distance from itself; and neither of these points of view is the "right" one.

Again, you could choose between these two, but only if you introduced a third body and used that as privileged; but it is of course no more privileged than the other two, and I leave it to you as an exercise to figure out what things would look like from each of the bodies if this third body were introduced, and what real changes of distance would be going on.

But if there is a *real* process going on between the "orbiting" body and the one with size, then this has to have a purpose, which will be equilibrium without any either real or observed movement.

Does this occur? Yes. The orbiting body will tend, as I said, to make the body with size rotate; and this will continue until the speed of rotation catches up with the revolution of the orbiting body, so that the orbiting body makes one revolution as the rotating body makes one rotation. If either moves faster or slower once this point is reached, the gravitational pull of the other will tend to pull it back into "synchronicity," so that the final state of this unstable situation

will be a synchronous orbit.

But with only two objects in the universe, then once again no movement will be observable, because *all* distances from the body with size to the "orbiting" body will now be constant. It is only if we *imagine* ourselves as at some privileged point outside the system that we can speak of "revolving" and "orbiting" at the same rate (but that is because from our "reference frame" distances will be changing).

And in fact, the process that will be seen from the body with size is not that it begins to rotate, but that the "rising" and "setting" of the other body just gets slower and slower, until it finally slows down to a complete halt just overhead, say; and from then on, it is just "there," in a fixed position. And from the orbiting body, what will be observed is that the revolution of the other body (which originally was pretty fast) will slow down until the body finally stops revolving and is simply like our moon, always showing the same face.

Hence, movement *is* a process. Whenever movement can be observed, there is always a change in energy-level of fields (always a change in real distance); and this change, like all changes, implies instability and a purpose, in which there is no real movement and in which no movement is observable. Movement has as its purpose some definite position.

This is true with the orbits of the heavenly bodies; but because there are so many of them, and they are so complex, the actual synchronous orbits of all the planets and their satellites even of our relatively simple solar system are too far in the remote future to be achievable before the sun blows up, I would guess. And then there are all the stars of our galaxy, of which the sun is one, orbiting its center, acting on each other as they do so.

But we can see that the tendency is there toward the equilibrium of synchronicity with no more movement; each of the planets (and the stars in the galaxy too) exerts something of a "drag" on the

others; and if they all ever did get into synchronicity, it would be easy to see that any deviation on the part of one would be rectified back into equilibrium by this same "drag" of all the others.

Let me close this discussion of process and movement with a general look at cosmic evolution. There are two possibilities, since we know that the universe is now expanding: (a) that this is one phase of a cyclical expansion and contraction that is not a process, but is a kind of equilibrium; or (b) that it is a real process.

In the first case, what we have is something like Zoroaster's or Nietzsche's "eternal return." And in that case, either absolutely everything occurs exactly as it did two hundred billion years before (or whenever the last time was), or the basic macroscopic events are the same—the expansion to a given point, then collapse to a fireball and the explosion—but the "fine structure" is different each time. In the latter case, you are spared what Nietzsche wondered if he had the courage to face: the fact that what you are reading now "for the first time" you have at the same point in every preceding cycle for all unending time been reading "now for the first time," and that you will be doing this again "now for the first time" a couple hundred billion years from now.

As I write this, the Hubble space telescope is being deployed, and one of its functions is to see if it can find out how much mass is in the universe, to test whether there's enough to make the universe contract again after this expansion we know is going on. By the time you read this, that first alternative may have been eliminated; but at least based on what physics knows to date, it is a possibility.

If, on the other hand, the universe is simply expanding, then cosmic evolution is a real process, which implies several things.

First of all, it implies that *the universe as a whole is unstable*, which means that it was either something in equilibrium before the "big bang," and somebody or something did something to this mass of

material to scrunch it down into the unstable condition that made it explode in the first place—or else there was no body that it got transformed "out of" and it just absolutely began to exist, with the instability that produced the initial explosion that cosmic rays, apparently, are still some of the free radiation of.

Secondly, it implies that *the universe as a whole has a purpose*. Unfortunately, this is not to say that it has some deep "meaning" that it is trying to "fulfill." It just means that the instability has a direction toward a future equilibrium. And in fact, not surprisingly, we can tell what that future equilibrium is going to be, because the universe as a whole is pretty simple, actually.

As far as the bodies in the universe go, they are all unstable based on the Second Law of Thermodynamics, which says that all the complex (high-energy) forms of energy will eventually degenerate into heat; and the end (the purpose of this process) is the "heat death" of the universe, consisting of nothing but heat-photons filling space uniformly to a temperature of a degree or two Kelvin.

As far as the expansion of the explosion is concerned, once the cycle has been eliminated, then what it means is that the bodies will just get farther and farther apart from each other (as they degenerate by the Second Law of Thermodynamics) until they will be so far apart that they will have for practical purposes no gravitational effect on each other, and each will be nowhere with respect to all the others. Systems of bodies will presumably stick together longer, but there are forces in them that will tend to break them up too.

All of this, of course, supposes that things go on as the laws of physics say they will, and that there isn't some *personal* kind of a God who has his own ideas about things and isn't above interfering in this process he created, making instabilities that couldn't be predicted from the original "soup" that resulted from the explosion.

There are indications that this is in fact what happened; but they

become more clear when we deal with living bodies than in the inanimate realm; and so this belongs to the third part of this book.

And so let this hint at evolution be a finish to this part and a transition to the treatment of living bodies.