TIME : NEWTON, LEIBNIZ, AND BERKELEY

THE PHILOSOPHICAL INTERPRETATION OF TIME :

A CRITICAL EXPOSITION OF THE THEORIES

OF

NEWTON, LEIBNIZ, AND BERKELEY

By

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TITLE: The Philosophical Interpretation of Time: A Critical Exposition of the Theories of Newton, Leibniz, and Berkeley

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ABSOLUTISM

CHAPTER 1

Absolutism : Newton

The more or less explicit and precise statement of the Newtonian position as regards the philosophical problem of time is to be found in the scholium following the eighth definition in his Mathematical Principles of Natural Philosophy, to wit:

> Absolute, true, and mathematical time, of itself, and from its own nature, flows equably without relation to anything external, and by another name is called duration; relative, apparent, and common time, is some sensible and external (whether accurate or unequable) measure of duration, which is commonly used instead of true time; such as an hour, a day, a month, a year. 1.

In reference to this passage, it must not be assumed that Newton is providing a full and complete definition of time, despite the fact that it arises in that section of the treatise which is devoted to definition. Yet one is confronted with the obvious structural associati on of the scholium in question and the series of explicit definitions that precedes it. One seems to be caught in the problem of ascertaining just what it is that Newton is doing in this particular context. It would, indeed, seem that he is either defining the nature of time, or that he is not defining it. And there are legitimate structural considerations which serve

to substantiate or to justify either view; but, on the other hand, there are legitimate points to be found which serve to destroy either view. T hus, one is virtually obliged to admit that Newton is both defining and not defining the internal character of time.

In order to escape this apparent paradox, one need only distinguish between defining a thing by providing its internal and essential character, and specifying the theoretical or ontological status accorded to a thing. For, although Newton overtly denies that he is providing, or that he intends to provide, a definition of the internal character of time, or of space, or of motion-- these being, as he says, well known to all--[2], yet, to be theoretically consistent, his mechanistic interpretation of the workings of the universe must presuppose a differentiation of absolute time (space and motion) and relative time (space and motion). The definition provided, then, is hardly a full and complete one, but is strictly per differentiam.

In support of this statement, the so-called axioms of his system-- i.e., the laws of motion-- might be considered. For example, the first law of motion, as everyone knows, states that

> every body continues in its state of rest, or of uniform motion in a right line, unless it is compelled to change that state by forces impressed upon it. [3]

If, as Newton declares, any motion or any alteration of the motion of an object can only be accounted for by the fact that some force (or forces) or other were exerted directly upon the object in question, then any motion of a specified object, or any alteration of such, that cannot be connected ultimately with the exertion of some force cannot be referred to as a "genuine" motion, but is rather merely apparent. Suppose, for instance,

that, in an experimental situation, a billiard ball is placed upon a vast, frictionless table-surface; suppose, further, that the point from which the ball is viewed is fixed with respect to the table upon the surface of which the ball is placed; and suppose, still further, that the table receives an impulse that causes it to move to the left with velocity x. In such a situation, contrived though it may be, the billiard ball will be seen to move towards the right with velocity x. Yet no force or forces, acting directly upon the ball, can be found to have caused the motion of the ball. In this instance, it must therefore be said that the motion of the ball is not a genuine motion at all, but is merely apparent. The genuine motion is that of the table, and hence of the fixed point from which the ball is viewed. The motion to which we have referred above as "genuine"-- the motion, that is to say, which is the result of a force (or forces) directly impressed upon the object in question--may otherwise be designated as "absolute", because it's mathematical determination is at least theoretically independent of any particular physical view-point, or frame of reference. On the other side, the motion to which the appellation "apparent" has been applied may otherwise be referred to as "relative", for the simple reason that it's determination is dependent upon the physical point-of-view or frame of reference from which it is perceived, and upon the prevailing physical conditions within this frame of reference. Thus, absolute motion must be distinguished from its relative counterpart. Such a distinction in regard to physical motion must involve a similar distinction in those factors in terms of which physical motion can be described, or its quantity or magnitude cal--

culated. These factors, of course, are space and time, for motion may be defined as the change of the place, or of the spatial location, of a body.

The adequate scientific description of any physical motion involves the precise determination of the places successively occupied by the body in question. It is thus evident that both time and space have to be presupposed in the descriptive consideration thereof. Moreover, the science of mechanics which Newton systematically propounds is a quantitative science, and, as such, is interested not merely in the fact of motion, but in the measurement of such, and thereby in the formulation of physical laws that admit of universal application, and which adequately and accurately describe the physical universe. Towards this end, it is necessary that physical motion, and hence both time and space, should be accurately measurable. This necessity for the precise and universal quantitative determination of motion, made evident by the nature of the science of mechanics, indicates another, but related, reason for postulating the existence of an absolute time. It may be said that the theoretical genesis of the notion of absolute (as opposed to relative) time in the Newtonian theory is found to rest with the radical incapacity of the time of ordinary experience to provide a sufficient and objective ground for measurement accurate enough to satisfy the interests, and to fulfil the requirements, of the physical sciences. Indeed, the time that enters into ordinary experience seems to be so bound to a limited and partial frame of reference, and so dependent upon conditions prevailing within this frame of reference, that natural science, as a dicipline which purports to be impartial and universal in scope, cannot but be considered manifestly

impossible.

Newton observes, in the text of his Mathematical Principles, that the usual, imprecise, or common-sense, view of space and time, and consequently of motion, refers them to "the relations that they bear to sensible objects" [4]; and this, in turn, gives rise to

> certain prejudices, for the removing of which it will be convenient to distinguish them into absolute and relative, true and apparent, mathematical and common. [5]

The "prejudices" to which Newton thus refers arise ultimately from the unwarranted and theoretically unjustifiable adoption of particular material frames of reference: i.e., frames of reference, or points of view, the adoption of which makes it possible, in a physical system to have a motion or an alteration of motion without there being any clearly ascertainable and directly impressed force to produce it, and to provide definitions of spatial and temporal intervals that do not result in the strict quantitative uniformity of such intervals and which are, for this reason, insufficient for scientific purposes. A solar day, for example, defined astronomically as that period of time between two immediately successive dawns at meridian x, is a variant quantity, no matter how slight the variation may be. The very fact that it does vary is itself sufficient grounds for its scientific inacceptability.

By their very nature, periodical mechanisms of the sort mentioned above, however they may be set up and defined, depend upon the adoption of a specific physical or material frame of reference; and it cannot be ascertained whether the frame of reference considered is in the state of absolute rest necessary for precise scientific measurement. Newton implies

as much when he states that

> as it is possible, that in the remote regions of the fixed stars, or perhaps far beyond them, there may be some body absolutely at rest; but impossible to know, from the position of bodies in our region whether any of these do keep the same position to that remote body, it follows that absolute rest cannot be determined from the position of bodies in our regions. 6.

There may, of course, be periodical mechanisms that can be designated as better or worse as regards the possible precision of measurement, or as regards the theoretical provision of definitions of temporal intervals, instances of which are respectively more or less uniform or regular in extent. In other words, the use of periodical mechanisms in order to define temporal intervals may well result in the designation of intervals which are more or less uniform, or which vary in uniformity. But, in the interests of the precision required by scientific procedure and theory, the question inevitably arises as to whether there can be a definition of temporal intervals such that its instances are absolutely invariable. Professor Ernest Nagel suggests that it is just such a question as this which is the basis for the Newtonian distinction between absolute and relative time.[7] And Newton, as can be noted from the passage cited at the beginning of the present chapter, is of the opinion that an absolute time--i.e., a time which is universal, independent, and invariably uniform--is not just theoretically possible, but necessary.

To approach the matter from yet a slightly different direction, the differentiation of absolute and relative time, or of absolute and relative quantities in general, may be effected in the light of another passage from the first pages of Newton's Principles, to wit:

> Relative quantities are not the quantities themselves, whose names they bear, but those sensible measures of them (either accurate or inaccurate), which are commonly used instead of the measured quantities themselves. S.

Indeed, the measurement of anything takes for granted the existence of the thing to be measured. Furthermore, it takes for granted the existence of a standard of measurement. So, on the one hand, since relative time (e.g., a day, a year, etc.) is the product of an act of measuring, it follows, of course, that there must be something which is distinct from the de facto measurement or quantitative expression, and which is the thing measured or the thing quantitatively expressed. Or, if absolute time is not a thing to be measured, but is rather the standard according to which the measurement of something else is to be effected, it must likewise exist prior to the act of measuring, and hence be distinct both from that which is measured and from the de facto measurement. In either case, the existence of time as an absolute must be assumed. It need only be said at this stage, in consideration of the foregoing passage, that Newton regards what he calls "absolute time" (or simply, and just as properly, time) both as a thing to be measured, and as an ultimate standard of measurement; it is no less evident that he considers relative time to be the quantitative expression or the measurement of it.

The existence, then, of absolute time can supposedly be demonstrated both theoretically and experimentally. For if the existence of absolute motion can be proven experimentally, it would seem that the existence of time as an absolute is implicitly demonstrated by that very same experimental proof. It is towards this end that Newton set forth his

famous experiment of the rotating bucket. It seems to have been Newton's opinion that if the existence of absolute motion is to be demonstrated experimentally at all, then, in accordance with the first law or axiom of motion, to approach it _via_ rotational motion is the simplest and most coherent way. Thus, it is by proving experimentally that the rotational motion of the water in a rotating bucket is to be viewed as an absolute in accordance with the first law of motion, that the inference can be made to the existence of an absolute space and an absolute time in which the motion can be considered to occur. At best, of course, the experimental proof provided for the existence of absolute space and absolute time is _indirect_, but this fact involves little (if any) impediment to the theoretical situation. Having demonstrated that the rotational motion of the water in the bucket is an instance of absolute motion, it is a simple and legitimate matter to show that certain astronomical motions of a circular nature, such as the movement of the planets around the sun, are similarly absolute; it is, furthermore, legitimate procedure to show that the theoretical matter may be extended from circular and rotational motion to longitudinal motion, and thereby to comprehend the entire scope of physical dynamics.

The bare existence of absolute space and absolute time is adequately accounted for, it seems, by establishing the objective existence of absolute motion of any sort or species; but in establishing the existence of absolute _longitudinal_ motion, the possibility that an object may move absolutely _ad infinitum_, without being impeded by any force whatsoever, must theoretically be taken into account. Since such

an object would move *ad infinitum* in a straight line, according to the first axiom or law of motion, the *possible infinite continuance of its motion implies that the space and the time in which it moves is infinite in extent*: *i.e.*, there must be infinite room in which a body moving thus absolutely can be presumed to move. The measurability of the motion implies the measurability of space and of time: and, since measurement is essentially quantitative in character, the measurability of space and time implies that space and time are inherently and necessarily quantitative in character. It may, therefore, be said, with E.A. Burtt, that

> the exact measurability of ... motion implies that this room (*i.e.* space and time) is a perfect geometrical system and a pure mathematical time... 10.

The term "measurability" is used advisedly in the context of the foregoing passage, for, in the light of what was said earlier, measurability and actual measurement are two distinct considerations. They are, indeed, as widely different as the absolute and the relative, and were used above to distinguish between the latter.

Furthermore, the theoretical dissociation of measurability and measurement may well serve, not only to distinguish between absolute and relative, but also to establish a strictly theoretical demonstration for the existence of absolute space and absolute time. It is a fact of our common experience that we do indeed measure the spatial and temporal dimensions of things, and that what we do in such cases is to measure the space that a thing occupies-- *viz*, the *extension* of the thing in question-- and the *time* for which a thing, event, or process endures-- *viz*, the *duration* of the thing, event, or process in question. That we do thus

possess measurements of space and of time testifies to the view that the things measured are absolute, that they exist independently of the actual physical measurement provided. In short, if there exists a measurement, there must exist that which has been measured and which is measurable. Specifically, if standard rods, etc. exist as physical measurements of space, then space itself must exist independently of the measurement, as that which is measured; if there exist periodical mechanisms, which are taken to be the physical standard measurements of time, then time itself must exist independently of the measurement provided, as that which is measured. The space and time about which we speak in this manner are, by virtue of their independence of all physical measurement, actual or possible, absolutes in the Newtonian sense.

In an essay, reputed to have been written very early in his career,[11] Newton describes space and time as "dispositions of being gua being". Writing in this regard about space, he propounds his thesis in the following way:

> Space is a disposition of being gua being. No being exists or can exist which is not related to space in some way. God is everywhere, created minds are somewhere, and body is in the space that it occupies; and whatever is neither everywhere nor anywhere does not exist. And hence it follows that space is an effect arising from the first existence of being, because when any being is postulated, space is postulated. 12.

The same may, of course, be affirmed of time or duration, with appropriate alterations of terminology,

> for certainly both (time and space) are dispositions of being or attributes according to which we denominate quantitatively the presence and duration of any existing individual thing. 13.

But when it is said that space and time are dispositions of being *qua* being, it is said merely that any being under consideration, by virtue of the fact that it exists, partakes of the nature of space and of time : that, in this sense, they exist, if they exist, in space and time. Moreover, it is evident from the context of both of the foregoing passages, as well as from the context of the *Principles*, that the existence of beings is fundamentally dependent upon their relation to, or existence in, space and time. It is evident also that the reverse is not, and cannot be, the case: *i.e.*, that space and time are inherently not dependent upon the existence, or upon the character, of things or beings on the physical level. For if the relation of a thing or being to space and time is the fundamental criterion for the existence of the thing or being in question, it would appear that the postulation of such a being would involve the postulation of space and time, not as a consequence, but as the *necessary pre-condition*, of the former.

Insofar as the nature of time is quite independent of the data observed in experience, and even in common experience, and insofar as it is the pre-condition of physical existence, it is to be interpreted as a reality on the *metaphysical* , rather than on the physical, level; its nature as an absolute, and as a metaphysical reality, is determined by this very independence. Absolute time, in the Newtonian scheme, can thus be referred to as one of the "independent variables", upon which virtually all scientific procedures and all scientific laws ultimately depend. And insofar as absolute time, as well as absolute space are the independent variables upon which scientific investigations ultimately

depend, they may, in some respect, be considered *transcendent* beings. For their independence stands as testimony to the fact that they would presumably exist whether or not there were any spatial or temporal things, *i.e.*, whether or not there were a physical world. So although Newton makes very few metaphysical statements, at least within the context of his *Mathematical Principles*, and although he seems to have some distaste for metaphysical speculation *per se*, nevertheless his pronouncements concerning space and time *as absolutes* can only be considered to be peculiarly metaphysical in character.

Thus it is that, in their ultimate and most characteristic nature, space and time *as absolutes* cannot be derived from the existence or the internal character of physical beings, and must not be referred to any possible specifically designatable, and therefore physical or material, frame of reference. To attempt such a derivation, or to seek to effect such a reference, is to commit the procedural error of circularity. Time is, as has already been affirmed, *measurable*; but *to measure time by any physical means* (*e.g.*, by the employment of periodical mechanisms of whatever sort) is to establish a radical dichotomy of time itself which is measured and the measurement of time. The time that is presumably measured is an *absolute*; and if it is to be quantitatively determined or measured without any such theoretical dissociation or practical distortion, it must inevitably be determined or measured *absolutely*[14], by reference to itself alone and not to some thing theoretically other than itself. Insofar as, by Newton's own admission, they are pure mathematical reality, absolute time and absolute space contain within themselves

their own metrics; and it is only by referring to their own internal metrics that an absolute measurement of space and time as absolutes can be provided.

If it is said (a) that time itself is purely mathematical in nature, and (b) that in order to effect an absolutely accurate measurement of time, one is obliged to refer to nothing other than time itself (or, in other words, that time by nature contains within itself its own unique metric), then the similarity between such a conception of time and a mathematical series of numbers might seem, on various bases, altogether too striking to ignore. The analogy between the two would seem to hold good on several points or issues. First of all, both numerical series and time are reputed to be infinite in extent, for neither, in and of itself, is considered to have limits or boundaries. This is obvious in the case of number, and from a consideration of the very notion of number; but in the case of space and of time it is not quite so evident. That these last are infinite in extent is, as has already been noted, established indirectly or by inference, as an inevitable consequence of the nature of absolute motion: i.e., specifically, as a consequence of the nature of an absolute motion of a body moving longitudinally, upon which no impeding forces are impressed. Yet the existence of such an unterminated or unaltered physical motion is, at best, doubtful. It is theoretically possible, of course, but it is practically undetermined, and perhaps even indeterminable. If the infinitude of space and time in themselves depends upon the veracity of such a physical motion, then it may well be doubted that space and time

and indeed infinite in extent. The existence of space and of time may well enough be demonstrated, physically, by reference to the physical or experimental demonstration of the existence of absolute motion[15], and perhaps the general quantitative or mathematical character of space and time may be demonstrated by referring to the measurability of motion, which depends upon their own measurability. But it might be suggested that the infinitude of space and time cannot, with strict adequacy, be physically established. If this property of space and time is to be proven legitimate, it must, therefore, be established by purely theoretical, rather than by practical or experimental, means. In short, it must be arrived at in consideration of the inherent quantitative nature of space and time alone: i.e., by means of reason, and not by experiment. To this end, Newton argues, in specific regard to space, that

> space extends infinitely in all directions. For we cannot imagine any limit anywhere without at the same time imagining that there is space beyond it. 16.

Essentially the same argument as is here considered in regard to space can likewise be considered in reference to time.

The similarily between absolute space and absolute time, on the one side, and number, on the other, can be demonstrated further by the theoretical fact that both are independent of things in the physical universe, and are, on this basis, transcendental or metaphysical considerations. For number itself is radically distinct in character from the things that are quantified or enumerated, just as space and time are by nature to be dissociated from the things that occupy space and endure, and that are susceptible to being measured by virtue of this fact.

Moreover, their independence in regard to things, their transcendental or metaphysical status, testifies to the view that both space and time, on the one side, and number, on the other, contain within themselves their own unique metric, or means of assigning variant values. In other words, the value of number is fundamentally intrinsic to, and is the very essence of, number itself. And hence, to speak of the value of number is to speak of number itself. Insofar as space and time are, in themselves, quantitative independent variables, they may be construed to partake of this characteristic of number.

The traditional Euclidean view of mathematical quantity or number is that the range of its values constitutes an infinite series, and it may be said that, when we speak of number, that about which we speak is nothing other than this very infinite series: 1, 2, 3, ... n. That a general absolute concept of number is, by nature, susceptible to division or analysis into specific and genuine parts (i.e., specific numbers) is more or less intuitively obvious. The same may be affirmed of Newtonian time; for, absolute time, in the Newtonian theory, is divisible, and thus admits of genuine parts. Similarly, it is maintained that absolute space is also divisible, and admits of genuine parts which are subsequently referred to as "absolute places". Indeed, Newton states, in this regard, that "there are given successive parts in duration (and) coexistent parts in space".[17] Furthermore, Newton declares that

> In all directions, space can be distinguished into parts whose common limits we usually call surfaces; and these surfaces can be distinguished in all directions into parts whose common limits we usually call lines; and again these lines can be distinguished in all directions into parts which we call points. [18]

And if this can be affirmed of space, then it would seem that it can be said also, with terminological modifications, of time. In fact, it was one of Newton's teachers, Isaac Barrow, who declared that time "has many analogies with a line", and who proceeded to give an atomistic interpretation of such magnitudes;[19] and in one sense, Newton's own pronouncements on the topic hardly suggest that he significantly departed from the earlier view of his teacher.

Having thus established the fact that mathematical time and mathematical space are divisible into genuine parts, it would be pertinent to inquire into the extent of the divisibility in question, and hence to inquire into the quantitative nature, or the quantitative magnitude, of the parts. For, if time and space are <u>infinitely divisible</u>, then the parts into which they are capable of being divided are <u>infinitesimal</u> in character; while, on the other hand, if they are <u>not infinitely divisible</u>, the parts could only be finite in extent. The issue thus to be decided by such an inquiry concerns the possible continuity or the possible discontinuity of both space and time, and the outcome of this inquiry, in turn, reflects upon the inherent character of physical motion and its mathematical description. The resolution of the problem may be found in encapsulated form within the context of the <u>Mathematical Principles</u>. Newton's affirmation that "every <u>particle</u> of space is <u>always</u>, and every <u>indivisible moment</u> of duration is <u>everywhere</u>"[20] testifies to his belief that time (if not space) is divisible only <u>to a limited extent</u>, or is composed of <u>finite indivisibles</u>.[21] However, to regard time and space as composed of finite indivisibles

is to interpret them as essentially discontinuous quantities, analogous to the series of natural numbers in mathematical theory; yet Newton, like his teacher, Isaac Barrow, sought to characterize space and time as fundamentally continuous quantities.

Since space and time are, in some sense, to be regarded as particulate or atomic in their internal character, and since they are to be interpreted as independent of any physical existent, the parts of space (i.e., absolute places) remain the same through time-- by virtue of their immobility, they are quantitatively the same at all times--, while the parts of time (i.e., instants, or moments) remain quantitatively the same for all places.[22] Thus, in describing space and time as "independent variables", they may be regarded, on this basis, not only as independent of things in the physical universe, but also as theoretically independent of each other. In the words of A.N. Whitehead,

> ...as regards time, if material has existed during any period, it has equally been in existence during any portion of that period. In other words, dividing the time does not divide the material. (But)...in respect to space, dividing the volume does divide the material ...The division of time functions, in respect to material, quite differently from the division of space. [23]

Somewhat the same considerations could serve to distinguish space and time within the Newtonian context.

Both space and time are systems used for ascertaining or determining the order and the extent of things in the physical universe. To this end, they are tools.[24] Insofar as this is the case, and insofar also as they are composed of virtually indivisible parts, they must themselves be essentially characterized as the unique orders of their parts. It is,

therefore by referring to their inherent natures that the order of the parts of time may be distinguished from that of the parts of space. For the parts of space and time, in themselves, are purely and simply quantities, and in that respect they are theoretically akin one to the other. Thus, if space and time are to be dissociated, they must be so by virtue of their unique properties as systems of order. Time, on the one hand, is described by Newton as the immutable or unalterable order of its parts (i.e., instants), while, on the other hand, space is described in similar fashion as the immutable order of its parts (i.e., points or places). Moreover, it is on pain of contradiction that the orders of space and time are immutable or unalterable; for, if we

> ...suppose those parts to be moved out of their places, ...they will be moved out of themselves. For times and spaces are, as it were, the places as well of themselves as of other things. 25.

The assumption that lies behind the Newtonian doctrine of space and of time as absolute beings, then, is not only that space and time must be interpreted as an aggregate of indivisible and impenetrable particles, but that the very essence of the parts of both space and time are defined by their inherence in their respective systems of order. If, for example, time is to be regarded as the aggregation or the order of its parts (i.e., instants)-- t_1, t_2, $t_3 \ldots t_n$--, then the unique quantitative character of any of these instants is derived from its position in the immutable constitutional order of time. The same may, of course, be said in a necessarily more complicated way[26] of space and its parts. Thus, as Newton declares:

> ...times and spaces are, as it were, the places as well of themselves as of all other things. All things (including, it seems, the parts of time) are placed in time as to order of succession; and all things (including the parts of space) are placed in space as to order of situation. It is from their essence or nature that they are places, and that the primary places of things should be moveable is absurd. 27.

The distinctive characters of space and time, in consideration of the foregoing, lies not specifically in the inherent character of that which is ordered, for the parts of both space and time are, by nature, simply mathematical or numerical quantities; it lies, rather, in the respective ways in which they are ordered. As Newton suggests, the parts of time are ordered dynamically, whereas those of space are ordered statically.

Time, then, differs from space primarily in the fact that it is a dynamical or flowing quantity, and that it is an order established with a view to the perpetual succession of its parts. Under the influence of Barrow, Newton sought to make the notions of continuous motion, and of an equally continuous time, fundamental in his system. But Newton attempted to ground the continuity of time upon the relentless evenness, or the uniformity, or the uninterrupted character, of its flow, and thus both upon its essentially quantitative character (i.e., upon the nature of number), and upon its inherent and primordial dynamism. In regard to the latter of these, it must be declared that both the existence and the continuity of motion are assumed in the context of Newton's universal science of mechanics, as being (I suppose) intuitively certain.[28] Indeed, it is evident from the preface to the first edition of the Mathematical Principles that, for Newton, natural philosophy as a

discipline is the study of the phenomenon of physical motion: i.e., "from phenomena of motions to investigate the forces of nature, and then, from these forces to demonstrate the other phenomena."[29] Every science assumes, or takes for granted, the existence of its subject-matter;[30] the science of mechanics assumes the existence of physical motion, and if such motion is viewed as continuous, then the continuity is likewise assumed.

To proceed from the supposed, or assumed, continuity of motion to that of time is just as legitimate as it is to infer the existence of time from the fact that motion exists. Indeed, to say that a certain character pertains to the one is to say that it pertains equally well to the other, insofar as dynamism is part of the very essence of time.[31] In consideration of number, for time can be construed as fundamentally quantitative in nature, it may be said that Newton was of the opinion that number is "less a collection of units than an abstract ratio of any quantity to another".[32] As a result of his belief in this regard, the quantitative nature of mathematics in general, and of arithmetic in particular, is to that extent assimilated to geometrical considerations in the classical Euclidean sense.[33] Moreover, both mechanical and geometrical magnitudes are interpreted as having been generated by the motion of an indivisible mathematical or physical particle. This very generation testifies to the supposed continuity of the magnitude under consideration. In brief, it was to describe the generation of such quantities or magnitudes, e.g., the motion of physical bodies, or geometrical figure, that Newton developed his theory of fluxions.

What can be affirmed of geometrical entities can likewise be

said of virtually any mathematical entity, since all mathematical entities are given geometrical interpretation. For example, a circle as a geometrical figure can be described or defined in two ways: (a) as that figure in which each point on the circumference is equidistant from the center, and, in slightly different fashion, (b) as the path traced by a point-particle moving under the influence of certain specifiable and mechanically describable forces. The first of these possible definitions is essentially static in character, and refers to the complete or finished magnitude; the second is fundamentally dynamic , and refers to the process of the generation of the geometrical quantity under consideration. The one, moreover, is susceptible to description as an agglomeration of discontinuous parts, whether these are considered to be finite or infinitesimal in extent; but the other, inasmuch as it is expressed dynamically, and inasmuch as motion itself is regarded as continuous, can be regarded as a continuity. It seems, in this light, that there are two legitimate ways of describing or defining mathematical entities: the one being "entitative", and the other "dynamical".

The same considerations apply to arithmetical problems. For, since number was regarded by Newton as a ratio of what amount to geometrical magnitudes, then the notion of number itself can be interpreted in fundamentally the same way as geometrical quantity . Again, and more generally, the remarks made above may be applied in any study or investigation of motion, whether physical or otherwise.

Just, then, as a geometrical figure may be considered dynamically as a magnitude generated by the motion of a geometrical indivisible

(i.e., a point), so time may likewise be considered as a magnitude generated by the absolute and equable motion of an indivisible (i.e., an instant).[34] Indeed, it may well be that the descriptive phrase "generated magnitude" applies more obviously to time than it does to geometrical quantities or figures, in view of the fact that Newton explicitly affirms the equable flow of time. In short, time, as Newton describes it, is the dynamical continuum par excellence. And, as much as any geometrical quantity, Newtonian time may be described both as the fixed or determinate order of its homogeneous parts, and as a continuous process. To adapt the phraseology of Professor M.K. Munitz, Newtonian time can be considered as a "single line progress".[35] Such a description involves both of the aforementioned aspects: viz., the determinate order or series of instants that is taken to constitute the "line", and the uniform, progressive, longitudinal motion of the "line". Somewhat the same dichotomous interpretation is presented by several other writers, one of these being Isaac Barrow, who reportedly maintained that magnitudes such as time and lines can be considered as constituted either from the continuous flow of one instant or point, or as an aggregation of instants or points.[36] And there is E.A. Burtt, whose formulation of the matter is that

> ...the idea of time thrust upon the world by modern science is a mixture of two peculiar conceptions. On the one hand, time is conceived as a homogeneous mathematical continuum, extending from the infinite past to the infinite future. Being one and entire, its whole extent is somehow present at once; it is necessarily bound together, and all subject to knowledge... (On the other hand, it) is a succession of discrete parts, or moments, no two of which are present simultaneously, and hence nothing exists or is present except the moment now. Hence from this

> point of view, time is contracted into a mathematical limit between the past and the future. 37.

In any case, the assumption on Newton's part that time involves considerations both of order and of rate or generation evokes the problem as to how these are to be theoretically reconciled; and it is only by having regard for the basic concepts of the theory of fluxions (calculus) that this reconciliation can, at least to a certain degree, be accomplished.

Insofar as time is, in at least one sense, to be considered as an order, it is to that extent significantly relational in its character. This same general characterization applies equally well to absolute time (i.e., time itself) as it does to relative time (i.e., the measurement of time, or empirical time) in regard to Newtonian theory. The distinction, then, of absolute and relative time, that Newton wants theoretically to maintain, is to be effected not by having regard to the inherent character of the relation itself, but rather by having regard to the ontological status, or for the character, of the things related. Thus, if it is considered as relative, time is found to be dependent upon the qualitative modifications of things or of the experience of things, and is thus to be regarded as an order of qualities with respect to before and after. Moreover, the reference on this score is to heterogeneous considerations, whether they are considered to be absolutely just as they are experienced, or whether they are, in the end, reduced to something else, perhaps to configurations of matter.[38] But absolute time, as has been said above, is purely quantitative and therefore homogeneous in character, and thereby bears no reference whatsoever either to

qualitative concerns or to those of spatial position.[39] In no way can time be found to imply the existence of any concrete change or motion as its content, or even the necessarily temporal existence of any concrete physical reality.[40] The implication in this regard is strictly uni-directional; it proceeds solely from the factual existence of the motion of a physical body, or perhaps from the very existence of a physical body, to the time in which it exists, and which is the logical ground of its existence. Time, then, exists metaphysically as the logical presupposition of concrete, factual, physical existence, and would by nature continue to do so even if there were no temporal beings, even if it had no contents.[41] To paraphrase Bertrand Russell,[42] there is a radical difference between <u>having</u> a quantity or magnitude and <u>being</u> a quantity or magnitude, between <u>having</u> an order and <u>being</u> an order. There is no doubt, on the empirical level, that experienced qualities have magnitude, and are to this extent quantitative; there is likewise no doubt that they are ordered in a certain way. But serious theoretical difficulties are to be encountered if it is said that experienced qualities <u>are</u> magnitudes or quantities, or that by their very nature they constitute a certain, specific, and essential order.

On the other side, since time is also to be considered as a continuous process, absolute and relative time are to be dissociated on the basis of the uniformity (equability) or the continuity ascribed thereto. Physical change is fundamentally either qualitative or positional, and as such it involves the conjunction of qualitative

states or of positions, both of which are essentially immovable, for a qualitative state is simply what it is and nothing more and Newton himself testifies to the immovability of space (and hence of position or place, as its parts). Considered as relative, time is dependent upon physical motion, and this motion, in turn, depends upon the qualitative modification, or the change of the place, of physical things. But that a thing moves or changes qualitatively in no way affects its essential character as a thing or body. Physical motion and qualitative alterations are therefore accidental properties of the thing or body in question. In this regard, there is a wide theoretical gap between having motion, or being in a state of change, and being motion, or being change. For in the one case, the physical motion of a body can, at least in principle, be accelerated or retarded by virtue of the fact that the physical motion of a body is an accidental property of such a body, but Newton declares that the flowing of time, insofar as it pertains to the very essence of time, is not liable to any change.[43]

That absolute and relative times differ in the aforementioned ways stands as testimony to a differentiation on a more general level. Indeed, in Newton's preface to the first edition of the Mathematical Principles, what is called geometrical is, in accordance with classical theory, to be distinguished from the so-called mechanical:

> The ancients considered mechanics in a two-fold respect; as rational which proceeds accurately by demonstration, and practical. To practical mechanics all the manual arts belong, from which mechanics took its name. But as artificers do not work with perfect accuracy, it comes to pass that mechanics is so distinguished from geometry that what is perfectly accurate is called geometrical; what is less so is called mechanical. [44]

In accordance with the classical theories of antiquity, more theoretical weight is to be attached to the rational than is to be placed upon the practical or "mechanical", for the rational is interpreted as the ground upon which the reliability of practice, or of mechanics, depends. In view of what has been affirmed heretofore with respect to Newtonian theory, it might be suggested that the same consideration applies also to this context. Newton's aim, for instance, was to provide a universal science of mechanics, to show, in short, that the motions of physical bodies are universally determinable by strictly mechanical means and are mathematically describable. The universality of the mechanistic determination of physical motion, and the accuracy of the mathematical description of it, depend upon the assumption of geometrical principles and modes of procedure. It is therefore hardly surprising that the universality and the accuracy of his mechanical disquisitions ultimately involve the assumption of rational, rather than practical, standards, and that, at least in the more momentous and philosophically significant problems to be considered, Newton should proceed primarily by the way of rational demonstration and only secondarily, if at all, by practical experimentation. When Newton says that

> Absolute time, in astronomy, is distinguished from relative, by the equation or correction of the apparent time. For the natural days are truly unequal, though they are commonly considered as equal, and used for the measure of time; astronomers must correct this inequality that they may measure the celestial motions by a more accurate time. 45.

he must be interpreted either as affirming, or as tending towards, the rational, rather than the practical or physical, character of the

"correction". The ultimately rational nature and implications of the correction have, of course, their practical or physical consequences, but this is not to be taken to detract significantly from their connection with rationality.[46] Thus, the time of so-called "rational demonstration"-- i.e., absolute time-- may be indicated as differing from the physical time of the mechanical sciences, or that of experience, both in degree and in kind.

Indeed, Newton's interpretation of time as an absloute seems to have somewhat the same character and status as a Form or Idea in the theory of Plato, of which Form or Idea any particular physical or empirical manifestation is a more or less imperfect copy or translation. In this way arises the essential contrast between mathematical or rational considerations, in reference to which one is fundamentally concerned with ideals and their purely logical associations, and the practical instances or measures that approximate to the ideal without ever attaining it. Within the confines of a strict, axiomatized system of geometry, such as that of Euclid, a parallel with respect to our present concerns might very well be suggested.[47] For the triangles, circles, and other geometrical figures, which are described by essentially mechanical means on a blackboard or on a piece of paper can be shown to satisfy only approximately the axioms, rules, and definitions of Euclid. The ideal and perfect triangles, and circles, of pure geometry completely satisfy a definition or set of definitions, and thereby possess an absolute degree of perfection by their very nature, to which degree their sensible or physically described counterparts can assuredly only

approach, but never achieve. Only that portion of what we call the science of geometry which concerns itself exclusively with ideal and logical properties or perfections would be designated at all geometrical by Newton; that which is not primarily so concerned, but nevertheless involves geometrical implications, Newton would call mechanical, insofar as it is dependent upon the sensible appreciation or the physical translation of purely ideal geometrical perfections.[48] To the extent, then, that it is possible for physical representations to approximate to theoretical or rational ideals, the two might be treated as different in respect of degree. But the fact that the physical representation, though quite capable of approaching, can never actually achieve, the inherent perfection of the ideal suggests, on the other hand, that the two differ in point of kind.

According to some writers,[49] it is the strongly logical character of the Newtonian theory that marks it as a novelty and as a milestone in the history of scientific thought, and that distinguishes it from its historical antecedents. In brief, Newton seems to exercise much the same influence, and to have much the same effect, upon the physical sciences as Euclid seems to have exercised, and to have had, upon geometry. Specifically, the axiomatic and demonstrative character of the Mathematical Principles, for example, can be found to parallel, and to be roughly the equivalent in power of, that of Euclid's Elements. And what is said of the nature of geometrical figure in the context of the latter can be said with virtually equal legitimacy of Newtonian time. Thus, the mathematical or logical nature of time may be considered as a perfection

of which scientific or mechanical measurements of whatever sort, or of whatever degree of potential refinement and accuracy, must be more or less perfect and accurate representations; for all such measures must of necessity be viewed as relative to some physically identifiable frame of reference,[50] and to employ a metric that is associated with the physical motion of a periodical mechanism. It is not time itself that is measured in this way, nor is it motion which is thus measured by time. In such cases, rather, the measurement is that of a motion by a motion. It is, moreover, relative to, or dependent upon, both the point of view from which the measured motion is apprehended, and the character of the motion that is adopted as the standard of measurement. Time itself essentially escapes such a measurement, for it can only be said that

> absolute space and absolute time... are not the most perfect measures one could conceive, but rather the theoretical ideals to which all relative measures are more or less good approximations. 51.

It is theoretically inconceivable that an ideal, or non-physical, being of any sort should be measurable, or otherwise describable, in physical terms, or that an absolute should admit either of measurement or of interpretation in terms of the relative; for the absolute is the ground of the very being, or of the possibility, of the relative.

Truly, time is, for Newton, a pre-condition of physical existence. Hence, there can be no natural frame of reference that can be employed in order to identify the Newtonian absolutes, upon which they can be interpretively based, and by reference to which they are susceptible to significant physical measurement. For, in order to be designated as

"natural" in the first place, a physical frame of reference must be presumed really or actually to exist. In this respect, such frames of reference are essentially no different from material things or physical events. The one requirement for real or actual existence--whether of things, or of events, or of frames of reference--is that that which is said really or actually to exist must exist in space and in time: i.e., must be spatio-temporal in character. Thus, whatever is read into the Newtonian conception of absolutes

> it is always taken to be denying the same thing: namely, that time, space, place, and motion can, fundamentally, be referred to any material frame of reference. 52.

As has already been intimated, then, space and time are not to be viewed as physical, but rather as metaphysical, both in their character and in their theoretical status.

This inherently metaphysical nature of time raises peculiar problems of its own: viz., those centering on the question as to whether it is to be affirmed as real, either in a substantial or in some other sense, or, on the other hand, whether it is to be affirmed as strictly ideal; and if it can be clearly ascertained as real, or as ideal, in what way is it to be considered so. That both designations enter into metaphysical disquisitions should be manifestly evident from a study of philosophical theory in general.[53] In specific regard, however, to the theory of time, an affirmation of the metaphysical reality, or of the metaphysical ideality, of time depends upon the interpretation given to temporal entities, or to physical existence, and also upon the theoretical

vantage point adopted. Despite Toulmin's suggestion that Newtonian time is a "theoretical ideal", an expression which, though in one respect correct, might be misleading, Newton must be interpreted as advocating as well the objective reality of both space and time. Indeed, they are first and foremost objective realities. For, to maintain that time and space are fundamentally ideal is to affirm that they are in some way dependent upon qualitative occurrances in the mind, whereas Newton's position is that they are, in themselves, absolutely independent of such matters. They are, as we have said, pre-conditions of the very existence of things. And, if they are pre-conditions of things, and if things themselves are objectively real (as Newton assumed that they are), or exist quite independently of any apprehension or knowledge of them, then it is demonstrable obvious that time itself is similarly an objective reality, though the conception of it is ideal.

The question, then, remains as to the mode in which the reality of space and time in Newtonian theory is to be affirmed. In other words, the question of how, or in what way, space and time are to be considered real inevitably arises. There are, it seems, two responses that can be made to this question, and the two may be regarded as exhausting the possibilities in this regard. Either space and time are substances existing necessarily in and of themselves (i.e., by virtue of their own inherent natures), or they are properties of some other substance, the existence of which is necessary, and is, furthermore, guaranteed by its own internal nature.

The metaphysical substantiality of space and time may be

eliminated on the basis that it leads ultimately either to contradiction, or to an infinite regression of the sort derived within the famous paradoxes of Zeno the Eleatic.[55] In view of such serious theoretical consequences, therefore, Newtonian time cannot be given a significant substantial interpretation. Moreover, the characteristics of time and space do not by themselves guarantee the inherent necessity of their existence. To show demonstratively that space and time exist independently of things in the physical universe, or absolutely, is one matter, but to show that they exist necessarily, by virtue of the properties that can be ascribed thereto, is quite a different matter. The absolute existence of space and time is guaranteed by the nature of physical existence, and it may be shown by inference from the latter that space and time are its pre-conditions. And although it is said that they exist necessarily from the vantage point of the physical universe, and that they exist in absolute independence of their contents, yet these points cannot be demonstrated internally, with reference to the inherent characteristics of space and time alone. If it cannot be established on the basis of strictly internal criteria and by strictly internal argument, then something other than time and space themselves must be invoked in order to account for their absolute necessity. Space and time, then, must be interpreted as a property of some ultimate metaphysical being, the existence of which is necessary, and the necessary existence of which is guaranteed by strictly internal considerations.

In the "General Scholium" of his Mathematical Principles,[56] and in the Opticks (1704), Newton indeed speaks in theological terms of God, as

the ultimate, and inherently or absolutely necessary, being. And the inherent or intrinsic necessity of God's existence is given as the ground for the absolute independence, the universality, and the continuity of both space and time. Space and time, in terminology used by Newton, constitute the "boundless uniform sensorium" of God,[57] the organ in or through which He is immediately aware of, or is present to, what is theoretically other than Himself. To affirm that space and time are aspects of the divine sensorium is, therefore, to make the inquiry into the natures of space and time a fundamentally theological inquiry; for they are attributes within the nature of God, and cannot be treated without, at the same time, considering the characteristics generally of divine being. The way, then, in which the things that constitute the universe truly exist or are present, objectively, is the way they are for, are present to, or are known by, God. But the way they exist for particular finite beings is the way they appear from a particular physical point of view, since, for example, the data that exist within the sensoria of human beings, unlike those that exist within the divine sensorium, are dependent upon, or are received by means of, organs of sensation which are, and can only be, <u>physical</u> in character. Because of His essentially non-physical nature, and His absolute independence of physical existence,[58] God is to be viewed as omnipresent; whereas a man is physically limited by virtue of the fact that the sensorium in this case is dependent upon the operation of physical organs of sense.

Of the nature of God, Newton says that

> He is eternal and infinite, omnipotent and omniscient; that is, his duration reaches from eternity to eternity, his presence from infinity to infinity... He is not eternity and infinity, but eternal and infinite; he is not duration or space, but he endures and is present. 59.

It is the divine sensorium that is space and time. It is, furthermore, by virtue of the fact that space and time are involved in the very nature of God that they can be designated as most truly absolute. But, granted that God's sensorium is space and time, what does it mean to say that He is infinite and eternal? Or, in other words, what does it mean to say that He is omnipresent with respect both to space and to time? In response, it may be said that God is eternal in the intensive sense that He is essentially beyond time, and infinite also in the intensive sense that He is essentially beyond space: i.e., that His essential character is unconditioned either spatially or temporally. The same may, to a certain limited extent, be said of human nature, for although what is thought arrives in the human or finite sensorium through physical sense organs, yet the way in which thinking proceeds, and the principles by which mental procedure is governed, are not so determined. It is in this light that

> There are given successive parts in duration, coexistent parts in space, but neither the one nor the other in the person of a man or his thinking principle; and much less can they be found in the thinking substance of God. 60.

The divine sensorium is space and time, but it cannot be said that this sensorium is equivalent to God. It is but one of His constituent attributes. In slightly different terminology, then, God is infinite and eternal in extent, because the divine sensorium is one of the

constituents of His nature. If extensive infinitude and extensive eternity implies the existence of a being at all places and at all times respectively, and if the divine sensorium is inseparable from the divine nature, as a whole, in the sense that it inheres in the latter, then God can be considered to be extensively infinite with respect to space, and extensively eternal in time. In addition, it may be indicated that extensive infinity and extensive eternity are derived from their intensive counterparts.

It should be clear that Newton interpreted, and indeed justified, his absolute interpretation of space and time in theological terms, and that, if it is to be understood that there is a frame of reference according to which space and time as absolutes can be recognized and fully appreciated, the adoption of such would be tantamount to making oneself absolutely transcendent with respect to the physical universe, and thereby coincident with God. This, however, is impossible; and so

> because the parts of space cannot be seen, or distinguished from one another by our senses, therefore in their stead we use sensible measures of them. For from the positions and distances of things from any body considered as immovable, we define all places; and then with respect to such places, we estimate all motions, considering bodies as transferred from some of these places into others. And so, instead of absolute places and motions, we use relative ones; and that without any inconvenience in common affairs... 61.

It is impossible that finite and physically-dependent beings should be capable of a significant identity with God. Hence, it is impossible that such beings should fully and adequately comprehend the internal nature of space and time in themselves (i.e., as absolutes). Yet,

Newton says that

> In philosophical disquisitions, we ought to abstract from our senses, and consider things themselves, distinct from what are only sensible measures of them... 62.

Presumably, only in this way can the absolute universality of the laws of mechanical science, and of the principles of philosophy, even be approached; and there is that within the nature of man-- viz., his thinking principle-- which makes at all possible such an approach or approximation, though not its attainment.

Insofar as he functions as an experimental and positivistic scientist, and inasmuch as the mathematical principles and the physical laws that he propounds are fundamentally descriptive, Newton may well be classified as an empiricist, despite the fact that he is concerned not with the qualitative, but rather with the quantitative, properties of the subject matter.[63] For him, scientific procedure consists in the formulation of mathematical laws that describe the behavior of the things in the physical universe, and which are inferred from, and verified or verifiable by, observation. Indeed, Newton's thought may be said to tend towards the purgation of metaphysical considerations from the domain of the physical sciences. It is to this end that Newton describes, or rather, prescribes, his method towards the end of the Opticks:

> As in mathematics, so in natural philosophy, the investigation of difficult things by the method of analysis ought ever to precede the method of composition. This analysis consists in making experiments, and in drawing general conclusions from them by induction, and admitting of no objections against the conclusions, but such as are taken from experiments, or other certain truths. 64.

The laws of Newton's universal mechanics can be reduced, then, to generalizations based, by virtue of experiment, upon observation. This characterization would apply to scientific laws regardless of their degree of generality. In the Mathematical Principles, for example, it would be appropriate not only to the specific and particular laws discussed in the various propositions, but just as well to the very axioms of the system (i.e., to the so-called "laws of motion"). Furthermore, he eschews speculative or metaphysical hypotheses as explanatory powers.[65] To this extent, the Newtonian doctrine is markedly empiricist.

Yet, as we have noted, Newton does not, and cannot, totally ignore metaphysical or speculative conceptions. Several of them, indeed, find a necessary place within his system: for example, that of the "ether", and especially those of space and time. And in this regard, there is legitimate ground for his being categorized as a metaphysician. In defence of his empiricism, however, it must be said that the metaphysical beings of space and time do not explain, or exercise influence upon, anything in the physical universe, whether bodies or motions.[66] They are simply the metaphysical or transcendental media in which physical things exist and move, and by relation with which the things of the physical universe derive their quantitative character.

Not only are space and time interpreted as quantitative magnitudes, but the nature of material substance, and that of physical motion, are likewise quantitative. And if, by virtue of their purely quantitative character, space and time are to be considered as absolutes,

and as theoretically independent of any spatio-temporal, or physical, beings, and as the metaphysical basis of physical quantities, so also must material substance (i.e., extended things) and physical motion (i.e., the motion of extended things) be interpreted in some sense absolutely. This must be declared in the interests of methodological consistency. Thus, material substances and physical motions are absolute in the sense of having existence independently of any specific human experience or knowledge, and in the sense also of being effectively the material pre-conditions of any such experience or knowledge. The ontological differentiation of space and time on the one side, and material substance and physical motion on the other side, need involve no significant objection to this point, and does not significantly affect the status of the physical universe, as an absolute in its own right. That the absolute existence of the physical universe is the material pre-condition of human experience and knowledge, and that space and time are the formal pre-conditions of the physical universe, suggests merely that there is a hierarchy of absolutes.

In seeking to establish a universal and inherently quantitative science of mechanics, the existence of the physical things with which it deals must be assumed, or taken for granted. Indeed, it would be manifestly impossible and absurd if, in developing such a science, the very existence of its subject matter had to be proven. It is necessary, therefore, that a science presuppose the existence of what it describes. The theoretical situation, here, is basically the same as is that at the beginning of Aristotle's Physics.[67.]

Further, the establishment of an inherently universal mechanical science involves the assumption of the absolute existence of the physical universe. For otherwise there could be no assurance whatsoever that the science in question is, or is even capable of being, a universal one. In other words, if the science is to be truly universal, both in the scope of its descriptive power and in that of its applicability, then the objectivity or the independence of the material things described, i.e., of the things which ultimately provide the material or the content of the science in question, must be taken for granted at the very outset. Experiments such as that of the rotating bucket do not purport to prove the existence of motion, nor really to demonstrate the existence of absolute motion; what they do is merely indicate a specific context in consideration of which absolute motion may be distinguished from relative.

Moreover, the assumption of the existence of the physical universe immediately implies the existence of space and time. The mere existence of space and time, and even the absolute physical existence of space and time, requires no more proof than does the (absolute physical) existence of the universe. In short, it is the absolute existence of space and time as metaphysical beings that has to be demonstrated.

B

RELATIVISM

Formal theoretical opposition of the Newtonian doctrine of absolutes comes from two different directions, the one significantly metaphysical, and the other empirical, in character. The susceptibility of Newtonian theory to attack from both of these directions arises from peculiar features inherent in the theory itself. On the one hand, insofar as the Newtonian theory is avowedly scientific or positivistic, both in intent and in form, and insofar as it is based upon the experimental method, which depends in its turn upon the nature of observation, criticism may, on this score, be positivistic and elemental. As such, the criticism would be directed either against the interpretation of the facts advanced as supposed evidence for the conclusions that are set forth, or against the stringency of the logical connection between factual evidence and the conclustion. They would be significantly factual criticisms, or methodological criticisms. As such, they are directed towards showing that the argument against which they are brought is inconclusive, that the language in which it is expressed is unclear or imprecise, and that the doctrine against which they are brought is hypothetical. On the other side, it has been noted in the preceding chapter that Newton's absolutist theory of space and time is metaphysical in character, since they are quite independent of, and indifferent to, physical existence; furthermore

they are given an ultimately theological interpretation, insofar as they, and thereby all physical considerations, are referred finally to the divine sensorium, or, in general, to the inherent nature of God. For this reason, a metaphysical critique of the Newtonian theory would seem to be appropriate. Such a critique, unlike that which arises out of the empiricist tradition, takes the form of a reductio ad absurdum, and is directed towards the derivation of explicit contradictions within the significantly metaphysical aspect of the Newtonian theory.

Despite the fact that they are obviously negative with respect to the Newtonian theory of absolutes, it must not, of course, be supposed that the theories which thus attempt to destroy the Newtonian interpretation are themselves negative in their essential character, or that they are to be viewed as having their origin as theories primarily in the negation of the aforementioned thesis. They are themselves inherently positive theses that arise, historically, about the same time as Newton's own. They are theses, the internal principles of which mark them as opponents of the Newtonian. In other words, they are theses which are externally antagonistic to that of Newton, the antagonism being virtually necessitated by the nature of their own internal principles and inherent presuppositions.

The opposition between, or the radical differentiation of, philosophical theories, which is grounded upon the very assumptions or axioms of the conflicting systems, is bound to have far-reaching effects; and, at some point or other in any theory whatsoever, assumptions have to be made, and axioms have to be established or formulated. A radical

difference in the interpretation of space and time will inevitably be reflected in the adoption of antagonistic theories of material or physical existence; and this, in turn, will be reflected in the adoption of conflicting theories of mind. Or, the adoption by two philosophical theories of conflicting interpretations of physical existence will have the effect of producing an essential conflict in interpretations of space and time, as well as in interpretations of mind. This appears to be a theoretical and methodological truism, and would remain good or true regardless of similarities either on specific points or in consideration of certain general attitudes.

The metaphysical opposition to the Newtonian interpretation of space and time as absolutes is to be noted in regard to the philosophical theory of Leibniz; and the criticism established on the basis of empiricist principles is to be found in the theory of George Berkeley. These theories, though widely divergent in many respects, are alike insofar as they both involve interpretations of space and of time as beings which are fundamentally derivative and relative, both in character and in theoretical status. The meaning to be attached to these terms: "relative" and "derivative", will become apparent in the discussion of the two theories indicated above, which occupy, and are the subject-matter of, the following two chapters.

CHAPTER 2

Relativism : a) Leibniz

It is not on the basis of strictly physical considerations that the Leibnizian theory is to be dissociated from that of Newton. The two tend to agree, to a large extent, about the facts, and tend to accept the same factual matters. Rather, the area in which they begin to conflict is on the level of the ultimate explanation of such facts. In this light, their most significant conflict is to be noted as metaphysical, instead of physical, in character. It is indeed no accident that the only direct confrontation of the Newtonian and the Leibnizian theories-- viz., the Leibniz-Clarke Correspondance (1715- 1716)-- is preeminently theological in its tone and import, and that the text of the Correspondance bears primarily upon the relationship of space and time with the supposed omnipresence of God. As has been noted in the preceding chapter, Newtonian physics must ultimately be referred to metaphysics, and all of his pronouncements in the context of the physical sciences have theological overtones because of the fact that space and time , as absolute preconditions of the physical universe, are taken to constitute the divine sensorium. It is to this application or attribution of space and time to the very internal nature of God that Leibniz objects so strenuously. And it is, indeed, in this theological or metaphysical context that Leibniz attempts to show the various inconsistencies in the Newtonian theory.

The entire philosophy of Leibniz is based upon two fundamental logical principles or axioms: viz., the principle of contradiction or of identity,[68] and the principle of sufficient reason. The first of these is obvious enough in regard to its meaning; it affirms, in effect, that 'A is A', or that 'AB is A', and cannot in either case be 'not-A'.[69] The second of the aforementioned logical principles states that nothing can either exist or have certain attributes without there being a reason sufficient to explain why the thing in question should be thus rather than otherwise, or why it should exist rather than not exist.[70]

Since these principles are the basis of the Leibnizian doctrine as a whole, they may also be expected to be the basis, as well, of his criticism of the Newtonian thesis, insofar as this criticism is conducted from the point of view of his own doctrine as a positive whole, and thus involves all the assumptions and axioms that are to be found in regard to the latter.

In reference to the Newtonian interpretation of space and time, it was noted that these beings are absolutely independent of, and indifferent to, the spatio-temporal physical universe. The same holds true whether space and time are considered to be beings which exist in and by themselves, or whether they are considered to refer ultimately to God, as constituting the divine sensorium. In either of these cases, in which space and time are to be designated as absolute beings, there would arise at least one notion, or one matter, for which no sufficient reason can be ascertained: viz., why physical things are in space and time precisely the way they are in space and time. In Leibniz's words:

> ...'tis impossible there should be a reason why God, preserving the same situations of bodies among themselves, should have placed them in space after one particular manner and not otherwise; why everything was not placed the quite contrary way, for instance, by changing east into west... Their difference therefore is only to be found in our chimerical supposition of the reality of space in itself. But in truth the one would be the same thing as the other, they being absolutely indiscernible, and consequently there is (no) reason for the preference of the one to the other.
>
> The case is the same with respect to time. Supposing anyone should ask why God did not create everything a year sooner, and the same person should infer from thence that God has done something concerning which 'tis not possible there should be a reason why he did it so and not otherwise... (It) would be impossible there should be a reason why things should be applied to such particular instants rather than to others, their succession continuing the same. 71.

It is thus impossible, on Leibniz's principles, either that there should be something for which no sufficient reason can be ascertained, or that God should exercise His will quite arbitrarily, without doing so in accordance with some sufficient reason.

From the principle of sufficient reason in general, several subsidiary principles may be derived. One of these subordinate principles is that of the <u>identity of indiscernibles</u>; and it may be suggested that to base an argument upon this particular principle is tantamount to arguing on the basis of the axiom of sufficient reason itself. It is evident in the foregoing cited passage, that the subsidiary principle is, to some extent, invoked in an argument that is based upon the general axiom; but the criticism directly and significantly grounded upon the subordinate principle of the identity of indiscernibles has a slightly different flavour. According to the formulation of this principle, it is

impossible that things should exist separately which differ solely in respect of number, i.e., in all other ways but numerically to be identical.[72] In this light,

> to suppose two things indiscernible is to suppose the same thing under two names. And therefore to suppose that the universe could have had at first another position of time and place than that which it actually had, and yet that all the parts of the universe could have had the same situation among themselves as that which they actually had-- such a supposition, I say, is an impossible fiction. [73]

Furthermore, it was said in the foregoing chapter that absolute time and absolute space admit of division into parts; to say that absolute space and absolute time are divisible into parts is to say that these parts are genuine, and that, in some sense, they constitute the nature of space and time, as finite spaces (or places) and finite times (or instants) to comprise infinite space and infinite time. But these parts, whether interpreted as particles or as minimal fluxions, may be considered as identical in all respects but numerically, and this is manifestly impossible, given Leibniz's axiomatic principle of sufficient reason and the derived principle of the identity of indiscernibles. The assumed homogeneity of the parts of both space and time implies, on the Newtonian view, that the inherent character of any one part (for example, t_1, as a part of time) is <u>both qualitatively and quantitatively exactly like any of the others</u> (t_2, t_3, t_4 ... t_n). It is thus <u>inherently</u>, or in view of its essence, <u>quite indistinguishable from the others</u>. But yet t_1 is considered, on the Newtonian interpretation, to be somehow <u>numerically different</u> from the others, and is thought to derive its unique or

individual character from the position that it is presumed to occupy in the absolute order to which it belongs. It is against the notion that times and places can be distinguished, and given individual character or status, by numerical considerations alone, since they can be construed to differ in no other way, that an argument based upon the principle of the identity of indiscernibles is appropriate, and seemingly conclusive. Indeed, as Leibniz says,

> If two individuals were perfectly alike and equal, and, in a word, indistinguishable in themselves, there would be no principle of individuation; and I would venture to assert that there would be no individual distinction or different individuals under this condition. 74.

Thus the view that space and time are absolute metaphysical beings, and quite independent of the qualitative determinations of the physical universe, and furthermore, that they admits of genuine parts, is a fundamentally meaningless view; and the theory in which this view is maintained can therefore be designated as "chimerical", as contrary to basic logical principles, and as constitutionally unreasonable. And no less meaningless and unreasonable, according to Leibniz, is the view that space and time, as absolute and infinite, do not consist of parts, and do not admit of division; for, in this case, finite spaces and finite times would not be coherent with their infinite counterparts.[75] Yet, one or the other must be admitted, and no matter which of the alternatives is accepted, the result of such an acceptance, on the basis of the absolutist view, is the same.

Moreover, to refer to absolute space and absolute time as constituting the <u>divine sensorium</u>, or as being a property of God, leads

to explicit contradictions in regard to the nature of God. If space and time consist of mutually external and impenetrable parts, and since, as Newtonian absolutes, they constitute the divine sensorium (which, in turn, is part of God's inherent nature), then it would follow that there are parts in the nature of God. But this conclusion is inconsistent with the notion of divine perfection, which is traditionally designated as perfect unity.[76] Multiplicity is the contrary of perfect unity, and to predicate them both of one and the same being is a logical absurdity. Thus, either the notion that God is a perfect unity, or the interpretation of space and time as metaphysical absolutes that comprise the divine sensorium, must be rejected. In the opinion of Leibniz, it is the latter which is to be abandoned.

To say that God can act without any sufficient reason either for His action, or for acting as He does, is equally inconsistent with the perfection of the divine nature: viz., perfect wisdom. God cannot act, in short, in an irrational way, since, as the most perfectly wise being, He is supremely rational; and one of the primary canons of rationality is the principle of sufficient reason. Even God, therefore, cannot act without sufficient reason, for this would imply a contradiction in His nature. Nor can He distinguish between indiscernibles; nor can He act to produce a change that is based upon indiscernibles, and is, on this basis, no change at all. It is fundamentally inconsistent with the perfection of God that His nature should be internally contradictory, for freedom from contradiction is a distant, but nevertheless necessary, requirement for perfection. Moreover, it is inconsistent with the perfection

of divine nature that God should produce a contradictory situation; yet Leibniz affirms that such may be found to be the case in the Newtonian theory:

> To say that God can cause the whole universe to move forward in a right line or in any other line, without making otherwise any alteration in it, is another chimerical supposition. For two states indiscernible from each other are the same state, and consequently 'tis a change without a change... God does nothing without a reason, and 'tis impossible there should be any here. 77.

Since Newtonian space and time are absolutely uniform, no distinction, and no choice, among its parts can be justified by any reason, whether external or internal. That the distinction thereof, and subsequently a choice between alternatives, is capable of being made in regard to the Newtonian theory is inconsistent both in consideration of divine wisdom and in itself.[78]

The fact that inconsistencies or contradictions result from the adoption of any theory, or the fact that, in the adherence to a theoretical system, basic logical axioms are transgressed, is quite adequate grounds for the rejection of the theory in question. That the Newtonian theory of absolute space and absolute time transgresses accepted logical principles, and, as a result, leads to contradictory affirmations, is therefore considered by Leibniz to be sufficient reason for abandoning the view that space and time are absolutes in the Newtonian, or indeed in any other, sense. The contradictions to be found in Newtonian theory may, with slight changes of formulation, be found to apply in any other absolutist theory. And, for this reason, Leibniz considers his critique

to be conclusive in this regard. In order to remain consistent, according to Leibniz, Newton would be obliged to deny the principle of sufficient reason; but to deny this principle is itself a manifest absurdity, and leads to a host of accompanying contradictions on the metaphysical and the theological levels.[79] Thus, no matter which way the absolutist turns, Leibniz can supposedly bring a reductio ad absurdum against him. And since this is the case, then the theoretical notion that space and time are absolute realities must perforce be abandoned.

As a positive doctrine, and not just as a criticism of Newtonian theory, Leibniz's system is thoroughly dominated by his logical considerations. In this regard, the basic logical axioms or principles mentioned above-- viz., the principle of identity, and the principle of sufficient reason-- are of the first importance, and significantly permeate every other theoretical problem. Indeed, Leibniz goes so far as to say that the prime importance which he attaches to the hitherto unacknowledged principle of sufficient reason and its corollaries significantly alters the entire character of metaphysics, and that metaphysics becomes a real, and logically demonstrable, science by adhering to these principles.[80] Indeed, metaphysical problems become logically solvable by resorting to the principle of identity, which is the logical condition or determinant of possibility, and to the principle of sufficient reason, which is at once a procedural or dynamical axiom and the logical condition or determinant of actuality.[81]

It would appear, then, that there are two ways of approaching a

study of metaphysical subjects. In the first place, one may consider the concepts of such subjects in themselves, and this may be done by a pure logical analysis of the notion of the subject in and by itself. It should be evident that the procedure in this case is governed by the principle of contradiction or of identity alone. But secondly, one may treat the concepts of metaphysical subjects, not specifically as they are in and by themselves, but in significant relation to other subjects which are factual or physical in nature. Such an investigation of metaphysical matters must proceed in direct accordance with the principle of sufficient reason, and in indirect accordance with the principle of identity.

Logic, then, is to be noted as the basic dicipline in regard to Leibnizian theory. Now, one of the fundamental ingredients in the study of Leibniz's logic is the investigation into the nature and the conditions of truth. And hence logic is to be viewed as the tool, by means of which truths of any other dicipline whatsoever may be appropriated, ascertained, and certified. But an investigation into the general field of logic reveals that there are two different kinds of truth to be dealt with: the one being necessary truths of reason, and the other being contingent truths of fact. Necessary truth is a purely analytic matter, depending upon nothing other than a mere analysis of concepts alone. Its determination, that is to say, is an entirely internal consideration, and, as such, is subject to the principle of contradiction (or identity) alone. Thus, formulated truths of reason, or necessary propositions, are those whose opposites involve a contradiction and are, on this basis, impossible. On the other hand, contingent truth is determined externally, and is

thus subject primarily to the principle of sufficient reason. The contingent truth of propositions, or the truth of contingent propositions, is likewise determined externally, and must find its sufficient reason in the correspondence between the content of the propositions in question and the reality to which the proposition refers, for to affirm that a contingent proposition is internally consistent has no direct bearing upon its factual truth.[82]

Insofar as there are two distinct sorts of truth to be noted in consideration of logical theory: i.e., truths of reason and truths of fact, it follows that there are likewise two apparently distinct species of knowledge: viz., intellectual knowledge and sense knowledge, respectively. The kinds of truth, to which we have referred, seem not to differ simply by virtue of their genesis, but rather in their very natures. Truths of reason, which are necessarily true, and which comprise intellectual knowledge, are significantly analytic propositions.[83] As examples of this kind of truth and knowledge, one might merely indicate the virtual formal tautologies 'A is A', and 'AB is A'. The first and most ultimate necessary truth, and the formal criterion of all other necessary truths, is the logical law of contradiction or of identity. And it may, on this basis, be said that truths of reason are absolutely necessary, because the criterion for their truth is absolutely internal. On the other hand, truths of fact, which are contingently true, and which comprise sense knowledge, are synthetic propositions.[84] In this sphere, that which is first and ultimately true is experience, and hence the first truths of fact are just as numerous as one's immediate perceptions. Thus, considered formally,

contingent truths of fact are external relations of perceptions; furthermore, they implicitly affirm, not only such a relation between perceptions, but the existence of their objects.[85] And it is by referring to their objects that contingent truths are to be determined. In short, it would seem that it is by going beyond the propositions or ideas themselves, and by ascertaining the correspondence of ideas or propositions and reality, that contingent propositions may be affirmed as true.

Truths of fact, in their own proper sphere or context, are just as certain as are truths of reason, for although there are different kinds of truth, there are no different degrees of truth. Similarly, sense knowledge is just as certain as intellectual knowledge. It must nevertheless be said that truths of fact, or contingent truths, presuppose the necessary truths of reason, in the sense that existential statements, if they are to be statements at all, must conform to the fundamental criteria of rationality itself. Both formally and materially, statements of contingent fact depend upon something other than themselves. Thus, despite the fact that one's own existence has to be presupposed in consideration of his perceptions, the logical postulation or affirmation of

> our own existence is not...an ultimate and fundamental premiss for all truths. My own existence is an axiom... in the sense of being indemonstrable, not in the sense of being necessary.[86]

Contingent truths of fact are, therefore, not to be confused with necessary or analytic propositions, the criterion for the truth of which is ultimately internal. Quite to the contrary, they are radically non-, or unnecessary, since the affirmation of their opposites does not terminate in a contradiction, and since the criterion invoked in this regard has

external implications.

The distinction between the contingent truths of fact that comprise sense knowledge and the necessary truths of reason which comprise intellectual knowledge can be found to reside in the theoretical consideration that truths of reason directly involve, or refer to, the necessary conditions of possibility, while truths of fact refer to, or have as content, that which is presumed to exist. But, in addition to effecting a distinction between necessary and contingent truths, the foregoing explains also the nature of the relationship between the two. For that which exists must, of course, be possible, and, as such, must be subject to the basic axiomatic rules, or necessary conditions, of possibility. To assert the mere possibility of X is not, however, and cannot be, to affirm the existence or the actuality of X. If, on the other hand, the factual existence of X is ascertained, it cannot without contradiction be asserted, at that very same time, that X does not exist. In this regard, all being, whether actual or possible, must conform to the primary logical principle of contradiction or of identtiy. Before it is ascertained as an actual fact, it is, at least in principle, equally possible internally for a thing to exist or not to exist-- to be mere possibility, and hence to conform solely to the principle of identity; and, in regard to its existence, a sufficient reason as to why it should exist, rather than otherwise, has to be given, at least implicitly. Indeed, everything which can be ascertained as existing or as actual must have a sufficient reason for such existence or actuality; and if no sufficient reason can be ascertained, then the existence, or the actuality, of the

thing in question cannot legitimately be affirmed.

In the attempt to deal, however briefly, with Leibniz's notions about logic, and having intimated that such notions center, in part, around the notion of truth, it yet must be noted that truth as such is an attribute of propositions.[87] Indeed, the investigation into the nature of the proposition of which truth is to be attributed is another, and probably the more metaphysically significant, aspect of Leibnizian logic.

It must be said, in this regard, that Leibniz's interpretation of the nature of the proposition is, for the most part, an <u>intensional</u>, rather than an <u>extensional</u> one. That is to say, while maintaining that all propositions are either explicitly of the Aristotelian subject-predicate form or are at least reducible thereto, he is found to maintain that the concept of the predicate term is contained within the concept of the subject.[88] For example, if the proposition "The apple is green" is both true and interpreted intensionally, the particular predicate-concept "green" is contained within the particular subject-concept "apple"; and this, translated into object-language, is to say that the quality referred to by the term "green" inheres in the specific thing called an apple. The extensional approach to such a proposition, in Leibniz's opinion, is, to a certain extent, deficient, because (a), although one is quite capable of dealing with generalities by means of extensional logic, it is difficult, at best, to deal adequately with individual substances-- such as Julius Caesar, Socrates, or this specific apple-- by extensional means;[89] and because (b) it omits an account of what it is for a predicate, or property, to be attributed to a subject. The intentional view is regarded, by Leibniz, and

was intended by Leibniz to be, the remedy for such deficiencies.[90]

It falls within the nature of the concepts of substances that they are the only possible subject elements of any proposition. In this, Leibniz is in agreement with the logical pronouncements of Aristotle.[91] Qualitative, quantitative, and relational considerations are so many modifications, affections, or attributes, of substances. As such, qualitative, quantitative, and relational considerations are not, in any legitimate sense, to be interpreted as being themselves substantial. For, "just as the affections of a natural body are not themselves bodies, so the affections of being are not themselves beings".[92] As logical subjects, substances are to be treated as logical units, or as atomic individuals, and therefore as essentially indivisible. Yet an analysis of the concepts of material substances shows that they are themselves composed of material or extended parts; and an analysis of these parts, in turn, shows that they are divisible into more ultimate or minute, but nevertheless extended, parts; and so on, ad infinitum. The view that substance can be essentially described as material, and therefore extended, involves the view that it is always and inescapably composite in nature. By process of quantitative analysis, any material entity, insofar as it is characteristically extended, can be divided into mutually external parts ad infinitum, since (a) the divisible whole, insofar as it is a material being, occupies space, or is an extended magnitude, (b) the products of the division cannot but partake of the essential nature of the whole which is divided, and must therefore themselves occupy space, or be extended, and (c) since extension or space is regarded as an infinitely divisible quantity.[93] In brief, the ultimate

constituents of material substance cannot be found by analysis; and if they cannot be found, it is virtually meaningless to affirm their actuality or reality. The nature of substance, and the way in which substance is to be interpreted, is of paramount importance for the Leibnizian theory, because of its logical implications. If, in accordance with the nature of a logical subject, substances are to be regarded <u>either</u> as <u>ultimate indivisible units or atoms</u>, <u>or</u> as <u>reducible to such</u>, then <u>they cannot be interpreted materially</u>, as characterized primarily by <u>extension</u>, if only for the reasons indicated above. And, if substances cannot be material, it follows that they must be fundamentally <u>immaterial</u>, in character.

The direct bearing of logical considerations upon Leibniz's metaphysics is evident both in consideration of these two diciplines by themselves, and in reference to the testimony of various commentators and historians.[94] For if it can be truly affirmed of a logical subject that it is an essential simplicity or unity, and that it necessarily and effectively contains its predicates; and if a logical subject may be viewed as a conceived substance, then it can be said of substance that it is ultimately simple, and that it effectively contains its attributes or properties. The correspondance of the ways in which logical subjects and substances are treated suggests that there is a fundamental correspondance of logic and metaphysics in general, in regard to the Leibnizian theory. In other words, <u>Leibniz's metaphysics can be regarded as logical in its character</u>; and similarly, <u>his logic can be regarded as metaphysical</u>.

To deal theoretically with the nature of substance <u>per se</u> is, of course, the peculiar function of metaphysics.[95] What is of especial interest

in the context of this chapter is Leibniz's metaphysic of substance, for it is in the theoretical examination of substance that the character of space and of time is to be ascertained.

Substance, according to Leibniz, is that which is either simple in itself, or susceptible to a resolution into simples; thus:

> Simple substance is that which has no parts. Compound substance is a collection of simple substances... Compounds or bodies are pluralities, and simple substances-- lives, souls, and spirits-- are unities. There must of necessity be simple substances everywhere, for without simple substances there would be no compounds. 96.

That there are compound substances is a matter of empirical fact, and the very existence of compounds testifies, as Leibniz says, to the legitimacy of the notion that there are simples. For, if there were no simples, there could be no compounds, since these last must be composed of something. And since, in the interests of theoretical consistency, simple substances can only be immaterial, the same view is to be taken of composites, for the nature of composite substances must, in this regard, be the same as that of the simple substances out of which they are composed, and in terms of which they are finally to be explained.

These truly simple substances are referred to in various Leibnizian contexts as monads;[97] and, since substance is defined, at the beginning of the "Principles of Nature and of Grace", as being which is by nature capable of action,[98] monads must be noted to be essentially active, or centers of force;[99] as Leibniz says,

> I believe that our thought of substance is perfectly satisfied in the conception of force and not in that of extension. Besides, there should be no need to seek any other explanation for the conception of power or

> force than that it is the attribute from which change follows and its subject is substance itself. 100.

Moreover, these simple substances or monads contain their properties, just as, according to Leibniz's intensional view of logic, each individual logical subject, as a concept, contains within itself the concepts of the predicated legitimately attributable thereto. Indeed, if a complete and perfect concept of such a simple substance includes all of its predicates, past, present, and future, so also must the individual substance itself contain within itself every specific quality that ever has, or ever will, belong to it, every action that it ever has, or ever will, perform, and every relation into which it has ever, or will ever, enter, in the entire course of its history.[101] Thus, it might be suggested that both the monad itself and the monad as conceived (i.e., as logical subject) are fundamentally atemporal in nature.

The Leibnizian doctrine of monads must be regarded as a rejection of the theoretical priority of quantitative over qualitative considerations. Despite the fact that the monad is described as a perfect metaphysical unit, its indivisibility testifies to the view that it is qualitative rather than quantitative in character. If it is to be described as a unit at all, then the term must be interpreted in a not strictly quantitative sense: viz., as metaphysical simplicity, or as qualitative indivisibility. The very indivisibility of the monad stands as evidence for its non-quantitative nature, since it is an essential attribute of all quantities that they are susceptible to division, and monads are not significantly or really divisible. The monad, then, is a qualitative whole or unit. It is a whole, that is to say, which has

qualitative, and not quantitative, parts; and these parts (properties or attributes) are to be related internally rather than externally, since an external relation depends upon the quantitative differentiation of the relata.

Insofar as they are simple, or uncompounded, and therefore spiritual, beings, monads are obviously without distinguishable parts in space. It must be stressed, however, that this is not to say that there is absolutely nothing within its essential nature that can be regarded somehow as multiple, but merely that what is to be regarded as multiple in this regard is unreal, since only substances are ultimately, and in the last analysis, real.

As has been intimated, the monad comprehends within itself all of the properties that can ever belong to it. But, in examining the essentially simple nature of the monad, it is to be noted that its very simplicity is a fundamental simplicity of action, and that the monad admits necessarily of change and of diversity.[102] It is for this reason that the nature of such an elementary being significantly does not admit of methodical quantitative analysis. The multiplicity of the properties of the monad is a multiplicity of qualities; yet it is comprehended within an essentially simple quality of action, just as a plurality of particular actions are contained within a single larger action. Moreover, the qualities or properties alluded to are internally related to each other, as well as internally related to the substance to which they belong: this in accordance with the principle of sufficient reason. For the particular actions of the monad are tendencies,[103] and, as such, must be viewed as comp-

rehending at once that from which they are directed, and that towards which they are directed. Indeed, it seems to be because of this internal relation of states in a change, in accordance with the principle of sufficient reason, that "each thing or part of the universe must point to all the rest",[104] and that, in regard to the particular actions or perceptions of the monad,

> They are the present thoughts from which future thoughts are born, and one can say that in the soul, as indeed everywhere, the present is great with the future.[105]

In order to avoid the theoretical problems involved in the attempt to account theoretically for change, change must supposedly be taken as primary. And to advocate the primacy of change or of action is to maintain that it is not fundamentally explicable or describable by referring to its parts, but rather quite the reverse. It is also to allow that the parts are internally related to the whole and to each other; and this, in turn, is to allow that change or activity or tendency, in consideration of itself alone, admits of qualitative, and not of quantitative, determination.

The fact that quantitative concerns are, for Leibniz, theoretically subordinate to qualitative considerations on the metaphysical level testifies to the view that quantities, like specific differentiated qualities, are derived from a reality which is purely qualitative and purely simple. In short, it must be noted that the attribution of a plurality of specific qualities, actions, or relations, to the monad-- i.e., the quantitative or numerical description of the monad-- is a

particular representation, or appearance, of the simple qualitative whole, and is, at least in some sense, a perceptual abstraction from the whole.[106] Indeed, Leibniz defines perception as *the representation or expression of multiplicity in a unity*.[107] Both the concept of numerical unity and that of numerical multiplicity *are derived or abstracted from*-- *i.e.*, are quantitative representations of-- metaphysical, and essentially qualitative, being; for, as Leibniz says:

> The concept of unity is abstracted from the concept of one being, and the whole itself, abstracted from unities, or the totality, is called number. Quantity is therefore the number of parts. [108]

The analysis, or the perception, of a motion consists in an abstraction from the whole, and ultimately in the external relation, and the enumeration, of its abstract parts. And since number can be divided *ad infinitum*,[109] such a quantitatively represented motion is a mathematical continuum. Indeed, Leibniz declares, in this regard, that "motion is continuous or not interrupted by little intervals of rest";[110] for the contrary is a subversion of the principle of sufficient reason. The abstract, or quantitative representation of motion, as composed of a multiplicity of mutually external parts, leads directly to the Leibnizian *theory of complexions and of the infinitisimal calculus*. The axiomatic principle of sufficient reason makes it necessary, in the mathematical representation of motion, to assume that between any two of its termini there must be *an infinite number of others*. And thus, the principle of continuity is to be regarded as a legitimate derivation from the aforementioned axiom.[111] Yet there is a vast difference between the notions of *mathematical continuity*, which

consists in the infinite divisibility implied by the nature of perception, or in the infinite augmentation of organic tendency or appetition[112] -- these being, respectively, the sources of "differential" and "integral" calculus-- and metaphysical continuity; for the one involves, and is based upon, a fundamental multiplicity, whereas the other involves simplicity. Furthermore, mathematical continuity is to be interpreted as derived, or abstracted, from metaphysical continuity, by virtue of the fact that multiplicity, and number in general, is the result of an abstraction from the active and entirely qualitative being of the monad.

Insofar as quantitative considerations are thus made theoretically subordinate to qualitative concerns, and since all reality is ultimately qualitative in character, it must be said that quantities, and any being that involves quantitative properties, are, in a very significant way, unreal. And if quantity can be interpreted as unreal, then suspicions might be aroused regarding the reality of material substance, of physical motion, and of space and time. As H.W. Carr suggests, the rejection of the primacy of quantitative over qualitative distinctions leads finally to the view that neither matter, nor physical motion, nor space and time, have any objective reality.[113] Material substance, then, is phenomenal, in the sense that it is derived from, or contained in, perception; it is, in other words, that which appears, or that which is the appearance of something substantial.[114] Because they have no indivisible parts, material bodies cannot be interpreted as real, but rather as something ideal. It is, indeed, the very fact that material bodies are characterized by extension-- the fact that they are perceptually divisible into a multiplicity of parts,

none of which are minimal or indivisible-- that is the criterion of their ideality. The same may be said of the physical motion of such bodies. For such a motion involves the consideration of geometrical concepts of magnitude and figure, and hence is nothing but a change of the relative situations of bodies. And, since physical motion is the motion of material bodies, it is likewise phenomenal or ideal in character.[115] Ultimately, metaphysical action or force is more real than both physical motion and the extended material body to which such motion pertains; and thus physical motion must be regarded not as the cause, but rather as the effect, of force.[116] In short, force is a real being, and both matter and motion are, in their various ways, appearances or representations of that which is, in its essential nature, an activity, tendency, or force. But, although they are appearances or phenomena, they may be denominated phenomena bene fundata-- i.e., phenomena which are well grounded in the internal, and intrinsically perceptive, nature of substance per se.

What may be said of matter and of physical motion can also be said of space and time, with appropriate adjustments of terminology; for the theoretical approach to the notion of material substance, and to the motion of such substance, inevitably has its effect upon the interpretation given to space and time. In this regard, and in reference to Leibnizian theory, we are not to be disappointed, for in several contexts Leibniz makes the analogy between material body and physical motion on the one side, and space and time on the other.[117]

That space and time are unreal is, therefore, implicitly evident from what has been noted heretofore. For whatever is to be considered real

must *either* be simple or indivisible by itself, *or* be significantly composed of simples or indivisibles. Thus, if space and time are to be interpreted *as realities*, or, in other words, *as substances*, then they must be *either simple or indivisible*, *or a complex of simples or indivisibles*. But the divisibility of space proceeds *ad infinitum*, since it is quantitatively continuous:

> There is no minimum in space or in a body, that is, no part of which the magnitude would be zero; for such a thing cannot have any position, since whatever has a position can be in contact at the same time with several things which do not touch each other... Nor can a minimum be assumed without it following that there are as many minima in the whole as in the part, which implies a contradiction. 118.

Since the reality of space and time, on Leibniz's principles, would have either indivisibility, or a reduction to indivisibles, and since neither of these conditions can be satisfied, it follows that space and time cannot legitimately be interpreted as *real*. Furthermore, both space and time are generally regarded as quantitative in character. But it was noted in an earlier context that quantities are *abstractions from substance*. Now, strictly speaking, reality can only be ascribed to individual substances, and if space and time, as quantitative in their import, are to be ascertained or interpreted as realities, then they must be individual substances. But this is a *manifest absurdity*; for it would be *to refer to an abstract attribute of a substance as itself a substance*. 119. Yet again, the purely logical investigation or analysis of the concept of a propositional subject reveals a basic *atemporality* and *non-spatiality*. And since Leibniz's logical doctrine and his metaphysic of substance correspond to a large extent, it can only be said that substance, and

reality in general, are fundamentally atemporal and non-spatial in character. For these reasons, space and time cannot be real, and cannot be substances, or be interpreted substantially.

Nor can space and time be attributes of substance. For, in the first place, since substance is qualitative, so also must the attributes of substance be qualitative; but space and time are not qualities. Moreover, substance is real, and it follows from this that the direct or immediate attributes of substance must be real; but it has already been established that space and time are unreal.

What has been said thus far about space and time is obviously negative in its import. It has, in other words, been shown what space and time are not. These negative conclusions are of importance, however, because various theoretical possibilities as regards the character of space and time can thereby be eliminated. Four alternatives present themselves in the attempt to determine the character and the ontological status of space and time: (1) that they are substances, (2) that they are attributes of substances, (3) that they are real relations, and (4) that they are rational relations. It might, in addition, be suggested that these four alternatives exhaust the possibilities in this regard. Now, the denial of the reality of space and time effectively eliminates the first and the third alternatives, as listed above. And inasmuch as space and time are not themselves qualities, and inasmuch as they are unreal, the second of the foregoing alternatives can be eliminated. Thus, by process of elimination, the fourth alternative-- that space and time are to be considered rational relations-- remains uncontested.

From the foregoing process of elimination, it follows that, for Leibniz, space and time are to be aligned with the so-called theoretical realm of truths of fact, and not, at least directly, with truths of reason. Both space and time are properly to be interpreted as rational relations, as opposed to substances, properties of substances, and real relations. In this light, space is considered to be the phenomenal order a posteriori of all possible coexistents, or, in a more specialized logical sense, of compatibles; and time is considered to be the phenomenal order a posteriori of all possible successions, or of incompatibles:

> Time is the order of all non-contemporaneous things. It is thus the universal order of change in which we ignore the specific kinds of change that have occurred. Duration is the quantity of time. If the quantity of time is continuously and uniformly diminished, the time passes into an instant which has zero magnitude. 120.

One might say that time is the order of things which, in view of the logical principle of contradiction, cannot be regarded as contemporaneous or coexistent. And it would seem that, since time is to be regarded as the universal order of change, its existence presupposes the existence in perception of at least two mutually incompatible things. These things are to be described as incompatible because it is possible, and even necessary, that to regard them as coexisting would be logically inconsistent. Thus,

> If a plurality of states of things is assumed to exist which involve no opposition to each other, they are said to exist simultaneously...We deny that what occurred last year and this year are simultaneous, for they involve incompatible states of the same thing. 121.

If two such states cannot exist simultaneously, on pain of contradiction, it follows that they must do so successively or "dynamically". And if the

one is, or contains within itself, a sufficient reason for the other, it is therefore to be considered as "before" or "prior to" the other. Moreover, the fact that one such state is, or contains within itself, the reason for the other testifies to the mathematical continuity of the succession, in accordance with the principle of sufficient reason, and to the view that the successive states are to be regarded as infinitesimal.[122] For otherwise, the two states in question would be quite discrete, and the relation of them opposed to the aforementioned principle.[123]

The perceptual change within the simple nature of the monad-- i.e., the successive multiplicity of its apprehended, and therefore abstract, states-- can be regarded as the phenomenal manifestation of the incompatible, and mutually external, attributes that inhere in, and fundamentally are derived from, it. To elucidate, part of an apt analogy used by R.L. Saw might with advantage be cited. If we imagine ourselves at a symphony concert, listening and watching with some degree of attention, we find that

> the violins are sometimes playing, and sometimes at rest. "'A' is playing" is incompatible with "'A' is not playing", but only if we add "at the same time". Now in order to understand Leibniz, we must understand that "at the same time" does not really mean what it appears to mean, but that it is our way of expressing the fact that 'A' has incompatible attributes. "A's" playing and "A's" being at rest are related, but not by way of succession. They are related according to A's own "inner principle of change". [124]

Despite the importance of this "inner principle" for the appearance of time, it is not to be interpreted, in any sense, as an absolute time above and beyond the phenomenal. For it is against the very notion of an absolute time, of whatever sort, that Leibniz was noted earlier to react.

The one and only time that Leibniz will, or can, admit is relational and phenomenal in character: a truth of fact, derived *a posteriori*.

As the order of all possible successions, phenomenal time enters into experience as the *mathematically continuous*, *and therefore abstract*, "unfolding" of the incompatible attributes that are perceived to inhere in, or that are external representations of, the nature of each particular created subject, or substance, or monad. This unfolding or tendency is, on the metaphysical level of reality, an essentially simple action or force, and is truly continuous, in the metaphysical sense; it is empirically represented, however, as an external relation of fundamentally abstract perceptions or perceived states. It is, indeed, in this regard that time is designated as a *rational relation*, and as *phenomenal*.

The basic theoretical distinction between rational and empirical considerations, or between "truths of reason" and "truths of fact", has already been noted. It has been shown that the principle in regard to the former is that of *contradiction* or of *identity* alone, whereas the principle which is *directly* and *immediately* pertinent to the latter is that of *sufficient reason*. This distinction may well be considered to hold true throughout the corpus of Leibniz's philosophy. Nevertheless, a modification must be effected in this regard, in order that the Leibnizian position might not be misrepresented. For, although contingent propositions (*i.e.*,"truths of fact") are significantly *synthetic and a posteriori*, they are also, in a certain respect, *analytic and a priori*. Leibniz says, for example, that

> In demonstration I use two principles, of which one is that what implies a contradiction is false, (while) the other is that a reason can be given for every truth (which is not identical or immediate), that is,

> that the notion of the predicate is always contained, explicitly or implicitly, in the notion of the subject, and that this holds good no less in extrinsic than in intrinsic denominations, no less in contingent than in necessary truths. 125.

Indeed, Leibniz suggests that there is no such thing as a purely extrinsic determination, and that things and their relations cannot adequately and sufficiently be described, or accounted for, solely by extensive means. All extensive matters must ultimately be reducible to intrinsic denominations. And, therefore, all extrinsic being and all external relations receive their fullest explanation by fundamentally intrinsic or internal interpretations.[126] Reality, in brief, is intensity, and appearances or abstractions constitute extensity. And just as appearances are derived from reality, so extensity is theoretically subordinate to intensity. It is precisely in this grounding of extensive upon intensive considerations that the origin and the justification of extensity can be provided. So although time (as well as material substance, physical motion, and space) is radically phenomenal, it is a justifiable and well grounded phenomenon: i.e., a phenomenon bene fundatum.

From what has been said thus far, it is evident that substance is ultimately to be interpreted organically, or as activity, rather than materially, or as characteristically extended. Substance is, therefore, to be viewed metaphysically, and in theoretical separation from matter.[127] Indeed, material body is a perceptual appearance of, or a perceptual abstraction from, essentially metaphysical and logical being. In short, extended or material body is an abstract appearance, or a pluralistic and extrinsic

representation of the internal and intensive nature of the monad. Similarly, space and time, insofar as they are systems of the external relation of perceptions, are appearances of that which is unextended, or non-spatial, and non-temporal, and essentially involves no external relation. In other words, space and time are systems of external relation, which perceptually represent real, and therefore internal, relations on the metaphysical level. These are reflections of the general theoretical dissociation of the intelligible world which comprises truths of reason and the sensible world comprising truths of fact,[128] in consideration of which, the latter is to be regarded as the representation of the former, and is significantly grounded in the former, but is not, and cannot be, theoretically equivalent thereto.

Now, if all being is fundamentally organic, the real and ultimate nature of individual substances must be interpreted organically. That is to say that Socrates, the chair on which I am sitting, the piece of paper upon which I am writing, must all essentially be organisms; they are all composed of the basic metaphysical and organic substances that are referred to as monads. It is in consideration of the attributes that can be abstracted from the internal nature of the monad in question, or that virtually inhere in them and thus virtually constitute their nature, that they enter into real composite substances. Indeed, that monads cohere in such real composite substances as Socrates, the chair, the paper, is determined a priori, by virtue of the theoretical fact that they "contain" certain "attributes", or by virtue of their unique ap[illegible]on or organic tendency. Thus, if two monads exist, or cohere, together in the real

composition of the chair, their "attributes" will to this end and extent be coordinated. It will therefore be evident from the analytical examination of monad 'A' that it will enter into the composition of the chair; and from that of 'B' that it will also enter into the real composition of the chair. Indeed, it will be evident that 'A' will be conjoined with 'B', and that its "attributes" are, at least in part, harmonious with those of 'B'. In this regard, it may be said that the only possible influence of one elementary, real being upon another can therefore only be ideal.[129] Insofar as the "attributes" or "properties" of 'A' and 'B' are virtually contained within themselves prior to their "attributional" conjunction, their harmony is pre-established. It is, furthermore, in regard to this pre-established harmony that each monad is to be interpreted as the reflection of, and as reflecting, the entire universe.[130]

Moreover, the nature of the real substances that are thus composed of monads is effectively determined by the internal nature of these fundamental beings. And these monads may, on this account, be designated "substantial forms".[131]

It is a notion common to several philosophical systems[132] that there are various grades of being, and that the differentiation of these grades of being is effected by having regard for the various degrees of rationality. Leibniz's theory can be counted among this number, for he says that

> I am willing that the general name of monads or entelechies shall suffice for those simple substances which have only perception..., and that those substances only shall be called souls whose perception

is more distinct and is accompanied by memory. 133.

The gradation proceeds in continuous fashion from mere brute perception in dormant or body monads to infinite and complete rationality in the Supreme or Divine Monad.

It is traditionally considered that there are three general types of soul: (a) the vegetative or appetitive, the appropriate functional characteristics of which are assimilation and reproduction; (b) the sensitive, the characteristic and most appropriate function of which is sensation; and (c) the rational, which involves a characteristic capability for abstract thought, whether confused or clear. 134. Again, the distinction of these various levels might also be viewed as a continuous gradation of the proportion, activity: passivity, or acting: suffering. 135. Although Leibniz deviates, to some extent, from the traditional notion, the same general view holds good in his theory. And its effect upon the theory of time must be noted.

It has been mentioned earlier that, for Leibniz,

> the present state of a simple substance is naturally the consequence of its preceding state...(and in a similar way) its present is big with the future. 136.

Although every real being is perceptive, there is a significant variation of the clarity of perception. The least amount of perceptive clarity belongs to those monads that constitute real body; indeed, there is no clear perception at all in so-called "body" monads. They are aware in the most confused or unclear way only of the present state. Lacking a minimal amount of perceptive clarity, it cannot be fully and adequately aware even of its present state; lacking the faculty of memory, it cannot be aware of the

past; and lacking rationality, it cannot be aware of the future. "Body" monads can thus be presumed to exist quite below the so-called "threshold of consciousness", and they behave like atomata in the sense that they are wholly passive in nature, or that they suffer rather than act.[137] It is because of this passivity that it is considered inappropriate, in view of Leibnizian terminology, to affirm that "body" monads are souls.

With the monads that constitute animal souls, however, come higher degrees of perceptive clarity, and traces of memory; and, as Leibniz says, "memory furnishes souls with a consecutiveness which imitates reason".[138] Instinct, reflex action, and habit, are, for the most part, the forms that memory takes in the animal world. And the past-- though not the future, since animal souls possess an imitation of reason, not reason itself-- becomes something more than the mere implicit condition of the present; it becomes, in varying degrees, an explicit fact.[139]

Graded higher still, the human soul is a spirit, and has the capability for abstract thought, or rationality. By means of rationality, human souls are enabled to rise to an awareness of eternal and necessary truths: i.e., truths of reason. Two major consequences arise from this. Firstly, rational beings are enabled to arise to specific acts of reflection, by which they become conspicuously aware of the "I" or "ego"-- i.e., they are self-conscious. Secondly, it is on the basis of eternal and necessary truths, of which rational thought is the origin, that the human mind can affirm that each present state of affairs is the inevitable consequence of that which precedes it, and are, in addition, enabled to transcend the present state and the explicit recognition that it is determined by the

past in order to speculate about the future. Insofar as rational beings can comprehend, to varying degrees, the whole scope of time: past, present, and future, they are likewise able to transcend considerations of time altogether and concern themselves with eternal and atemporal truths. It must be affirmed, however, that it is the character of the small minority of their actions which can truly be said to differentiate men from the lower animals: for, as Leibniz declares, men act like "brutes" in the great majority of their actions.[140]

The human soul is the pinnacle of all created beings. But it is inescapably limited and finite, because of the very fact that it is a created being. As such, it cannot but retain a certain degree of passivity, and the rational activity attributable thereto cannot, in principle, be complete or perfect. Even on this level, then, which is the highest and most perfect manifestation of finite rationality, the knowledge of the internal and essential nature of time, and of its causes and its implications, is not, and cannot be perfect. Such a perfect awareness or knowledge of time involves atemporal and eternal considerations, and, if anyone, it is God alone who is capable of possessing a complete and perfect knowledge of the connections between eternity (or atemporality) and time. And thus it would be God alone who is most capable of completely comprehending the real and true signification of what appears to be time.

It has been intimated already that reality and appearance are theoretically distinct orders of being: the one being intensive and qualitative in character, the other being fundamentally quantitative and extensive, involving as it does (a) the external relation of mutually discrete perceptual elements,

and (b) the theoretical distinction of perceiver and perceived.[141] It is, of course, the case that the former provides the reason for the very being of the latter, and that the latter is quite impossible without the former, which is its basis. To say, then, that God comprehends the true and real signification of what appears to be time is to say that He understands *sub specie aeternitatis* and essentially that reality which is the metaphysical basis for the aspectual phenomena that occur *sub specie temporis* to finite, contingent, or created minds. In other words, it might be said that God understands reality *as it is in itself*, in which case the knowledge in question is independent of perspective; whereas created or contingent beings are capable of knowing reality *only insofar as it is connected with that which appears* (*i.e.*, with *phenomena* insofar as they have their ground in reality), in which case the knowledge in question is conditioned by the point of view that has necessarily been adopted, and limited by virtue of the necessity of such an adoption. One need only affirm that the distinction thus effected is primarily one of *kind*, not merely one of degree.

The very being of space and time is bound essentially to the adoption of a particular finite point of view, since space and time are orders of perception and hence phenomenal in character. It would therefore seem that, if God can be said to know reality *sub specie aeternitatis*, or as it is in and by itself, then it cannot, strictly speaking, be said that God knows time, insofar as God knows *reality*, and time is not real in the sense that it is not a substantial being. It may be declared that what God *does know*, in this regard, is reality itself, insofar as this is the atemporal (*i.e.*, eternal) metaphysical ground of time.

There are two points especially to be noted in regard to what has just been said. In the first place, it is evident that, for Leibniz as for Newton, the problem of time is based ultimately upon theological considerations. For, in the final analysis, it is the existence, the nature, and the action of God that assures the being of time. To have made the foregoing point is not necessarily to say that God is a temporal entity, or that time is intimately or essentially to be associated with the divine nature. It is merely to affirm that, in the strict and technical meaning of the terms in Leibnizian theory, if there exists any time at all, then God must exist as its ultimate ground or explanation, and that if God does not exist, then time cannot exist. It is thus to be concluded that there must be a logically indissoluable bond between the real and substantial being of God and the phenomenal being of time.

Secondly, once it is established that there is such a bond between God and time, it is necessary to ascertain the general nature of this bond, for the results of such an investigation has its inescapable effect upon the possibility or the impossibility of comparing Leibniz and Newton on the theological aspects of the problem of time. To this end, it was noted in the initial paragraphs of the present chapter that Leibniz attacked the Newtonian view of time as being directly contained within the divine nature, and as being an absolute in the sense of being a form of God's perception.[142] The argument in that context will not, and (I hope) need not, be reiterated. It is sufficient to declare here that the bond between God and time cannot, in view of Leibniz's critique of the Newtonian position, be at all direct. It can, therefore, only be indirect.

The nature of this logical and metaphysical bond between God and time

may more thoroughly be specified by referring once again to the principle of sufficient reason, this principle being, as has been indicated, the fundamental assumption of the Leibnizian system. It states, as has been mentioned earlier, that

> ...no fact can be real or existent, no statement true, unless there be a sufficient reason why it is so and not otherwise... 143.

The fact that anything exists or is real is taken to be adequate testimony, in Leibniz's view, to the ultimate fact that God exists.[144] In short, it is God alone who is able sufficiently to guarantee the existence or the reality of any element whatsoever of the system of monads. Indeed, this system may be regarded as complete and coherent if, and only if, it can certainly be granted that any elementary finite part of the system exists, since any one substantial atom within the system is inescapably bound up with all the others. But it is evident that, from Leibniz's point of view, no finite part of the system contains within itself the sufficient reason for its existence, or for its being thus rather than otherwise.[145] Thus, the sufficient reason for the existence or the character of any finite entity is provided by a being which is theoretically external to, or other than, the being in question. Nor can it be the case that the being in question has its sufficient reason in any other finite or contingent being, for the same question may justifiably be repeated ad infinitum; in Leibniz's terms, since such a procedure

> ....only involves other contingents, anterior and more detailed, each one of which needs a like analysis for its explanation, we make no advance. 146.

What is sought in this regard is not merely an efficient, but rather an absolutely sufficient or final, cause; and for the reason indicated in the

passage cited immediately above, it must be said that

> the sufficient or final reason must be outside of the sequence or series of this detail of contingencies, however infinite it may be. And thus it is that the final reason of things must be found in a necessary substance, in which the detail of changes exists only eminently, as in their source; and this is what we call God. 147.

God, then, is the final and absolutely sufficient cause of all being: i.e., that being which, at once, is the ultimate explanation of all contingent being, and the sufficient reason for its own being.

This fact that God is considered to be the final and ultimate explanation of all being whatsoever, is the prima facie criterion for the attribution of necessity to God. As the sufficient reason for, and the final cause or explanation of, all contingent being, God must be construed as theoretically other than, or external to, such being.[148] By thus referring to God as the reason for all contingent being, we possess cosmological grounds for asserting his existence;[149] but the necessary existence of God cannot be sufficiently established by this means, insofar as it provides for a mere relative necessity, and not the absolute necessity, of the divine nature. It is, however, by virtue of the fact that God is the sufficient reason for his own existence that absolute necessity must be considered as one of his attributes. On this basis, the existence of God is primarily to be established by ontological, as opposed to cosmological, means. Indeed, it may be said that, if God is admitted as a being which is at all possible-- i.e., if the concept of such a supreme substance involves no contradiction--, then it must be acknowledged that he is an absolutely necessary being, and that he exists through the necessity of his own

inherent nature.[150]

To conceive of God thus as the absolutely necessary being has its repurcussions for the theory of time. For no matter how his nature may otherwise be interpreted,[151] one matter must, on the basis of the divine necessity just affirmed, be demonstrated: viz., time is quite irrelevent, and cannot at all pertain, on the theological level in general, and to the nature of God in particular. Since God is the absolutely necessary being, it would seem to be the case that he cannot be perceptive, inasmuch as this involves a certain degree of passivity and, therefore, of dependence, and the attribution of dependence mitigates against any affirmation of necessity. Furthermore, if God is the absolutely sufficient reason for all being whatsoever, and to this extent comprehends all beings within himself, then it follows that he must be independent of any particular or limited point of view. And since time qua phenomenal is inescapably bound up with such a point of view, God cannot but be eternal in the intensive (or qualitative), rather than the extensive (or quantitative) sense of the term.[152] The definition of time as "the order of non-contemporaneous perception" and the characterization of God as the one absolutely necessary real being are themselves adequate grounds for suggesting that time is irrelevent in regard to Leibnizian theology.

It is therefore evident that the theses of Newton and Leibniz are to be dissociated, at least on the metaphysical or theological level. It will be remembered that, for Newton, the doctrine of absolutes implies that absolute time is a form of God's perception, or, more specifically, that it is an aspect of the divine sensorium. As such, it is directly

involved in the divine nature. Quite to the contrary, the conclusion to which we are virtually driven in regard to the Leibnizian theory is that time is not, and cannot be, directly involved in the divine nature, and that, at best, the metaphysical connection between God and time is indirect. And thus the expectations implied at the beginning of the present chapter are realized.

CHAPTER 3

Relativism : b) Berkeley

It has been indicated that Leibniz's criticism of Newton is of a metaphysical or theological nature, and consists in showing that the Newtonian interpretation of space and time as absolutes is contradictory in itself. In other words, Leibniz's approach and method in this regard is thoroughly that of a logical *reductio ad absurdum*. Berkeley's approach is not to be characterized, at least primarily, in this way. On the contrary, the latter's criticism of Newton comes about, almost exclusively, through the analysis of the meaning of terms in common usage (and as used by Newton), and the examination of the sort of logical entailment involved in the Newtonian arguments. It might, indeed, be said that Berkeley's criticisms are matters of the interpretation of the very meaning of facts themselves, and to this extent formal; whereas Leibniz's criticisms are found to concern not the facts themselves, or their interpretation, but the *explanation* of them. Thus, Berkeley's criticisms seem to be *concrete or factual*, whereas Leibniz's are *abstract or theological*;[153] those of Berkeley seem to be, in some respect, *physical*, and those of Leibniz significantly *metaphysical*. On the one side, there are arguments presented against Newtonian theory which are *external*, since they are dependent upon the adoption of a different interpretation of the meaning of the facts. On the other side, there are *internal* arguments brought

against Newtonian theory, [illegible]ch depend not upon interpretive, but rather upon explanatory, differences.

Berkeley's arguments against Newton are overtly arguments against the latter's theory of absolute space, but they have direct implications against the theory of absolute motion, and indirect import against the theory of absolute time. In his essay, Towards a New Theory of Vision, the following argument is established against the Newtonian notion that distance or extension can be interpreted absolutely, or as possessing a possible existence independently of anything extended:

> 1. Distance (or extension) by itself and of itself is invisible. 154.
>
> 2. Some things are to be perceived by the mediation of others. 155.
>
> 3. No thing which is not itself perceived can be the means of perceiving another. 156.
>
> Therefore, distance (or extension) is perceived by means of some other idea. 157.

On the basis of this syllogism, it is supposedly shown that the existence of an absolute space cannot be established as something sensible. And it follows that, if it is neither sensed nor sensible, it cannot have any direct physical impact, and obviously cannot be determined either as existing or as possible by this means.

In order for it to be significant at all, there are two possible ways in which it can be so: (a) as a sensible object, or (b) as a possible object of thought. That is to say, it must be either sensible or intelligible. As regards absolute space, however, the first alternative can be eliminated, in Berkeley's estimation, in view of the foregoing

argument. And this elimination leaves the latter alternative as the only possible ground for the significance of absolute space: viz., that absolute space is intelligible, or an object of thought. But this alternative can be shown to be impossible as well, on either of two grounds: (a) that to regard space as significant in this way is contrary to its nature as an independent absolute, or (b) that the intellect is concerned with unextended beings-- i.e., ideas--, and absolute space is essentially an extended being.[158] Thus, the two criteria for the factual significance of absolute space are both to be eliminated as impossible. The conclusion, therefore, is that the notion that space as an absolute is factually insignificant, and that, as a consequence of its factual insignificance, absolute space is nothing at all:

> From absolute space...let us take away now the words of the name, and nothing will remain in sense, imagination, or intellect. Nothing else then is denoted by those words than pure privation or negation, i.e. mere nothing. 159.

A precisely analogous argument can be advanced against the view that time is an absolute,[160] and either the same general form of argument, or a derivative argument, can be established against an absolute interpretation of motion.

It cannot but be admitted that absolute space and absolute time are not perceptible beings, and hence are not directly involved in any of Newton's demonstrations in physics. In other words, Newtonian physical science is, for the most part, curiously unaffected by his essentially metaphysical doctrine of absolutes; for his physical inquiries depend upon space and time inasmuch as they are measured and, therefore, relative.

The doctrine of absolutes is, on this basis, theoretically inconsequential, and ought not to be included in the theory at large in the interests of doctrinal economy, if for no other reason. For the multiplication of abstractions serves no significant explanatory purpose, and only compounds the obscurity and the difficulty of the theory in which they occur.[161] Solely in view of Occam's Razor, Newton may be criticized. Clarity, precision, and economy are, for Berkeley, the three cardinal criteria of theoretical adequacy, and, in Berkeley's opinion, Newton tends to fall short in at least two of these respects.

Methodologically, Berkeley attacks Newton (and Leibniz as well) for committing what might, in contemporary terminology, be called a category mistake, for confusing two orders of beings, which are to be essentially dissociated: viz., the concrete and the abstract, the relative and the absolute. In this light, Berkeley declares that

> To throw light on nature, it is idle to adduce things which are neither evident to the senses, nor intelligible to reason. [162]

The theoretical distinction between concrete and abstract considerations, between nature and that which is falsely taken to explain nature, at once stands as testimony to, and is demonstrated by, the fact that the one cannot be derived from the other, or that the one cannot be assumed as the presupposition of the other. In other words, the concrete thing cannot be logically derived from an abstraction; no more can the independent existence of an abstraction be derived from the concrete.[163] The two differ radically, in point of kind. Now, Berkeley attacks Newton for just this sort of illegitimate and erroneous derivation, for deriving non-descriptive, or

non-physical, or abstract quantitative absolutes from evidence which is descriptive, physical, and concrete. And to this extent, it can presumably be shown than Newton is guilty of a procedural fallacy. It can only be said that the particular, by itself, cannot stand as conclusive and sufficient evidence for the necessity of a general conclusion; nor can a generalization, by itself, testify to the necessary facticity of any particular individual. The conclusion, in either of these cases, is not, and cannot be, a necessary one, but merely hypothetical; and even the adequacy and the correctness of the hypothesis can be challenged, in view of its supposedly tenuous empirical support. There is, therefore, insufficient evidence in support of Newton's conclusions. And Newton's theory of absolutes suffers from a methodological inadequacy in this regard.

The philosophical empiricism of George Berkeley may be represented or categorized in two ways. Firstly, it may be classified as an immaterialism, since his theory of the knowledge of objects may succinctly be expressed in the formula, "Esse est percipi", or "To be is to be perceived". In short, the only way in which the existence of an object of knowledge can be ascertained is by reference to the fact that it is perceived. And, secondly, Berkeley's philosophy can be classified as a spiritual realism, since, if anything is perceived, the existence of that which perceives must be assumed, even though it cannot itself be perceived. The full, or theoretically complete, formula that can be supposed to represent the Berkeleian epistemological position is thus "Esse est aut percipi aut percipere": "To be is either to be perceived, or to perceive".

Of the objects of human knowledge, the existence of which consists in their being perceived, Berkeley enumerates three kinds: (a) ideas of sense, (b) those objects which are perceived by attending to the passions and the operations of the mind, and (c) ideas of memory and of imagination.[164] As is also the case with John Locke,[165] Berkeley traces all human knowledge ultimately to sensation; and all knowledge is taken to depend upon the fundamental ideas of sense. To translate into Lockean terminology, it may be said that Berkeleian "ideas of sense" are "simple ideas" or "simple perceptions", and that known objects are either simple ideas themselves or collections of such. But, as opposed to the theoretical approach of his predecessor, Berkeley is of the opinion that ideas are not merely mental representations of some external, or extra-mental, reality, but rather that, in this regard, such ideas are themselves the objective reality. There is, then, no such thing as an extra-mental world of material, and therefore extended, substance, despite the beliefs of such theorists as Descartes and Locke.[166] It may be urged that Berkeley's view on this point is a result of the application of Occam's Razor to the aforementioned theories. But in fact Berkeley argues that "the very notion of what is called matter or corporeal substance involves a contradiction...".[167] Two arguments may be used to establish the fact that the hypothesis of a world of real material substance, as the substratum and efficient cause of sensation, is contradictory. In the first place, sensible qualities, such as colour, figure, motion, and so forth, are nothing other than ideas perceived through the senses, or combinations of such ideas. If the Berkeleian tenet that the being of a sensible thing consists in its being perceived.

by sense[168] is accepted, then a contradiction results if such a percept is thought to exist in real material substance, which, insofar as it is extra-mental, is capable of existing unperceived. In Berkeley's own words:

> To have an idea is all one as to perceive; that, therefore, wherein colour, figure, and the like qualities exist must perceive them.[169]

In this case, then, either the notion of the inherence of sensible qualities in extra-mental substance must be rejected, or one is involved in the philosophically untenable situation of affirming that there exists a substance which is both material, and therefore theoretically independent of perception, and perceived. And, secondly, as regards the theoretical possibility that, though ideas exist nowhere but in the mind, such ideas are to be considered copies or representations of qualities which inhere in extra-mental substance, Berkeley says that

> If we look but ever so little into our thoughts, we shall find it impossible to conceive a likeness except only between our ideas. Again, I ask whether the supposed originals or external things, of which our ideas are the pictures or representations, be themselves perceivable or no? If they are, then they are ideas, and we have gained our point; but if you say they are not, I appeal to anyone whether it be sense to assert a colour is like something which is invisible; hard or soft, like something which is intangible; and so of the rest.[170]

The consequences inherent in this case are, then, fundamentally the same as in the preceding one: either reject the notion of an extra-mental reality, or be involved in contradiction. Rather than have to face the possibility of inconsistency, it is necessary to abandon the doctrine of the reality of corporeal substance.

Having noted that all human knowledge is ultimately grounded upon what are referred to as "ideas of sense" or perceptions, it may be advantageous to make note of the inherent characteristics of ideas *qua* ideas.. By nature, ideas are *inert*, or *inactive*: "there is nothing of power or agency included in them".[171] Berkeley goes on to say that

> To be satisfied of the truth of this, there is nothing else requisite but a bare observation of our ideas. For since they and every part of them exist only in the mind, it follows that there is nothing in them but what is perceived; but whoever shall attend to his ideas, whether of sense or of reflection, will not perceive in them any power or activity; there is, therefore, no such thing contained in them. [172]

As is implied in the foregoing passage, a second characteristic of ideas is that *they are grasped wholly or completely* (in the sense that there is nothing within the idea that is not perceived), *and immediately* (*i.e.*, instantaneously, or all at once). They are, in these respects, *self-contained units or atoms*, and possess no essential relationships either to material or corporeal substances, or to other ideas; they are, that is to say, determinate and isolated data of sense or of reflection. Again, they are *particular* or *singular*, and *concrete*. Indeed, Berkeley's entire philosophy is directed against the theory of abstract general ideas.[173] It is in this respect that Berkeley may well be classified as a *nominalist*. But this is not to say that he rejects *general ideas per se*-- this, it must be emphasized, is *not* the case; what he does do is *interpret general ideas in a nominalistic fashion*.

To say that Berkeley is a nominalist in regard to the problem of essences is, in this context, merely to affirm that any so-called general ideas, or essences, are found to be based upon that which is particular

or singular, and concrete. In the Berkeleian theory, for example, the so-called "essence" of triangularity or of redness is nothing more complex than the representation of all triangles, insofar as they are triangles, by one specific triangle; or the representation of all red things, insofar as they are red, by one particular red thing. Inasmuch as the specific triangle that is taken as the representative of all triangles, and thus is the standard or the criterion by reference to which the term "triangle" is applied to other such beings, is itself singular and particular, it possesses, by virtue of this fact, its own peculiar or individual characteristics: it may be acute-angled, have sides that measure two inches in length, and be red in colour.[174] The same general approach may be adopted in regard to the "essence", redness. For Berkeley affirms that "extension, figure, and motion, abstracted from all other qualities, are inconceivable."[175] And just as it is meaningless to affirm that one knows certain secondary qualities apart from the primary, so it is meaningless to affirm the existence of a primary quality in separation from, or in abstraction from, the secondary. One cannot, then, be said to know extension or figure apart from the particular perception of a specific extended figure, and this last automatically involves some secondary quality or other (e.g., the colour, red). Nor can one apprehend colour apart from some particular coloured, and therefore extended, thing, which is an object of perception.

In reference to the first section of the Principles of Human Knowledge, the fundamental ideas of sense are found to be akin, though not quite identical, to the "simple ideas" in Locke's Essay. From the sense of sight, for example, the mind receives ideas, such as colours;

from the sense of touch, ideas such as heat, cold, hard, and soft; from the sense of hearing, ideas of sounds, pitch, timbre; and so forth. And,

> As several of these are observed to accompany each other, they come to be marked by one name, and so to be reputed as one thing. Thus, for example, a certain colour, taste, smell, figure, and consistence having been observed to go together, are accounted one distinct thing signified by the name "apple"; other collections of ideas constitute a stone, a tree, a book, and the like sensible things... 176.

Sensible things, then, are to be regarded as <u>collections of basic or primitive ideas of sense</u>, or singular and isolated qualities. For, since we observe such things, and since any primitive idea <u>of itself</u> implies or involves nothing beyond itself, it must be that observed objects, which are collections of qualities, are the effect of a <u>synthesis</u> or <u>collection</u> of such primitives. And a synthesis of ideas implies the existence of a being that effects the synthesis in question.

To be sure, sensible objects are collections of ideas, or of sense impressions, <u>qua</u> sense qualities. But each collection of primitive sense qualities is itself an <u>idea</u>. Thus, each and every <u>object of sense is just as inert, is grasped just as completely or wholly</u> as a unit insofar as all of its parts are so grasped, <u>is just as particular and self-contained</u>, as are the primitive ideas. By nature, the character of the <u>ideas of things</u> (<u>e.g.</u>, of an apple, or of apples) do not differ significantly, or internally, from the primitive ideas out of which they are composed, but only externally, insofar as they are collections or composites, and not simples. To push the point still further, it would seem that there are ideas of collections of objects-- <u>i.e.</u>, collections of collections of primitive ideas or qualities--, such as the idea of the physical world; and even such highly complex

ideas as they must possess the characteristics inherent in the other mental ideas or perceptions: inertness, unity, particularity, and self-reference or self-containment.

Now, it has been noted already, in reference to Berkeley's criticism of other theories prevalent at his time, that it is impossible that ideas should, in any way, exist either in material or corporeal substance, or in themselves; for this involves the contradiction of affirming that a perception can exist unperceived, or that that which is by nature unperceptive perceives. Ideas are of the nature of perceptions. They can be presumed to exist only in that which is inherently perceptive. For this reason, there must be a perceptive being, or mind, in which ideas or perceptions occur. It would seem, on this basis, <u>that a mind</u>, inasmuch as it is perceptive, <u>must be presupposed in reference to the fact of perception</u>; it is, as it were, the <u>focal point of perception</u>. Furthermore, the mind is to be considered as the <u>only truly substantial being</u>, since, so far as Berkeley is concerned, the view that there is any other kind of substance is a flagrant contradiction.[177] Ideas themselves are not substantial in character, <u>because they are constitutionally incapable of independent existence</u>. Rather, they must be conceived to exist only in a mind. Thus, as has already been summarily noted, Berkeley's theory is a <u>spiritual realism</u>, since it resides within the nature of a true substance that it is undoubtedly real, and the mind or spirit is considered to be the only true substance.

By the terms "mind", "spirit", "soul", or "myself", as Berkeley says,

> I do not denote any one of my ideas, but a thing entirely distinct from them, wherein they exist or, which is the same thing, whereby they are perceived--for the existence of an idea consists in its being perceived. 178.

It has been stated repeatedly that ideas or perceptions are characteristically inert; it has also been stated that, for Berkeley, physical objects are collections either of primitive ideas, or of collections of primitive ideas, depending upon the degree of complexity of the thing under consideration. One is virtually obliged to say, in view of the synthetic character of objects or things, that the mind involves activity, or that it is an active being, at least to some extent. Berkeley specifically refers to the mind as exercising "divers operations, as willing, imagining, remembering" about or upon perceptions.[179] The human mind can therefore be found to be active insofar as it operates, as what is called "understanding", upon the diverse and inert ideas of sense. To this extent, the Berkeleian thesis may be designated as a <u>doctrine of spiritual activity</u>.

But ideas of sense are, in the strictest way, ultimately <u>received</u> by the human mind. It is a fact of experience that one <u>does not always will to perceive what one perceives</u>. And thus it seems that one cannot exercise a choice as to <u>whether or not one will perceive</u> in the first place, or as to <u>what one perceives</u> when perception takes place. The fact remains, then, that the primordial ideas of sense, or elementary perceptions, are received as they are, whether or not one wills their reception.[180] The reception of such ideas occurs, for the most part, quite independently of the human will.[181] Thus, the human mind or spirit is to be considered as a perceptive, but nevertheless active, being: a peculiar blend of activity

and passivity, both of which are quite necessary. In addition, the passivity of the human mind is underscored, and indicated, by the fact that, even in the act of understanding, the mind does not in any way alter what has been perceived, but merely combines them, relates them, and so forth-- that is to say, it exercises its activity in ways that are external to the ideas themselves, or formally rather than in regard to content.

Despite the fact that the perceptive nature of the human mind marks it as passive, it nevertheless must be said that the human mind is an essentially active being. As A.A. Luce says:

> Activity is the essence of the Berkeleian mind or subject, rational, percipient activity, and until we form the habit of considering ourselves in that light, we cannot move freely in the Berkeleian system. 182.

This commentator says, further, that

> In the pages of his Commentaries, we can see him (i.e., Berkeley) fighting his way towards full self-knowledge; the earlier entries speak of the mind as passive, and identical, or nearly so, with its contents; he can take Hume's viewpoint and call the mind a "congeries of perceptions"; but in the end he reached the position ...in which mind is active, and is distinguished from its contents as sharply as active from passive. 183.

Although there are various difficulties with Luce's statements in this regard-- difficulties which, it might be added, arise in direct reference either to the content of Berkeley's thesis or to its tone--[184], it might be regarded as established thereby that the nature of the mind does indeed involve activity.

Nevertheless, the affirmed activity of the mind must be exerted upon something. This "something" the mind does not create for itself, nor is it contained a priori within the mind, prior to its perception.[185] It is, and must be, supplied to the mind, or received by the mind. In this respect,

the essential activity of the human mind is dependent upon its perceptive nature or its passivity. Just as the being of an idea consists in its being perceived-- i.e., in its being in a mind--, so the very being of a mind or spirit consists in its perceiving, its thinking, and its willing; and in order to think at all, there must be something that is thought, and this cannot be provided by any activity of the human mind itself.

For Berkeley, the finite mind is a thinking human subject. As such, it is not merely non-physical existence or substance in general, or human subjectivity in general. In analogy with ideas, the mind or spirit that perceives and thinks is to be considered as particular, or as individual. It is, as it were, the individual ego, or the individual locus of perception. As such, it would seem that perceptions, the existence of physical objects, indeed, the whole world, are "contained" exclusively within each specific individual mind, and are hence entirely relative to the mind in question. Furthermore, the activity of the mind seems not to proceed beyond itself, and is manifested entirely in operations of understanding, willing, and so forth, in regard solely to its own perceptions or ideas.

If the human mind is, in effect, a "tabula rasa" (as Locke, and the empiricist tradition in general, would have it), then perceptions must have their origin in a source which is external to the human mind itself. Since the activity of each mind is restricted to the understanding, or to the thinking, of its own ideas, and since by far the greater part of mental activity consists in the understanding (i.e., the combining, relating, etc.) of perceptions that are presented to, or received by, the mind, and since

no idea can be impressed upon the mind by any being that is inert, or that possesses a limited scope of activity and limited power, it must be concluded that only a Being that is purely active, whose will is of infinite scope and potency, can be responsible, as the efficient and final cause, for the imposition of perceptions or ideas of sense upon finite minds. 186. That there is an infinite Mind, in this regard, is a matter of record within the context of the Berkeleian theory; indeed, he approaches the notion from several different directions, and in several different ways. In the first place, he demonstrates the matter syllogistically, as follows:

> Sensible things do really exist.
> If they really exist, they are necessarily perceived by an infinite mind.
> Therefore, there is an infinite mind. 187.

This syllogism is expanded, and elaborated, when he states that

> To me it is evident...that sensible things cannot exist otherwise than in a mind or spirit. Whence I conclude, not that they have no real existence, but that, seeing they depend not on my thought, and have an existence distinct from being perceived by me, there must be some other mind wherein they exist. As sure, therefore, as the sensible world really exists, so sure is there an infinite omnipresent spirit, who contains and supports it. 188.

The conclusion of these arguments is that the infinite Mind is the ultimate explanation of, and justification for, the real existence of the sensible world. Furthermore, this infinite Mind is ultimately the origin, or the final efficient cause of perception in finite minds; thus,

> There is a Mind which affects me every moment with all the sensible impressions I perceive. 189.

In addition to these arguments, certain questions pertaining (a) to the

continuity of the world, (b) to the uniformity and the describable uniformality of the physical universe, by means of which it may be considered susceptible to description in terms of physical and causal "laws", and (c) to the origin of the human mind, lead to considerations which testify to the real existence of an absolutely active Being, or an absolute and omnipresent Will, in reference to which they are answered, and without which they are effectively unanswerable.

A.N. Whitehead says of Berkeley, that he "hastens to have recourse to an idealism with its objectivity grounded in the mind of God".[190] Indeed, it is the unlimited Mind of God that, on Berkeley's thesis, is to guarantee, not only the bare existence of the world, but also the regularity, the continuity, and the coherence of its existence. It should be evident, then, that the notion of God is essential to Berkeley's entire thesis; his immaterialism inevitably leads up to it, and were it lacking, the whole Berkeleian theory would collapse.

We have noted that there are three kinds of known objects: ideas of sense, ideas of memory and of imagination, and "such as are apprehended by attending to the passions and operations of the mind". With the first we have already dealt to some extent; and with the second, insofar as they are akin to the first, except that they are less vivacious, or weaker,[191] I do not propose to deal. In reference to the third, however, it may be noted that we are dealing with activities of one sort or another. Berkeley admits, for instance, the possibility (and, indeed, the actuality) of self-knowledge. But since the mind is active, no idea of it is at all possible:

> A little attention will discover to us that the very being of an idea implies passiveness and inertness in it, insomuch that it is impossible for an idea to do anything or, strictly speaking, to be the cause of anything; neither can it be the resemblance or pattern of any active being... 192.

The term "idea", then, is appropriate only to inert, positive, and fundamentally isolated sensations, or to collections of such sensations. But although it is not possible to have an idea of any active being or of any action or activity, or although we cannot be presumed to know any active being or any activity in the same way as we know an apple or a house, it is nevertheless the case that these are significant "objects" of human knowledge. And if they are known, then there must be a "vehicle" by which they are known, and which are to this extent similar to idea. Berkeley says, in this regard, that

> We may not...strictly be said to have an idea of an active being, or of an action, although we may be said to have a notion of them. 193.

The vehicle by means of which actions, or active beings, are known is thus what Berkeley calls "notion"; and notions are similar to ideas by virtue of the fact that both are vehicles. Yet the distinction between notions, on the one hand, and ideas, on the other, is evident from the foregoing.

In any case, if active beings and actions cannot be known by way of idea, or are in no way the objects of direct perception, and if, as Berkeley suggests, active beings and actions are nevertheless legitimate "objects" of knowledge, then one can only assume that they are known by some other means. This other means, as was noted in the foregoing paragraph, is what Berkeley refers to as "notion". It must be admitted, at this stage,

that knowledge by idea and knowledge by notion differ not in degree, but in kind.

Now, Berkeley acknowledges that knowledge by notion is altogether different from that by sensation or idea.[194] Thus, it would seem that if knowledge of the primitive ideas of sense is direct and complete-- direct because no inferential agency is required for their apprehension, and complete (self-contained or self-referential) because there can, on pain of contradiction, be nothing in any such idea which is not directly sensed--, it must be affirmed that knowledge by notion cannot be direct and complete. Such a knowledge must, at least, be indirect, insofar as it involves an intervening inferential agency.

It cannot be denied, however, that Berkeley allows the knowledge of the knowing self (i.e., "myself") to be immediate;[195] but, in view of the foregoing, such a knowledge must be notional and hence indirect. And this raises the question as to how it is possible for there to be a knowledge which is at once immediate and indirect. At one stage of the Principles of Human Knowledge, Berkeley affirms that to know something notionally is to know what is meant by the word in question.[196] To know what the word "triangle" means is, therefore, to have a notion of a triangle; and this, presumably, need not involve having an idea or an image of a specific triangle. It is merely to know the definition of the term, and, wherever possible, to be able semantically to relate the definition in question and a perceivable figure which satisfies it. Similarly, if one knows the meaning of the words "idea" and "I" or "myself", then one has a notion of what an idea is and of what I am, and also of what the relationship is between these two. To proceed but

one step further, in regard to these last instances of notional knowledge, it is utterly impossible sensuously to perceive either an idea *per se*, or my self. That only can be thus perceived which is a sense quality, and neither ideas *per se* nor the knowing self can legitimately be interpreted as sense qualities. In short, it becomes evident that the knowledge of what an idea is, or of what I am, is indirect, because neither is, or can be, given in sensation. It must, therefore, be the product of a rational or inferential act. Yet the fact remains that the primitive ideas of sense are given directly to the mind. And it follows immediately and necessarily (*i.e.*, self-evidently) from knowing what an idea is, that it cannot exist but in a mind, and that the mind is the "substratum", or the necessary support, of ideas. In other words, the notion of the knowing self is necessarily and intimately involved with the very notion of an idea.

Now, despite the fact that knowing what an idea is is *notional* in character, and therefore *indirect*, it is nevertheless the case that ideas of sense are the vehicles of direct an certain knowledge. Inasmuch as this is the case, and since the notion of the knowing self is contained implicitly, but obviously, within the notion of any item of knowledge whatsoever, it follows that, to precisely this extent, the knowledge of the knowing self is just as immediate as is the most immediate awareness of sense data, or the objects of sensation.

In the light of the distinction established between ideas and notions as different vehicles or means of knowing, and in regard to the general topic of self-knowledge which we have already developed to some length, it is necessary to effect a differentiation of knowing oneself as

an active agent, and knowing oneself by way of having some particular perception of some subjective state or other.[197] It is the former of these that is the primary concern in this context; the latter may be dealt with in a way very similar to objective perception. As an active agent, then, the ego or self may essentially be characterized as a function of the will. It need only be mentioned that such an active being cannot be known by way of idea, or by way of direct and fundamentally inert perception.[198] Hence it follows that the nature of such a being can be known only by virtue of the fact that an inference is performed upon the data provided directly in sense perception. And it has been suggested above that the involvement of such an inference need not mitigate against the immediacy of self-knowledge.

The knowledge of the self has a very significant bearing upon the theory of knowledge in general: especially upon the treatment of relations, and of time. It is to the first of these that attention must now be given.

The knowledge of relations-- knowledge of actions being but a sub-group of this-- is a knowledge of a mental construction. For since the concrete ideas which are the basis of the relation, or are the relata, are complete in themselves, are inert, and do not have reference beyond themselves, they cannot be the ground for their being related. Insofar as the basic data of sense-- i.e., ideas or perceptions-- are thus inert in character, and insofar as they are complete in themselves in the way that has been described, their relation is the product of an inference performed by some active being or spirit. Now, some of these relations, though constructed by an active being, are by nature stable, while others are

dynamic. For example, the relation of certain fundamentally inert and discrete sense-data may result in the object that we refer to as an "apple". Such a combination of ideas into physical objects is peculiarly static and self-contained in nature, for the apple that I apprehend at present is not, by virtue of itself alone, related to the tree on which it hangs, nor to the apple that I saw a month ago. It is itself, immediately, and refers to nothing beyond what it is. The same may be said of more and more complex ideas: e.g., the apple-tree, the orchard, the farm, the whole valley, etc.. None of these are actions; nor are they significantly active beings. Hence, they may be known by idea. They may be known completely, though indirectly, by the inferential agency or the understanding of an active spirit.

There are, in addition, relations that may be designated as "dynamical" in character. In contradistinction to such relations as give rise to complex ideas of objects, dynamical relations can only be established incompletely: viz., by the juxtaposition of the termini of the change in question, which is presumed to indicate something other than the the juxtaposition itself. This "something else" is not susceptible to interpretation in strictly objective terms, for it has been mentioned that in Berkeley's system an "object" is by nature inert and self-contained, and hence refers to nothing other than itself. Of such a dynamical relation, then, we can have no idea. In other words, dynamical relations partake more thoroughly of the inherent nature of spirit or mind, and can in no way be considered in separation from it. Or, again, they partake most uniquely of the nature of subjectivity, and not of objectivity, even though

they may be noted to be, in some sense, objectively pertinent.

In view of the foregoing, one might affirm the theoretical kinship of objective or static relations and space, and of dynamical relations and time. Of the one we may have an idea; of the other it is utterly impossible that we should have any idea. Or it might be said that in the one case the relation somehow refers to the content of the ideas in question, while in the other case it refers more to the way or the manner in which ideas are comprehended by the mind.[199]

In any case, it might be affirmed that time is a relation of the latter sort: i.e., a dynamical relation. As Berkeley himself says:

> Whenever I attempt to frame a simple idea of time, abstracted from the succession of ideas in my mind, which flows uniformly and is participated by all beings, I am lost and embrangled in inextricable difficulties. I have no notion of it at all... Time therefore...(is) nothing, abstracted from the succession of ideas in our minds...[200]

Thus, while space or extension either is, or is capable of being, given in an idea, time is purely the effect of the formal activity of the mind. And since the very nature of the mind consists in its thinking-- both in the sensuous reception of ideas, and in the activity of the understanding-- it must be affirmed that time is nothing apart from the mind. What we are aware of, when we perceive, are not only ideas, but the succession of ideas.[201] It is this last that gives rise to the notion of time; and it is this last which seems to be purely formal in character.

With this in mind, then, we may take note of several things about time, as it receives mention in Berkeley's theory. First of all, it may be designated as a relation that is relative to some mind; for it is

manifestly impossible, by definition, that ideas should exist independently of a mind. As is also the case in Leibnizian theory, it is a relation which is fundamentally phenomenal; it is a "rational" relation in this regard, and cannot be separated from its contents. Thus, it cannot be viewed or interpreted either as a real substance, or as any property of such a substance, for to interpret it as such would be to consider it as an abstraction, and this Berkeley finds empirically repugnant. For somewhat different reasons, both Leibniz and Berkeley stand opposed, on this score, to the scientific empiricism of Isaac Newton, a theoretical view which declares that time is, in one of the aforementioned ways, substantial and absolute.[202] It is indeed against the Newtonian interpretation that Berkeley directs his invective, as was noted earlier. In phrases that are reminiscent of Saint Augustine, he says that

> The plainest things in the world, those we are most intimately acquainted with and perfectly know, when they are considered in an abstract way, appear strangely difficult and incomprehensible. Time, place, and motion, taken in particular or concrete, are what everybody knows, but having passed through the hands of a metaphysician, they become too abstract and fine to be apprehended by men of ordinary sense. [203]

It cannot, of course, be denied that time is something known. This fact becomes, at best, somewhat dubious in Newtonian theory. In view of the Berkeleian thesis, time is something concrete rather than abstract; but it is not to be considered concrete in the direct and immediate sense in which primitive ideas qua content of knowledge or of sensation are so, but rather in the fundamentally indirect and mediate sense in which notions qua form of knowledge or of sensation are so.

It has been suggested by various commentators, notably G.D. Hicks,[204] that Berkeley's dictum that time is a succession of ideas is susceptible to supposedly grave objections, or criticisms. In the first place, it is said that there is a large, and perhaps unbridgeable, gap between the "succession of ideas" and an "idea of succession". But this objection is, on the one hand, quite alien to the central problem of time; it is, in other words, epistemologically pertinent, but not essentially pertinent, to the discussion at hand. It is concerned, not with the nature of time itself, but rather with the connection between time itself and the knowledge of it. On the other hand, this objection seems to be based upon an equivocation of the term "idea": an equivocation, moreover, which Berkeley is careful to avoid. There is, and can be, no idea of succession in the Berkeleian theory. The two-- i.e., idea and succession-- are qualitatively distinct: one being material, specific, and self-contained, while the other is formal and not entirely determinate, inasmuch as it is a dynamical relation. In other words, they are of logically different and contrary kinds. To conjoin the two, in effect to postulate the facticity of an idea of succession is, therefore, a contradiction of the same sort as the existential or conceptual postulation of a round square. Thus, this criticism of the Berkeleian position can be eliminated with relative ease.

Secondly, it is said that Berkeley's supposedly definitive affirmation that time is a succession of ideas is circular-- i.e., that the definiendum appears in the definiens, that the notion of succession, in terms of which time is supposedly defined, implies a time in which it can be presumed to exist, or that succession is a mode of time. It need

only be noted, in this regard, that this objection is significantly ab extra, and hence is not theoretically fatal. It can be found to assume what Berkeley explicitly rejects; it is not consistent with Berkeley's primary tenets; and, therefore, it seems to be more of a disagreement than it is a significant internal, and conclusive, criticism. For, as a nominalist, Berkeley specifically rejects the doctrine of real essences, or the doctrine of abstract general ideas, and thence virtually of all of traditional metaphysics. For this reason, he can legitimately deny that the succession of ideas presupposes a time in which it can be presumed to exist, and from which it derives its existence. The view that time is logically prior to succession is thereby eliminated, and what remains is the view that it is either logically equivalent, or logically inferior or subordinate, to the succession of ideas.[205]

Whether it is the case that time and the succession of ideas are logically equivalent, or whether it is the case that time is derived from the succession of ideas in the mind, is an issue which must be concluded, one way or the other. It would seem slightly absurd to speak, in the context of Berkeley's thesis, of time being derived from the succession of ideas in the mind; for this would imply that such a succession could exist independently of time, that there could possibly be a succession which is not a time, that there could be a succession of ideas in the mind of which the mind in question is unaware, or that there may exist in the mind ideas which are not matters of perceptual awareness. Thus, the notion that time is somehow derived from, or is theoretically subordinate to, the succession of ideas, is manifestly impossible, insofar as contradictory, on the

Berkeleian interpretation. We are left with the conclusion, then, that for Berkeley, time and the succession of ideas are logically equivalent: in the apprehension of a succession of ideas we apprehend a particular or specific time, and in referring to time we ultimately refer to some specific succession of ideas.[206]

It might be mentioned at this juncture that the affirmed logical equivalence of a succession of ideas and time serves to differentiate between the Berkeleian thesis and the theories of both Newton and Leibniz. As has been indicated, Berkeley's nominalism in this regard, or his rejection of the realist and the conceptualist doctrines of abstract general ideas, of time as either explicitly or implicitly absolute, is the point at which his views and those of the Newtonians and the Leibnizians come into direct conflict. For the purposes of this paper, enough has already been said on this score, that reiteration would be superfluous. It is sufficient to say that on the relational and the relativistic interpretation of time, which is maintained in common by Leibniz and Berkeley, regards the Newtonian theory of real, substantial, and absolute time either (a) as contradictory, or (b) as contrary to the empirical facts and the common usage of words, or (c) as merely a conglomeration of empty verbiage. In any case, the elimination of the Newtonian theory is thought to be necessary. And to this effect, the doctrines of Leibniz and Berkeley are directed against the doctrine of absolutes. Both reject the view that the real or absolute existence of time is a necessary condition for succession. The views, however, in which succession is regarded as a necessary condition of time, or in which the two are to be logically equated,

are left open by this rejection; and it is at this point that Leibniz and Berkeley-- united in their theoretical condemnation of the Newtonian views-- part company. The logical rationalism of Leibniz may be alligned with the former of these alternatives;[207] while the general empiricism of Berkeley may be alligned with the latter. On the basis of his empiricist tenets, Berkeley undoubtedly would turn the invective employed against Newton against Leibniz as well; for Leibniz is to be regarded as hypostatizing either succession (or change) itself, or the logical ground of succession (or change), in much the same way as Newton is to be regarded as hypostatizing time.[208] It would seem, then, that Leibniz is susceptible, in Berkeley's opinion, to remarkably similar, if not the same, problems that accrue to the Newtonian interpretation.

Another of the objections that can supposedly be urged against the Berkeleian interpretation of time is that it leads to a complete and utter solipsism, that a community of thinking beings is quite impossible, and that each thinking being is effectively confined to the contemplation of its own percepts.[209] This accusation is, by far, the most serious and the most comprehensive of the three mentioned by Hicks. Its application to the topic is obvious: for if it is the case that each mind is confined to itself, and is capable of apprehending or understanding only its own ideas, then it follows that time too will be restricted in its scope of significance to precisely the same extent. And, further, it follows that physical science, as a science which purports to be in various respects universal, and which depends for its universality upon the universality and the absolute uniformity both of time itself and its measurements, is

similarly thought to be impossible.[210] Berkeley denies, however, that his system is incompatible with scientific and mathematical truths;[211] and since these are universal in scope, rather than personal or particular, then this universality must be accounted for. In the attempt to provide such an account, several rather interesting points emerge; and in order to give maximum exposure to these matters, I will take the liberty of repeating what may already have been said.

The nature of the mind consists, not only in its thinking, but, as Berkeley says, in its thinking *always and constantly*.[212] And thinking itself involves the conjunction of *that which thinks and that which is thought*: *i.e.*, of the primary perceptions or ideas, *qua* content, which are inert and dependent upon a certain passivity or perceptiveness in the nature of the mind, *and* of that which exercises a formal activity upon these inert matters. The human mind, as well as its knowledge, is virtually a whole, composed of contrary but complementary factors, or "pairs of aspects",[213] the lack of but one of which is sufficient ground for the elimination of the whole.[214] The human mind, then, is not a self-contained, self-sufficient, or independent being. It involves a certain passivity insofar as its sensations, or its primitive ideas, are provided to it, or are imposed upon it, and are not the products of its own finite and limited will. Thus it seems that *psychological considerations by themselves are insufficient to account for the origination of the basic data of experience* in which human knowledge has its beginning; in other words, it seems that a *metaphysic is required to this end*.

It is, then, only *on the metaphysical level* that the existence of

primitive ideas, and ultimately of all ideas, can be adequately accounted for. And this account, this delineation of source, this determination of the effective cause of perception, must be given without resorting to a world of material substance as the independent and effective agent in this regard; for this last is, for Berkeley, an essentially meaningless, and therefore repugnant, solution to the problem-- in short, no significant solution at all.[215]

Since the agency of material substance in this regard must perforce be rejected, and since ideas are constitutionally incapable of independent subsistence, it follows that the ultimate source of all those ideas that are received by the human mind can only be presumed to be a non-human, and infinite Mind: i.e., a Being, a Spiritual Substance, wholly independent, self-contained, and self-sufficient; a Being that is completely and perfectly active and powerful, inasmuch as it influences all, but is not itself influenced,[216] and the activity of which has its origin in, and may to some extent be characterized as, an unlimited and creative Will. The very existence of ideas, or sensations, is referable to such a Being, as its real and final source, or cause. In addition, the same theoretical facts testify to the immanence of this Being. It is just such a Being which assures the objective continuity of the world, and which either explicitly or implicitly coordinates and regulates perceptions on the human level.

God is necessarily and universally immanent; and insofar as He coordinates and regulates the primitive ideas that occur, not just to one mind, but to any and all minds, the universality, or at least the trans-individuality, of spatial and temporal reference-points is made possible.

Social and scientific considerations, which depend upon the possible inter-subjectivity or the community of human minds in regard to their possession of primitive ideas-- i.e., the possibility that the content of ideas possessed by several minds can be substantially the same, though different with respect to perspective--, can be made possible by referring to this necessary characteristic of imminence in the nature of God, and in the nature of the relation between the infinite Mind and human minds. It is, for instance, on the basis of the ultimate imminence of God, that you can

> ...bid your servant to meet you at such a time in such a place, and he shall never stay to deliberate on the meaning of these words. 217.

It may be said, then, that a certain temporal location, say "two o'clock", is a concrete, objective human experience: i.e., an idea or perception, or, more correctly, a stable complex of perceptions. And it can easily be shown that it is on the basis of such ideas that both social intercourse and scientific measurement are rendered possible and indeed actual. As such, it is not time itself at all; for, on Berkeley's thesis, time can be considered as nothing, apart from the succession of ideas in the mind, and is established by reference to strictly formal considerations. To view the matter in this light is, it seems, in no significant way to degrade social relationships, or to lessen the supposed universal validity of scientific measurement.[218] Moreover, although the foregoing is not explicitly contained in any of Berkeley's works, yet it is either implicit in his doctrine, or quite consistent with it.

Thus, the "times" which make scientific measurement, and social interaction and intercourse, possible are objective. And even in light of

the foregoing, it need subvert nothing in Berkeleian theory to say with Philonous in the Three Dialogues that

> ...it is possible (that) ideas should succeed one another twice as fast in your mind as they do in mine, or in that of some spirit of another kind. 219.

For, from what has been affirmed, the succession of ideas provides the subjective measure of time, and this measure is not publicly observable. Indeed, time itself is strictly psychological in nature, and strictly personal.[220] The objective measure of time is something else again: still to an extent subjective, inasmuch as ideas cannot subsist but in a mind, but significantly inter-subjective.

It has been suggested that, although time is fundamentally subjective or private, insofar as it the succession of ideas in the mind, the Berkeleian approach leads to the postulation of an absolute time. In the words of a writer who makes this suggestion:

> It is fairly clear that Berkeley has simply introduced, though from a different standpoint, the old distinction between absolute and relative time...Time as it is for God is absolute, for, though it is relative to God's mind, it is absolutely independent of any finite percipient being, and therefore supplies a norm with reference to which the differing particular times of finite individuals may be standardized. 221.

Although, to a certain extent, this passage involves a misrepresentation of the Berkeleian position: for the admitted universality of time in the Mind of God, as the efficient cause of perceptions in finite minds, is not a sufficient criterion for calling it an absolute in the Newtonian sense,[222] yet the writer in question does succeed in putting his finger on the weak link in Berkeley's theory of time. For, if a succession of ideas occurs to any finite mind, and if God, as the efficient cause of perception, is

presumed to impose ideas upon the finite mind, then it seems to follow that there must be a succession of ideas within the infinite Mind of God.

It must, of course, be the case that God is not a percipient being, for perception involves passivity whereas God is altogether active. Thus, He cannot be affected by the ideas of which He is the ultimate origin. It must be that He produces but does not receive (i.e. perceive) them. Yet even in this case, the fact remains that God has a succession of self-produced ideas in His Mind, and that His Understanding and His Will are coincident. Thus it is that A.A. Luce can refer to the "eagle gaze of God",[223] the active apprehension of a Mind that

> ...contains all and acts all, and is to all created beings the source of unity and identity, harmony and order, existence and stability. [224]

The view that there is a succession of ideas in the Mind of God is, however, not consistent with Berkeley's affirmations in other contexts. For instance, in his correspondance with Samuel Johnson, Berkeley writes that

> We are confounded and perplexed about time (a) supposing succession in God, (b) conceiving that we have an abstract idea of time, (c) supposing that time in one mind is to be measured by the succession of ideas in another, (d) not considering the true end and use of words, which as often terminate in the will as in the understanding, being employed rather to excite influence and divert action than to produce clear and distinct ideas. [225]

According to this passage, there can be no succession in the Mind of God; and yet that there is such a succession is required for the maintenance of his theory in general. To argue that what God has in His Mind is not a succession of particular ectypal or finite ideas, but rather an archetypal idea, is to affirm, on Berkeley's behalf, a doctrine which is explicitly

repudiated by him: viz., a Malebranchian "vision of all things in God".[226] For in this instance, two distinct possibilities arise. Either the finite or ectypal ideas are modifications of the archetypal idea, or the two are utterly distinct. As regards the first of these, it can only be said that it is contrary to the general Berkeleian system. For it is either the case that the finite mind is active in its apprehension of ideas, insofar as it effects the alteration or the modification of the archetypal idea into an ectypal idea, or it is the case that the ectypal idea is a view of the archetypal idea from a finite vantage point, in which case the latter is to be considered the virtual objective referent of the former. As regards the second of the aforementioned alternatives-- i.e., to argue that ectypal and archetypal ideas are completely and utterly distinct--, one is forced to conclude that, if human minds think about or contain ideas that are ectypal and God thinks about ideas that are archetypal, then the human mind and the infinite Mind are just as completely and utterly distinct; and since in this case God in no way acts upon finite minds directly to produce perceptions, but is rather entirely absorbed in the contemplation of archetypal ideas, and since the human mind is fundamentally passive in regard to perception, and, finally, since the mind cannot contain or comprehend its perceptions a priori, it follows that there is no such thing as perception or sensation or any human knowledge whatsoever. Both of the foregoing alternatives must be rejected in reference to the Berkeleian thesis, for the one is explicitly contrary to the basic tenets of the theory in question, while the other is manifestly absurd.

Such difficulties as the foregoing seem to be of the first order,

and spell the doom of the theory under consideration. It may be noted that the problems encountered are significantly metaphysical problems, inasmuch as they do not arise specifically in the empiricist account of knowledge, but in the attempt to indicate the origin of the ideas or perceptions out of which human knowledge is built. In the context of this paper, the difficulty may be translated into terms which indicate a concern with the problem of time. Thus, if it is asked whether an absolute time is indeed demonstrated by the fact that the succession of ideas or perceptions in the finite mind has its origin in the infinite Mind of God, and if it is asked, further, what is the nature of such an absolute and what is its relation to the time of finite experience, then one is confronted with difficulties that are, in effect, insurmountable and, in the light of Berkeley's system, unanswerable. Yet, in reference to this position as a whole, such questions, it seems, must be asked. For Berkeley's immaterialist thesis requires its peculiar metaphysical concomitant; and it can be affirmed that his approach to the latter is determined and necessitated by peculiarities inherent in the former. In this light, questions that can be brought against his metaphysic are questions that can be levied with equal efficacy against his immaterialist doctrine as a whole, with appropriate adjustments of terminology.

C

CONCLUSION

CHAPTER 4

Summary and Evaluation

I

It is evident, both generally and in consideration of what has been said in the foregoing pages, that there is a fundamental correlation, in an admittedly narrow historical context, between the theoretical account of the physical universe, and that of space and time. Indeed, the content of the preceding chapters makes it sufficiently evident that in view of the three theories discussed, the affirmed character and ontological status of material substance and of physical motion is parallel or analogous to the character and status of space and time. It may, however, be beneficial to summarize the conclusions in this regard.

(i) In reference to the Newtonian theory, it has been noted that space, time, and the physical universe are all essentially quantitative as opposed to qualitative in character. As such, both can be found significantly to partake of the same nature as does mathematical quantity. Thus, space, time, and material substance can be regarded as composed of ultimately indivisible particles, corpuscles, or "atoms"; and these particles are to be differentiated from each other not at all by inherent qualitative con-

siderations, but in some sense only quantitatively. In this light, the qualities that pertain to physical things are to be explained by the essentially quantitative configurations of the basic material particles. And physical qualities seem, therefore, to be the appearances of such quantities.

Similarly, spatial and temporal qualities depend ultimately upon, or are appearances of, essentially quantitative concerns. The corpuscularity of space, time, and matter cannot be denied within the Newtonian context. With specific regard to space and time, it is reflected a priori in his mathematical theory of fluxions by the eventual denial of the significance of infinitisimal increments, and by the consequent assumption of quantitative minima; in regard to matter, it is supposedly confirmed by experience, and experimental observation.

The physical indivisibility and the impenetrability of the atomic parts of matter, moreover, is reflected in, and by, the mathematical indivisibility of the minimal parts of space and time. Indeed, the divisibility of physical objects into fundamental parts (i.e., atoms or corpuscles) corresponds to the divisibility of space into its elemental parts (i.e., places); and the characterization of atoms as indivisible and impenetrable corresponds to the character of the elemental parts of space, or places. Thus, the theoretical account of material substance may be found, if only on this account, to parallel that of space, for the simple reason that physical objects are spatial or extended beings, and must of necessity partake of the nature of space or extension. The theoretical correspondance of extension or space and material things may, on this analytic basis, be

demonstrated.

It may, however, be demonstrated in a somewhat different way. For both space and physical things may be viewed as composite or synthetic wholes: as "unities" which are composed of indivisible and impenetrable parts. As such, the coherence of the parts must theoretically be accounted for, and, if the two are indeed analogues, it must be accounted for in parallel fashion. It has been noted that the synthetic unity of physical bodies is the result of forces which reside in the very nature of the particles conjoined; in other words, material particles are not to be characterized by extension alone, but also by certain physical and mathematically describable forces: viz., by inertia or mass, attraction, and so forth. Similarly, it is to be noted that the synthetic unity of space is the result of a sort of force. But because space itself is a mathematical, and therefore, metaphysical, being, the force in this case is purely metaphysical in its character and its status; for, insofar as space is said to be an aspect of the divine sensorium, it is at once a coherent force assignable to God, by virtue of which the divine nature may be designated a unity, and a force that resides in each part of space, by virtue of which it may belong to the synthetic metaphysical whole. The same things may be said of time and motion.

On the one hand, then, space and material substance, and time and the physical motion, may be regarded in Newtonian theory as actually divisible; and numerical unity, in this instance, is to be ascribed to the indivisible atoms, or places, or instants. But on the other side, extension, duration, motion, and material things, by themselves, may be viewed as mathematical unities; in which case, the divisibility of which they all admit

is merely potential. It follows from the merely potential divisibility of extension itself that an extended thing, insofar as it is extended, is divisible only potentially, and vice versa. And it follows from the potential divisibility of duration itself that an enduring or temporal thing, notably physical motion, qua enduring or temporal, is divisible only potentially, and vice versa. Thus, in this case, as in that in which actuality is to be ascribed to the parts obtained by analysis or division, the characters of space and time are reflected in the character of the physical universe, and for fundamentally the same reason.

The correspondence between the theoretical accounts of space and time, on the one hand, and the physical universe of material substance and physical motion, on the other, is also to be found in a pure regard for theoretical or ontological status, to the limited extent that both physical things, whether material substances or the motions of such substances, and space and time are all to be interpreted, in the Newtonian scheme, as absolutes. It has been noted that space and time are absolutes, in the sense that, as presuppositions of the very being of the physical universe, they are to be interpreted as purely mathematical, and as quite independent of any physical considerations: they would presumably exist whether or not there were any spatio-temporal objects. Material objects and physical motion also may be interpreted as absolutes, in the sense that they are presumed to exist independently of any actual apprehension, or any actual knowledge, of them, and must be presupposed in any such apprehension or knowledge.

Thus, there are, in effect, two orders of absolutes. In consideration of the Newtonian theory, the physical universe stands as the direct condition of human knowledge, while space and time, as mathematical or metaphysical

beings stand as the conditions of the physical universe. It may be said that the knowledge or the apprehension of space and time are derived from the knowledge and the apprehension of material substances and their motions, and depends, therefore, upon the physical universe as an absolute which must be presupposed as the condition of such knowledge. Furthermore, physical existence, in its turn, is determined by, and presupposes, the absolute metaphysical or mathematical orders of space and time. It would, therefore, seem to be the case that the empirical knowledge of space and time is, in theory, twice removed from space and time themselves, as metaphysical absolutes. In any case, the ontological status of the aforementioned metaphysical or purely mathematical absolutes is different from, in the sense of more ultimate than, that of the physical universe as an "epistemological" absolute. The significant similarity of their characters is derived from, or is determined by, the fact that the one stands as the effective pre-condition of the other; and to this extent confers the quantitative peculiarities of its mathematical nature upon that which is thus subsumed under it. Indeed, it may be suggested that the interpretation of space and time as absolutes inevitably involves just such an ontological differentiation.

(ii) If, as has been suggested in the preceding paragraphs, the ontological priority of space and time over the physical universe, and hence its independence of physical things, is a sufficient criterion for designating a theory an absolutist one, then it follows that the absence of such a priority of space and time over physical considerations is the

distinctive mark of a relativism. In other words, a relativist interpretation of space and time involves either the theoretical coincidence of space and time, on the one side, and physical considerations, on the other, or the theoretical dependence of the former upon the latter.[227] From what has been said in the preceding chapters, it is evident that both the Leibnizian and the Berkeleian interpretations are to be classified as relativistic on precisely this basis.

In specific regard to the Leibnizian theory, it has been noted that matter is the perceptual appearance or representation of that which is fundamentally immaterial; extension, the perceptual appearance of that which is ultimately unextended; duration or time, the perceptual appearance of that which is itself atemporal. In other words, they are physical representations of a metaphysical and purely logical reality. In particular, space and time constitute the way that things appear to be, regardless of what the things in question are. They are the forms, or the systems of the order, of physical things or the physical universe. Matter and motion, on the other hand, constitute in a very general fashion the what, or the content, of the physical universe; they are the individual things that are spatially and temporally ordered, or the things that exist in certain formal relations. Moreover, both content and form, and the possible differentiation of these, are implied in the very nature of perception, and hence in the nature of what is perceived, insofar as it is perceived. That which is perceived, or is contained in perception, is inevitably extended or enduring, or both, on this basis; content cannot be perceived independently of form. For precisely the same reason, form cannot be perceived indepen-

dently of content. Thus, the contents and the forms of perceptual experience are co-implicative, and relative, one to the other. Each is, that is to say, to be interpreted in reference to the other; and both are to be explained by reference to a common metaphysical source.

Inasmuch as space, time, and the physical universe are perceptual appearances, they may be denominated "ideal" or "phenomenal" beings, in a non-pejorative sense of those terms. They are physical phenomena that are well grounded in metaphysical or logical reality, and yet are significantly different from this reality. They are not illusions, but rather representations. Furthermore, since the nature of perception consists in the recognition, or the representation, of a plurality in what is logically singular or metaphysically simple, all of the above are quantitative or numerical (i.e., arithmetical) considerations. As such, they partake of various properties usually attributed to numerical series: viz., infinite divisibility, infinite augmentability, and abstractness-- this last, since number viewed independently of things numbered is obviously an abstraction. Thus, for example, material substance qua extended, space, and time are all infinitely divisible; no elementary material atoms, no indivisible points of space (i.e., places), and no indivisible instants can either be confirmed, and hence legitimately affirmed, as existing or actual beings. Again, space and time, as perceptual forms considered entirely apart from things perceived (i.e., the content of perception), are abstractions; and the same may be said of matter, as the content of perception in general, considered independently of formal determinations. This last, as has been noted, is the major point upon the basis of which Leibniz is found to take

exception to the Newtonian interpretation, for the proffered reason that abstractions per se cannot consistently be set forth as virtually independent realities.

(iii) In reference to Berkeley, the theoretical situation is very similar to that of Leibniz. For Berkeley, as for Leibniz, space and time are forms of sensation or of experience, as opposed to the content of sensation or experience. In other words, they constitute the way in which perceptions or ideas, qua content, are apprehended by minds or spirits, and the way in which they are ordered by such beings. For this reason, they are just as relative to the total context of experience as they are for Leibniz. The same approach may be made in regard to material substance, for what is experienced as physical substance is a formal complex of elementary perceptions. In short, the origin, and therefore, the character of space, time, and the physical universe lie in an association of primitive or simple ideas of perception. Thus, as is the case also with Leibniz, space, time, and physical objects, for Berkeley, are ideal or phenomenal, insofar as they all, by nature, involve, and are the result of a combination of ideas.

But unlike Leibniz, the simple ideas of perception are not representations of a reality which is, in some respects, different from the representation. Quite to the contrary, they are reality for Berkeley, as has been noted earlier; and physical reality itself is to be designated as "ideal". For Leibniz, perception is, in some sense, an abstraction, for (a) it involves the recognition of a phenomenal plurality in a metaphysical

unity, and (b) it involves the representation of reality. In either case, such a view implies a strictly theoretical dissociation of the representation and that which is represented. For Berkeley, on the other hand, the ideas of sense perception are not representations of anything theoretically other than themselves. And hence, space, time, and physical objects are not, in Berkeley's system, abstractions at all, but rather are manifestly concrete. Indeed, it was noted in the preceding chapter that Berkeley objected to the indulgence in confusing abstractions, such as is to be found both in the Newtonian and in the Leibnizian theories; and in this respect, Leibniz's theory is no better than Newton's, in Berkeley's opinion.

II

(i) Despite the theoretical divergencies indicated heretofore, all of the interpretations discussed in this paper appear, on reflection, to have this one point in common: viz., that space, time, and the material universe are to be regarded as being an external relation of various sorts of particles or "quasi-particles". In other words, all of the theories discussed are significantly relational in character. And, as relations, all of the aforementioned considerations of necessity involve the assumption or the presupposition of that which is related, or of relata, since a relation cannot legitimately be considered to exist without that which is related. This point holds good for Newtonian theory, as well as for the systems of Leibniz and of Berkeley, the only difference being the nature and the theoretical status of the particles conjoined. In Newtonian theory,

of course, the parts have a metaphysical status, and have a fundamentally mathematical character; for Leibniz, they are phenomenal or perceptual, and are reflections of the nature of a reality which is not phenomenal or perceptual, but is rather metaphysical in status and logical in character; and for Berkeley, they are phenomenal or perceptual (i.e., ideas), and in themselves constitute one of the aspects of reality. Yet, in any, and all, of these theories, the parts must be apprehended, whether sensuously or intellectually, for otherwise it would be meaningless and impossible to speak of them. Thus, it may be affirmed that in any, and all, of the aforementioned theories, an intellectual or sensuous "consciousness-of" must inevitably be assumed.

The virtually inescapable consequence of this point is that, inasmuch as space and time are significantly relational or synthetic in character, they are all derived and hence a posteriori, despite the fact that, in at least two of the theories mentioned, the implications of this necessary a posteriori status is either partially (Leibniz) or wholly (Newton) denied. In short, it might seem that to refer to such beings as real is, at worst, to be guilty of a covert, but nevertheless flagrant, contradiction, and, at best, and in Leibnizian terms, to subvert the procedural principle of sufficient reason.

(ii) Moreover, both space and time are, in all of these interpretations, relative beings. This relativity is obvious in reference both to the Leibnizian, and to the Berkeleian, theories. In regard to the Newtonian theory of absolutes, however, it is not quite so evident. Yet it cannot be

denied that, as an element in the divine sensorium, space and time are relative to the nature of God; in other words, the frame of reference, the adoption of which is necessary for the adequate sensuous appreciation and the perfect mathematical computation of extension, duration, and physical motion, is ultimately theological. This is not to say that space and time are not absolutes; for they are to be aligned with God, and God is Himself an absolute. In addition, space and time are are still to be regarded as absolute, insofar as they are significantly independent of physical existence. Furthermore, it should be indicated that the final reference in consideration of the Leibnizian and the Berkeleian theses is also theological. And it is this ultimate reference to the nature of God that can be noted as the source of various paradoxes in all three of these theories.

In view of the Newtonian theory, if it is admitted that the divine sensorium is an attribute or property of God, whether essential or accidental, and if space and time are taken to be constituents or aspects of the divine sensorium, and finally if, due to their divisibility, whether actual or potential, space and time consist of parts, then <u>the divine sensorium consists of parts</u>, and in consequence, as Leibniz was noted to have said, <u>the nature of God consists of parts</u>. And this conclusion has been, or can be, shown to be <u>impossible</u>. Furthermore, if the divine sensorium is an attribute or property of God, and if time is an aspect of this sensorium, then, since time by nature involves an equable flow, the nature of God likewise involves an equable flow or a flux. But this last is <u>quite impossible</u>, because, by Newton's own admission, God remains always (and everywhere) the same.

The metaphysical or theological repercussions of the Leibnizian theory are similarly paradoxical. For either God is Himself a monad, or He is not a monad. It has been noted in an earlier context that a monad is to be considered as a logical subject, which in some sense contains its predicates. Furthermore, it has been noted that time is the order appropriate to all incompatible predicates. Now, if God is a monad, and if, like all monads, He contains predicates, then He is to that extent a perceptive being. On the other side, if He is not Himself a monad, then He is not, by definition, a simple, real being. But God cannot be a monad, because to be a monad implies being perceptive, and to be perceptive implies a certain passivity; and God is not at all passive. Yet He must be a simple, real being, and thus must be a monad. As a consequence, God must, but cannot, be a monad. Much the same result is achieved by considering the relationship between God and finite or created monads. For if He is to be interpreted as a monad, then a theoretical continuity between God and finite monads is achieved; but this, at the expense of a possible contradiction (as outlined above). If, on the other hand, He is not to be so interpreted, then the possibility of conceptual inconsistency remains, but the problem is further complicated by the radical theoretical discontinuity between finite beings and the divine Being.

The difficulties with the Berkeleian thesis are, in various respects, much the same as those dealt with in regard to Leibniz, but with a somewhat different twist. The similarity will, I expect, be evident. The basic premiss of the Berkeleian theory is that the being of anything resides either in its being perceived or in its perceiving: i.e., to be is either to be perceived or to perceive. The being of God, therefore, consists either in the fact

that He is perceived, or in the notion that He perceives. But God is not, and cannot be a sensible idea, and He is not, therefore, perceived. Thus, the very being of God consists in perceiving. But God cannot perceive , insofar perception involves a degree of passivity, and God is not at all to be considered as passive. The only way out of this paradox is to say that God does not perceive in the same way as do finite and created minds, that in God understanding and will are coincident, whereas in finite minds they are theoretically separate: i.e., that the divine perception is purely active, in view of this coincidence of understanding and will, whereas the perception of finite beings involves passivity, in view of the separation of the two. If God is perceptive, then the ideas that He perceives are either ectypal or archetypal. If they are ectypal, then time and temporal considerations are appropriate in reference to God; in other words, there is, or can be, a succession of ideas in the divine mind. And if they are archetypal, then God's perceptions are of a different kind than those of finite minds, and God cannot be considered to be the direct cause of finite perceptions. In regard to the first alternative, Berkeley expressly rejects the view that there can be a succession of ideas in the mind of God. In regard to the second alternative, an activity of representation, appropriation, or of selection, must be attributed to the finite spirit, and the existence of such an activity or power Berkeley does not, and indeed cannot, admit.

The foregoing paradoxes, or contradictions, are the result, it seems, of a fundamentally relational view of space, time, and the physical universe, coupled with the fact that all of these beings have an ultimately theological reference.

(iii) If contradictions or paradoxes such as the foregoing apply on the theological level of each of the theories discussed, then one might have suspicions that in consideration of time by itself, similar paradoxes can be derived. And indeed, the suspicions can be realized in this context. On the one hand, since time is to be interpreted as a relation of Newtonian instants which are mathematical in character, Leibnizian perceptions, or Berkeleian ideas, the instants, perceptions, or ideas, respectively, cannot themselves be temporal in character, or be times. In each theory, time is the relation; and the mathematical instants, the perceptions, or the ideas, are the relata, or the things related. And a relation is obviously distinct from that which is related. Therefore, time itself is theoretically something other than, in the sense of being different in kind from, its parts. If one should object to this point by saying, in effect, that Newtonian instants, Leibnizian perceptions, or Berkeleian ideas, are themselves relational, and that, on this basis, they are themselves times, it is easy to show that the result of such an hypothesis is infinite regress; for if the relata in the first instance are themselves relations, then the relation in this latter case also involves termini or relata; and if these in turn are relations, then they in turn necessarily involve termini or relata; and so on ad infinitum. So the components of time cannot themselves be times.

On the other side, however, the parts of time must themselves be times, for otherwise they could not be parts of time as a whole. It is necessarily the case that the parts of a whole partake of the nature of the whole, and that there is a continuity of character between part and whole.

Thus, if the parts of time do not partake of the nature of time itself, then there is a fundamental discontinuity between the two, and it must be admitted either that the part is not a part of the whole, or that the whole is not what it was said to be. In both cases, the result is an explicit contradiction. And in order to escape this contradiction, it must be admitted that the parts of time are times.

The result of the entire process is a contradiction: viz., that the parts of time must, but cannot be, times. And this effectively spells the doom of all of the theories in question, insofar as they are all fundamentally relational in nature.

(iv) In view of the methodological parallels in the treatment of time, space, material substance, and physical motion-- the fact that space is dealt with as a virtually precise analogue of time, and that material substance, insofar as it is regarded as essentially extended, must be approached in the same fundamental way as is space, and finally that physical motion must be treated in the same way as is time--, it may be suggested that the problems and difficulties that result from the relational interpretation of time can also be derived in regard to the interpretations of the nature of space, of the nature of material substance qua extended, and of the nature of physical motion. Thus, the established parallelism both of the theoretical treatments, and of the inherent characters, of time, space, material substance, and physical motion, merely extends the range of the application of the conclusions found in regard to the theoretical consideration of time.

III

The results of the preceding evaluation are of paramount importance. It has been noted that all of the theories discussed are ultimately and finally relational in character, that time in all of them is a relation of parts, whether metaphysical or empirical, which are mutually external, and to this extent quantitative in character. It is, moreover, in regard to this very relational nature that the theoretical difficulties indicated can be shown to arise. If this is the case, then it must be (a) that time cannot be relational, (b) that it cannot, in any sense, be quantitative in nature, since the existence of relations depends upon a basic differentiation (and therefore, enumeration) of relata, and (c) that either it does not consist of parts or its parts are not to be interpreted as mutually external.

It may, in conclusion, be noted that the failures of these theories is historically significant and suggestive. For in some respects, the history of philosophic thought seems to reveal that its mode of inquiry consists, not primarily in doctrinal perpetuation, or in the virtually blind acceptance of specific theories, but in the fact that one philosopher tends to capitalize upon the mistakes of others: either to react against, or to correct, other theories. In other words, one might expect that the inadequacy of the theories of Newton, Leibniz, and Berkeley, would lead in due course to interpretations of time which attempt to avoid the deficiencies of the relational theories, by conforming to the points set forth in the preceding paragraph. It need only be mentioned that this reaction is to be found in the Kantian and in the Bergsonian theories.

Footnotes

1. Newton, Mathematical Principles of Natural Philosophy, p.6

2. Ibid, loc. cit.

3. Ibid, p. 13.

4. Ibid, p. 6.

5. Ibid, loc. cit.

6. Ibid, p. 8f. The stresses are mine.

7. Cf. Nagel, The Structure of Science, p. 179.

8. Newton, Mathematical Principles of Natural Philosophy, p. 11.

9. Cf. Ibid, p. 10f.: "If a vessel, hung by a long cord, is so often turned about that the cord is strongly twisted, then filled with water, and held at rest together with the water; thereupon, by the sudden action of another force, it is whirled about the contrary way, and while the cord is untwisting itself, the vessel continues for some time in this motion; the surface of the water will at first be plain, as before the vessel began to move; but after that, the vessel, by gradually communicating its motion to the water, will make it begin sensibly to revolve, and recede by little and little from the middle, and ascend to the sides of the vessel, forming itself into a concave figure ..., and the swifter the motion becomes, the higher will the water rise, till at last, performing its revolutions in the same times with the vessel, it becomes relatively at rest in it. This ascent of the water shows its endeavor to recede from the axis of motion; and the true and absolute circular motion of the water, which is here directly contrary to the relative, becomes known, and may be measured by this endeavor."

10. E.A. Burtt, The Metaphysical Foundations of Modern Physical Science, p. 254.

11. The essay in question is entitled "De Gravitatione et Aequipondio Fluidorum"; and by means of historical and internal analysis, the date of its composition has been set between the years 1664 and 1668.

12. Newton, "De Gravitatione et Aequipondio Fluidorum"; in Unpublished Scientific Papers of Isaac Newton (ed. A.R. Hall and M.B. Hall), p. 136.

13. Ibid, loc. cit.

14. It must be measured, if it is to be measured at all, in absolute way: i.e., by not referring, in the act of measuring, to anything external to itself, as the thing measured. But just how this is possible is left quite unspecified.

15. This is essentially the first reason, as indicated by G. J. Whitrow, for Newton's introduction of the notion of time as an absolute. Cf. Whitrow, The Natural Philosophy of Time, p. 34.

16. Newton, "De Gravitatione et Aequipondio Fluidorum", in Unpublished Scientific Papers of Isaac Newton, p. 133. Also, cf. "The Lawes of Motion", Ibid, p. 157. Newton argues at length about the possibility of infinite extension following the first passage indicated above; and his conclusions are as follows: "If anyone now objects that we cannot imagine that there is an infinite extension, I agree. But at the same time I contend that we can understand it. We can imagine a greater extension, and then a greater one, but we understand that there exists a greater extension than any we can imagine. And here, incidentally, the faculty of understanding is clearly distinguished from imagination." (Ibid, p. 134).

17. Newton, Mathematical Principles of Natural Philosophy, Book iii, p. 545.

18. Newton, "De Gravitatione et Aequipondio Fluidorum", in Unpublished Scientific Papers of Isaac Newton, p. 132.

19. Cf. C.B. Boyer, The History of the Calculus, p. 181.

20. Newton, Mathematical Principles of Natural Philosophy, Book iii, p. 545. (From the second edition of Newton's opus, 1713).

21. C.B. Boyer suggests that, by the time of the publication of the second edition of the Principles (1713), Newton had come to reject the notion of mathematical infinitisimals. In this regard, cf. Boyer, The History of the Calculus, pp. 213, 222, 225, 229ff., 254, 259, 287, 294, 300. In regard to the finite divisibility of time, cf. Newton, Opticks, p. 403.

22. The quantitative "sameness" of instants or moments, irregardless of alteration of place, is referred to by some commentators as involving or implying "world-wide simultaneity".

23. A.N. Whitehead, Science and the Modern World, p. 51. He goes on to say that "This fact that the material is indifferent to the division of time leads to the conclusion that the lapse of time is an accident, rather than of the essence, of the material. The material is fully itself in any sub-period however short. Thus the transition of time has nothing to do with the character of the material. The material is equally itself at an instant of time. Here an instant of time is conceived as in itself without transition, since the temporal transition is the succession of instants."

24. If mathematical considerations are interpreted, in a fundamental way, as tools-- and the suggestion exists that Newton interpreted it in this way--, then it follows that space and time in themselves, insofar as they are mathematical beings, are to be interpreted as tools.

25. Newton, Mathematical Principles of Natural Philosophy, p. 8.

26. The situation would be complicated by the fact that, unlike time which has only one "dimension", space has three "dimensions": length, breadth, and depth.

27. Newton, Mathematical Principles of Natural Philosophy, p. 8.

28. Newton does not define motion, just as he does not define time; the reason being that they are "well known to all". Moreover, the definition of either of these would involve him, as has been said, in metaphysical disputes, which are inappropriate to his subject and his dicipline, and his descriptive procedure.

29. Newton, Mathematical Principles of Natural Philosophy, p. xvii.

30. In this respect, the parallel with Aristotelian doctrine might be noted. Cf. Aristotle, Physics, 193a2ff.

31. The Newtonian position, in this regard, is similar to, but not identical with, the Aristotelian interpretation. Newton affirms, of course, that time "flows equably", and it thus involves dynamism; Aristotle states that time is the "number of motion with respect of 'before' and 'after' ..."(Physics IV, 219b1ff.). The dynamism of time is thus assured on both of these theories: by association for Aristotle, and by some sort of identity for Newton.

32. C.B. Boyer, The History of the Calculus, p. 190.

33. Cf. C.B. Boyer, The History of the Calculus, p. 191, and p. 242f.

34. Cf. Ibid, p. 295.

35. M.K. Munitz, Space, Time, and Creation, p. 146. It should, however, be noted that Munitz, in using this terminology, is not overtly referring to the Newtonian theory. Thus, the phrase is here interpretively applied to the Newtonian view of time.

36. C.B. Boyer, The History of the Calculus, p. 181.

37. E.A. Burtt, The Metaphysical Foundations of Modern Physical Science, p. 261f. Cf. M. Capek, The Philosophical Impact of Contemporary Physics, p. 162.

38. Cf. M. Capek, The Philosophical Impact of Contemporary Physics, p. 38f.

39. This distinction is made in view of the two-fold character of change: (a) qualitative change, or change of quality, and (b) motion, or change of position.

40. The theoretical fact seems to be this: that whether the being considered is moving or at rest, either qualitatively or in respect of position, it must occupy time.

41. The notion of time as not implying any concrete physical change finds a parallel in regard to space, and the impossibility of deriving the existence of material or extended bodies from it.

42. Cf. B. Russell, "Is Position in Space Absolute or Relative?" in Mind, vol. x (1901), p. 294.

43. Cf. Newton, Mathematical Principles of Natural Philosophy, p. 8.

44. Ibid, p. xvii.

45. Ibid, p. 7f.

46. As Newton says: "It may be that there is no such thing as an equable motion, whereby time may be accurately measured..." (Ibid, p. 8). And since no motion of the prescribed sort can be shown or observed, the attempt to effect such a "correction" by significantly physical means must be foregone.

47. Cf. S. Toulmin, "Newton on Absolute Space, Time, and Motion", in Philosophical Review, vol. lxviii (1959), p. 21n.

48. In principle, what has been stated in this geometrical con- applies also to the other branches of mathematics: esp. to arithmetic, to the physical sciences, insofar as they involve mathematical descriptions and computations, and to logic, insofar as it proceeds according to rules that are common to both it and mathematics.

49. For example, cf. S. Toulmin, "Newton on Absolute Space, Time, and Motion", in Philosophical Review, vol. lxviii (1959), passim.

50. Discussion of the various means of temporal measurement can be found in the following:
N. Feather, Mass, Length, and Time, chap. 3, pp. 37-55;
E. Whittaker, From Euclid to Eddington, pp. 40ff.
It is only requisite to note that for any significant measure to be found in these contexts, a natural or physical frame of reference must be adopted.

51. S. Toulmin, "Newton on Absolute Space, Time, and Motion" in Philosophical Review, vol. lxviii (1959), p. 21.

52. Ibid, p. 8.

53. Very generally, and perhaps to a certain extent misleadingly, the "school" of realism can be found to trace back to the Aristotelian doctrine, while that of idealism can be traced back to the Platonic theory.

54. If the so-called "order of knowing" is adopted as primary, then the result is most likely to be an idealism; but if, on the other hand, the "order of being" is thought to be of prime impostance, then the result is a realism.

55. Zeno is purported to have shown that the corpuscular or atomic interpretations of space and time lead to absurd consequences in regard to motion: either to overt contradiction, or to an infinite regress. This is most obviously manifest in his paradoxes of Achilles, the arrow, and the stadium.

56. The "General Scholium" appears only in, and after, the second edition of the Principles (1713).

57. Cf. Newton, Opticks, qu. 31, ad fin.

58. Cf. Ibid, loc. cit.

59. Newton, Mathematical Principles of Natural Philosophy, Book iii, p. 545.

60. Newton, Mathematical Principles of Natural Philosophy, Book iii, p. 545.

61. Ibid, p. 8.

62. Ibid, loc. cit.

63. In saying this, reference must be made to the mechanistic notion that the qualitative properties of things are the result of, and are therefore to be explained by, the essentially quantitative configurations of material particles, and therefore of (or by) spatial position.

64. Cf. Newton, Opticks, qu. 31 , ad fin; p. 404. The method of composition consists in the deduction of consequences from laws or generalizations, and also involves the unification of phenomena. For a general outline of the method, cf. Newton, Mathematical Principles of Natural Philosophy, Book iii, pp. 398ff., and H. Reichenbach, The Rise of the Scientific Philosophy, chap. 14.

65. Newton quite explicitly states that he does not base his scientific inquiries upon speculative hypotheses: "hypotheses non fingo" (Cf. Mathematical Principles, pp. 398ff.; and F. Copleston, A History of Philosophy, vol. v, p. 151.).

66. Cf. Newton, Mathematical Principles of Natural Philosophy, Book iii, p. 545: "God is the same God always and everywhere. He is omnipresent not virtually only, but also substantially; for virtue cannot exist without substance. In him are all things contained and moved; yet neither affects the other: God suffers nothing from the motion of bodies; bodies find no resistance from the omnipresence of God."

67. Cf. Aristotle, Physics, 193a2ff.

68. Cf. Leibniz, Monadology, #32 (Loemker ed., vol. ii, p. 1049). This is to be said despite the fact that some writers make it three: (a) the principle of sufficient reason, (b) the principle of contradiction, and (c) the principle of pre-established harmony. I think here of J.T. Merz.

69. Cf. Ibid, #31 (Loemker, ii, p.1049). As Leibniz says: "First truths are those which predicate something of itself..." (First Truths, Loemker, i, p. 411).

70. Cf. Leibniz-Clarke Correspondance, L3:2 (Loemker, ii, p.1101)
L2:1 (Loemker, ii, p.1099)

Cf. also First Truths (Loemker, i, p.413).

71. Leibniz, Leibniz-Clarke Correspondance, L3:5&6 (Loemker, ii, p. 1108f.).

72. Cf. Leibniz, First Truths (Loemker, i, p.413)
Correspondance with Arnauld (Loemker, i, p.515)
Leibniz -Clarke Correspondance, L5:23 (Loemker, ii, p.1139).

73. Leibniz, Leibniz-Clarke Correspondance, L4:6 (Loemker, ii, p. 1117).

74. Leibniz, New Essays, chap. xxvii, #3 (Leibniz Selections, p.442).

75. Cf. Leibniz, Leibniz-Clarke Correspondance, L4:11 (Loemker, ii, p.1118).

76. Cf. Leibniz, Leibniz-Clarke Correspondance, L3:3 (Loemker, ii, p.1108), L5:42 (Loemker, ii, p.1144), L5:51 (Loemker, ii, p.1149).

77. Leibniz, Leibniz-Clarke Correspondance, L4:13 (Loemker, ii, p.1119.

78. Cf. Leibniz, Leibniz-Clarke Correspondance, L4:1ff (Loemker, ii, p.1117); L4:18 (Loemker, ii, p.1119f): "For any external reason to discern between them can only be grounded on some internal one. Otherwise we should discern what is indiscernible, or choose without discerning."

79. Cf. Leibniz, Leibniz-Clarke Correspondance, L5:130 (Loemker, ii, p.1169).

80. Cf. Leibniz, Leibniz-Clarke Correspondance, L4:5 (Loemker, ii, p.1117), L5:26 (Loemker, ii, p.1140);
Principles of Nature and Grace, #7 (Loemker, ii, p.1038).

81. Cf. Leibniz, Letter to Herman Conring (Loemker, i, p.286).

82. It may be said to have no direct bearing; it nevertheless has indirect bearing, since if a contingent proposition is not internally consistent, it will be false.

83. They are a priori in the sense that they are not dependent for validation upon facts of experience. They are, then, true independently of experience.

84. These are a posteriori, in the sense that they are dependent upon, or derived from, the facts given in experience, and are to be determined as true or false by reference to these facts.

85. Cf. Leibniz, Dissertation on the Art of Combinations (Loemker, i, p.119f.).

86. B. Russell, A Critical Exposition of the Philosophy of Leibniz, p. 167.

87. Cf. Leibniz, New Essays, bk.iv, ch.11, #14; also cf. G. Martin, Leibniz--Logic and Metaphysics, passim; R.L. Saw, Leibniz, chap. 8, pp.203-229; R. Latta,

88. Cf. Parkinson, Logic and Reality in Leibniz's Metaphysics, p. 11, and p.17n5.

89. Cf. Leibniz, Discourse on Metaphysics, #8 (Loemker, i, p.471f).

90. Cf. Parkinson, Logic and Reality in Leibniz's Metaphysics, The Aristotelian, or extensional, view of logic is to be found in Categories 2a11f. Leibniz, however, did not entirely forego the extensional interpretation (cf. Loemker, "Introduction" to Leibniz's Philosophical Papers and Letters, vol. i, p.123).

91. Cf. Aristotle, Categories, 5.

92. Leibniz, Dissertation on the Art of Combinations, III, 1 (Loemker, i, p.122). Cf. Leibniz, Metaphysical Foundations of Mathematics (Loemker, ii, p.1084).

93. Cf. Leibniz, First Truths (Loemker, i, p.416).

94. Cf. Parkinson, Logic and Reality in Leibniz's Metaphysics, p.3 & p.55.
B. Russell, A Critical Exposition of the Philosophy of Leibniz, p. 42.
F. Copleston, A History of Philosophy, vol. iv, p. 228.

95. Cf. Aristotle, Metaphysics, I.

96. Cf. Leibniz, Principles of Nature and of Grace, #1 (Loemker, ii, p.1033); Monodology, ##1-3 (Loemker, ii, p.1044).

97 Cf. Leibniz, Principles of Nature and of Grace, ##1-2 (Loemker, ii, p.1033f.); Monodology, #3 (Loemker, ii, p.1044); The Nature and the Communication of Substances (Loemker, ii, pp. 741ff.).

98. Cf. Leibniz, Principles of Nature and of Grace, #1 (Loemker, ii, p.1033f). Also cf. Monadology, #10ff. (Loemker, ii, p.1045); The Nature and the Communication of Substances, #11 (Loemker, ii, p.745).

99. Cf. B. Russell, A Critical Exposition of the Philosophy of Leibniz, p. 91;
Parkinson, Logic and Reality in Leibniz's Metaphysics, p. 170-177.

100. Leibniz, On Substance as Active Force (Vis Viva) Vs. Mere Extension (Leibniz Selections, p. 158).

101. Cf. Leibniz, First Truths (Loemker, i, p.414);
Letter to Arnauld (Loemker, ii, p.599).

102. Cf. R.L. Saw, Leibniz, p. 43.

103. Cf. Leibniz, Reflexions on Bayle's Critical Dictionary (1702), (Loemker, ii, p.942).

104. Ibid, loc. cit. There is reference here both to the relation of the "parts" in monads, and to the relationship of monads to each other.

105. Ibid, (Loemker, ii, p.943). Also cf. Leibniz, Monadology, #22 (Loemker, ii, p.1047); Parkinson, Logic and Reality in Leibniz's Metaphysics, p. 178ff.

106. Cf. Leibniz, Monadology, #14 (Loemker, ii, p.1045): "The passing state which enfolds and represents a multitude in unity or in the simple substance is merely what is called perception. This must be distinguished from apperception or from consciousness... It is in this that the Cartesians made a great mistake, for they disregarded perceptions that are not perceived. It is this, too, which led them to believe that only spirits are monads and that there sre no souls in beasts or other entelechies...".

107. Cf. Leibniz, Monadology, #14 (Loemker, ii, p.1045).

108. Leibniz, Dissertation on the Art of Combinations, III, #5 (Loemker, i, p.123). Also, cf. Metaphysical Foundations of Mathematics (Loemker, ii, p.1084).

109. Cf. Leibniz, Dissertation on the Art of Combinations, III, #8 (Loemker, i, p.124).

110. Leibniz, Theory of Abstract Motion: Fundamental Principles, #7 (Loemker, i, p.218).

111. Cf. Leibniz, Letter to De Volder (Loemker, ii, p.837): "This is the axiom that I use-- no transition is made through a leap. I hold that this follows from the law of order and rests upon the same reason by which everyone knows that motion does not occur in a leap; that is, that a body can move from one place to another only through intervening positions."

112. Cf. Leibniz, Principles of Nature and of Grace, #2 (Loemker, ii, p.1034); Letter to Arnauld (Loemker, ii, p.599); Monadology, ##14-17 (Loemker, ii, p.1045f): "This is the only thing-- namely perceptions and their changes-- that can be found in simple substance. It is in this alone that the internal actions of simple substances can consist." (Monodology, #17).

113. Cf. H.W. Carr., Leibniz, p. 154.

114. Cf. B. Russell, A Critical Exposition of the Philosophy of Leibniz, p. 107.

115. Cf. Leibniz, Specimen Dynamicum, (Loemker, ii, p.729).

116. Cf. B. Russell, A Critical Exposition of the Philosophy of Leibniz, p. 107.

117. For example, cf. Leibniz, Specimen Dynamicum (Loemker, ii, p.728).

118. Leibniz, Theory of Abstract Motion: Fundamental Principles, #3 (Loemker, i, p.217).

119. Cf. Leibniz, Dissertation on the Art of Combinations, III, ##1 & 5 (Loemker, i, pp. 122 & 123). Indeed, to say this involves the confusion of two distinct logical categories or ontological realms.

120. Leibniz, Metaphysical Foundations of Mathematics (Loemker, ii, p.1083).

121. Ibid, loc. cit.

122. Cf. C.B. Boyer, The History of the Calculus, p. 219 & p. 297.

123. Cf. Leibniz, Letter to De Volder (1699), (Loemker, ii, p.837).

124. R.L. Saw, Leibniz, p. 112.

125. This passage is cited in the text of the following: F. Copleston, A History of Philosophy, vol.iv, p.280; and the footnote reference is to the Gerhardt edition of Leibniz's works, vol. 7, p.199f.

126. Cf. Leibniz, Of Nature Itself, passim (Loemker, ii, pp. 809-825); First Truths (Loemker, i, p.413f).

127. Cf. Leibniz, What Is Independent of Sense and Matter (Loemker, ii, p.896f).

128. Cf. Leibniz, Reply to the Thoughts on the System of Pre-Established Harmony (Loemker, ii, p.952); What Is Independent of Sense and Matter (Loemker, ii, p.892).

129. Cf. Leibniz, Monodology, #51 (Loemker, ii, p.1052): "...in simple substances there is only an ideal influence of one monad upon another. This can have its effect only by the intervention of God, insofar as one monad may with reason demand, in the ideas of God, that God should have a concern for it in regulating the rest from the beginning of things. For since a created monad can have no physical influence on the interior of another, it is only in this way that one can be dependent on the other."

130. Cf. Leibniz, The Nature and the Communication of Substances, ##15-17 (Loemker, ii, p.748f). On the general question of harmony, cf. Leibniz, Principles of Nature and of Grace, passim (Loemker, ii, pp.1033-1043).

131. Cf. Leibniz, The Nature and the Communication of Substances, #11 (Loemker, ii, p.745).

132. In this context, I am thinking, for example, of (Plato), Aristotle, and St. Thomas Aquinas.

133. Leibniz, Monodology, #19 (Loemker, ii, p.1047).

134. I would refer the reader (a) to Plato: the myth of the Charioteer, located in the Pheadrus 246, and the various analogies and figures to be found in Republic VI; (b) to Aristotle: De Anima, II and III, and especially II, 4; and (c) to St. Thomas Aquinas: Summa Theologica, qu. 78.

135. In the context of the Leibnizian theory, this can be noted to be the key to the entire question of ultimate causality; in this regard, cf. Leibniz, Monadology, ##49-52 (Loemker, ii, p.1052f).

136. Leibniz, Monodology, #22 (Loemker, ii, p.1047). Cf. Theodicy, #360.

137. The reader might be cautioned, however, to take note of the fact that passivity and activity (for example) are variations

on the same theme: they are opposite ways of looking at the same thing or fact. And hence they are set on a continuum with one another, and constitute the opposite poles of this continuum. In other words, they are fundamentally continuous in nature. That is to say, beings that are considered to be passive in nature are those to which a very small degree of activity can be assigned. Activity, just as motion etc., is a relative term.

138. Leibniz, Monadology, #26 (Loemker, ii, p. 1048).

139. To paraphrase Leibniz's own example: a dog, being aware that the stick with which it has been beaten in the past is borne against it once again, will whine and run away, even though, on the later occasion of its being borne against it, the dog has not been adversely affected thereby. Cf. Monodology, #26 (Loemker, ii, p. 1048).

140. Cf. Leibniz, Monodology, #28 (Loemker, ii, p. 1048): "Men act like beasts insofar as the consequences of their perceptions are based only on the principle of memory, like empirical physicians who have a simple practice without theory. We are all mere empirics in three-fourths of our actions. For example, when we expect daylight tomorrow, we act as empiricists, because this has always happened up to the present. Only an astronomer concludes it by reason."

141. The opposition indicated in this context is fundamentally that of quality and quantity respectively. It has already been mentioned that perception may be defined as the recognition of a multiplicity in a unity. Hence, the latter element of this opposition involves the quantitative considerations from which the suggestions thus made may be derived.

142. Cf. above, pp. 43-50.

143. Leibniz, Monodology, #32 (Loemker, ii, p. 1049).

144. This is the ground upon which the cosmological argument for the existence of God is based.

145. Cf. Saw, p. 72.

146. Leibniz, Monodology, #37 (Loemker, ii, p. 1050).

147. Leibniz, Monodology, #37-38 (Loemker, ii, p. 1050).

148. Cf. Leibniz, Principles of Nature and of Grace, #8 (Loemker, ii, p. 1038).

149. Cf. Leibniz, Monodology, ##37f. (loemker, ii, p.1050); Principles of Nature and of Grace, #8 (Loemker, ii, p.1038f); Parkinson, p.86ff; Russell, p.175 (288).

150. Cf. Leibniz, Monodology, #45 (Loemker, ii, p.1051); Russell, p.172 (286); Parkinson, pp. 77-85; Saw, p.75f.

151. At this point in the text, I avoid any extensive exposition of the divine nature. And it need only be said here that God may be interpreted as the supreme monad (cf. Parkinson, p.138), and this position receives confirmation in Leibnizian papers (cf. Loemker, ii, p.1072). On the other side, Russell states that what we have in those contexts in which Leibniz speaks of God as a monad are mere theoretical slips, and that it was never Leibniz's intention to make God a monad. (cf. Russell, p.187). The debate in this regard is hersby acknowledged, and is regarded, for our purposes, as inconclusive. Such attempts to interpret the nature of God, however, do not affect the characterization of God as an absolutely necessary being; and it is by virtue of this necessity that the argument in the text progresses.

152. Cf. Russell, p.146; Parkinson, p.78. In these contexts, it is suggested that the definition of 'eternity' is 'necessary existence'. The situation is very similar to that of Plato, and the doctrine of forms (Cf. Parmenides, 128e et seq.).

153. Cf. Berkeley, De Motu, #16 (Armstrong ed. p.255), #23 (A, p. 257), #67 (A, p.270f).

154. Cf. Berkeley, Towards a New Theory of Vision, #2 (A, p.285; Luce-Jessop ed., i, p.171).

155. Cf. Ibid, #9 (A, p. 286; L-J, i, p.172f).

156. Cf. Ibid, #10 (A, p.287; L-J, i, p.173).

157. Cf. Ibid, #11 (A, p.287; L-J, i, p.173), #18 (A, p.288; L-J, i, p.174).

158. Cf. Berkeley, De Motu, #53 (A, p.266).

159. Ibid, loc. cit.

160. The syllogism against the notion of absolute time as a sensible being might run as follows:

1. Duration by itself is intangible.
2. Some things are to be perceived by the mediation of others.
3. Nothing which is not itself perceived can be the means of perceiving another.

Therefore, duration is perceived by means of some other idea.

161. Cf. Berkeley, De Motu, #43 (A, p.263).

162. Ibid, #21 (A, p.256).

163. Berkeley admits that mathematical and mechanical abstractions are useful for purposes of computation and of abbreviated expression, but he persists in the belief that they are inherently incapable of explaining the real thing (i.e., motion). Cf. De Motu, #7f (A, p.252), #22 (A, p.256f), #28 (A, p.258), #39 (A, p.262), #41f (A, p.262f).

164. Cf. Berkeley, Principles of Human Knowledge, #1 (A, p.61; L-J, ii, p.41; Turbayne ed., p.23): "It is evident to anyone who takes a survey of the objects of human knowledge that they are either ideas actually imprinted on the senses, or else such as are perceived by attending to the passions and operations of the mind, or lastly, ideas formed by the help of memory and imagination-- either compounding, dividing, or barely representing those originals perceived in the aforesaid ways." In regard to the second of these, cf. A.A. Luce, Berkeley's Immaterialism, p. 39f.

165. Cf. Locke, Essay on the Human Understanding, II, i, #1-3.

166. In this regard, compare Locke, Essay on the Human Understanding, II, viii, ##8ff, and Berkeley, Principles of Human Knowledge, ##4-5, 9, 10 (A, pp. 62, 64f; L-J, ii, pp.42f, 44f; T, pp. 24f., 27f).

167. Berkeley, Principles of Human Knowledge, #9 (A, p.64; L-J, ii, 44; T, 27).

168. Cf. Berkeley, Three Dialogues (Turbayne ed. p.13).

169. Berkeley, Principles of Human Knowledge, #7 (A, p.63; L-J, ii, p.43f.; T, p.26).

170. Ibid, #8 (A, p.64; L-J, ii, p.44; T, p.26f).

171. Ibid, #25 (A, p.70; L-J, ii, p.51; T, p.35).

172. Ibid, loc. cit.

173. An example of such an abstract general idea, and one which is basic to the entire Berkeleian approach, is considered to be the so-called "idea of matter". It has been noted that it is his antipathy to such an idea that is the ground for Berkeley's immaterialist position.

174. Cf. Berkeley, Principles of Human Knowledge, "Introduction" #15 (A, p.53; L-J, ii, p.33f; T, p.14f).

175. Berkeley, Principles of Human Knowledge, #10 (A, p.65; L-J, ii, p.45; T, p.28).

176. Ibid, #1 (A, p.61; L-J, ii, p.41; T, p.23).

177. Cf. Ibid, #24 (A, p.70; L-J, ii, p.51; T, 34f): "It is on this ...that I insist, to wit, that 'the absolute existence of unthinking things' are words without meaning, or which include a contradiction."

178. Ibid, #2 (A, p.61f; L-J, ii, p.42; T, p.24).

179. Ibid, loc. cit.

180. Cf. Ibid, #29 (A, p.72; L-J, ii, p.53; T, p.36f).

181. It must be noted that there are instances in which the human mind wills certain ideas or perceptions; yet its creativity is severely limited in this respect, insofar as it must exercise this activity upon data provided by sensation. Moreover, relatively speaking, it is not often the case.

182. A.A. Luce, Berkeley's Immaterialism, p. 48.

183. Ibid, p. 49.

184. For one thing, Luce seems here to take no account of the passive nature of human perception, or of the fact that ideas or perceptions are received by the mind, or again of the fact that the human mind has no control over either the fact of perception (i.e. whether or not it will perceive) or what, when perceiving, it perceives (i.e., the content of the perception). It is true enough, however, that once sense-data are perceived, the mind operates upon them, and thus is active. But in order to operate, the mind must have something to operate upon.

185. This latter point provides the distinction between Berkeley's philosophy and that to be found in Leibniz's Monodology.

186. Cf. Berkeley, Principles of Human Knowledge, #57 (A, p.83f; L-J, ii, p.65; T, p.49f), ##90 (A, p.98; L-J, ii, p.80; T, p.67) in conjunction with #1 (A, p.61; L-J, ii, p. 41; T, p.23). Cf. also Three Dialogues (T, p.59).

187. Berkeley, Three Dialogues (T, p.56).

188. Ibid, (T, p.55).

189. Ibid, (T, p.59).

190. A.N. Whitehead, Science and the Modern World, p. 66.

191. Cf. Berkeley, Principles of Human Knowledge, #30 (A, p.72; L-J, ii, p.53f; T, p.37).

192. Ibid, #25 (A, p.71; L-J, ii, p.51f; T, p.35).

193. Ibid, #142 (A, p.121; L-J, ii, p.106; T, p.96).

194. Cf. Berkeley, Three Dialogues (T, p.78); also Principles of Human Knowledge #142 (A, p.121; L-J, ii, p.106; T, p.96), and #135 (A, p.118f).

195. Cf. Berkeley, Three Dialogues (A, p.194f).

196. Cf. Berkeley, Principles of Human Knowledge, #140 (A, p.120); Three Dialogues (A, p.193f).

197. To affirm that one is capable of knowing oneself by way of having a perception of some subjective state is to represent oneself as an objective stable (or inert) being, and not to know oneself as what is essentially and active agent or subject. In attempting to represent oneself in this way, one may very easily be guilty of a misrepresentation.

198. Cf. Berkeley, Philosophical Commentaries, #643 & #663 (A, p. 368), #478a (A, p.367); Principles of Human Knowledge, #25 (A, p.71; L-J, ii, p.51f; T, p.35); Three Dialogues (A, p.193f).

199. Cf. Berkeley, Principles of Human Knowledge, #89 (A, p.97f; L-J, ii, p.79ff; T, p.66f). Compare with Kant, Critique of Pure Reason: "Preface" to the second edition.

200. Berkeley, Principles of Human Knowledge, #98 (A, p.101; L-J, ii, p.83; T, p.70).

201. Cf. Ibid, #26 (A, p.71; L-J, ii, p.52; T, p.35).

202. Cf. Newton, Mathematical Principles of Natural Philosophy, p. 6.

203. Berkeley, Principles of Human Knowledge, #97 (A, p.101; L-J, ii, p.83; T, p.70).

204. Cf. G.D. Hicks, Berkeley, p.172ff. Of the supposed difficulties raised by Hicks, the first is most easily disposed of, since he seems completely to ignore certain specific statements by Berkeley himself: e.g. cf. Berkeley, Philosophical Commentaries, #643, #663, #478a(A, p. 367f); Principles of Human Knowledge, #25 (A, p.71; L-J, ii, p.51f; T, p.35);

Three Dialogues (A, p.193f). All of these exemplary passages, if rightly scrutinized, preclude the very possibility of an "idea of succession".

205. This statement is a direct consequence of Berkeley's affirmation, cited earlier in the text of this paper, to the effect that "time is nothing apart from the succession of ideas..." (Principles of Human Knowledge, #98). To say that time is a presupposition of the succession of ideas is to imply that it would be capable, in theory, of an existence independent of the succession, in the Newtonian sense.

206. It is not a definition in the Aristotelian sense of definition by genus and difference, since this involves the doctrine of essences, or of abstract general ideas. It is rather a definition in the sense of a logical equivalence. If definition must, by nature, be regarded as by genus and difference, then to say that time is a succession of ideas is not a definition at all, but rather a descriptive equivalence. I prefer, however, and I think it can be said that Berkeley prefers, to regard "definition by logical equivalence" a legitimate sort of definition.

207. Cf. Leibniz, Metaphysical Foundations of Mathematics (Loemker, ii, p.1083): "Time is the order of all non-contemporaneous things...". This abbreviated statement may well be translated: "Time is the order of all possible successions".

208. Cf. Berkeley, De Motu, #17 (A, p.255; L-J, iv, p.15).

209. Cf. Hicks, Berkeley, p.172ff.

210. Cf. the text of this paper, p.4f.

211. Cf. Berkeley, Principles of Human Knowledge, #58f (A, p.84f; L-J, ii, p.65f; T, p.50f), #35f (A, p.74f; L-J, ii, p.55f; T, p.39f).

212. To grant the mind an existence when it does not think is to treat it as an abstraction, and this involves a manifest contradiction; for, on Berkeley's thesis, the very nature of mind, and the very ground for its being, resides in its thinking. Thus, to consider the mind in this way is quite repugnant to Berkeley's philosophical position. In this regard, cf. the manuscript extension to the Principles of Human Knowledge, #98: "Sure I am that should anyone tell me that there is a time wherein a spirit actually exists without perceiving, or an idea without being perceived, or that there is a third sort of being which exists though it neither wills nor perceives nor is perceived, his words would have no other effect on my mind than if he talked in

an unknown language. It is indeed an easy matter for a man to say, 'the mind exists without thinking', but to conceive a meaning that may correspond to those sounds, or to frame a notion of a spirit's existence abstracted from thinking, this seems to me impossible...". (T, p.70f, n).
This thesis, it might be added, finds an echo within the context of the Leibnizian doctrine of monads.

213. Cf. M. Knoll, "Transformations of Science in our Age", in J. Campbell, ed., Man and Time (Eranos Yearbook).

214. Cf. Berkeley, Siris, #253 (L-J, v, p.120).

215. It inevitably assumes that the world is an "abstract concept", in Berkeleian terms, or, which is the same thing, that it is a Newtonian absolute. This is the point of significant disagreement between Berkeley and Locke; for Locke is in this respect a Newtonian: that he believed that there is a world of primary qualities which exists absolutely and quite independently of the human mind, and which is the immediate efficient cause of human knowledge. In saying that the so-called "external world" is a world in which only primary qualities exist, Locke's advocation of the Newtonian view is further in evidence; for the primary qualities in the Lockean theory are as significantly quantitative as are the Newtonian absolutes. Cf. Locke, Essay on the Human Understanding, II, viii, #8ff.

216. God is presumably a being which is not at all passive, and not therefore at all affected by sense perceptions. He is, in other words, non-perceptive. Cf. Three Dialogues (A, p.193).

217. Berkeley, Principles of Human Knowledge, #97 (A, p.101; L-J, ii, p.83; T, p.70).

218. Thus, we may contest the statement by G.J. Whitrow, that the empiricists generally, in considering time to be the succession of ideas in the mind, "failed to make clear how this is related to the time used in physics"; and we may contest also his statement, in specific regard to Berkeley, that "he paid no attention to the problems of the uniformity and the universality of time..." (Whitrow, The Natural Philosophy of Time, p.49). Cf. A.A. Luce, Berkeley's Immaterialism, p.139. Berkeley seems merely to have separated considerations of private (or psychological) and public time; cf. Bergson, Introduction to Metaphysics, passim, and Time and Free Will, passim; and cf. P. Lecomte du Nouy, Biological Time, pp. 125-177.

219. Berkeley, Three Dialogues (T, p.31).

Since time is the succession of ideas, properly speaking, it is just as private as are the ideas which enter into its composition. For this reason, it is not absurd, on Berkeley's thesis, to affirm the possibility that ideas should succeed each other twice as fast in one mind than in another. The possibility, in this regard, remains unaffected by the fact that there is no way for such a comparison to be known. In any case, there is no strictly objective standard of temporal succession, no regulator that dictates the uniform rate at which ideas may succeed each other. In other words, there is no basis for saying that the rate of succession must be the same for one mind as for another.

The passage cited in the text would terminate in absurdity if succession, or time, were something objective and absolute: i.e., if there were an absolutely uniform idea of succession; it would be just as inconsistent as is the notion of an idea of succession that it presupposes, or as is the doctrine of absolutes

The passage cited thus is presented in the Three Dialogues as a rejoinder by Philonous to the absolutist stand of his opponent, Hylas. On the basis of the absolutist thesis to maintain an affirmative response to the question posed results in absurdity or inconsistence. The result is not the same in regard to having Berkeley's thesis as the basis for an affirmative response.

220. Once again, we must refer to the distinction between notions and ideas. The latter element in the dichotomy within the text of this paper involves ideas, which, like others of its kind, enter into, but neither do nor can represent, a succession. The succession is different in kind from the ideas which enter into it: it is dynamic, incomplete because continuing, and therefore notional. Cf. Berkeley, Principles of Human Knowledge, #25ff (A, p.71f; L-J, ii, 51f; T, p.35f). This is fundamentally the reason for Berkeley's rejection of an idea of succession.

221. G.A. Johnston, The Development of Berkeley's Philosophy, p.242.

222. If it can be said that the succession of ideas is an essentially private time, and is subjective or psychological, then it must equally be affirmed that the measure of such time is likewise subjective and psychological in character; for Berkeley suggests that the succession of ideas is the measure of time (Cf. Berkeley, Three Dialogues (T, p.31)). And the measure of time, in this regard, is therefore for the most part, quite independent of the social or scientific "time"

qua temporal position, by reference to which minds can be coordinated. True time-- if we may use the term "true"-- is inescapably private and subjective (i.e., psychological); public and scientific "time" is not, it would seem, rightly to be called "time" at all.

223. A.A. Luce, Berkeley's Immaterialism, p.152.

224. Berkeley, Siris , #295 (L-J, v, p.137).

225. Berkeley, Philosophical Correspondance with Johnson, (A, p. 247; L-J, ii, p.293).

226. Cf. Berkeley, Three Dialogues (T, p. 57f).

227. By the terms "coincidence" and "dependence" in this context I mean the following: (a) by "coincidence" I mean that space and time are treated as on an equal theoretical footing, or as of equal theoretical weight, the one being no more important in the theory than the other; (b) by "dependence" I mean that the one is less significant, or of less theoretical importance, than the other.

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