A RELATIONAL METAPHYSIC

STUDIES IN PHILOSOPHY AND RELIGION

volume 4

1. FREUND, ELSE-RAHEL. *Franz Rosenzweig's Philosophy of Existence: An Analysis of* The Star of Redemption. 1979. ISBN 90 247 2091 5.
2. OLSON, ALAN M. *Transcendence and Hermeneutics: An Interpretation of the Philosophy of Karl Jaspers.* 1979. ISBN 90 247 2092 3.
3. VERDU, ALFONSO. *The Philosophy of Buddhism: A "Totalistic" Synthesis.* 1980. ISBN 90 247 2224 1.

A RELATIONAL METAPHYSIC

by

HAROLD H. OLIVER
Boston University

1981

MARTINUS NIJHOFF PUBLISHERS
THE HAGUE/BOSTON/LONDON

Distributors:

for the United States and Canada

Kluwer Boston, Inc.
190 Old Derby Street
Hingham, MA 02043
USA

for all other countries

Kluwer Academic Publishers Group
Distribution Center
P.O. Box 322
3300 AH Dordrecht
The Netherlands

This volume is listed in the Library of Congress Cataloging in Publication Data

ISBN-13: 978-94-009-8252-9 e-ISBN-13: 978-94-009-8250-5
DOI: 10.1007/978-94-009-8250-5

To Martha
and our Daphne Ann

CONTENTS

PREFACE

C.S. Peirce's indictment that "the chief cause of [metaphysics'] backward condition is that its leading professors have been theologians" (*Collected Papers* 6:3) falls heavily at my door. For it was out of reflection upon religious experience and its meaning that the present relational metaphysic was conceived. My hope, however, is that its scope is sufficiently wider than its theological origins to justify its appearance as a work in philosophy. Having been nurtured in existential philosophy and having reached some measure of maturity with the wise counsel of Professor Dr. Fritz Buri, of Basel, I came to feel that theology as a modern discipline had reached an impasse owing to its overextended commitments to a subject–object paradigm of thought. Even those theologians who despaired of these ties seemed unable to find an independent alternative idiom for their ideas.

A second tension in my thinking resulted from the inordinate neglect by theologians of the natural world. Also, my natural interest in physical understanding seemed unfulfilled within the narrow confines of theology, even of philosophical theology as then practiced. As I turned decisively toward the study of modern physics, and especially of cosmology, a new world seemed to open up to me. After extensive study with prominent astronomers and physicists, it began to dawn on me that the new physics has devised conceptual paradigms of thought which could be generalized into a metaphysical system of universal interest.

One man in particular played the principal role in suggesting to me the fruitfulness of a relational model of reality. This person was Dr. Michael Ovenden, Professor of Geophysics and Astronomy at The University of British Columbia, who, like myself, was a Visiting Fellow at The Institute of Theoretical Astronomy (now The Institute of Astronomy) in Cambridge, England, in 1971. In

view of my deep intellectual indebtedness to Professor Ovenden, it is appropriate that a statement of his, lifted from a taped conversation, should introduce Part I. He has kindly consented to this use of his statement. Professor Ovenden has read most of the earlier draft and graciously advised me at various points. It is only fair to say that his version of relational thought finally differs from my own. Nevertheless, I should like to make as a matter of public record my gratitude to him for his material assistance over the years. For all my debt to him, I must absolve Ovenden of responsibility for any technical errors or poor theoretical constructs which may remain.

My debts to others are numerous. I am able to mention only a few persons whose encouragement and support have made the writing of this essay possible. Particularly, I would thank Professor Sir Fred Hoyle, then Director of The Institute of Theoretical Astronomy, for the confidence shown in me as evident in my appointment as Visiting Fellow for the year 1971–72. The camaraderie and intellectual stimulation of the Cambridge astronomers made the year a highlight of my life. It was through their persistence that I became a Fellow of the Royal Astronomical Society (London). In the early stages of my thinking which led to this essay, I received valuable assistance from the former Cambridge astronomer, The Reverend Dr. David Peat (now at York), and his former graduate student, Dr. Michael Edmunds (now at Cardiff).

To my students at Boston University I remain grateful. The first two chapters were written for a seminar entitled "What Is a Thing?" held in the Fall Semester of 1973; the students who attended those sessions provided such initial support and encouragement, as well as criticism, that I am honored to list their names: Bruce E. Camber, N. Dana Daniels, Clyde C. Holler III, Dwight Hutchison, Russell Kleinbach, William C. Trench, and Lawrence G.B. Willson. I must also mention with gratitude the assistance of Christopher Keller, who accompanied me in a deeper study of Feuerbach.

My graduate students have shown unusual interest in this project, and have been of immeasurable assistance in so many ways: among them (now Professor) Lawrence G.B. Willson, who followed my developing interest in the sciences and very incisively criticized earlier drafts of this essay from the vantage point of

his former commitment to the thought of Charles Hartshorne; also, Bruce E. Camber, Karl Squier, David Odell-Scott, Matthew Ritter, Alan Previto, and the Reverand Ronald L. Carter, Dean of Student Life at Boston University. In addition, James M. Bank, Stephen A. Metz, Bruce Chapman, and Sara Marble Cashion performed unselfish service in bringing this project to its termination. It was Sara who called my attention to the extremely pertinent lines from E.E. Cummings which introduce Part II.

I cannot begin fully to recount the valuable assistance and encouragement of colleagues in theology and philosophy at Boston University, in the Boston Theological Institute, and elsewhere. I remember with special delight the extremely fruitful dialogues which I have had in recent years with Professors Alan M. Olson and Leroy S. Rouner. A former student, Dr. Richard A. Hughes, now Professor of Religion and Philosophy at Lycoming College, has been a constant supporter and critic. In Chapter V, I indicate in a small way something of the depth of his vision of things. A milestone in my commitment to this project was reached when an early draft of Chapter IV was relatively well received by my esteemed colleagues in the Boston Theological Society.

When I as a theologian proposed to study cosmology on my last sabbatical, a person whose sponsorship and encouragement helped to turn this plan into reality was the then Dean of the School of Theology, Dr. Walter G. Muelder. I remain deeply in his debt. There has been no more loyal a friend at Boston University during our stay here than Dr. J. Robert Nelson, who was Dean when this project was begun. To these, and to the present Dean, Dr. Richard D. Nesmith, I register my gratitude.

Two sources of material support turned my sabbatical plans into reality. The Trustees of Boston University showed unusual faith in my venture by granting permission and subsistence for the year of study in Cambridge. The proposed program could not have been carried out without the additional and most generous support of The Danforth Foundation, which granted me a Post-Doctoral Fellowship for Cross-Disciplinary Study for that same year. I hope this essay in some small way redeems the faith they manifested in me.

For personal interest in my work, and for taking the initiative to secure funds from the Graduate School of Boston University to

underwrite the typing of an early draft, I wish to thank Dr. Warren F. Ilchman, then Dean of the Graduate School.

The final stages of the preparation of this text might have been disastrous had it not been for the expert editorial and typing assistance of Mrs. Esther Glover.

During the production stage of this volume, I have had the distinct privilege of serving as Chavanne Visiting Professor of Religious Studies at the Rice University in Houston, Texas, an honor for which I am deeply grateful to the Board of Governors of Rice, and to Dr. Niels C. Nielsen, Chairman of the Department of Religious Studies.

Finally, a personal word. The period during which some of this essay was written was a very anxious one, for my wife, Martha, and I were awaiting the birth of our only child. On September 9, 1974, our daughter, Daphne Ann, was born. The parental experience has deepened my confidence in the relational interpretation of all experience. I have learned through this experience that "relatedness" is primarily not an abstract notion, but a living reality.

WINCHESTER, MASSACHUSETTS
and
HOUSTON, TEXAS

INTRODUCTION

After an era dominated by the philosophy of language, metaphysics has begun to recover something of its lost respectability. This gradual reversal is grounded partly in the realization that no philosophical assertion, not even the denial of the validity of metaphysics, is a-metaphysical. Every position with respect to the actuality of any state of affairs betrays a metaphysical commitment, however hidden it may seem. The reason for this lies in the nature of metaphysics.

Metaphysics is the study of reality. Its method is the generalization of experience for the purpose of identifying fundamental entities, i.e. entities which are not further reducible. Intrinsic to its task is the critical evaluation of things claimed fundamental by previous or current metaphysical systems. The principal question to be given metaphysical priority is: "What is real?" If instead, priority is given to epistemological questions, such as "What can I know?" it becomes virtually impossible to make progress toward the systematic, constructive tasks of metaphysics. The primary reason for this fact is that epistemological questions begin by bifurcating reality into knower–known in such a way that idealism becomes the inevitable conclusion. The Kantian question takes Cartesian doubt one step further, and it is a fatal step for metaphysics. The only way out of this impasse is to redirect attention to the reality question in a way that does not predetermine subsequent inquiry.

The question "What is real?" requires translation into an operational form. Following the lead established by Martin Heidegger, I have chosen to operationalize the intention of this metaphysical effort with the question "What is a thing?"[1] No other heuristic question has the functional generality of this one, as Heidegger has himself demonstrated. When it is decided how a given meta-

physical system answers this question, it is apparent that one is at the heart of its claims. In addition to its important critical usefulness, the question functions well in the effort to probe experience anew for its fundamentals.

It has been fashionable, at least since Leibniz, to justify the metaphysical enterprise by appealing to a question to which no other discipline can frame a legitimate answer, namely "Why is there something rather than nothing at all?" The danger of this question is that its appeal will be due to its mystical elusiveness; its weakness lies in the fact that it is virtually impossible to operationalize. When this question has been made fundamental nevertheless, subsequent discussion has necessarily focused on the "limits" of all established methods of inquiry, save metaphysics. The metaphysicians who have chosen this approach have been led, almost of necessity, to illumine reality solely through the category of "Transcendence," i.e. that which "transcends" the limits that have been exposed. Having followed this course myself some years earlier, I realize the power this idiom has over the mind. All too often, unfortunately, the term "transcendent" has meant primarily "the transexperiential," so that one is left wondering about the sources of this insight.

Without wishing to fault those who prefer this route of metaphysical inquiry, I intend to locate the metaphysical quest totally within experience. My own thinking has been increasingly influenced by Whitehead and Peirce, for whom experience is the primary source for philosophical reflection. Both made great strides toward the ultimate generalization of experience, which is the goal of metaphysics. If Whitehead has attracted more attention for his metaphysical insights, it is at least partly because Peirce's are difficult to retrieve from his unsystematic legacy.

A central concern of this essay is that metaphysics reached an impasse of its own making long before Logical Positivism and Language Philosophy usurped its position of eminence. The impasse was a conceptually induced inability to get beyond the polar options of classical metaphysics, namely, idealism and realism. There was a kind of Indeterminacy Principle at work, in that the more successfully the reality of the mental subject was established, the less real became its world, and vice versa. Almost every domain of human life was affected, usually adversely, by this polar paradigm.

The crisis provoked a new thrust toward a total reconceptualization of the task of metaphysics. The most frequently heard phrase was that of "the overcoming of the subject–object scheme." Husserl and Heidegger became the patron saints of this new movement, both because of their open attack on objectifying science and their novel phenomenological probings of human experience. Husserl, however, was finally lured back into the womb of the "subject"· Heidegger, into the mystical domain of "the thinking which Being does." My disaffection with both options led me to take a closer look at the new directions in physics which seemed unrecognized by these seminal minds. There I discovered that, although there was "objectifying science," science in itself could not be so characterized. In Chapters I and II, which comprise Part I, I attempt to sketch the conceptual developments within physics which redeem its own legacy.

The title of Part I, "A New Paradigm in Physics and Metaphysics," features the term "paradigm" which has been much discussed by philosophers of science ever since Thomas Kuhn employed it in a novel way in his work, *The Structure of Scientific Revolutions.*[2] By the term "paradigm" Kuhn means the set of commitments accepted at any given time by the scientific community as the basis for the practice of science.[3] Research conducted within the framework of such a set of commitments he terms "normal science."[4] The principal threats to a prevailing paradigm are to be located in the unforeseen "anomalies" in experimentation, i.e. in discoveries, or "novelties of fact," which do not fit existing theories, and hence lead to new theories.[5]

While this aspect of Kuhn's theory provoked substantial criticism initially,[6] more recently his further claim that scientific "revolutions" are always occasioned by some crisis of normal science has been seriously challenged. I refer especially to Owen Gingerich's research which undermines Kuhn's claim, stated both in the work mentioned and his monograph, *The Copernican Revolution*,[7] that in Copernicus' day there was a crisis created by the radical disparity between the Ptolemaic system and astronomical phenomena as then observed.[8] According to Gingerich, there is no evidence to substantiate the claim that such a crisis existed.

Since it is Kuhn's thesis about paradigms that is most germane to my own essay, I shall refrain from further discussion of other

problems in his work and proceed directly to indicate the meaning which I assign to the term. Although influenced by the prominence Kuhn gave to the term, I have nevertheless generalized it somewhat. By "paradigm" I mean a prevailing conceptual framework which determines in large measure both the ways in which physical and metaphysical problems are conceived and the specific forms of the systematic treatment of these problems so conceived. More specifically: my thesis in Part I is that the Newtonian way of conceiving Nature so deeply penetrated the mainstream of philosophy as well as physics that, despite the rise of modern physics, much philosophical thinking remains under its conceptual influence. I proceed then to argue that the rise of modern physics represented a "paradigm shift" of enormous import to metaphysics. Attention is given primarily to two metaphysical systems which have been most deeply affected by the new physics, namely, those of Whitehead and Ervin Laszlo. It should become apparent that it is not the novelty of these physical and metaphysical theories which I find attractive, but the relational insight into reality which they have in common.

In Part II, "Foundations of a Relational Metaphysic," I attempt to lay the groundwork for a further generalizing of experience by utilizing these insights to formulate a metaphysic fully purged of the subject–object orientation of Newtonian–Kantian thought. Chapter III develops and defends the thesis of universal internality as the fundamental axiom of relational metaphysics. In Chapter IV, after outlining the contributions of Feuerbach, Buber, and Zaidi to the evolution of a relational ontology, I formally set forth the tenets of a fully relational metaphysic. In the final chapter, entitled "Fundamentals and Pseudo-Fundamentals," the attempt is made to illustrate the nature and extent of the empirical basis of this metaphysic and, as well, the conditions for the genesis of pseudo-fundamentals, such as subjects and objects.

To the extent that the thesis which I advance is compelling, it should have bearings upon almost every human concern, whether scientific, socio-political or religious. It is my hope in the near future to extend my exploration of these implications.

PART ONE

A NEW PARADIGM IN PHYSICS AND METAPHYSICS

> There is this complementary [between the 'conceiver' and the 'conceived'], so that the reality we seek lies neither in us nor in the world, but in the *relationships* between us and the world. It is the structure of relationships that is the transcendent thing.
>
> – Michael Ovenden

INTRODUCTION TO PART ONE

> "Since Nature will remain unknown so long as motion remains unknown, diligent examination of it is the more encumbent upon philosophers." Henry Oldenburg to Hieronymo Lobo, 27 May 1669. Quoted from the frontispiece to R.S. Westfall, *Force in Newton's Physics* (New York: American Elsevier, 1971).

The fundamental problem of natural philosophy has always been that of motion. The centuries-old attempt to understand it has been a major factor in shaping the course of Western intellectual history. The history of the attempted solutions reflects the expansion of the human intellect to ever-widening horizons.

The interrelationship of astronomy and the problem of motion has been most evident in the effort to explain the motion of the planets, while progress in planetary astronomy has served as a foundation for many other human achievements. Contrary-to-fact conditionals are always questionable, but there is some worth in Sir Fred Hoyle's remark that "if the Earth had been wholly cloud-bound as the planet Venus is, man's intellectual emergence would scarcely have been possible."[1]

In a deeper sense, man has for centuries felt that the heavens displayed above him hold the key to his Whence and Whither. Philosophy in the West began as astronomy, and the connection has since always seemed fundamental. Feuerbach must have had this in mind when he wrote: "It is the heavens that admonish man of his destination, and remind him that he is destined not merely to action, but also to contemplation."[2] There is also a religio-historical dimension to the starry heavens; for whereas in the Age of Classical Philosophy (corresponding to its sense of ἁρμονία) the planets – conceived as perfect orbs moving in

perfect circles were "divine Beings" worthy of adoration, in Late Antiquity the loss of nerve with its deep sense of guilt and fear was mirrored in the astral religions and gnostic cosmologies wherein the celestial bodies were regarded as forces hostile to mankind.[3] *Die Entzauberung der Welt* – the disenchantment of the world – which freed man from bondage to cosmic elements was the consequence of at least two distinctly Western phenomena. As for the first, it is commonly said that the *conditio sine qua non* for the emergence of Western science was the Hebraic doctrine of Creation with its ontological difference between Creator and Creation, and there is good reason to regard this as one of these phenomena. The other phenomenon was the framing of laws of motion which, though in part forged in a mythico-speculative setting, proved to be self-sufficient in isolation from it. Kepler is a case in point.

The ancient world conceived of the visible components of the heavens as twofold: the "fixed stars," so called because they did not (seem to) change their relative positions, and the wandering stars, or planets (πλάνητες ἀστέρες). The notion that there were certain "fixed" stars was not experimentally invalidated until modern times, when instrumentation was developed which allowed the delicate measurements necessary to "prove" that the stars do in fact move in respect to each other. Many astronomers have devoted considerable attention to the task of measuring the proper motions and radial velocities of stars. The designation "fixed stars," though incorrect, did serve to distinguish these stellar objects from others which roamed the heavens in periodic motion but which are now known to be nonstellar spheres of the solar system. The attempt to frame a geometrical, physical model to account for these visual phenomena resulted in what Galileo called the two "great world systems": the Ptolemaic which dominated Western thought until the modern era, and the Copernican which in a modified form is the currently accepted physical model of the solar system. Both systems accounted equally well for positional astronomy, or kinematics; that of Copernicus did so much more economically (it needed fewer epicycles), however, and unlike the Ptolemaic, set the stage for a universal dynamics.

It was the advent of modern dynamics that signaled the birth of "Classical Physics." Aristotelian mechanics was earth-bound;

it took the combined genius of Galileo, Kepler and Newton – to name only some of the principals – to draft a universal dynamics, and its first complete statement was Newton's *Principia*, published in 1687. In point of fact, the modern concept of "dynamics" was the creation of Leibniz, who coined the word (French: dynamique).[4]

Historically speaking, the impact of Newton's *Principia* on the intellectual climate of the West, both physically and philosophically, was virtually without parallel until the work of Einstein. For the *Principia* was regarded, according to Gerd Buchdahl, as

> a vast synthesis in which all the then-known celestial and terrestrial motions were shown to be derivable from three primary laws of motion together with the law of gravitation, according to which there was a mutual attraction between any two bodies in the universe, of a magnitude that could be expressed by a precise mathematical formula. It was the vastness of this conception, at the same time simple and all-embracing, that caught the imagination of Newton's and later generations'![5]

The *Principia* was the fruit of centuries of groping, and represented the apex of a conceptual struggle of the first magnitude, a "breakthrough" in one of the most sustained efforts of the human spirit.

Newton's acclaim was immediate; his impact upon eighteenth- and nineteenth-century thought, unparalleled. The *Principia* became the prelude and impetus to the Age of Reason, for Newton was thought to have demonstrated in a matchless way the power of the mind to comprehend the nature of the world. In point of fact, however, the *Principia* was not merely a prelude; it set the agenda for two centuries of physics and philosophy, and if I am right in what follows, it occasioned the conceptual paradigm which dominated physics until the twentieth century, and still dominates much of modern theology and philosophy. In order to demonstrate the nature of that paradigm and its philosophical and theological consequences, I shall review in detail the work of three principal figures: Newton; his contemporary, Leibniz; and the eighteenth-century philosopher, Kant.

CHAPTER I

THE SUBJECT–OBJECT PARADIGM AND ITS DEBT TO CLASSICAL PHYSICS

A. NEWTON VERSUS LEIBNIZ: PHYSICS AND PHILOSOPHY IN THE SEVENTEENTH CENTURY

Newton's mechanics was not just a physical idea; it was an all-embracing philosophy of the natural world. Westfall has reminded us that "Newton's dynamics was interwoven with his natural philosophy to the extent that the one cannot be understood in isolation from the other."[6] The framework for his mechanics was a theory of *particulate* matter located in Absolute Space and Time. Historically, the acceptance of his laws of motion and the inverse square law entailed the acceptance of these related theories. I shall attempt to show that these theories reflected an understanding of the nature of physical reality which not only formed the problematic of Kant's *Critique of Pure Reason*, but determined its structure as well; and that this subject–object structure became the prevailing conceptual matrix for epistemology and (*pace* Kant) of ontology wherever Kant's influence was felt.

One way of demonstrating this thesis would be to show that another serious option was available in Newton's day, and in Kant's. Before that can be done, however, it is necessary to discuss the essential features of Newton's mechanics.

1. Newton's "Laws"

As is well known, Newton's mechanics comprised three "Laws of Motion" and a Law of Universal Gravitation. It is proper to distinguish the laws of motion, which are "conceptual," from the law of gravitation, which is empirical. The three "Laws, or Axioms, of Motion," as they appeared in the *Principia* are:

I. 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.

II. The change of motion is proportional to the motive force impressed; and is made in the direction of the right line in which that force is impressed.

III. To every action there is always opposed an equal reaction; or, the mutual actions of two bodies upon each other are always equal, and directed to contrary parts.[7]

These three are not empirical laws, but axioms or assumptions. That is to say, they are conceptual formulations whose appeal is to reason, not experimentation. In one sense they are assumptions as to how Newton proposed to look at the world.[8] One of the most adequate statements about the "assumptive" character of these laws which I have witnessed was made by an astronomer friend, Michael Ovenden, to wit:

> These [i.e. the Laws of Motion] could in no sense be proved wrong; they are wholly tautologous, in that, if you measure a force by the rate of change of momentum, then whenever there is a change of momentum, you will automatically say that a force is acting. Of course, when you go from this to applying it to our experience, then the question you have to ask is, does that particular way of looking at things make the world look simple? If you put on Newtonian spectacles, do they make the world look simple? If so, then it is a good theory. If not, then it is not a good theory. And of course, eminently so does Newton's theory do this.[9]

It is a debatable question whether Newton viewed his three laws as I have proposed. Max Jammer, who agrees that they "are assumptions inaccessible to experimental verification," adds the caveat that "to Newton they were facts of immediate experience."[10]

However that may be, Einstein supports the distinction between the Laws of Motion and the Law of Gravitation in his simplification of Newton's mechanics to "two laws": (1) the law of motion, and (2) the expression for force, or potential energy.[11] In commenting upon the two categories, Einstein shows the relation of the two: "The law of motion is precise, although empty, as long as the expression for the force is not given."[12] It is precisely the way

Newton gave empirical content to the three assumptions by his law of universal gravitation that would lead Einstein to "go beyond" Newton.

Newton's law of universal gravitation was a triumph for quantitative mechanics. The formula $F = G \frac{mM}{r^2}$ (the force is directly proportional to the product of the masses and inversely proportional to the square of the distance) contained the elements M and m which reflect a theory of particulate reality which involves action-at-a-distance. It is probable that the inverse square law was suggested to him by Hooke, though Westfall is probably correct in saying that "Hooke had done no more than glimpse it obscurely from a distance," while "Newton had contemplated its very essence."[13] It is interesting that whereas Jammer stressed the "factual" character of the first three laws – at least as far as Newton was himself concerned, Westfall argues that "in Newton's views, the inverse square relation embodied an inherent rationality whereby it alone could support an architecture suitable to a cosmos."[14]

This theory of action-at-a-distance should be pursued further because it figures prominently in the debate between Leibniz and Clarke, the latter of whom was probably Newton's spokesman.[15] On this point, it is important to distinguish between Newton's own views and the views of those who soon took up his principles and interpreted them in their own way. Although Newton spoke of action-at-a-distance, he felt that he was clear of the charge which many readers – including Leibniz – leveled against him, of having proposed "an occult quality." After the first edition of the *Principia*, Newton gave increasing attention to this matter for, as I. Bernard Cohen has pointed out, Newton's inverse square law had "led to an attribution to Newton of ideas he abhorred. One was that since the gravitational attraction is a function of the masses of bodies irrespective of any other properties save their separation in space, this attraction arises simply from the existence of matter."[16] The evidence seems to suggest that Newton vacillated on the question of the "cause of gravity." In one letter to Bentley, he argued that "the cause of gravity is what I do not pretend to know," while in another he wrote that "it is inconceivable that inanimate [sic] brute matter should without the

mediation of something else, which is not material, operate upon and affect other matter without material contact."[17] Newton's public, not having access to these letters, had to depend on his published ideas; this must have seemed puzzling, since he wrote one way about them in the *Opticks* and another in the second edition of the *Principia* – both largely in response to Leibniz. In his General Scholium to Book III of the second edition of the *Principia.* Newton argued that "the cause of gravity" was not properly a mechanical question; for since it cannot be deduced from the phenomena, it is "to be called an hypothesis; and hypotheses, whether metaphysical or physical, whether of occult qualities or mechanical have no place in experimental philosophy."[18] Cohen alerts us to the fact that "the cautious wording prevented the reader from gaining any insight into Newton's actual beliefs on this subject, which can only be surmised from a letter to Boyle – not known to the general reader – and one 'hint,' but 'no more' in the last paragraph of the General Scholium."[19] In the *Opticks*, Newton was more revealing. In the second (i.e. Latin) edition of the *Opticks*, published in 1708, he advanced the notion of an 'all-pervading aether," adding that "the variations in density of the aether are the cause of gravitation."[20] Having spoken thus in 1708, Newton begged off the question in the second edition of the *Principia* in 1713, coining the now famous phrase: *Hypotheses non fingo.*[21] However much Newton detested the "sympathies and antipathies of Renaissance Naturalism," his idea of attraction owed much to it; in fact, as Westfall says, "Newton attached it unmistakably to the mechanist conception of matter when he made it universal."[22]

2. Absolute Time and Space

While the extent to which Newton wished to keep physics separate from religion is still disputed, it is becoming increasingly apparent that religious and metaphysical assumptions played a major role in his concept of space.[23] One historian who stresses this point is Max Jammer, who wrote: "Intimately acquainted with the problems of religion and metaphysics, Newton managed to keep them in a separate compartment of his mind, but for one exception, namely, his theory of space. Space thus occupies a unique place in his teachings."[24]

There is Newton's own testimony to support the thesis that it was the problem of space which led him to the study and formulation of a theory of dynamics. In the *Principia*, he wrote that it is because "the parts of space cannot be seen that in their stead we use sensible measures of them." The key to the exploration of space lay for him in motion, and in particular, accelerated motion.[25] Much has been written about the general features of Newton's theory of Absolute Space and Time. One thing is certain: he adopted it deliberately over against ideas of relativity which were also available to him. In his masterful reconstruction of the evolution of Newton's ideas, Westfall has argued that absolute motion in absolute space was an early idea of Newton's which became superfluous later on, though he did not give it up:

> With the revision of the third version of *De motu,* his dynamics became what dynamics has remained ever since, the science of the causes, not of motions, but of changes of motion. To this science, even as it is presented in the *Principia*, the concept of absolute motion is utterly without consequence.
>
> Why then did Newton assert it? Possibly germane to the question is the increasing stridency of his assertions, which grew, both in vehemence and in length, in exact proportion as the development of his dynamics rendered the concept operationally meaningless. In the first version of *De motu*, the inherent force of a body provided a criterion to identify absolute motion, which was referred to only by implication. Step by step, as he modified the concept of inherent force toward reconciliation with the principle of inertia, he introduced the idea of absolute motion and explained it in ever increasing detail, though not with additional criteria. To understand Newton's motives we need to return to *De gravitatione* where absolute space expressed his revulsion from the absolute insecurity of a world in which no guidelines and reference points were present. "The eternal silence of these infinite spaces fills me with fear." Pascal's *cri de coeur* found its echo in Newton's refusal to set sail in the shoreless sea of relativity. By vehemence alone, when all else failed, he would refuse the manifest conclusion to which his own dynamics led him. His assertion of absolute motion has all the appearance of an act of defiance hurled in the face of the very current of thought on which his dynamics itself was borne inexorably toward its ultimate form.[26]

It is difficult to assess this bit of "psychologizing," especially in the light of the more generally accepted view expressed, e.g. by Max Jammer, that the three laws of motion in their final form are not independent of the concept of absolute space. For Jammer, the mechanics in the *Principia* is "one great vindication of his

theory of absolute space and absolute motion." He continues: "To demonstrate the existence of true motion and absolute space – such is the program of the *Principia.* All Newton's achievements and discoveries in the realm of physics are in his view subordinate to the philosophical concept of absolute space."[27] It is only natural then that Jammer would claim that "absolute space . . . is a necessary prerequisite for the validity of the first law of motion."[28] The difference between Westfall and Jammer is perhaps understandable if it is borne in mind that the latter is expressing Newton's own perception of the matter, while the former is evidently evaluating the issue from a modern dynamical perspective.

Of interest is the more general question: How did Newton conceive of the large-scale structure of space, and of the matter in it? Initially it can be said that he held to a vast "coordinate system" (of relative space) which mirrors in a measurable way absolute space which is not otherwise accessible to the senses. Influenced by the ideas of Gassendi and Henry More, Newton developed an elaborate theory of the universe "as a vast expanse of empty space seasoned with the subtlest suggestion of solid matter."[29] Newton held to a *particulate* view of matter, of which the most telling statement is to be found in Query 31 of the *Opticks*:

> It seems probable to me, that God in the Beginning form'd matter in solid, massy, hard, impenetrable, moveable, Particles, of such Sizes and Figures, and with such other properties, and in such Proportion to Space, as most conduced to the End for which he form'd them; and that these primitive Particles being Solids, are incomparably harder then any porous Bodies compounded of them; even so very hard, as never to wear or break in pieces; no ordinary Power being able to divide what He himself made one in the first creation.[30]

A careful reading of the whole of Query 31 should convince one that Newton's *particulate* theory of matter, his laws of motion and gravity, and his concept of Absolute space were in his mind coordinately compelled by the close inspection of "the phenomena." Newton needed an absolute reference frame for absolute motion. Of the few experiments which are to be found in the *Principia*, the famous "rotating pail" phenomenon convinced him that such an absolute reference frame was demanded by the behavior of the liquid, for through it "the true and absolute

circular motion of the water, which is here directly contrary to the relative, becomes known."[31]

As an indication of the extent to which Newton misjudged the role of matter in the question, I call attention to the tacit assumption of the "rotating pail" experiment, namely, that "the surface of the water in the pail would be as curved, even if it were rotating in empty space, as when rotating in a space filled with starry matter."[32] The idea of empty space was congenial to Newton, as opposed, say, to Leibniz, who rejected the notion of the void. In any case, Newton thought that the total matter in the universe was so minimal that it could virtually be ignored in dynamical questions.

The chief opponents of the notion of Absolute Space (and Time) were Leibniz and George Berkeley, the latter of whom used the "rotating pail" experiment to criticize Newton. Jammer tells us that Berkeley, in his work *De motu*, argued that "the real motion of the pail is far from being circular, if the diurnal rotation of the earth and its annual revolution are taken into account."[33] In a way which adumbrates what later came to be called "Mach's Principle." Berkeley appealed to the system of the fixed stars as a necessary reference frame for the intelligibility of motion. It should be added that Jammer, who gives attention to the significance of Berkeley's ideas, does not see his argument as the equivalent of Mach's Principle, citing as evidence the fact that Berkeley confined himself "to the problem of the perception and comprehensibility of motion, and ignores in this context the dynamical aspect of motion."[34]

At the beginning of the eighteenth century, before the second edition of the *Principia*, the religious dimensions of the problem of space increasingly dominated Newton's thought. Jammer, in fact, regards the General Scholium of the second edition as a direct outgrowth of Newton's theological and spiritual interests. It was in the General Scholium that Newton first identified space and time as attributes of God; in the *Opticks* he spoke of space as God's "boundless uniform Sensorium,"[35] a claim that provoked the Leibniz–Clarke debate. Since Newton had been constantly under attack for what some called the "atheism" of his mechanical theories, he felt obliged to make public the religious and theological background of his ideas. It was these theological ideas

which aroused his Continental opponent, Leibniz. In order to develop this aspect of the problem, and to show that the theological dimension was in fact relevant to the physical issue, I must turn to a consideration of Leibniz and his dynamics.

3. Gottfried Wilhelm Leibniz

Since Leibniz's dynamical ideas are not as well known as Newton's, it will be necessary to present them in greater detail and in the broad context of his metaphysical ideas. It is commonly known that Leibniz shares with Newton the credit for the discovery of calculus; but it is widely thought that Leibniz's dynamics was a physical cul-de-sac, lacking in any lasting significance. For, after all, he held rather strange notions (e.g. that there could not be a vacuum) and for dubious metaphysical reasons. Furthermore, by the end of the eighteenth century it seemed certain that Newton's dynamical ideas had proved their superiority beyond question.

Leibniz's dynamical theory, like Newton's, was integrally bound up with his ideas of space and matter. He held to a relational view of space, in which "space is nothing but a system of relations, devoid of metaphysical or ontological existence."[36] Jammer traces the origins of the relational view of space to the eleventh-century Muslim philosopher, *Al-Ghazāli*, and further suspects that Leibniz learned of this idea via the summary of the *Kalām* by Maimonides, whom, according to Jammer, Leibniz must have read.[37] If one can trust the extensive survey of the ideas of space in early Christian thought presented by Torrance, it may be more economical to locate the sources of Leibniz's relational view within the early Christian tradition.[38] Whatever its origin, it may safely be assumed that Leibniz derived his ideas of space and matter *logically* by the application of his two chief principles, viz. the Principle of the Identity of Indiscernibles and the Principle of Sufficient Reason. It is these which play so large a part in the debate with Clarke.

The interaction of physics and metaphysics in Leibniz's speculative system is too often unnoticed, especially by modern readers who think of the two subjects as quite separate affairs. In what follows, I shall attempt to show the correctness of Ian Hacking's

statement that "Physics is not only an anti-Cartesian device [for Leibniz]; it positively molds Leibniz's philosophy."[39] This insight must be tempered by Loemker's caveat that Leibniz shifted from this early logical studies more directly to the topic of dynamics around 1690 when he read Newton's *Principia* in Italy.[40]

Any proper representation of Leibniz's thought must begin with his *monadology* – a doctrine presented in a work by that title in 1714 – according to which the primary "reals" are monads, i.e. simple substances which exist in relation to each other, but without influence upon each other. Each monad is a mirror of the entire universe; or better, in the words of Lewis Beck, each monad "is a standpoint from which the entire universe can be surveyed." It is a microcosm, he adds, in which "are found the signatures of all things."[41] The relations between them have only ideal, rather than real, existence.

Space is relational, rather than absolute: it is simply the totality of extensive relations among monads. As such, space has only ideal existence. In the words of Beck, "Space is the logical mapping of the representational relations among substances."[42] Matter, like space, has no real existence, but is a mere phenomenon. The background of these categories, real and ideal, or phenomenal, lies in his *Monadology*, where Leibniz proposes two distinct realms: (1) "the physical realm of nature"; and (2) the realm of spirit, "the moral world within the natural world." The link between the two realms is the pre-established harmony by which "the course of the universe as determined by natural laws – the universe regarded as a machine – is kept in exact agreement with the course of events in the realm of grace."[43] This dual aspect of the real versus the phenomenal is to be investigated in two ways: *a priori* and *a posteriori,* or as we may say: metaphysically and physically. Beck develops these ideas appropriately:

> As a phenomenal realm, everything in it is to be explained according to efficient causes. These causes are discovered in experience, though they may be included under mathematical and physical laws which make it possible for us to deduce the phenomenon from the simple laws about the behavior of bodies, including only the variables of size, figure, position, motion, and force. As a noumenal realm, however, explicable by the reasons God had in creating it, it is to be explained by appeal to the final causes of God's creation. But since each is the same world looked at in two different ways, the two explanations can never be incompatible with each other.[44]

This schema allowed Leibniz to reconcile the opposed claims of theology and science: for there was freedom in the world viewed as spirit, and natural causality in the world viewed as phenomenon. Loemker was led to claim that, for Leibniz, physics is a "phenomenal commentary on metaphysics."[45] Martin saw Leibniz as "the last universal scholar" hoping for "a synthesis of theology, metaphysics, mathematics, *and physics*."[46]

The question naturally arises: what is Leibniz's concept of matter, if the monadic substances are real, and space is only the extensive relations between them? Here one can benefit from a second look at Newton, who espoused an atomistic theory of matter as "bodily substance" characterized basically by the term "extension." According to Ivor Leclerc's excellent treatise on *The Nature of Physical Existence*,[47] extension for Newton did not mean simply "extended, or spread out"; rather "extendedness . . . is an ultimate and irreducible character." Leibniz opposed this view of extension as "primitive" and maintained conversely that extension is a feature only of a plurality of substances which are themselves only truly primitive. Thus Leibniz held to the validity of the concept of matter only in this special sense, and was then faced with the difficult question: "how the character of extension, which he and the atomists agree is a primary feature of a composite body, can be derived from constituent substances which are conceived by him as essentially non-extensive."[48] Since, for Leibniz, extension implies plurality, the constituent elements (i.e. monads) cannot be extensive. Therefore for Leibniz, "body" and "matter" (which he identified) have a "different ontological status from that of substances or monads," namely, "the status of a derivative from substance."[49] Because Newton and the other advocates of material atomism held the material atoms to be "the true substantial existents," they were compelled to conclude that "there is no difference in ontological nature between the atoms and the composite body."[50] The answer to Leibniz's question posed above is framed by Leclerc as follows:

> Leibniz's doctrine is that substances, which in themselves are non-extensive, can be in extensive relations with each other. Accordingly, if the very nature of extension is that it is a relation and not an attribute, it is clear how the character of a plurality is derivable from the nature of the constituents.[51]

Since for Leibniz extension cannot be accorded the status of actuality (that being reserved for the constituent monads), it is accorded the status of possibility. As Leibniz expressed it, "extension is only the order of possible coexistence."[52]

The *Leibniz–Clarke Correspondence* offers an unusual opportunity further to pursue Leibniz's views on space, matter, and motion. Newton held to what is often referred to as "a receptacle notion of space."[53] God arbitrarily places objects into this space; and these "objects" are particles which are dynamically identical to each other. Both of these ideas were demanded of Newton's dynamics. Leibniz recoiled from the receptacle notion and his reasoning is a blend of his two logical principles. He argued against Clarke that space is not a real entity existing separately from the matter in it, for "without the things placed in it one point of space does not absolutely differ from another point of space." Newton's claim to the contrary violates the principle of sufficient reason; for, if true, it would be "impossible there should be a reason why God, preserving the same situation of bodies among themselves, should have placed them in space after one particular manner, and not otherwise."[54] A similar argument is used to show the distinctly individual and unique character of the "reals": "In all things absolutely indifferent, there is no foundation for choice, and consequently no election or will, since choice must be founded on some reason or principle"; and since it would be "a thing indifferent to place three bodies, equal and perfectly alike, in any order whatsoever," it is never done.[55]

It should be apparent from these arguments that Leibniz of necessity differed from Newton also on the question of a void, i.e. empty space. The former is often discounted because his views on this issue led him to reject the possibility of a vacuum[56] – and that for theological reasons. But this question of a vacuum is on a deeper level for Leibniz. Empty space is by definition impossible for Leibniz, for whom space is only ideal, not real; it is like a genealogical table to which, despite its usefulness, no one would attribute reality.

Newton's perception of the dynamical situation led him to suppose that the universe was losing energy and needed an occasional assist from the Creator. In his *Opticks,* he wrote that the perturbations of the planets (i.e. "the mutual Action of the Comets and

Planets upon one another") is "apt to increase, till this system wants a Reformation."[57] In his first letter to Clarke, Leibniz criticized the notion whereby "God Almighty wants to wind up his watch from time to time, otherwise it would cease to move." His reasons are complex. On the theological level, Newton's concept fostered a view of God which required his supernatural intervention into the phenomenal world; i.e. it would require a miracle – an idea abhorrent to Leibniz. On the physical level, it contradicted his notion of the constancy of force in the universe, which led him to write: "That forces should continually decay and perish at last 'is without doubt contrary to the order of things'."[58]

Leibniz's view that space is a continuum served to link his ideas to the developments which brought about the end of the Newtonian domination of physics in the late nineteenth and early twentieth centuries. The negative side of Leibniz's ideas is more important than the positive. Negatively, he rejected Newton's idea of attraction-at-a-distance, regarding it as an "occult quality" which seemed to depend on the hermeticism of Renaissance Naturalism. In the Fourth Letter to Clarke he wrote: "'Tis a supernatural thing, that bodies should attract one another at a distance, without any intermediate means."[59] In the Fifth Letter, attraction brings us back to "the occult qualities of the schools: which some men begin to revive under the specious name of forces; but they bring us back again into the kingdom of darkness,"[60] Clarke's defense, reflecting Newton's position, rested on a distinction between the *effect* of gravity (which is the substance of Newton's inverse square law) and the *cause* (which Newton admitted had yet to be discovered).[61] Leibniz did not live to reply to Clarke, but it is clear that his answer would have continued his objection to the inverse square law, for his objection was rooted in a totally different physical vision.

On the positive side, Leibniz's alternative to Newton's theory of gravity was a simple espousal of a theory of vortices (= circulating ether) which in that form seemed destined for obscurity. In retrospect, however, it is proper to see Leibniz's ideas as the seedbed of modern field theory which as applied by Einstein in his General Theory of Relativity made the idea of attraction-at-a-distance superfluous. It is not that General Relativity disproves Newton's Law of Gravity; rather it simply defines the dynamical

situation of the planets in such a way that no place is left for the concept of attraction-at-a-distance.[62] Leibniz's most forward-looking notion was his idea (*contra* Newton) that matter is "not ontologically unimportant" – as claimed in the mechanical philosophy – but "active," i.e. "the whole of nature is full of life."[63] Probably it is not too presumptious to see in these ideas the roots of the equation of matter–energy and the curvature of space–time which came to fruition later in Einstein's General Theory of Relativity.

For all his efforts, Leibniz could not stay the momentum of Newton's dynamical ideas, and by the end of the eighteenth century it seemed to most that Leibniz had been tilting with windmills. No one has described the situation more elegantly than Alexandre Koyré:

> At the end of the century Newton's victory was complete. The Newtonian God reigned supreme in the infinite void of absolute space in which the force of universal attraction linked together the atomistically structured bodies of the immense universe and made them move around in accordance with strict mathematical laws.[64]

It must be remembered, however, that this "Newtonian" position was not necessarily faithful to Newton's own philosophy of nature. Koyré stresses the difference in his further remark: "The price for the victory was devastatingly high. Thus . . . the force of attraction which for Newton was a proof of the insufficiency of pure mechanics, a demonstration of God's presence and action in the world, ceased to play this role, and became a purely natural force, a property of matter, that enriched mechanics instead of supplanting it."[65]

A proper appraisal of Leibniz's physical ideas could not be made until the late nineteenth century, when field theories first emerged within physics itself. In commenting on the significance of field theory, Einstein wrote that "this is really the first insight which supports turning away from the theory of distant forces, a development which really begins later on under the external pressure of experimental data."[66] He follows this general remark with a plea and a judgment: "Newton, forgive me; you found the only way which, in your age, was just about possible for a man of highest thought – and creative power."[67] In his Preface to

Jammer's book on space, Einstein directly linked his own work to that of Leibniz:

> Newton's decision was, in the contemporary state of science, the only possible one, and particularly the only fruitful one. But the subsequent development of the problems, proceeding in a roundabout way which no one then could possibly foresee, has shown that the resistance of Leibniz and Huygens, intuitively well founded but supported by inadequate arguments, was actually justified.[68]

Einstein was not alone in stressing the vindication of Leibniz in modern physics. Westfall, who has explored the issues dividing Newton and Leibniz perhaps more thoroughly than any other historian of the seventeenth century, states that although the immediate appeal of Newton's mechanics was inevitable in the seventeenth century, it was a necessary step toward the realization of the depths of Leibniz's view on physics: "Historically speaking, Newtonian dynamics, based on Newton's concept of force, had to be incorporated into mechanics and thoroughly digested before Leibnizian dynamics with its different ideas of force, rebaptised later as kinetic energy, would be utilised to the full."[69]

Newton's immediate success in the eighteenth century was to have momentous consequences for both science and philosophy. I shall explore only one aspect of this influence, namely, on the philosophical work of Immanuel Kant whose debt to Newton needs to be more fully explicated.

B. KANT'S CRITICAL PHILOSOPHY AND ITS ROOTS IN PHYSICS

The interpretation of Kant has been one of the most difficult problems in modern philosophy. What often begins as an effort to understand reason and experience through Kant's help, ironically becomes for many a quest simply to understand Kant. The clarity he promised to the great questions of knowledge was soon lost in the dark labyrinths of his complex and most difficult ideas. It is not as though Kant has not been "understood," for many modern scholars claim to know his meaning. The problem is that these scholars do not always agree even on the most rudimentary elements of Kant's thought. As with all major thinkers of the past, one's own interpretation will be a blend of one's own reading

of Kant and available scholarly options. The interpretation which follows is such a mixture.

I begin with Karl Popper, whose bold statements about Kant's dependence on Newton prompted me to consider afresh the degree to which Newton's physics may have determined not only the *problem* but the *structure* of the *Critique of Pure Reason* as well. I hope to show in what follows that although Popper may be correct in principle, the Kantian problem is more subtle than his presentation betrays.

In a discussion of Kant's *Critique* in 1952, Popper maintained that for Kant, Newton's theory was simply true; that Kant believed that Newton had achieved "*scientia* or *epistēmē*"; that his uncritical acceptance of Newton's physics was the "dogmatic slumber" referred to in the *Prolegomena*; that Hume, whose denial of the possibility of certain knowledge of universal laws, or *epistēmē*, had awakened him.[70] On this interpretation it could be said that it was Hume who turned Kant's acceptance of Newton's natural science into the query that underlies the first *Critique*, viz. "How is pure natural science possible?" Thus, the term "natural science" meant for Kant simply "Newton's theory," although Popper admits that it would have been impossible for a reader of the first and second editions of the *Critique* (1781 and 1787) to know this fact. Popper is even aware that some will disagree and so goes on to cite the (scanty) direct evidence for this claim: namely, the acceptance of Newton's mechanics in Kant's *Metaphysical Foundations of Natural Science* (1786) and the reference to the "starry heavens" in the *Critique of Practical Reason* (1788) which Kant amplified by a reference to "the *a priori* character of the new astronomy."[71]

Two years later, in 1954, Popper expanded his ideas in an essay entitled, "Kant's *Critique* and Cosmology," in which he stated now more generally that "it was the cosmological problem . . . which led Kant to his theory of knowledge."[72] By cosmology Popper means the problem of the "antinomies of pure reason," which is certainly the fundamental problem leading to the *Critique of Pure Reason.* In this later article Popper identifies the "second major question" of the *Critique* as " the problem of the validity of Newtonian theory in whose absolute and unquestionable truth he [Kant] believed."[73]

Popper is so sure that the *Critique* is based on a Newtonian cosmology that he dares to propose that the problem of the *Critique* dissolves with the realization that Newtonian science is not demonstrably true.[74] To illustrate this I quote from the earlier of Popper's articles:

> As we now know, or believe we know, Newton's theory is no more than a marvellous *conjecture*, an astonishingly good approximation; unique indeed, but not as divine truth, only as a unique invention of a human genius; not *epistēmē*, but belonging to the realm of *doxa*. With this Kant's problem, "How is pure natural science possible," collapses, and the most disturbing of his perplexities disappears.[75]

In 1958, Popper again addressed himself to the problem of Kant in a talk "On the Status of Science and Metaphysics,"[76] in which his theme is that a philosopher is to be judged on his ability "to see a *riddle*, a *problem* or a *paradox*, not previously seen by anyone else."[77] Kant, he argues, is "the first philosopher clearly to apprehend the riddle of natural science," by which – according to Popper – he "almost invariably [sic] had Isaac Newton's celestial mechanics in mind," for "like almost all of his contemporaries who were knowledgeable in the field, Kant believed in the *truth* of Newton's celestial mechanics."[78] The problematic of the *Critique* is then stated by Popper in a somewhat different way: it is that Kant could not admit that Newton was correct in thinking that "the truth of his theory" could "be logically derived from the truth of certain observation-statements," i.e. *by induction*.[79] Kant – in Popper's judgment – was "the greatest discoverer of the riddle of experience," but was "in error on one important point." That point? Believing that Newton's theory was true! But Kant can be excused for this, for well into the twentieth century the same error was still being made, e.g. by Henri Poincaré – "the greatest mathematician, physicist, and philosopher of his generation."[80] Popper adds: "It was an unavoidable error – unavoidable, that is, before Einstein."[81] Newton's theory did not become problematic until Einstein; before him, it had become what Popper calls a "dangerous dogma."

Popper proceeds to an alternative theory of theory – a meta-theory informed by Einstein's rather than Newton's physics. And it is a meta-theory which – thanks to Kant – Einstein personally endorses. Since this question is not our concern here, I shall focus

on the validity of Popper's general claim that Kant held Newton's mechanics to be absolutely true and that it was such a presupposition which underlies the first *Critique.*

I shall for the moment "bracket" the question of the truth of Newton's mechanics for Kant, and look at some preliminary considerations. Those who have studied the main periods of Kant's life point out that the decade prior to the first *Critique* is the least well known of any in Kant's career. This fact not only encourages conjecture about the origin of the *Critique*, it virtually requires it.[82] One is of necessity left to discover the development by study of the documents of the 1770s.

I agree with Popper that the problematic out of which the first *Critique* arose was that of the "antinomies," but am convinced that Kant encountered them not in Newton, but in the Leibniz–Clarke (Newton) debate. In addition to the evidence of the *Critique* itself, there is Kant's own direct testimony in a letter to C. Garve in 1798.

> My starting point was not an investigation into the existence of God, but the antinomy of pure reason: "The world has a beginning: it has no beginning, etc. . . ." It was these [antinomies] which first stirred me from my dogmatic slumber and drove me to the critique of reason . . . in order to resolve the scandal of the apparent contradiction of reason with itself.[83]

The equation of the term "dogmatic slumber" here with the historic passage in the *Prolegomena* in which he refers to Hume strongly suggests that the antinomies were central in Kant's mind when he began to write the first *Critique.*

The advantage of this interpretation is that it appropriately brings Leibniz into the picture, whereas Popper's discussion leaves him out entirely. In fact, the lack of subtlety in Popper's treatment of Kant is directly related to his failure to deal with Leibniz. In this regard it is significant that Gottfried Martin began his epoch-making work, *Kant's Metaphysics and Theory of Science*, with a discussion of "The Philosophy of Leibniz," justifying this with the valuable insight that Kant's philosophy "takes the form of a continuous discussion with Leibniz,"[84] The first part of the *Critique* which deals with space and time under the heading "The Transcendental Aesthetic" is – as Martin says – "certainly a discussion with Leibniz and Newton, as has often been shown."[85]

The serious question becomes for us: to what extent is the *Critique* Leibnizian or anti-Leibnizian, for it is certainly true that Leibniz and Newton were at odds over certain fundamentals. One who had read only Popper's discussion of Kant or the statement of Martin to the effect that "Kant . . . maintains in all probability going far beyond what can be proved, that Newtonian physics in its fundamental conformity to law is the only possible physics"[86] and was aware of the differences between Newton and Leibniz, would prematurely surmise that Kant turned away from Leibniz in the first *Critique.* But is this correct?

The answer is difficult to frame, but its subtlety is required by the complexity of the *Critique.* Here I have chosen to lean heavily on Martin, one of the outstanding interpreters of Kant, and on Leclerc, a distinguished modern spokesman for Leibniz.

1. Kant's Pre-critical Philosophy

There is always a certain measure of risk in dividing a scholar's sustained creative efforts into periods, for the continuity is likely to be minimized. At the same time, creativity commonly denotes a movement in which certain discontinuities will occur. Nevertheless, Kant affords a justification for making a distinction between his pre-critical and critical periods; for in 1769, after many publications in physics and philosophy, he spoke of "a great light that dawned upon him" as he struggled with the question of the structure of space. In 1770, he wrote *De Mundi Sensibilis atque Intelligibilis Forma et Principiis Dissertatio*, setting forth a new critical view that space and time as relations are not – as he said before – grounded in the physical monads, but "in perceiving substances as the a priori form of their perceiving."[87] In order fully to appreciate this inversion which constituted what Kant called his "Copernican revolution" with respect to the question of knowledge, it is necessary to reconstruct the main features of his philosophical–physical ideas before that change took place. The format which I follow in this reconstruction is determined by the question raised earlier: at what points is Kant Leibnizian and at what, Newtonian?

In the decade between his work on *Living Forces* (1747) and his *Monadologia physica* (1756), Kant approached the question of force in a Leibnizian way.[88]

With Leibniz, Kant held to the idea of simple substances or monads, which aggregate to form "bodies." Monads are real while bodies are, for him, relations of simples. The force inherent in body is identified as the action of monads.[89] But for Kant, *contra* Leibniz, the activity of monads lies not in "perceiving," i.e. in only an internal change in themselves, but in an outward directed external motive force which effected an internal change in another monad. Furthermore, *contra* Leibniz, monads do not exist without direct effect upon one another; the internal changes which are the essence of monadic activity could not take place "free from all external connection."[90] Even so, Kant concurred with Leibniz that space and extension are relative, that is, that they are relations. But Kant grounds their relational reality in their fundamental external action upon one another; "space is brought into being by the acting of substances."[91] He perceived that the view that substances extensionally act upon one another required the additional notion that they must exist somewhere in relation to one another; but he was unwilling to ground this "situation of substances" in the physical substance itself. Whereas in 1755 he was content to ground the situation of the physical monads in the mind of God (following Leibniz and Newton), no further suggestion is made about this until thirteen years later in his paper on incongruent counterparts in space in which he argued that there was "a certain absoluteness of direction in space." It was this insight which led immediately to the first effort of critical philosophy in 1770.

The problem facing Kant in his critical works was the ontological status of "the relation of situation" and of time and space. It has not yet been determined to what extent Kant addressed these problems in his pre-critical period in terms of Newtonian options. It seems that the more one takes into account the discussion with Leibniz, the less significant becomes the question of Newton. This is so, not because Kant rejected Newtonian ideas about mechanics, but rather because he (and his contemporaries) did not see the problem which these ideas posed for his overall philosophical activity. This was his "dogmatic slumber" from which he was awakened, viz. when Newton's ideas became problematical. At the only time that Kant saw that he must choose between Leibniz and Newton prior to his *Critique*, he tended to favor

Newton. That was in his essay entitled, *Of the First Ground of the Distinction of Regions in Space*, written in 1768. Martin minimizes the role of this essay for our question by speaking of its "transitory inclination towards Newton," but it must be said that Martin's reconstruction of Kant's pre-critical ideas about the phenomenality of space differs from that given by Leclerc.[92]

One begins to sense the difficulty of determining the extent to which Kant was a Newtonian in his pre-critical period upon consulting the discussion in Beck,[93] who argues that prior to the *Critique*, Kant held three different views of space: a Leibnizian one in 1747, a Newtonian one in 1768, and a mixture of his own and Newton's in 1770.[94] The clue to his development Beck supplies in the remark that: "Like so many of Kant's problems, that of space arose from the fact that in his science he was a Newtonian, while the metaphysical framework within which he moved was, on the whole, Leibnizian."[95] An important point is further made by Beck, who indicates that Kant's first publications (from 1747 on) were not under the influence of Leibniz directly, but were written from the standpoint of Leibniz as modified by Wolff.[96] It is probably of great significance for the question of Kant's relation to Leibniz that the *Nouveaux Essais* of the latter were first published in 1765 and the Leibniz–Clarke correspondence was reissued in 1768. Beck, who calls attention to these facts, mentions further that there is some merit to the view of Vaihinger, Cassirer, and Tonelli that Kant was reading these works at the time he said he was awakened from his "dogmatic slumber."[97]

There is no reason to believe that Kant's metaphysical commitments to Leibniz in the pre-critical period are to be interpreted as meaning that Kant was not at the same time, and in his unique way, also Newtonian in his scientific ideas.

2. Kant's Critical Philosophy

Whereas in the pre-critical period Kant was choosing between current options at crucial points, the critical period represents a discontinuity precisely because he inverted the whole problematic of his contemporaries and thus set up the unique agenda which became crucial in philosophy until modern times. Had this in-

version not taken place, he would be remembered only for his contribution to scientific theory.

My concern in looking at the critical works is to determine to what extent he carried over into them Leibnizian and/or Newtonian ideas about space, time, and matter.

I have argued earlier that the central problematic out of which the first *Critique* arose was the antinomies, which play a major role in the Transcendental Dialectic. It is fairly easy to show that these antinomies of pure reason, as Kant called them, bear some direct relationship to the Leibniz–Clarke (Newton) debate, staged in the early years of the eighteenth century.[98] The antinomies of space, time, and matter as stated by Kant in the *Critique* are the result of juxtaposing the conflicting claims of Newton and Leibniz on these ideas: e.g. "The world had a beginning in time and is also limited as regards space" (Newton); "The world has no beginning in time, and is infinite as regards both time and space" (Leibniz). Kant's treatment of these historic antinomies is the foundation of his critical philosophy. For him, space and time are no longer conceived as objects which are grasped in knowing; they are rather forms of pure intuition to which the objects conform. This represents a break with Leibniz and Newton, though not so completely with the former. The clearest evidence for this claim is afforded by the following statements in the *Aesthetic*:

> What we are maintaining is, therefore, the *empirical reality* of time, that is, its objective validity in respect of all objects which allow of ever being given to our senses. And since our intuition is always sensible, no object can ever be given to us in experience which does not conform to the condition of time. On the other hand, we deny to time all claim to absolute reality; that is to say, we deny that it belongs to things absolutely, as their condition or property, independently of any reference to the form of our sensible intuition; properties that belong to things in themselves can never be given to us through the senses. This, then, is what constitutes the *transcendental ideality* of time.[99]

and

> Our exposition therefore establishes the [empirical] *reality*, that is, the objective validity of space in respect of whatever can be presented to us outwardly as object but also at the same time the [transcendental] *ideality* of space in respect of things when they are considered in themselves through

reason, that is, without regard to the constitution of our sensibility. We assert then, the *empirical reality* of space, as regards all possible outer experience; and yet at the same time we assert its *transcendental ideality*.[100]

It is not self-evident what Kant meant by "transcendentally ideal"; Martin, after exploring the use of the word "transcendental" in the *Critique*, concludes that for Kant "space and time in respect to their being as such are not real but ideal."[101] Martin judges that Kant is in agreement with Leibniz in saying this about space and time, but differs from the latter in his view that "the transcendental ideality of space and time has its origin in the nature of the human mode of knowledge"[102] rather than in God. One consequence of this is that space and time "can only be proved valid for things as they appear to us and not for things as they are in themselves."[103]

Rejecting the views of space as substance or accident (Newton), Kant agrees in part with Leibniz that space and time are relations. Martin points out that in the *Note to the Amphiboly of the Concepts of Reflection*, Kant speaks directly of the relational character of space. The paucity of univocal material on this point in the *Critique* leads Martin to return to the 1770 Dissertation to fill in what is apparently intended. There Kant stated the four possibilities of the reality of space: (1) a real being, a substance; (2) a determination, an accident; (3) an objective relation; and (4) a subjective relation that originates in our mind and attaches to the subjective nature of our mind.[104] Drawing from a variety of sources, Martin argues that Kant rejected the view that space is a substance or accident. It was – as Leibniz said – a relation, but it is a subjective relation. Whereas Leibniz had grounded the relations in God's thinking, Kant in the *Critique* grounds them in the human mind.

On this foundation Kant advanced a phenomenal theory of space and time. Space, considered ontologically, is appearance; it does not exist in itself, but in us.[105] Martin boldly asserts that the "relational character of nature is probably one of Kant's deepest grounds for declaring nature to have the character of appearance."[106] It must not be assumed that the term appearance is in any way analogous to the concept of illusion; it is rather a "middle term" between the thing-in-itself and illusion. It is a realm of *Erscheinung* (phenomena), not *Schein*. And this phenomenal realm is what Kant means by nature.

Kant's concept of nature was accordingly a special synthesis of Leibnizian metaphysical ideas and Newtonian science. If Popper is correct, Kant assumed that Newton had achieved *epistēmē*; his only question was, how was it possible? Nothing we have reported about the ontological (metaphysical) status of nature in Kant is incongruous with an acceptance of the validity of Newtonian laws. It only defines the sphere in which these laws are operative. It could even be argued with some merit that the antinomies arise when the attempt is made to extend the validity of these laws to the realm of the things-in-themselves or, conversely, to extend the ontological claims valid for the things-in-themselves to the sphere of the phenomena, or Nature. There is every indication in Kant – and on this Kantian scholars as diverse as Martin and Heidegger are agreed – that Nature for him was "Newtonian nature." Kant shares much of the responsibility for the view so common in the nineteenth century that all physics is mechanics.[107] That is to say, nature for Kant is Nature "according to law," for which there is only one possible model, viz. Newtonian nature.[108] Accordingly, nature "only contains masses which move in a way that is strictly determined according to Newtonian laws."[109] If these assertions are correct, the reduction of nature to a material mechanism represents a fundamental break with Galileo, Kepler, Newton, and Leibniz, for whom – in the judgment of Martin – nature is still alive. The success of Newton's laws reached its most extreme expression in mechanism and the result is "a disenchanted world."[110] The role Kant played in bringing this to pass was considerable: nature in the *Critique* is the realm of Newtonian mechanics. For many today, nature is the world of natural objects; but for Kant it meant "conformity to law as such; it therefore means . . . nature as it appears and is known primarily in theoretical physics."[111] The connection between nature and physics lies for Kant in mathematics which is, in his view, a theory of relations. It is not without good reason that – as Martin points out – the great Kantian interpreter, Cohen, viewed the *Critique* as "a theory of Newtonian physics."[112]

So far I have been talking *about* the *Critique* and making judgments about Kant's commitments to Newton. Now I want to follow the advice of Heidegger in his book, *What Is a Thing*?, and attempt to "put ourselves within" Kant's philosophy and

"let Kant speak." If I do this by following the Kantian problematic as set forth in Heidegger's provocative treatise, it must not be assumed that I accept his judgment that "Henceforth, only Kant will speak."[113] There are many who would disagree with Heidegger's re-presentation of the *Critique*: I am convinced, nevertheless, that Heidegger's specialized approach to the essence of its argument is sufficiently faithful to it to serve to illustrate, even for those who would state it otherwise, my central thesis that the Newtonian concept of nature determined its structure.

It has been noted that Heidegger also maintains that when Kant spoke of science, he meant "Newtonian physics." He adds that whatever doubt still lingers about the correctness of this judgment based on the *Critique* should vanish upon consideration of Kant's work of 1786, on *The Metaphysical Foundations of Natural Sciences*, which was intended – or so Heidegger surmises – as "a conscious supplement and counterpart to Newton's work."[114] There is no doubt that the last decade of Kant's life found him giving increasing attention to the questions of physics. My concern, however, is with the first *Critique* itself, for it was this historic document which set the agenda for almost two centuries of philosophy. Can it be shown by entering into the world of the *Critique* that Newton is always lurking in the shadows?

Heidegger is convinced that the question of the thingness of the thing is not only present in the *Critique*, but "is its metaphysical center."[115] It is the centrality of this question that accounts for the foundational character of the work. Before delineating Kant's notion of "thing," I must follow Heidegger through his thesis on Descartes, for it was the latter who "discovered" the modern notion of the "subject" and created the conditions which led Kant to pose the question of the thingness of the thing as the question of "the objectivity of the object." The clarity which Heidegger brings to the interpretation of Descartes is based on clearing up a misunderstanding, viz. that his *cogito ergo sum* implied the *sum* as an inference from the *cogito*. Preferring the form *cogito sum*, Heidegger argues that "the *sum* is not a consequence of the thinking, but vice versa, is the ground of thinking, the fundamentum."[116] His reasoning is as follows:

In the essence of positing lies the proposition, I posit. That is a proposition which does not depend upon something given beforehand, but only gives to itself what lies within it. In it lies: "I posit": I am the one who posits and thinks. This proposition has the peculiarity of first positing that about which it makes an assertion, the *subjectum*. What it posits in this case is the "I." . . . Hence it came about that ever since then the "I" has especially been called the *subjectum*, "subject."[117]

What had been called "a subject" in the Middle Ages became "what stands over against the subject," i.e. "Gegen-stand" – "an object," in the modern sense.

It is this Cartesian legacy and the compounding of its problematic by the success of Newtonian physics that accounts for the focus of the *Critique* on the objectivity of the object. Heidegger is helpful again: he maintains, on good grounds, that when Kant speaks of "things" he does not have in mind "the things that surround us," but rather things as "objects of mathematical–physical science."[118] The focus is on how the objects of physics, i.e. natural things, are related to the things that surround us. These everyday things are merely "perceptions" and become "objects" only when "they are grasped in the universal concepts of cause and effect in themselves as they stand in themselves and to one another." Objects are conceptual components of necessary judgments, i.e., of judgments about things which "are valid at all times and for everyone."[119] A "thing" for Kant is a "natural thing" and I have shown that the concept of the natural is directly related to Newtonian physics.[120]

From this point on in Heidegger's essay on Kant's *Critique*, the problematic objectivity of the object is central. Kant's major distinction between analytic and synthetic judgments – which some trace directly to Leibniz's *Nouveaux Essais* – is expressed by Heidegger in terms of this problematic: "If the basis for the determination [of the truth in the subject–predicate relationship] is contained in the concept as such, then the judgment is analytic. If this basis is contained in the object itself, then the judgment is synthetic."[121] He is led to conclude that "the decisive respect in which analytic judgments are distinguished" – and we all know how central to Kant's thesis this distinction is – "is the reference of the subject–predicate relationship as such to the object."[122]

It is precisely because of the preoccupation with "synthetic judgments" that Kant is led to the use of the key concept, "Transcendental." For in addition to Kant's expressed definitions of the term, the basic idea commends itself that "transcendental" means "passing over to the object." The fundamental query is: "how our knowledge passes over to the object, *transcendit*."[123] These insights of Heidegger cause him to single out one statement of the *Critique* as "its deepest basis," viz. "the conditions of the possibility of experience in general are likewise conditions for the possibility of the objects of experience."[124]

Heidegger betrays the role of Newtonian laws in Kant's problematic when he says that for the latter "Synthetic judgments *a priori* are already asserted in all scientific judgments."[125] It is not possible to pursue in detail the discussion which Heidegger gives to the "Synthetic Principles of Pure Understanding"; it should be sufficient to point out that their importance for him (and supposedly for Kant) is that "they make possible the objectivity of the object."[126]

At this point Heidegger turns to "mathematical and dynamical principles," for these seem to him to be primary in any consideration of Kant's notion of objects. Though these are treated by Kant as "metaphysical principles" and hence in the manner of Leibniz, the discussion leads unavoidably to the claim that synthetic judgments extend our knowledge of objects, and that means of the world of appearances. Heidegger succinctly states, "the object," i.e. the natural objects of Newtonian mechanics, "is appearance."[127] Not *Schein*, but *Erscheinung*. The notion of "appearances" issues in a discussion of space and time, which need not be pursued further, except to include a quotation from the *Critique* which is substantial evidence for the general claim made all along that nature for Kant – the realm of appearances – is Newtonian nature: "By nature, in the empirical sense, we understand the connection of appearances as regards their existence according to necessary rules, that is, according to laws. There are certain laws which first make nature possible, and these laws are *a priori*."[128]

So far attention has been focused on but one of the two questions which open the *Critique*, i.e. how is pure natural science possible? with the insistence that the question is a reference to

Newtonian physics. It is now appropriate to show that the other question, how is pure mathematics possible? is central for Kant also by virtue of Newton's immanent success in the use of mathematics to frame "certain" laws of the natural world. Kant sees the problem of mathematics also in terms of the thingness of the thing, of the objectivity of the object, and therefore frames "the transcendental principle of the mathematics of appearances" (A65, B206).[129] Heidegger elaborates on this Kantian idea as follows: "The mathematical principles grasp the object with respect to the 'against' and in its inner possibility."[130] Through mathematics it is possible to "meet with something . . . corresponding in the object itself and to prove it by experiment."[131] It is reasonable to infer from these Kantian insights that "the possibility of pure mathematics" is not separate from, but integral to, the leading question of the *Critique*, viz. "the possibility of pure natural science." It was Newton's successful "mathematical principles of natural philosophy [i.e. science]" that had convinced Kant that the question of mathematics is at the same time the question of the possibility of theoretical physics. The objects of appearance are physical objects knowable through mathematics. Newton had actually achieved such knowledge "with certainty"; Kant explored the connection between mathematics and natural science to determine how Newton was able to do so.

Although Popper fails to appreciate the complexities involved in the relation of Kant to Newton and Leibniz, his essential thesis is defensible, viz. that Newton's successful physics raised the problem of knowledge for Kant. Whereas Popper bases his case on Kant's statements about Newton, I have attempted to show that the case can best be made from "within" the *Critique* itself. By proceeding in this manner I have argued that the *structure* of the *Critique* is also "Newtonian." This is not to argue that Kant does not transcend Newton in his theory of knowledge, but that he does so in a way that adds momentum to the growing success which Newton enjoyed in the eighteenth century. Whatever doubts anyone may have had at the time that the Newtonian era had arrived were dispelled. And if the readers of the *Critique* could have seen beyond their time, they would have known that it would be a Newtonian–Kantian era which would dominate physics and philosophy for over a century.

C. THE NEWTONIAN ERA IN SCIENCE AND PHILOSOPHY

In his acceptance of the validity of Newtonian physics, Kant was a child of the eighteenth century. All great Western philosophers of that century devoted themselves to the implications of Newtonian physical theory. For some it became the foundation of mechanism, a dogmatic theory of the world which went far beyond Newton, though to those who defended it the theory was "Newtonian." Scholars such as Laplace, d'Alembert, and d'Holbach considered their work as but refinements of Newton's original ideas. The prevailing mood at the midpoint of the century was captured in a work of d'Alembert, written in 1757: "The true system of the world has been recognized, developed and perfected."[132] For d'Alembert, the laws of motion became "necessary truths"; the next inevitable step, represented so thoroughly by d'Holbach, was that "all phenomena are necessary"; his *Système de la nature* spoke of the Universe in such deterministic terms that – as Buchdall rightly notes – "the poets shuddered."[133]

In 1796, Laplace published his *Système du Monde* in which Kant's cosmogonical theory was espoused and its so-called "nebular hypothesis" worked out in terms of Newtonian physics. He rigorously expanded Newtonian mechanics in his great work of 1799–1805, called *Mécanique Céleste.* With Laplace the height of mechanism was reached, for his "proof" that the perturbations of the planets were only temporary removed the last barrier to a completely "Newtonian world" in which, once the initial conditions were specified, the world acted like a vast deterministic machine.

In the eighteenth century the cosmos truly became "Newtonian"; for, despite the fact that the work of his successors went far beyond his original ideas, none of its proponents doubted for a moment that their fundamentals were the legacy of one man, and one man alone – Sir Isaac Newton. Dampier reports that Lagrange, "perhaps the greatest mathematician of the century," "described the *Principia* as the greatest production of the human mind, and Newton, not only as the greatest genius that had ever existed, but also the most fortunate: 'for there is but one universe, and it can happen to but one man in the world's history to be the interpreter of its laws.'"[134]

In the eighteenth century, mechanism was combined with materialism, and the combination produced what Coleridge called "a universe of death."[135] Concisely, in the words of Dampier, materialism was "a belief that dead matter, in hard and unyielding lumps, the solid impenetrable Newtonian particles . . . is the sole ultimate reality of the Universe."[136] Dampier's definition of "materialism," a word coined in the eighteenth century, in Newtonian terms is not question-begging; Newton's atoms were implied in his laws, or so it was thought then, and the acceptance of the latter had as its consequence the rise of modern atomism. This sequence was not a logically necessary one; for Kant, because of his attention to Leibniz, did not draw the same conclusion. But for all his independence, Kant lived in the same disenchanted world of phenomena. Even though Kant transcended his philosophical contemporaries by bringing "humanity and nature together under the seamless robe of reason,"[137] it would be unperceptive to miss the fact that from then on, contrary to Newton's maieutic intention, Nature would be the stillborn world of Newtonian physics.

CHAPTER II

THE EMERGENCE OF A RELATIONAL PARADIGM IN MODERN PHYSICS AND PHILOSOPHY

A. THE COLLAPSE OF THE NEWTONIAN WORLD AND ITS PARADIGM

The domination of Newton's natural philosophy over physics and philosophy did not come to an end all at once. Although it is relatively safe to date the birth of modern as opposed to classical physics at the year 1900, and although the conceptual revolution which brought modern physics into being did so abruptly, it is important to remember that there preceded it a period of preparation created by the failure of Newtonian theory to account for major anomalies in physical research in the nineteenth century. The popularity of the wave theory of light in the nineteenth century entailed the rejection of Newton's corpuscular theory of light advanced in his *Opticks*, and this rejection led to a neglect of this document which had been so important for eighteenth-century physics.

Two other major developments in the nineteenth century set in motion the decline of the Newtonian era in physics. The first was the rapid progress in mathematical theory, and the emergence of what came to be called mathematical physics. Physicists prior to the nineteenth century had always assumed that there was but one kind of geometry appropriate to the study of space: both Newton and Leibniz believed that space was Euclidean, as did Kant, who probably knew about non-Euclidean geometry from Lambert, but regarded it as a mathematical fiction. The creation of non-Euclidean geometries in the early nineteenth century by Gauss, Bolyai, and Lobachevski led Riemann to suggest their possible use in the problems of space, if Euclidean geometry should ever prove inadequate. It was only with the theories of Einstein in the early twentieth century that Riemannian geometry was employed in interpreting the phenomenon of motion, but the very existence

of these mathematical ideas in the nineteenth century virtually spelled the end of the autonomy of Newtonian cosmology.

The other major development in the nineteenth century that portended a paradigm shift was the emergence of field theory and the great strides in the understanding of electricity which attended it. Newton's theory of gravitation was not understood in the eighteenth and early nineteenth centuries as a "field" theory, although there did develop in the nineteenth century a mechanics of continua which made use of the field theories which had risen by that time. Modern field theory may be said to have begun with Michael Faraday's work on electromagnetic phenomena, which explained these effects by a theory of a continuous field. Since Faraday was not a skilled mathematician, it was left to another physicist, James Clerk Maxwell, to develop the former's ideas into a theory of electromagnetism with its own field equations. The delay in the formulation of field theory was due in part to the fact that the mathematics of partial differential equations upon which field theory depends was not available until the nineteenth century. The similarity of gravity and electromagnetism was noticed quite early in that century: Coulomb's law for the attraction of opposite electric charges looked like Newton's law of gravity, for in it the force of attraction was directly proportional to the product of the quantity of the charge and inversely proportional to the square of the distance. There was, however, no analogue in gravity to the repulsion of like charges. The hope of uniting both gravity and electromagnetic theory into a unified field theory is still unrealized, despite the extensive efforts by Einstein and others. The success of field theories in the nineteenth century weakened the plausibility of the notion of "action-at-a-distance" which had permeated Newtonian physics in its classical form. It should be said by way of caution, however, that neither Faraday nor Maxwell was successful in applying field theory to the phenomenon of gravity, and that despite some progress in the field of the mechanics of continua, no tenable field theory of gravity was available until the second decade of the twentieth century when Einstein proposed the General Theory of Relativity.

I spoke earlier of certain anomalies which arose in the application of Newtonian mechanics to the problems of astronomy and cosmology. J.D. North, who has masterfully discussed these

anomalies in his book, *The Measure of the Universe,*[138] focuses on two areas in which physicists were forced to make *ad hoc* adjustments to Newton's laws; viz. cosmology and planetary motion. Taking up the latter first: it was about the middle of the nineteenth century that Leverrier, the discoverer of Neptune, found that there was an anomaly in the motion of the planet Mercury which could not be accounted for by the perturbative forces of the other planets. Many *ad hoc* adjustments were made to account for the periodic advance in the perihelion of Mercury, but it would remain unsolved until Einstein predicted the exact figure in his General Theory of Relativity. Toward the end of the nineteenth century there was a growing distrust among astronomers of the adequacy of the laws of classical mechanics. The application of these laws to cosmological problems also resulted in difficulties for Newtonian mechanics. According to North, by the middle of the nineteenth century all the presuppositions of the Newtonian cosmology had been eroded: namely, "that the stars are distributed more or less homogeneously in space, that space is Euclidean, and that the stars are subject to no systematic motion in time."[139] Cosmology of the nineteenth century was still committed to certain Newtonian presuppositions from which it was not liberated until the twentieth century, and the consequence was that the advocates of these new cosmological theories were plagued by what were called "anomalies."[140]

The cumulative weight of these serious physical problems foretold the end of the Newtonian era, and with it, its particulate paradigm. The final break came with the two "discoveries" which gave modern – as opposed to classical – physics its distinctive character and tasks: Relativity Theory and Quantum Theory. These two theories not only spelled the end of classical physics and its subject–object paradigm; they also entailed a positive substitute in the form of what I shall call a new "relational paradigm." This claim fulfills the promise made earlier that Leibnizian metaphysics with its relational theory of space and time would eventually be vindicated.

B. THE EMERGENCE OF A RELATIONAL PARADIGM

1. In Modern Physics

a. Special and General Relativity

In 1905, Albert Einstein, while a junior clerk in the Swiss Patent Office in Bern, published in the great *Annalen der Physik*, an unpretentious paper with the title, "On the Electrodynamics of Moving Bodies." Today this document is recognized as the historic manifesto of modern relativity theory. With it the Special Theory of Relativity was introduced to the scientific community and received with mixed emotion. The theory of relativity which it proposes was called *special* because it was restricted to inertial systems which are in uniform relative motion with respect to each other, whereas the later General Theory relaxed the restriction and dealt with accelerated reference frames. Although the question of the role the Michelson–Morley experiment played in its formulation is still debated, there is no doubt that Einstein was stimulated by "the unsuccessful attempts to discover any motion of the earth relatively to the 'light medium' [i.e. ether]"[141] to disregard the ether which had dominated nineteenth century physics and postulate the invariance of the speed of light. Contrary to what is usually imagined, Einstein did not determine by experiment that the speed of light was a constant; rather, he asked what the effect would be on dynamics if he assumed the constancy of the speed of light. The consequence of using the velocity of light as a standard and limit was that the notions of simultaneity and of absolute rest ceased to be meaningful. The finite speed of light prevented one from determining the simultaneity of distant events, since the speed of light was the maximum velocity at which a change could be communicated. Furthermore, the relation of a moving observer to one at rest could be reduced by a transformation, so that it would be impossible to determine absolutely which observer was in motion and which at rest; in fact, the lack of a *modus operandi* for determining that, meant that the notions of absolute motion and rest became meaningless in physics.

While the Special Theory of Relativity, like any good theory, makes predictions of an empirical nature, many of which have

been corroborated, it is important to realize that it is primarily a rational way of conceiving of dynamical phenomena that has come to commend itself to virtually the entire scientific community.[142]

The most astonishing result of Einstein's theory was that the concepts of absolute space and absolute time were relegated to "the domain of metaphysics." The physicist who saw the implications of this theory perhaps more clearly than Einstein was Hermann Minkowski, who addressed the eightieth Assembly of German Natural Scientists and Physicists at Cologne in 1908, on the theme "Space and Time." In that historic address Minkowski tried to steer a middle course between the old and the new: on the one hand, he prophesied that "Henceforth space by itself, and time by itself, are doomed to fade away into mere shadows, and only a kind of union of the two will preserve an independent reality."[143] Minkowski proposed the first theory and diagram of the so-called "light-cone" in which he represented in two dimensions the newly grasped four-dimensionality of space–time. The cone itself was a graphic way of speaking of the fundamental character of the speed of light in the Universe; events within the light-cone are time-like and comprise those events which could affect and be affected by a so-called "world-point." On the other hand, Minkowski still respected "the dogma that both space and time have independent significance."[144] Minkowski's space–time, for all his prophecies, was – as d'Abro notes – "flat (uncurved), rigid and indeformable," i.e. it was simply the "4-dimensional counterpart of Newton's absolute space."[145]

It is important to note that the Special Theory of Relativity represented a major break with the physical atomism of Newtonian physics. Its primary entities are relational. There remains some question, which I shall explore shortly, as to how fully Einstein made the transition to this new conception of reality, but there is no doubt that Whitehead, who accepted the Special Theory of Relativity while rejecting General Relativity, grasped the full metaphysical significance of the shift toward "events," as every Whiteheadian must know. Before pursuing this question of the nature of Einsteinian "reals," I should first give attention to the General Theory of Relativity which Einstein almost single-handedly created as a step "beyond" Newton's theory of gravitation.

In his quest for greater comprehensiveness, Einstein turned

immediately upon completion of the Special Theory to the more generalized study of motion (in that it sought to incorporate into one theory both uniform and accelerated reference frames). The theory as advanced in 1916[146] had both rational and empirical aspects. The theoretical basis included the principles of equivalence and covariance: the former assumed the equivalence of gravitational and inertial mass and concluded that no empirical test could determine for an enclosed observer whether the sensation of acceleration was due to acceleration or movement through a gravitational field. The principle of covariance involved the application of geometrical transformations to accelerated reference frames. The mathematics necessary to accomplish these transformations was of such great complexity that even Einstein, who did not think of himself as primarily a formal mathematician, had to seek the technical assistance of his former classmate, Marcel Grossmann, in these matters.

Einstein had been dissatisfied with Minkowski's four-dimensional Euclidean space–time, and further sought to find a rational alternative to Newton's gravitational force acting-at-a-distance. He found the answer in his celebrated field equations in which the non-linear curvature of space–time is determined by the matter–energy in the Universe, and the motions of the planets are the result of these free bodies following geodesics in space–time. Put in conventional categories: in place of action-at-a-distance, the sun indirectly causes deformations of its space–time neighborhood, which accounts for the paths of the planets.[147] Newton's inverse square law, contested by Leibniz, is finally rendered superfluous by the more powerful explanatory General Theory of Relativity.

Einstein's unification of geometry and physics entailed an allegiance to metrical geometry which not all (including Whitehead) have found satisfactory. Whereas Whitehead demanded that the geometry be kept separate from the physics, in order that the former could be determined by the latter, Einstein seemed to vacillate on the question of the grounds for judging the epistemic status of the theory: for on one hand, upon hearing of the "confirmation" by a British expedition led by Eddington of his prediction of the bending of rays of light in the vicinity of the sun, his celebrated remark was "The truth of a theory is in your mind,

not in your eyes."[148] It is fairly easy to show, on the other hand, that Einstein was concerned about the correlation of his predictions with astronomical research.[149] Perhaps the answer to this complex question is that Einstein knew that empirical research can falsify a theory, even though it can never be said to "verify" it.[150] The General Theory has experienced something of a revival in recent years and, for whatever reason, tests of its predictions continue to be made.[151]

Before turning attention away from Einstein, I should clarify the conception of physical entities which is reflected in his natural philosophy. Certainly, space–time loses its absolute character as two separate absolute entities, i.e. they become part of the conventional language by which we talk about reality. As Cassirer pointed out quite early, in the General Theory "the problem of space has lost all ontological meaning. . . . The purely methodological question has been substituted for the question of being."[152] Cassirer speaks more directly about the nature of entities in the General Theory of Relativity in the following instructive way:

> Only with this result [i.e. that the meaning and nature of physical laws are independent of definite reference systems] do we reach the real center of the general theory of relativity. Now we know where lie its truly ultimate constants, its cardinal points, around which it causes phenomena to revolve. These constants are not to be sought in *particular given things*, which are selected as chosen systems of reference from all others, such systems as the sun was to Copernicus and as the fixed stars were for Galileo and Newton. *No sorts of things are truly invariant, but always only certain fundamental relations and functional dependencies retained in the symbolic language of our mathematics and physics, in certain equations.*[153]

The philosophical implications to be drawn from this new conception of thing as "relation" were first clearly stated by Cassirer in the essay now published in tandem with his essay on relativity just quoted, entitled appropriately, "Substance and Function." The relational metaphysic to be set forth in Part II could be understood as a more modern attempt to do the same.

b. Quantum Theory

Relativity theory was but one element of the twofold foundation of modern physics, for at the turn of the century new discoveries and theories in the domain of microphysics accounted equally for

the new shape physics was to assume in the twentieth century. The birth of quantum theory determined that deeper metaphysical insights would have to be summoned to aid in the unraveling of the riddles posed by the new physics.

It is my considered judgment that relativity and quantum theory are converging upon a relational paradigm of physical reality that could be useful in surmounting some of the long-standing impasses of metaphysics. The distinctive contribution of quantum theory toward this end should become apparent from the following review of the rise of quantum mechanics and the philosophical issues it raised.

Einstein's article on radiational phenomena, also published in 1905, was an extension of a discovery made by Max Planck five years earlier of a new natural unit, the "unit of action." In order to explain certain radiational phenomena, Planck postulated that radiation is not continuous, but consists of discrete quantities, or "packets," of energy which he called "quanta." This thesis shook the scientific community which had come to accept in a paradigmatic way the wave character of light, and in turn the continuous nature of all radiation. Planck's research was based on the unsuccessful attempts of others, principally Lord Rayleigh and Professor Wien, to frame laws which could account for certain aspects of radiation in terms of Maxwell's theory of *continuous* electromagnetic waves and fields. Planck was unable to break completely with the past and held that under certain conditions radiation could still be regarded as continuous. It was Einstein who was "the real revolutionary in this early stage of the quantum theory."[154] Einstein theorized that radiation has a dual character: "On certain occasions radiation behaves as though it were wave-like, on others as though it were corpuscular."[155] With this claim the door was opened wider to the microworld of sub-atomic phenomena, and at the time the "riddle of the quantum" was posed in a way which is still unresolved.

The atom had been previously interpreted in a classical Newtonian way, i.e. mechanically, but never satisfactorily until Bohr applied to its problems the "quantum theory" of Planck and Einstein. Bohr inherited Rutherford's model of the atom, which he constructed along the lines of a "miniature solar system" in which between the nucleus (= Sun) and the surrounding electrons (= planets) there was mostly empty space. Radiation from the atom

was conceived in a mechanical way (radiation was due to the mechanical motion of the electrons) which could not account for some of the experimental data. Bohr turned to Planck's quantum to explain these phenomena and the result was a blend of semiclassical theory and quantum theory which led of necessity to Bohr's "Correspondence Principle" which linked the phenomena of the macro- and microworlds while at the same time distinguishing between them.

A distinct "Quantum Mechanics" did not emerge until the work of Heisenberg in 1925, who dispelled the myth of planetary orbits of electrons still plaguing Bohr's model of the atom, and argued in a striking way that one "cannot assign to an electron a position in space at a given time, or follow it in its orbit."[156] This principle of limiting theory to observables was to become the backbone of the Copenhagen school. Heisenberg shocked the entire scientific community by proposing an Uncertainty Principle which gave "a quantitative estimate of the limitations on the possibility of giving a deterministic description of the world."[157]

The Uncertainty Principle was a quantitative formula which displayed the inability of the observer to measure simultaneously both the position and momentum of a particle. Heisenberg boldly asserted in 1925 that the "path" of an electron originates in our observation of it. With this assertion, one of the most vigorous debates in the history of science had begun, and it is still in progress. Had Heisenberg and his colleagues spelled the end of determinism at the sub-atomic level, as he and his Copenhagen collaborators Bohr and Born assumed? Or was the Uncertainty relation an indication of the incompleteness of Quantum Mechanics, as Einstein maintained until his death?

My concern is not to trace the history of the mathematical and physical aspects of Quantum Theory, but to focus on those aspects of it which appear most strongly to affect the subject–object thinking which dominated classical mechanics.

The Copenhagen interpretation revived epistemological questions long dormant in physics. It was as though the physicists' "hold on reality" had been undermined.[158] Heisenberg's strongest statement about the subjective character of our knowledge of the physical world appeared in his work entitled *The Physicist's Conception of Nature*.[159] Mathematical physics "no longer describes the behaviour

of elementary particles, but only our knowledge of this behaviour." One of the boldest statements of the philosophical implications of the Copenhagen theory appeared in the work of Bohm mentioned above. As one of the modifications "in our fundamental concepts brought about by the quantum theory," he lists the principle "that the world cannot be analyzed correctly into distinct parts; instead, it must be regarded as an indivisible unit in which separate parts appear as valid approximations only in the classical limit."[160] He continues with the assertion – crucial to the subject–object problem – that

> the properties of matter are incompletely defined and opposing potentialities that can be fully realized only in interactions with other systems. . . . Thus, at the quantum level of accuracy, an object does not have any "intrinsic" properties (for instance, wave or particle) belonging to itself alone; instead it shares all its properties mutually and indivisibly with the systems with which it interacts.[161]

Later in his presentation Bohm applies quantum theory to thought processes, concluding that "thought processes and quantum systems are analogous in that they cannot be analyzed too much in terms of distinct elements, because the 'intrinsic' nature of each element is not a property existing separately from and independently of other elements but is, instead, a property that arises partially from its relation with other elements."[162] These assertions led him to make the extremely suggestive remark that "the behavior of our thought processes may perhaps reflect in an indirect way some of the quantum-mechanical aspects of the matter of which we are composed."[163] Much has been made of Bohm's departure from the Copenhagen school: for my purposes, it is important only to note that in the subsequent book reflecting the change of position, namely, *Causality and Chance in Modern Physics*,[164] he did not abandon the qualification of the concept of "things" in his early work. Instead he worked it into a highly articulate theory under the pregnant caption: "Reciprocal Relationships and the Approximate and Relative Character of the Autonomy of the Modes of Beings of Things." I must be content to quote briefly from this section, giving only his answer to the question of the nature of things:

The existence of reciprocal relationships of things implies that each "thing" existing in nature makes some contribution to what the universe as a whole is, a contribution that cannot be reduced completely, perfectly and unconditionally, to the effects of any specific set or sets of other things with which it is in reciprocal interconnection. And, *vice versa*, this also means evidently that no given thing can have a complete autonomy in its mode of being, since its basic characteristics must depend on its relationships with other things. The notion of a thing is thus seen to be an abstraction, in which it is *conceptually* separated from its infinite background and substructure.[165]

Such abstractions are necessary, Bohm argues, "if only because we cannot hope to deal directly with the qualitative and quantitative infinity of the universe."[166] It would be tempting here to pursue these very fruitful ideas and their implications for relational thinking, but I must first discuss other aspects of quantum theory.

The Copenhagen position increasingly emphasized the role of the observer in quantum experiments in such a way that the reality of the classical particle increasingly faded. Heisenberg, recalling Aristotle, spoke of the particles as *potentiae* which become actual only under the subjective conditions of measurement. The next step was to treat the wave function as a probability of finding a particle, for according to Heisenberg, the wave function which makes a quantum jump when the experiment is performed represents not reality, but our incomplete knowledge of reality. He then makes the "subjective" statement that "the observation plays a decisive role in the event and that the reality varies, depending upon whether we observe it or not."[167] Mention of the observer as fundamental to the question of reality in quantum theory eventually led to a discussion of the role of "consciousness." One finds the rather strange-sounding but interesting idea from the American, E. Wigner, that "'it is the entering of an impression into our consciousness which alters the wave function' and that this awareness therefore influences the quantum description of objects."[168] This observation of Wigner is not so strange if one remembers that in classical probability theory, the probability is a function of the ignorance of the observer. It is just such a claim that led Popper and Bunge to attempt "to exorcize the ghost called 'consciousness' or 'the observer' from quantum mechanics."[169] Perhaps the most representative assertion of the Copenhagen school was the remark of Heisenberg, now cited more fully: "The conception of objective reality . . . has thus evaporated . . . into the transparent

clarity of a mathematics that represents no longer the behaviour of particles but rather our knowledge of this behaviour."[170] The concept of "thing" had undergone a radical transformation.

Characteristic of the Copenhagen interpretation was Bohr's famous Principle of Complementarity which claimed the mutual exclusiveness but simultaneous necessity of "wave" and "particle" interpretations of quantum mechanical properties.[170a]

The Copenhagen interpretation of quantum mechanics did not go unchallenged; physicists *and* philosophers questioned its fundamental claims. Among the physicists, one thinks of Einstein, Schrödinger, and de Broglie. The theories of the last two named took the form of a wave mechanics which tried to explain quantum behavior completely in terms of continuities.

The reaction of Einstein to the Copenhagen theory was both expected and puzzling. Determinism was so much a part of his being that he could not accept Heisenberg's Uncertainty Principle as a complete description of reality, and even spoke of "hidden variables" whose discovery might lead to a more complete, i.e. a deterministic, interpretation. The search for these "hidden variables" is still on in physics; even Bohm recently favored this interpretation.[171] Einstein consistently opposed the indeterminism which resulted from the ideas of Heisenberg, Bohr, and Born. In one of Einstein's charming communications which is included in *The Born–Einstein Letters* there is a permanent record of his fundamental objection:

> You [i.e. Born] believe in the God who plays dice, and I in complete law and order in a world which objectively exists, and which I, in a wildly speculative way, am trying to capture. I firmly *believe*, but I hope that someone will discover a more realistic way, or rather a more tangible basis than it has been my lot to find. Even the great initial success of the quantum theory does not make me believe in the fundamental dice-game, although I am well aware that our younger colleagues interpret this as a consequence of senility. No doubt the day will come when we will see whose instinctive attitude [sic] was the correct one.[172]

Earlier in the same collection Einstein had spoken on the same issue in words now famous: "Quantum mechanics is certainly imposing. But an inner voice tells me that it is not yet the real thing. The theory says a lot, but does not really bring us any closer to the secret of the 'old one.' I, at any rate, am convinced that *He*

is not playing at dice."[173] It should be said in passing that there is a renewed effort today among physicists further to explore Einstein's statistical interpretation of quantum theory.

What seems odd about Einstein's reaction – or I should say puzzling – is that the theory as developed by Bohr, Born, and Heisenberg seemed to fulfill the intentions Einstein exhibited in his earlier work on Special Relativity. Born says as much in his commentary to one of Einstein's letters: "We had come to different philosophical points of view between which there could be no bridge. But, even so, I believe that I followed the teachings of the young Einstein."[174] It is perplexing to find in one of these historic letters the Einstein of the daring views of earlier years, with all their insight into the relational character of reality, making the following claim about physical reality:

> If one asks what, irrespective of quantum mechanics, is characteristic of the world of ideas of physics, one is first of all struck by the following: the concepts of physics relate to a real outside world, that is, ideas are established relating to things such as bodies, fields, etc., which claim a "real existence" that is independent of the perceiving subject – ideas which, on the other hand, have been brought into as secure a relationship as possible with sense-data.

He continues:

> It is further characteristic of these physical objects that they are thought of as arranged in a space–time continuum. An essential aspect of this arrangement of things in physics is that they lay claim, at a certain time, to an existence independent of one another, provided these objects "are situated in different parts of space." Unless one makes this kind of assumption about the independence of the existence (the "being-thus") of objects which are far apart from one another in space – which stems in the first place from everyday thinking – physical thinking in the familiar sense would not be possible.[175]

It may be that Einstein was not able completely to free himself from the Newtonian paradigm; that his understanding of matter – as daring and innovative as it was – was still metaphysically wedded to some form of material atomism. As I shall argue later. it was Whitehead, not Einstein, who made the final break in the context of relativity and quantum theory.

This discussion of quantum theory would not be complete in any sense, and would in fact be misleading, if it failed to recount

certain new developments which attempt to dispel the ghost of quantum theory in its Copenhagen form. I shall confine attention to two of its chief spokesmen, Karl Popper and Mario Bunge. Beneath the façade of argumentative journalism which runs rampant through Popper's attempt to "exorcize the ghost of quantum mechanics" lies a serious effort to clear up what he calls "the great quantum muddle." Since in his view it is the misinterpretation of quantum mechanical principles that accounts for this muddle, there is a possibility of a "realism" in physics again if their right meaning can be restored. If Popper is correct in his technical arguments, one would be forced to agree with him that the Copenhagen metaphysics was wrongheaded and that "nothing has changed since GALLILEO or NEWTON or FARADAY concerning the status of the role of the 'observer' or of our 'consciousness' or of our 'information' in physics."[176] A further consequence would be that the wave-particle dualism is reduced to a fiction, for the prime entities would again be claimed to be particles.

Popper's arguments for resolving the "muddle" are worth repeating: (1) the correct understanding that problems of the new quantum theory are statistical in nature leads us to reject the Copenhagen view that the probabilistic character of the theory was due to "our lack of knowledge."[177] Popper argues that such an interpretation of the state of affairs introduced the observer, or subject, into quantum theory. It should be pointed out that Popper has long advocated his own particular theory of probability which departs from the classical pattern and has not been unanimously received. (2) Popper accepts Heisenberg's Uncertainty formula, but holds that its validity is purely statistical; contrary to Heisenberg he argues that it does not set limits to our knowledge, rather it "*adds* to our knowledge."[178] Popper holds that it is proper to speak of particles as having sharp positions and momenta, and regards the position that denies this as simply a dogma based on personal belief. His main theme throughout is that the observer intruded into the theory because of what he calls "bad philosophy," i.e. the intrusion of consciousness into classical probability theory which his theory of *propensities of real particles* does not allow.

Something of the "realism" assumed in Popper's theory of "probability" over against the subjectivity of that form of probability theory advocated by Heisenberg is readily apparent in Popper's frequent example of tossing a penny:

> Assume that we have tossed a penny. . . . The probability of each of its possible states equals 1/2. As long as we don't look at the result of our toss, we *can* still say that the probability will be 1/2. If we bend down and look, it suddenly 'changes': one probability becomes 1, the other 0. Was there a quantum jump, owing to our looking? Was the penny influenced by our observation? Obviously not. (The penny is a 'classical' particle.) Not even the probability (or propensity) was influenced. There is no more involved here, or in *any* reduction of the wave packet, than the trivial principle: if our information contains the result of an experiment, then the probability of this result, relative to this information (regarded as part of the experiment's specifications), will always trivially be $p(a,a) = 1$.[179]

I do not propose to try to demolish Popper's argument, but cannot refrain from raising the query as to whether Popper has not trivialized the quantum difficulty by treating it as a non-quantum phenomenon, i.e. as a classical one. Even if one should agree with him that the penny makes no "quantum jump," there is still the real problem that Heisenberg et al. were not dealing with pennies (i.e. macroscopic phenomena) but with quantum phenomena (i.e. microscopic). There is even the suggestion later on in the quotation given above of some analogy between the penny and "*any* reduction of the wave packet" which overlooks the very difficulty which Popper wishes to resolve, viz. that it is precisely the strangeness of the microworld that is unavoidable. That strangeness does not seem to be, as Popper assumes, a consequence of bad theory alone.

Popper's own theory of *propensities* seems to be a generalization of general probability theory to account for any kind of phenomenon; thus it reflects in part some concession to the difference between micro- and macroworlds. He holds that the propensities which characterize physical phenomena are not properties of particles, photons, electrons, or pennies (sic); rather they are "*properties of the repeatable experimental arrangement.*" Thus, he contends, there is no duality of particles and fields, for the particles are the *objects* of experimentation while the probabilities are propensity fields which as such are properties of the experimental arrangement.[180] To some it may be tempting to think that Popper – as he claims – has indeed removed the bad philosophy from quantum mechanics; but to agree that such is the case is not to assume that he has eliminated *all* philosophy from it. It is rather to concede that his philosophy is "better";

but to decide that question calls for a fundamental kind of inquiry that goes beyond the formalism by which Popper defends his view, into the very heart of Popper's ideas about truth and the nature of physical theory. While I cannot go into these matters here, I must state that his meta-theory is complicated by a questionable theory of truth which guides his work and upon which its credibility depends.

The other major spokesman for "ghost-free" quantum mechanics is Mario Bunge. His exhibitionist journalism is mainly directed against the operationalist physics of the 1920s which – on his view –

> reduced the physical object to little more than the grin of the Cheshire cat. What remained were observers and observables, and the latter were not real properties of autonomously existing things [sic] but mere possibilities of observation. Not observations on something out there but just observations. The external world was gone; only "its" representation was left.[181]

The hope of Bunge's concerted program of realism is to remove what he calls "psychological elements" from quantum theory.[182]

Bunge's major contribution to the volume on *Quantum Theory and Reality* (which he edited) is largely a realistic tour de force based on the *assumption* that "physical theories are supposed to say what the world looks like even when nobody is looking."[183] He is mainly perturbed by the Copenhagen claim that "to look" changes the probability, and hence the reality of the "particle." Much of the article contains *ad absurdum* arguments like the following:

> Indeed, the claim that things acquire their properties just because we condescend to look at them is sheer anthropocentrism and, in order to be carried out consistently, it requires filling the whole cosmos with a staff of observers ever ready to take infinitely precise measurements of anything conceivable – just to keep the world going. And this is merely a modern version of animism.[184]

Perhaps only one comment on this is in order: his cosmic observers are needed only to keep *his* world going.

The presupposition on which both Popper and Bunge seem to lean heavily is that Quantum Theory in its subjectivist form is the major, if not the sole, barrier to the return of physical and metaphysical realism, and that once Quantum Theory can be exorcized

of its ghosts, realism will triumph. Against this it should be argued that the debate between objectivism and subjectivism in both physics and metaphysics is much broader than the issues about the quantum, however much support each may claim for his favored interpretation. The danger of using the quantum theory one prefers to resolve the reality question is the circularity involved; the metaphysical commitments of the physicist play some role in the way he formulates the quantum problem and resolves it. This is as true of the Copenhagen view as of this counter-view of Popper and Bunge. Admitting this does not relativize the value of quantum mechanics, for I have said only that the physicists' commitments play *some* role . . . not that a particular theory is only a mirror of these commitments. The case which I am trying to build here with the discussion of the Copenhagen view is not thought to be conclusive proof of the breakdown of the subject–object paradigm, but only contributory to it as part of the cumulative weakening which that paradigm has experienced in this century.

In some respects the "reality" question has become increasingly the domain of philosophers,[185] with physicists still exploring the puzzles uncovered in the 1920s and 1930s. I say this quite aware of Popper's twofold claim that "the Copenhagen interpretation ceased to exist long ago" and that "most physicists who quite honestly believe it do not pay any attention to it in actual practice."[186] While it is difficult to deal with such generalizations about the quantity of those who espouse any given view (such as the Copenhagen Theory) at a given time, it is not so difficult to find those who are building on its foundations. Such seems to be the case with one of the most radical forms of quantum theory, viz. the Everett–Wheeler–Graham Theory. I shall deal with it briefly here to show that just at the time the "realists" are exorcizing the "ghost of consciousness" in Quantum Theory, certain frontline physicists announced a "ghost world." Everett's historic article which pioneered the new theory argues the cogency of the superposition of states, i.e. the view that the collapse of the state vector leads to the "actualization" of both possibilities. The novelty of Everett's thesis, however, is that he presses the conclusion to its logical and cosmological extremity. The technical description offered by Everett is as follows:

Throughout all of a sequence of observation processes there is only one physical system representing the observer, yet there is no single unique *state* of the observer (which follows from the representations of interacting systems). Nevertheless, there is a representation in terms of a *superposition*, each element of which contains a definite observer state and a corresponding system state. Thus with each succeeding observation (or interaction), the observer state "branches" into a number of different states. Each branch represents a different outcome of the measurement and the corresponding *eigenstate* for the object–system state. All branches exist *simultaneously in the superposition after any given sequence of observations.*[187]

Since non-physicists will wonder how far to press the implications of this radical claim, the following footnote is provided by Everett:

In reply to a preprint of this article some correspondents have raised the question of the "transition from possible to actual," arguing that in "reality" there is – as our experience testifies – no such splitting of observer states, so that only one branch can ever actually exist. Since this point may occur to other readers the following is offered in explanation.

The whole issue of the transition from "possible" to "actual" is taken care of in the theory in a very simple way – there is no such transition, nor is such a transition necessary for the theory to be in accord with our experience. From the viewpoint of the theory *all* elements of a superposition (all "branches") are "actual," none any more "real" than the rest. It is unnecessary to suppose that all but one are somehow destroyed, since all the separate elements of a superposition individually obey the wave equation with complete indifference to the presence or absence ("actuality" or not) of any other elements. This total lack of effect of one branch on another also implies that no observer will ever be aware of any "splitting" process.[188]

The note continues with Everett defending his theory with the argument that his theory, like that of Copernicus, "predicts that our experience will be what it in fact is."[189]

This "relative state" theory was endorsed early on by John Wheeler, the distinguished American physicist under whose direction it was formulated as a graduate project. After a careful defense of the rigor of Everett's proposed theory, Wheeler concluded that, while "the relative state theory does not pretend to answer all the questions of physics," the concept "does demand a totally new view of the foundational character of physics."[190]

Against Everett's careful caveat about making the issue one of "actuality," there ensued a vigorous, if perhaps low-level, debate among physicists as to the physical implications of this theory,

once referred to as the Everett–Wheeler–Graham Theory. Bryce S. DeWitt, who provoked the popular discussion, states that according to the Everett–Wheeler–Graham Theory, "the real universe is . . . constantly splitting into a stupendous number of branches, all resulting from the measurement-like interactions between its myriad of components. Moreover, every quantum transition taking place on every star, in every galaxy, in every remote corner of the universe is splitting our local world on earth into myriads of copies of itself."[191] Everett's theory created some stir among physicists who responded variously to the theory as DeWitt formulated it.[192] Since my purpose in referring to this new theory is not to determine its cogency, but simply to illustrate the continuing interest in the Copenhagen theory,[193] I need not report extensively on the subsequent reaction to it.

One lesson to be learned from an in-depth survey of the rise of modern physics is not that classical physics was wrong within the range of its concerns, but that it lacked the comprehensiveness required by the larger base of experience to which modern physics would have to address itself. Within a first-order approximation, General Relativity arrives at the Newtonian law of gravitation for distances of the order of the solar system and at velocities which are small with respect to the speed of light. Also, the laws of quantum mechanics pass over into the laws of classical, i.e. macroscopic, physics according to the "Correspondence Principle." Thus the movement toward greater generality, or comprehensiveness, was required to bring physical theory into line with the broader range of experience which physicists faced in the late nineteenth and early twentieth centuries. Moreover, generalization became the means which brought greater intelligibility into modern physics by relaxing the restrictions that made classical physics coherent.

2. In Modern Metaphysics

In two of the major metaphysical systems developed in this century remarkable progress was made toward an ultimate generalization of experience, with physical insights being integrated into a higher metaphysical schematization. I have chosen to pay particular attention to these metaphysical systems because they provide

unusual clarification of the notion of a "thing" and, accordingly, offer responsible guidance toward the formulation of a fully adequate statement of reality. The first of the two systems to be treated is Alfred North Whitehead's Philosophy of Organism; the second, the Systems Philosophy of Ervin Laszlo.

a. Alfred North Whitehead: His Physics and Metaphysics

To Whitehead, one of the most gifted philosophers of this century, it seemed possible to unite the whole of experience, both physical and mental, by generalizing the new directions in modern physics into a vast metaphysical scheme. Admittedly awakened from his dogmatic slumber by Einstein, Whitehead made substantial contributions to physical theory in addition to drafting a coherent empirical theory of relativity. It is my intention at this point to focus on the physical and metaphysical ideas of Whitehead, with a view to showing their ideal unification in any adequate theory of reality.

i. The Mathematical–Physical Foundations. By the time Whitehead had turned to metaphysics per se in 1918, he had already established himself as one of the greatest mathematicians of the century. Upon entering Trinity College in 1880, he devoted himself to mathematics. As an undergraduate, Whitehead attended lectures only on pure and applied mathematics. During that time, as he wrote in his autobiography, he "never went inside another lecture room."[194] It would be a mistake, however, to think of him as too narrowly focused on mathematics, for he adds that by 1885, he "nearly knew by heart parts of Kant's *Critique of Pure Reason*," and had spent countless hours in conversation on philosophical topics.[195] His *Treatise on Universal Algebra*, published in 1891, led to his nomination to the Royal Society in 1903. Even without the voluminous philosophical writings which would follow after World War I, Whitehead had earned for himself a permanent place in the history of Western thought with the great work, *Principia Mathematica*, which he and Russell completed in 1910.

After his move to the University of London in 1918, Whitehead's attention shifted to philosophy; and the three works which he published there were foundational for the metaphysical system which he would bring to fruition after his move to Harvard in

1924. The three publications were: *An Enquiry Concerning the Principles of Natural Knowledge* (1919), *The Concept of Nature* (1920), and *The Principle of Relativity* (1922). As shall become evident in what follows, even his scientific work on Relativity, which included a theory of gravitation substantially different from Einstein's General Theory of Relativity, was integrally bound up with his developing metaphysical principles. As for Einstein, so for Whitehead, the domains of physics and metaphysics – which some were content to keep separate – were forged into a unity. If this point seems more appropriate for Whitehead than for Einstein, it is only because the former developed the metaphysical theorizing into a full-blown natural philosophy and, indeed, into a metaphysical system. I shall discuss Whitehead's physical theories in terms of the philosophical matrix out of which they arose, hoping in this way to show the mathematical–physical foundation of his metaphysics.

It is clear that Whitehead's theory of relativity originated in part from the pioneering work of Einstein. His book on *The Principle of Relativity* began with these words: "The present work is an exposition of an alternative rendering of the theory of relativity. It takes its rise from that 'awakening from dogmatic slumber' – to use Kant's phrase – which we owe to Einstein and Minkowski."[196] It should be borne in mind that his more decidedly philosophical works of 1919 and 1920 also alluded to the impact of relativity theory on his perspective. Even before his book on relativity appeared, he had already stated in *The Concept of Nature* the grounds of his reservations about Special and General Relativity:

> Einstein's method of using the theory of tensors is adopted, but the application is worked out on different lines and from different assumptions. Those of his results which have been verified by experience are obtained also by my methods. *The divergence chiefly arises from the fact that I do not accept his theory of non-uniform space or his assumption as to the peculiar fundamental character of light-signals.*[197]

In the book Whitehead published a year earlier, *The Principles of Natural Knowledge*, the central problem raised, namely, "How is space rooted in experience?" derived principally – as he said – from "the successive labours of Larmor, Lorentz, Einstein, and

Minkovski [sic]." These have "opened a new world of thought as to the relations of space and time to the ultimate data of perceptual knowledge."[198] It would be a mistake, however, to judge Whitehead's physical vision as wholly derivative from the work of others.[199] In one of the classical articles which serves to set these matters into perspective, Victor Lowe argued that it is a misconception to hold "that Einstein's theory of relativity acted on Whitehead as an impulse from the outside that was needed to release his latent philosophical powers."[200] Lowe's own view of the matter is somewhat sceptical, viz. "*exactly* what role is to be ascribed to the theory of relativity in Whitehead's development, it is impossible to say . . . it is practically certain that Minkowski's work influenced Whitehead considerably, and that Einstein's spurred him on."[201] Lowe is correct to distinguish Minkowski from Einstein in respect to the General Theory of Relativity which Whitehead rejected for reasons which will become clearer later on; but it is misleading not to stress the dependence of Minkowski on Einstein's Special Theory.

Before exploring the intricacies of this problem, it seems appropriate to ask whether Whitehead's natural philosophy was also indebted to the progress being made at that time in the field of quantum theory. It must be remembered that Whitehead's early metaphysical ideas reflected the state of physical theory prior to the great era of Quantum Mechanics which began in 1925. A consequence of this is that it is very difficult to assess the relevance of, say, the Copenhagen school for his philosophy of organism. That he was aware of and sensitive to the world of the quantum is evident in his early philosophical writings. In *The Concept of Nature*, he called attention to the fact that a major postulate of quantum theory was "perfectly consistent" with his doctrine of "objects."[202] In his *Science and the Modern World*, he seemed pleased that the problem which quantum physics hands over to the philosophers having to do with "discontinuous existence in space" forces us to "revise all our notions of the ultimate character of material existence. For when we penetrate to these final entities, this startling discontinuity of spatial existence discloses itself."[203] In *Process and Reality*, published in 1929, Whitehead appealed to recent work on quantum theory as supportive evidence for his attack on "scientific materialism" and for his own "pluralistic" cosmology.[204]

It is a tribute to the metaphysical insight of Whitehead that subsequent theorists have been able in light of the continuing progress of quantum theory to extend his creative program and to preserve its distinctive features with only minor modifications.[205] It is probably incorrect, however, to link Whitehead's theory of physical reality too closely to work on the quantum, as if his metaphysical vision were solely a function of it. For that metaphysical vision – however consonant with quantum theory in its early form – had its roots in philosophical theories formulated long before the twentieth century. On this question of the relationship of Whitehead's natural philosophy to quantum theory, I am in agreement with the judgment of Victor Lowe that:

> There is no evidence that any twentieth century developments in the field of science lured Whitehead into metaphysics at this time [i.e. about 1925]. ... It is natural to include the quantum theory among influences on him; I think, however, that in fact this was to him a supporting illustration rather than a formative influence in the creation of his atomic pluralism.[206]

I wish to add to Lowe's appraisal only one additional judgment. In his discussion of Whitehead's "Theory of Objects," Robert M. Palter looks upon the work on Quantum Mechanics after 1924 as a "confirmation" of Whitehead's prediction "that the ultimate scientific objects may eventually turn out to be non-uniform (and hence not 'material' even in the limited sense in which electrons and protons are 'material')," for since that date physicists have been introducing "scientific objects which less and less resemble ordinary material objects."[207] Perhaps this statement claims too much; it would be more judicious to approach the problem from a more distinctly philosophical perspective which sees both quantum theory and Whitehead's view of reality in the context of the age-old philosophical quest to understand what Leclerc has called "the nature of physical existence."[208] Leclerc has in fact placed this issue in such a perspective, and I shall have occasion shortly to examine its relevance to the issue before us.

Having said this I may be permitted meanwhile to return to the larger issue of Whitehead's debt to relativity theory, in which it will become apparent that his theory of relativity differs from Einstein's precisely with respect to the question of entitivity. It is my intention to show this difference more precisely, and in

order to do so I begin with the commonly accepted premise that Whitehead accepted Special Relativity, though with important modifications, while rejecting the General Theory of Relativity.

What were these modifications and why were they tendered? Whitehead, as I hinted earlier, accepted the Special Theory as interpreted by Minkowski. As a geometer himself, he found Minkowski's four-dimensional geometry of space–time congenial to his own conception of physical reality. Especially fundamental to Whitehead's natural philosophy was the concept of the light-cone which was first advanced by Minkowski. It will be remembered that Minkowskian space–time was flat, i.e. Euclidean. Only with the theory of General Relativity in 1916 did Einstein propose a view of space–time–matter based on Riemannian geometry. Even so, Whitehead's "acceptance" of Special Relativity led him to share the rejection of Newton's Absolute Space. But whereas Einstein took the theory to mean the end of any possible meaning to absolute time as well, Whitehead was reluctant to share this conclusion. He in fact rejected Einstein's identification of the notation "*c*" in the Lorentz transformations with the velocity of light *in vacuo* upon which he thought Einstein's dubious denial of simultaneity was grounded. The whole matter of the role of light signals is described ably by Northrop:

> In them [i.e. the Lorentz transformations] an invariant constant *c* appears, referring to the velocity of light propagation and having the numerical value of 186,000 miles per second.
>
> On Einstein's physical relational theory the presence of this constant in the transformation equations follows necessarily, since simultaneity for spatially separated events is defined in terms of light propagation, and the relativity of time and space for different physical frames of reference is deduced from this definition.
>
> On Whitehead's theory all this is a mystery. As we have noted, for him the connection between space and time in a given time-system and between different time-systems has nothing to do with light propagation or physical frames of reference. This makes it difficult to understand why the constant *c* should have anything to do with the transformation equations.[209]

His rejection of Einstein's denial of simultaneity derived from his premise that we do in fact experience "simultaneity" and we must remain true to what we experience. If one delves more deeply into this so-called "experience of simultaneity," we find that it is beset with grave difficulties, as pointed out by E.B.

McGilvary, who began his critique of Whitehead by quoting from the latter's objection to the Special Theory as articulated by Einstein:

> In the first place, light signals are very important elements in our lives, but still we cannot but feel that the signal-theory somewhat exaggerates their position. The very meaning of simultaneity is made to depend on them. There are blind people and dark cloudy nights, and neither blind people nor people in the dark are deficient in a sense of simultaneity. They know quite well what it means to bark both their shins at the same instant. In fact the determination of simultaneity in this way is never made, and if it could be made would not be accurate; for we live in air and not *in vacuo*.[210]

McGilvary argues that Whitehead misses Einstein's central point, that there is a fundamental distinction between simultaneity at the same place and at a distance; that the stipulation "*in vacuo*" is insensitive to the nature of physical "constants"; and finally, that Whitehead is in error when he says of Einstein's definition of simultaneity: "The very meaning of simultaneity is made to depend on light signals," and that "the determination of simultaneity in this way [i.e. by electromagnetic signals] is never made."[211] Whatever the value of McGilvary's objections, both he and Whitehead seem not to have appreciated the conceptual precision of the Special Theory, which does not prove anything about the speed of light, but only proposes to show what the dynamical situation is if one assumes the invariance of the speed of light, i.e. that there is no ether.

As to Whitehead's other objection, namely, that it is arbitrary to choose one of the ways messages are transmitted (i.e. light signals) as opposed to others provided by nature (i.e. sound waves, fluid waves, nerve excitation), McGilvary is correct in pointing out that only the former exhibits "the character of having the same velocity in both of two systems in relative motion,"[212] and that even Whitehead virtually admits its special character when he grants this statement as an "approximation."

Einstein knew of Whitehead's reservations about his theory, but seemed unable to understand their necessity. When Northrop discussed with Einstein this problem of the simultaneity of spatially separated events, the latter admitted that he did not understand Whitehead on this point, to which Northrop replied:

There is no difficulty in understanding him. When Whitehead affirms an intuitively given meaning for the simultaneity of spatially separated events, he means immediately sensed phenomenological events, not postulated public physically defined events. On this point he is clearly right. We certainly do see a flash in the distant visual space of sky now, while we hear an explosion beside us. His reason for maintaining that this is the only kind of simultaneity which is given arises from his desire, in order to meet epistemological philosophical difficulties, to have only one continuum of intuitively given events, and to avoid the bifurcation between these phenomenal events and the postulated physically defined public events.[213]

Einstein's reply was brief but profound:

Oh! Is that what he means? That would be wonderful! So many problems would be solved were it true! Unfortunately, it is a fairy tale. Our world is not as simple as that. . . . On that theory there would be no meaning to two observers speaking about the same event.[214]

This was a fundamental difference between great minds which was never resolved.

If attention is focused on Einstein's General Theory of Relativity and Whitehead's alternative theory of gravity, even more fundamental differences in these two visions of the physical world become apparent. While one is left to surmise from Einstein's virtual silence on the notions of Whitehead how he construed the difference of this theory from that of the latter, in the writings of Whitehead there is an extensive rebuttal of Einstein's theory of gravity. It is accordingly appropriate to proceed by appealing to Whitehead's own statements.

If one leaves aside for the moment the deep metaphysical reasons for Whitehead's rejection of General Relativity and concentrates on the more obvious ones, the first reason would have to be a different conception of the relationship between geometry and physics.

In his book *The Principle of Relativity*, published only six years after Einstein's General Theory, Whitehead rejected Einstein's equation of physics and geometry in these terms:

It is inherent in my theory to maintain the old division between physics and geometry. Physics is the science of the contingent relations of nature and geometry expresses its uniform relatedness.[215]

If one seeks a fundamental cause of this great divergence between two of the then most famous geometers, it is probably to be found where Palter locates it; viz. in the fact that whereas Einstein was committed to *metrical* geometry, Whitehead operated from the primary position of *projective* geometry.[216] The simplest way to state what is involved here is to say that whereas the concept of distance is the key to metrical geometry and led Einstein to frame a fundamental metrical tensor, that concept plays no role in projective geometry. Either the cause or the result of Whitehead's preference for the latter lies in what Palter calls "the fundamental theorem of projective geometry," according to which "a projective *transformation* [as opposed to a metrical one] can easily be defined in terms of our primitive concepts."[217] As Whitehead knew, projective geometry is a more general form of geometry than metrical, in that – in Palter's words – "projective geometry is simply elliptical geometry with all metrical relations omitted."[218] A careful reading of the fundamental difference between these two types of geometry might well lead one to conclude that his commitment to projective geometry accounts not only for Whitehead's rejection of General Relativity, but for the entire theory of the extensive continuum as well which is so central to his "cosmology."

By keeping geometry and physics carefully separated, Whitehead was able to maintain his view that "geometry expresses the uniform relatedness of nature" (i.e. a necessary idea). A further gain is that physics (which deals purely with the contingent) furnishes the means of determining which scheme of uniform relatedness best describes the physical world. In Einstein's theory, physics and geometry are so integrally related that in the last analysis their truth "is in your mind." But for Whitehead, the final test of the worth of a particular geometrical scheme is a matter for physical experiment. In *Science and the Modern World*, for instance, where he compares the features of General Relativity with his own theory of gravitation, he notes that since they both make predictions – some exactly alike and some different, "The only method of selection between them is to wait for experimental evidence respecting those effects on which the formulae differ."[219]

For all their fundamental differences of outlook in philosophy, mathematics and physics, Whitehead's theory of gravitation is

not so radically different from Einstein's: both approximate the Newtonian laws within the classical limit; both account exactly for the advance of the perihelion of Mercury; and both give the same "eclipse results." The experimental difference between them is quite small, and cannot be decided in the present state of experimentation – or so Whitehead assumed. Then he indulges in a great act of defensive inclusivism: "If the above formula[220] gives results which are discrepant with observation, it would be quite possible with my general theory of nature to adopt Einstein's formula, based upon his differential equations, for the determination of the gravitational field. They have however, as initial assumptions, the disadvantage of being difficult to solve and not linear."[221]

It would seem justifiable, on the basis of Whitehead's remark, to draw a conclusion which I have long suspected, viz. that the fundamental difference between Einstein and Whitehead is philosophical. The fact that both of their theories of gravitation arrive at almost identical predictions seems to confirm the formulation of their respective positions given by Northrop: namely, Einstein held to a *physical* relational theory of space, while Whitehead advocated a *phenomenal* relational theory of space.[222] The fact that these are both "relational" accounts for their similar predictions; the terms "physical" and "phenomenal" point to a major metaphysical difference. Northrop speaks to this difference as follows: on the one hand, whereas in Einstein's Special Theory a relational theory of space was substituted for Newton's absolute space, in the General Theory "this relatedness was shown to have physical objects or events defined in terms of collocations of physical objects as its relata"; on the other, the "failure of Einstein and the contemporary physicists to reconstruct their theory of the physical object [demanded by their physical relational theory of space] as well as their theory of space and time as a consequence of Einstein's rejection of absolute space, suggests to Whitehead that Einstein's physical relational theory is but a half-way point in the reconstruction of the concepts of modern science."[223] Northrop offers a sketch of the train of Whitehead's thinking on this matter:

> Since physical objects can no longer be conceived as Newton defined them, as entities with position in postulated absolute space, how are we to conceive them? Postulated absolute space being untenable, Whitehead believes that

postulated physical objects, either molar or atomic, cannot be maintained either. This makes it impossible to define away the events we immediately sense, as Newton's and Einstein's physics does, in terms of postulated physical objects and propagations. Thus, bifurcation disappears, and the only events with which physics is left are the immediately sensed ones, and the only possible relata for the relational theory of space and time to relate are these immediately sensed events.[224]

The additional metaphysical clarification effected by Whitehead is apparent, even if the term "phenomenal" seems inadequate as a characterization of Whitehead's theory. Although there has been a resurgence of interest in Whitehead's theory of gravitation,[225] the interest I have in his metaphysical theory lies in his concept of a thing. I have up to this point treated the scientific aspects of his theory solely for the purpose of showing the unity of physics and metaphysics in his thought. Since that unity is itself a metaphysical idea, it is appropriate now to turn to his philosophy as a whole.

ii. Whitehead's Metaphysical Vision. Upon reading Whitehead's later works, one becomes increasingly aware of being in the presence not only of an interesting system, but of a passionate vision. Only when one begins to share something of that vision himself, and then only to the degree that one has entered into it, do the Whiteheadian texts lose that aura of utter strangeness that puzzles the uninitiate. A period of confidence ensues in which one feels he finally "understands" Whitehead. Then comes a feeling of inadequacy when one is called upon to re-state that vision to others, as I am now under some compulsion to do.

There are two principal aspects of Whitehead's conception of reality: the logical principles which guided him from his earlier work on mathematics and logic through his general philosophical writings; and the entities which constitute the "elements" of his view of the world. This brief consideration of his thought will focus on the entities, i.e. on his notion of "things."

It is important to realize from the beginning that Whitehead gave to his greatest single work, his *Process and Reality*, the revealing subtitle: An Essay in Cosmology. To those conditioned by the almost exclusive use of the term by physicists to characterize their theories of the origin and/or large-scale structure of

the Universe, it may seem strange to see the term cosmology used in this comprehensive sense. One becomes aware immediately of the extended sense which Whitehead's term cosmology carries upon reading on the second page of *Process and Reality*, "It must be one of the motives of a complete cosmology, to construct a system of ideas which bring the aesthetic, moral, and religious interests into relation with those concepts of the world which have their origin in natural science."[226] The goal which Whitehead set for himself in this work was ambitious, but not wholly unrealistic. He wrote:

> At the end, in so far as the enterprise has been successful, there should be no problem of space–time, or of epistemology, or of causality, left over for discussion. The scheme should have developed all those generic notions adequate for the expression of any possible interconnection of things.[227]

The word "interconnection" is the vital clue; for the whole of this work, as I perceive its intention, is an elaboration of the idea, expressed so elegantly in *The Concept of Nature*, that "Nature is relatedness." If one should wonder whether, for Whitehead, "relatedness" is a fundamental notion or is merely ancillary to some more basic affirmation about what is real, all doubt is dispelled in the early pages of *Process and Reality* where he articulates what might be called the essence of his vision:

> Descartes retained in his metaphysical doctrine the Aristotelian dominance of the category of "quality" over that of "relatedness." In these lectures [i.e. *Process and Reality*] "relatedness" is dominant over "quality." All relatedness has its foundation in the relatedness of actualities; and such relatedness is wholly concerned with the appropriation of the dead by the living – that is to say, with "objective immortality" whereby what is divested of its own living immediacy becomes a real component in other living immediacies of becoming. This is the doctrine that the creative advance of the world is the becoming, the perishing, and the objective immortalities of those things which jointly constitute stubborn fact.[228]

In respect of the position to be articulated in Part II of this essay,[229] the importance Whitehead here assigns to "relatedness" is noteworthy. In this quotation he approaches an identification of "relatedness" with "actualization" in a way which would seem to be tantamount to an endorsement of the dogma of universal internality, despite Hartshorne's rejection of the dogma for

himself.[230] Since Whitehead never systematically sets forth his doctrine of relations, some difference of opinion on this matter is to be expected.

Whitehead's term "actualities" betrays his fundamental commitment to the distinction between "actuality" and "potentiality" – a distinction which betrays his debt both to Aristotle and Leibniz. One of the first steps toward understanding Whitehead's thought is to determine what for him is actual and what potential, and then to seek to determine the relationship between these two concepts. I shall attempt first to set forth his notion of fundamental entities.

As for Leibniz, so for Whitehead, the primary entities are simple. Their aggregation produces abstractions which must not be accorded fundamentality. The chief metaphysical error to be avoided – and the one most commonly made – is "the fallacy of misplaced concreteness" whereby these abstractions are accorded an ontological status. The term Whitehead chooses for his fundamentals reflects his ontological principle: he calls them "*actual* entities." While the word "entities" may be used in a broad generic sense, actuality may be claimed only for the simple components of experience. Entities which are aggregates of actual entities are derivative; they comprise what Whitehead calls "the apparent world,"[231] and it is this world of the senses which is the domain of natural science. It is to these aggregates that the concept of motion pertains, and not to actual entities, for the latter – as he says in Leibnizian fashion – "never move."[232] It is unthinkable that actual entities should move, for in his understanding of them – here again reflecting Leibniz's relational view of reality – "the actual entity, in virtue of being *what* it is, is also *where* it is."[233]

The actual entities are the *res verae* of the real world; they are "the most concrete elements in our experience . . . the final real things of which the world is made up."[234] He adds: "There is no going behind actual entities to find anything more real."[235] Endemic to his empiricism is also the notion, expressed above, that it must avoid asserting that the abstract aggregates of actual entities are "concrete." Such a fallacy lies at the heart of all materialism, whether in philosophy or science. In fact, Whitehead rejects the term "matter" because it always evokes the feeling

of concreteness at the wrong level of experience. Or better said: our experience is not of abstract entities which are falsely concretized in the common concept of "matter," but of actual entities; we experience what is in fact real. We falsify experience when we concretize the abstract entities of our conceptual world. Whitehead has too often been misunderstood in this regard by those who would claim him as an empiricist in the narrow sense. He does take over the notion of "extension" in his *terminus technicus* "the extensive continuum," but rejects the attribution to it of the idea of "substance." It is rather the domain of potentiality.

Whitehead also employs the term "actual occasions" which utilizes the word "occasions" also used by Leibniz. Since the word "occasion" is closer than the term "entity" to the Whiteheadian term "event," it is appropriate here to inquire about the meaning of this latter term and its relation to the concept of actual occasions. While an actual occasion is the most concrete element in our experience, an event is "the most concrete fact capable of separate discrimination."[236] It must not be surmised from his further statement, i.e. "perception involves apprehension of the event and recognition of the factors of its character," that he has given up his empiricism as explicated above. Whitehead regards "events" as "nexūs of actual occasions" and seeks to avoid contradiction by asserting that "an actual occasion is the limiting type of event with only one member."[237] The context of these remarks is crucial:

> Thus the actual world is built up of actual occasions; and by the ontological principle whatever things are in any sense of "existence" are derived by *abstraction* from actual occasions. I shall use the term "event" in the more general sense of a nexus of actual occasions, inter-related in some determinate fashion in one extensive continuum.[238]

Unlike Leibniz's windowless monads synchronized by a pre-established harmony, Whitehead's actual entities act upon other actual entities. Such action, which he calls "prehension," involves the "feeling" of other actual entities; in fact, it is "the activity whereby an actual entity effects its own concretion of other things."[239] It is appropriate at this point to introduce his claim that actual entities are dipolar, having a physical and mental

pole. The physical consists in the prehension of actual entities; the mental, in the prehension of what Whitehead calls "eternal objects," which are purely potential. The "becoming" of an actual entity is a concrescence of many potentialities.

At the fundamental level – disregarding the "apparent" world for the moment – actuality is set over against potentiality. It is this schema of actuality and potentiality which accounts for the dynamic of Whitehead's vision of world, and is the key to the whole. For in Whiteheadian terms actual entities also prehend eternal objects, or inversely, eternal objects *ingress* into the concrescence which is the becoming of an actual occasion. What are these eternal objects? They are posited on the basis of the ontological principle that "it is a contradiction in terms to assume that some explanatory fact can float into the actual world out of nonentity,"[240] and it should be obvious from this principle why there are potential sources of actuality. These sources are "eternal objects" which are described in conscious indebtedness to the Platonic Forms. They are like "ideas" in that they are prehended by the mental pole of actual entities. In fact, it is a misconception to think of these pure potentials as *prior* to the world; this would contradict the fact that they are potentials, not actualities. Since he lists them among the Categories of Existence,[241] he affirms that they are "entities," and as prehended, are "objects." In what sense do they exist? To answer this leads one, as it did Whitehead, into a consideration of God. In *Science and the Modern World*, Whitehead returns to Aristotle, and in place of his Prime Mover – required by the Stagirite's "erroneous physics" – he speaks of God as "Principle of Concretion."[242] One could say that Whitehead faithfully brings the Aristotelian deity into line with modern physics. It is in connection with the notion of God as principle of concretion that the status of the eternal objects is to be clarified. Like all actual entities, God is dipolar. He prehends actual entities "physically" and "eternal objects" "mentally." Roughly corresponding to this twofold schema is the affirmation of the consequent and primordial natures of God, respectively. Without the primoridial nature of God, as Whitehead wrote in *Process and Reality*, "eternal objects unrealized in the actual world would be relatively non-existent" for concrescence.[243] They are universals – as he says elsewhere – of any possible world and through their

ingression, creativity (which has as its correlate the primordial nature of God) actualizes the real world. The universals become particularized in actual entities.

I have yet to comment on the status of space and time in Whitehead's vision of reality. That he was greatly preoccupied with the question was evident from his work on relativity and gravity. In a way which affirms his belief that the physical and metaphysical are closely related in a theory of reality, his later metaphysical writings continue to treat the problems of space and time. His most adequate discussion on this topic is to be found in the section on "The Extensive Continuum" in *Process and Reality*.

Through what Whitehead calls "the mode of presentational immediacy" "the contemporary world is consciously prehended as a continuum of extensive relations."[244] The European (i.e. Western) misapprehension of the reality of this continuum he attributes to its "confusion of mere potentiality with actuality."[245] In a master stroke which unites what were thought to be irreconcilable opposites in the lengthy debate between atomicity and continuity, Whitehead argues that "continuity concerns what is potential; whereas actuality is incurably atomic."[246] The historic theories of the natural sciences are relevant to the extensive continuum, but were wrong to accord it actuality. The corpuscular theory of reality is correct so long as it is confined to the realm of actuality, as was the case with Leibniz against Newton.

If it is wrong to speak of the extensive continuum as actuality, it must be accorded potentiality. Whitehead quotes Newton's *General Scholium* as the classic example of where Western thought went awry, and asserts that he wants to be included among those whom Newton called "the vulgar," who "conceive those quantities [i.e. space and time] under no other notions but from the relation they bear to sensible objects,"[247] except that in his philosophy of organism the term "sensible object" is to be replaced by "actual entity."[248]

The notion that space and time are relational is thoroughly Leibnizian, though Leclerc claims that Whitehead came to it by a different route.[249] One wonders how differently, considering the fact that central to both is the polar category of "possibility–actuality." It is certainly the case, nevertheless, that Whitehead

surpasses Leibniz at crucial points, one of which pertains to the discretization of actualities, or "occasions" – to use a word common to both. For although Leibniz atomized the occasions spatially, he still held to their enduring through time. This Whitehead gives up, and the result is a completely atomic entity which does not change since it does not even endure. According to Whitehead it only enjoys "the internal adventure of becoming. Its birth is its end."[250] It is understandable that Whitehead's chief polemic is against materialism and its notion of enduring objects. A typical statement is the following from *Process and Reality*:

> The simple notion of an enduring substance sustaining persistent qualities, either essentially or accidentally, expresses a useful abstract for many purposes of life. But whenever we try to use it as a fundamental statement of the nature of things, it proves itself mistaken. It arose from a mistake and has never succeeded in any of its applications. But it has had one success: it has entrenched itself in language, in Aristotelian logic, and in metaphysics. For its employment in language and in logic, there is – as stated above – a sound pragmatic defence. But in metaphysics the concept is sheer error.[251]

The cogency of Whitehead's attack on the concept of matter is increased when one delves into the history of the conception, to which Whitehead, among others, made a significant contribution.[252] Scientists are increasingly devoting attention to what Leclerc has called "the issue of ontological status in respect of concepts such as space–time, motion, the various 'particles,' energy, and so on."[253]

It has already been pointed out that Whitehead rejected Einstein's General Theory of Relativity with its equation of geometry and physics. Although both held to a relational theory of space–time, Whitehead found untenable the idea that matter determines the structure of space–time, as Einstein assumed. Not only does Whitehead reject the notion of matter in that sense; for him the uniform relatedness of Nature is a *necessary* rather than a contingent truth. This is the meaning of his often reiterated statement that he rejects the "causal heterogeneity" of Einstein's General Theory, according to which the presence of matter warps the structure of space–time non-uniformly. For Whitehead, only the theory of the "uniformity" of the large-scale structure of space–time justifies access to cosmological events at great distances, apart from which modern cosmology would not be possible.

Whitehead assumes, not that space–time is flat, but only that its curvature, whether hyperbolic or elliptical, is uniform. The result is that his mathematical formalism is simpler than Einstein's, in that it does not lead into the dark labyrinths of the latter's non-linear partial differential equations for which few solutions have been worked out. On this fundamental difference between Whitehead and Einstein I am not competent to make a personal judgment, though I am inclined by its impact on modern physics to favor Einstein. I do think, nevertheless, that Whitehead's notion of physical existents, elaborated without recourse to the concept of matter, is a great gain in the history of natural philosophy, even over Einstein's later thought which – at least in this one respect – was less comprehensive. To the extent that my own interest lies primarily in the movement toward greater comprehensiveness I feel compelled to argue the necessity of going beyond Einstein along the route plotted by Whitehead.

The second major metaphysical system to be treated is Systems Philosophy, which could be construed as a further step toward ultimate generalization in that it arrives at most of the positive features of Whitehead's metaphysics, and does so more economically. That is to say: it envisions reality as interconnectedness, as relation, without dependence on certain categories which, despite Whitehead's insistence upon their ontological priority, appear to have only a logical, i.e. inferred, status.

The step beyond Whitehead toward Systems Philosophy does not, however, involve a *non sequitur*, as a closer inspection of the latter should demonstrate.

b. Systems Philosophy

The link between Whitehead and systems philosophy, while not usually emphasized by general systems theorists, is in fact strongly stressed by Laszlo, the originator of "systems philosophy" as such. In his programmatic monograph, *Introduction to Systems Philosophy*, Laszlo expresses both his debt to Whitehead and his independence from certain Whiteheadian metaphysical elements. Having found in him an early "solution" to his own problems as a philosopher, Laszlo sought to go beyond Whitehead:

> Whitehead was illuminating, but not the final answer. For one thing, his ultimate principles were debatable – God, pure possibility, conceptual

prehension and related concepts, permit of alternative solutions. For another, the gathering of scientific information did not come to a stop in the first half of this century, but led to the accumulation of incomparably richer storehouses of tested knowledge. Hence I concluded that the Whiteheadian synthesis had to be done over again, in the light of contemporary findings, and perhaps without the superstructure of metaphysical principles gained by personal insight alone.[254]

The extent to which the end-product, i.e. systems philosophy, is preferable to the Whiteheadian scheme, I shall have occasion to consider later.

While systems philosophy as such grew out of a preoccupation with Whitehead, its immediate heritage is that of General Systems Theory, pioneered by Ludwig von Bertalanffy, a biologist who turned his talents toward the broad philosophical implications of his research. I shall first state the case for General Systems Theory, and then turn to the emergence of systems philosophy.

i. General Systems Theory: von Bertalanffy. The classic guide to the study of General Systems Theory is the book with that title which appeared in 1968.[255] It is a collection of distinguished essays, the earliest of which, entitled "General System Theory," was the programmatic *fons et origo* of this new approach to questions of science, natural and social.[256] In reporting on the aim and scope of General Systems Theory I shall depend primarily on von Bertalanffy's article of 1955, and the extensive introduction to the book of 1968 which incorporates the original essay.

General Systems Theory grew out of dissatisfaction with the analytical approach which came to dominate science through its success in classical physics. Von Bertalanffy constantly contrasts the method and aims of General Systems Theory with those of classical physics:

> "Analytical procedure" means that an entity investigated be resolved into, and hence can be constituted or reconstituted from, the parts put together, these procedures being understood both in their material and conceptual sense. This is the basic principle of "classical" science, which can be circumscribed in different ways: resolution into isolable causal trains, seeking for "atomic" units in the various fields of science, etc. The progress of science has shown that these principles of a classical science – first enunciated by Galileo and Descartes – are highly successful in a wide realm of phenomena.[257]

The presupposition of this approach, continues von Bertalanffy, is the condition that the interactions between parts be "weak" ones. As such, in modern science where *strong* interactions are encountered, a systems approach must intervene. Systems theory is thus a general science of "wholeness." i.e. it attempts to deal with "organized wholes."[258] Its chief aim is to eliminate all reductionism which would obscure the wholeness of systems, as happens, e.g. in the physicists' reduction of all phenomena to elementary particles.

Also in contrast to classical physics all of whose systems are "closed," General Systems Theory is the attempt to deal with "open systems" such as one finds in biology. Open systems, as opposed to closed, are those which interact with their environment. As an illustration, von Bertalanffy writes:

> Every living organism is essentially an open system. It maintains itself in a continuous inflow and outflow, a building up and breaking down of components, never being, so long as it is alive, in a state of chemical and thermodynamic equilibrium but maintained in a so-called steady state which is distinct from the latter. This is the very essence of that fundamental phenomenon of life which is called metabolism, the chemical processes within living cells. What now? Obviously the conventional formulations of physics are, in principle, inapplicable to the living organism *qua* open system and steady state, and we may well suspect that many characteristics of living systems which are paradoxical in view of the laws of physics are a consequence of this fact.[259]

Out of the need for a more comprehensive paradigm in science, von Bertalanffy proposed a general systems approach which opened a new era in scientists' ability to deal with a broader range of phenomena under a fairly simple rubric. Out of this initial proposal a Society for General Systems Research emerged in which the related work of the economist Kenneth Boulding, the biomathematician A. Rapaport, and the physiologist Ralph Gerard found a unified locus. The scope of General Systems Theory is evident from the fact that it seeks to bring together the gains of the following distinct developments in recent science and mathematics: computerization and simulation, compartment theory, set theory, graph theory, net theory, cybernetics, information theory, theory of automata, game theory, decision theory, and queuing theory.[260] The aim of this comprehensive approach is to

deal intelligently "with what is vaguely termed 'wholeness,' i.e. problems of organization, phenomena not resolvable into local events, dynamic interactions manifest in the difference of behavior of parts when isolated or in a higher configuration, etc.; in short, 'systems' of various orders not understandable by investigation of their respective parts in isolation."[261]

The new demands placed upon scientists by the emergence of new data led von Bertalanffy to propose "a new scientific discipline" (i.e. General Systems Theory) whose task is the "formulation of principles that are valid for 'systems' in general, whatever the nature of their component elements and the relations or 'forces' between them."[262] It proceeds by seeking "isomorphic laws [which] hold for certain classes or subclasses of 'systems,' irrespective of the nature of the entities involved."[263] As should become apparent later, systems philosophy will extend the scope of this method to a consideration of the nature of "entities" as well.

General Systems Theory challenged mechanism in physics by reintroducing the notions of causality and teleology, whose supposedly metaphysical character had led to their exclusion. Von Bertalanffy defends this novel departure from classical physics as follows:

> Notions of teleology and directiveness appeared to be outside the scope of science and to be the playground of mysterious supernatural or anthropomorphic agencies; or else a pseudoproblem, intrinsically alien to science, and merely a misplaced projection of the observer's mind into a nature governed by purposeless laws. Nevertheless, these aspects exist, and you cannot conceive of a living organism, not to speak of behavior and human society, without taking into account what variously and rather loosely is called adaptiveness, purposiveness, goal-seeking and the like.[264]

It remains to be seen as to exactly what dimensions of teleology are being retained, but the justification for reintroducing the notion of purpose seems valid for the wider range of phenomena with which biology and the social sciences must deal. The real question, however, is whether it is appropriate to apply it as well to the phenomena which are the domain of physicists. In fact, the whole question of the relation of classical and modern physics to other levels of scientific explanation is still unsolved, despite the effort of von Bertalanffy and others. They are to be com-

mended for seeking isomorphs between all the sciences, but whether the method should be called a new scientific discipline is still open to question. Von Bertalanffy is aware of these difficulties and for this reason cautiously states that General Systems Theory merely attempts "scientific interpretation and theory where previously there was none" and seeks "higher generality than that in the special sciences."[265] Laszlo is also aware of the need to speak circumspectly about the expectations of General Systems Theory. Von Bertalanffy devotes much of his programmatic essay and Introduction to a defense of General Systems Theory in view of the objections, actual and potential, which could be raised against this new discipline.

ii. A Systems Metaphysic: Laszlo (a) FUNDAMENTALS. There is general agreement that Ervin Laszlo's *Introduction to Systems Philosophy* is, as von Bertalanffy states in the Foreword, "the first comprehensive treatise of 'systems philosophy'."[266] It would appear then that there is good reason to focus on this work as a main source, supplementing it with insights from his other publications. The principal question to be put to systems philosophy is: what are its fundamentals? In other words, does it "go beyond" Whiteheadian philosophy in the treatment of entities?

In the first half of Laszlo's programmatic work on systems philosophy, he stated his dependence on the work of General Systems Theory primarily as articulated by Ludwig von Bertalanffy and then set out to achieve a mathematically rigorous formulation of this theory. His choice of General Systems Theory for the framework of his philosophy is rooted in the view that the former "gives us a theoretical instrument for assuring the mutual relevance of scientific information and philosophic meaning."[267] It is evident from this aim, as well as from the work of von Bertalanffy, that systems thinkers are generally appreciative of the scientific enterprise. Their chief problem is with classical physics. Occasionally a systems thinker will extend the criticism of the analycity of classical science into a general criticism of the whole effort of science, as does Hendryk Skolimowski in a recent collection of essays edited by Laszlo,[268] though it is more commonly the case that systems theorists build on scientific knowledge in a sympathetic way.

Almost every element in Laszlo's construction of a systems philosophy is an amplification of von Bertalanffy's ideas. At the outset, under the heading, "Why Systems Philosophy?" he turns von Bertalanffy's negative statements about analytic science into a more generalized attack on analytic method in all philosophy and a positive defense of synthetic philosophy, arguing that "synthesis can mean the conjoining of various sets of non-philosophically researched data, to furnish new avenues toward the constructive discussion of substantive philosophical issues."[269] According to Laszlo, systems philosophy wants to "see things whole . . . to avoid reductionism"; it is the affirmation, in Maslow's terms, that "of the two modes of thinking, the 'atomistic' and the 'holistic,' it is the holistic which is the sign of the healthy, self-actualizing person."[270]

In a way reminiscent of recent progress in relativity theory, Laszlo makes the judgment that systems theoretical concepts are superior to those of classical physics because they are "capable of remaining invariant where others encounter limits of applicability. That is, the range of their transformations is greater. Hence they can exhibit general order where the classical concepts show only delimited special orders."[271] Claiming that systems concepts provide a meta-language of scientific discourse, Laszlo argues that "if the special languages of classical disciplines are adhered to exclusively, nature becomes compartmentalized into distinct segments, each characterized by its own set of entities [N.B.], properties and laws. But if the general meta-language of systems theory is adopted, then the dictum 'special concepts for special phenomena' loses validity."[272] The promise of systems philosophy is that "by this method scientific findings are used instrumentally, to construct a conceptual framework adequate to the understanding of nature as an integral network of ordered interdependency of which man is a part."[273]

It is interesting that Laszlo sees his systems philosophy as the next logical step in the progression of thought which had its origins in Plato's universals and the categorial scheme of Aristotle, its development in Scholastic metaphysics, and its modern expression in the process philosophies of Bergson, Lloyd Morgan, Samuel Alexander, and Alfred North Whitehead.[274] Its ambitious program Laszlo states in terms reminiscent of Whitehead: "It

reintegrates the concept of enduring universals with transient processes within a non-bifurcated, hierarchically differentiated realm of *invariant* systems, as the ultimate actualities of self-structuring nature. Its data come from the empirical sciences; its problems from the history of philosophy; and its concepts from modern systems research."[275] Its dependence upon General Systems Theory means that it links with other major philosophical trends, if one can trust von Bertalanffy's claim to be extending the work of Nicholas of Cusa, Leibniz, Paracelsus, Vico, ibn-Kaldun, Hegel, and Marx.[276] Both writers probably claim too much in this regard, possibly because they wish to authenticate their ideas somewhat heteronomously. However that may be, there is a clear link between Whitehead and Laszlo.

Laszlo's debt to von Bertalanffy is conscious and deep. The former took the latter's view of "the world as organization" to be the new natural philosophy whose "systems worldview" finds detailed and self-critical formulation in systems philosophy.[277] To prevent misunderstanding of the self-claims of systems philosophy, Laszlo adopts from von Bertalanffy the term "perspectivism" which the latter had coined in his programmatic essay as an alternative to the "reductionism" which was dominant in other views.[278] It is important to note the factor of self-restraint imposed upon systems methodology by its authors, as e.g. in the remark of Laszlo: "I do not suggest that the general theory of systems I shall sketch here . . . represents the sole valid, and hence necessary, approach to sound empirical theory. I only suggest that such general systems theories grasp some forms of order in the world which elude other types of theories."[279] There is always the haunting question whether these cautious statements are evidence of the failure of General Systems Theory to provide the blend of comprehensiveness and rigor that is customarily required of scientific disciplines. And, it will be recalled, General Systems Theory is proposed as a new scientific discipline.

In Chapter III of his *Introduction to Systems Philosophy*, Laszlo raises von Bertalanffy's demurrer *vis-à-vis* natural science in its classical form to the level of an ontological principle of great importance. The formulation is valuable to us because of its judgment on and differentiation from classical physics. Arguing for the substitution of relational for substantival entities, he writes:

Classical physics operated on the assumption that the data to be explained are individual entities or events, located against the background of space and time, "flowing equitably through all eternity." Particular entities such as masses moving or at rest, could be plotted against coordinates of space and time and classified on the basis of their observed similarities. Thus classical physics posited particular entities as the ultimate furnishings of this world, with classification serving the primarily heuristic purpose of building theories for calculating their behavior. Although thinkers have always recognized that no two entities can ever be exactly alike, the difference could be disregarded as long as they created no difficulties for solving the problems at hand.[280]

The shift from such "particles" to "relational" entities he locates in modern physics, principally in the work of Einstein. Laszlo continues:

But contemporary physics gave up the notion of unique if classifiable masses moving against the background of eternal space and time. The new physics deals with ordered sequences of events, forming wholes, which can only arbitrarily, and usually without success in forming exact laws, be analyzed into individual components. The general construct for these ordered wholes is field.[281]

Einstein is then quoted as one who best summarized the development:

Before Clerk Maxwell, people conceived of physical reality – insofar as it is supposed to represent events in nature – as material points whose changes consist exclusively of motions. . . . After Maxwell they conceived physical reality as represented by continuous fields, not mechanically explicable. . . . This change in the conception of reality is the most profound and fruitful one that has come to physics since Newton.[282]

The reader will wonder whether in earlier chapters we have done full justice to Einstein in vew of his explicit statements about relational entities made early in his career. It should be remembered (1) that this statement represents the view of "the young Einstein" which Max Born thought was fairly represented in the Copenhagen view, which the former rejected, and (2) that the later General Theory of Relativity may in fact represent a return to classical entities. However that may be, Laszlo is correct to note the erosion of classical ideas of particulate reality by modern physics which, in his words, is devoted to "the discernment of ordered totalities constituting, at the basic physical level, fields,

and on higher levels, systems within fields – and so on, in a complex hierarchy of organization in nature."[283]

In articulating the nature of relational entities, Laszlo deliberately limits consideration to the microhierarchy, i.e. to terrestrial phenomena ranging from atoms to large social ecosystems, leaving out of account the macrohierarchy, i.e. the cosmos, and justifying his action by appeal to a statement of the philosopher E.R. Harrison, that "nobody in their right mind for a moment dreams that we are anywhere near achieving even an elementary notion of the universe as an organized whole."[284]

The microhierarchy is composed of natural systems, each of which is "a 'non-random accumulation of matter–energy in a region of physical space–time, which is non-randomly organized into co-acting interrelated subsystems or components.'[285] The units of such systems are likewise natural (concrete) systems, with the possible exception of some 'primary' or 'least hierarchial' systems, the components of which are elementary blobs of energy ('electromagnetic condensations,' in Einsteinian terms)."[286] By definition, systems philosophy is not able to deal with the fundamental units which are ingredients of all other entities but not composite themselves.

As von Bertalanffy indicated, the systems thinker is to search for *invariances*, i.e. for "the constraints on the behavior of coacting parts and systems – constraints which do not violate the laws of physics, but which are imposed on the deterministic laws of classical mechanics, exploiting the degrees of freedom permitted by the latter."[287] I have to say that this is all very vague and especially ill-defined with respect to quantum physics. Laszlo is only able to say that he assumes the existence of such constraints. Anyone who is able to accept Laszlo's fundamental thesis will appreciate his further claim that "the universe here conceptualized is an emergent–holistic universe, with systemic processes supervening over the mechanical processes and resulting in the local reversal of the general entropic trends in the cosmos."[288]

Part I of Laszlo's *Introduction to Systems Philosophy* is devoted to an "outline of a General Theory of Systems" in which a high degree of formalization of the technique is achieved. According to this outline, every natural system exhibits: (1) a Systemic State Property, which is to say it is an ordered whole whose wholeness is non-summative (the view that "the whole is greater

than its parts" he defends as mathematically demonstrable, so that it is free of any supposed mysticism); (2) adaptive self-stabilization (Systems Cybernetics I), rather than equilibrium; (3) adaptive self-organization (System Cybernetics II) which accounts for the emergence of life and intelligence (Ashby: "every isolated determinate system obeying unchanging laws will develop 'organisms' that are adapted to their environments") in systems which increase in negative entropy (negentropy) "as the 'bits' necessary to build the system from its components" affect the system; and finally (4) what he calls a Holon-Property according to which "many systems on one level constitute one system on a higher level, consequently higher level systems are less abundant and have a wider repertory of functional properties than systems on lower levels."[289]

It does not serve my purpose to follow Laszlo through his "empirical interpretations" of natural systems, though it is important to keep in view several philosophical principles which appear under that heading. In discussing the atom as a physical system, he makes the pregnant suggestion that "the character of the entire system is not the simple sum of the character of what appears within it as elementary particles, or even of the forces between them. Rather, *the character of the whole equals the sum of the relations of the components in the exact ordering in which they are found*."[290] He is able to amplify this claim mathematically and in terms of thermodynamics; the question remains whether as a philosophical principle it is generally applicable to the whole of reality, for it seems to reflect certain Leibnizian–Whiteheadian insights.

Another insight which extends Whitehead's understanding of the natural world is the admission that one can no longer distinguish physical nature from the organic world, as was long the case in mechanism. For Laszlo the hope of breaking down this pseudo-wall lies in the structural isomorphisms which they share. One of these isomorphs is "adaptive self-stabilization" (Bio-Cybernetics I) and involves learning, or intelligence. Here Laszlo discusses what might be called the physical character of intelligence (Piaget), which will be expanded later under the topic "Cognitive Systems." For him, intelligence is to be defined "as the insight into, or grasp of, the relations which are relevant to the compatibility of the organism with its environment."[291]

Another link with a notable tradition occurs in his discussion of the adaptive self-organization of organisms. The result of this self-reorganization is adaptive evolution, i.e. a gain in structural complexity, measured in negative entropy of information content. One hears the echo of Teilhard de Chardin in his claim that such a process leads to a "complexification of organic forms." And though Laszlo credits von Bertalanffy with this idea, it is interesting that the latter is quoted as appealing to "the paleontological record" as a phenomenological fact.[292] It is significant that Laszlo rejects both the "typing error" theory of random mutations as well as the contrary "teleological" or "inner directed" views of evolution as "extreme cases resulting from an undue bias for one or the other."[293]

When he comes to discuss Social Systems, Laszlo becomes heir to a complex issue he cannot avoid: whether social systems are systemic "entities" on a par with other entities of natural systems. He puts the question this way, namely, whether "social entities are methodologically conceptualized theoretical entities or concrete, real existents 'in nature'."[294] After a lengthy discussion of recent debate on the question, Laszlo simply takes a stand: "I shall conclude . . . that it is meaningful to speak not only of theoretical, but also of concrete systems in sociological inquiry although it may be, as e.g. Lévi-Strauss holds, that no direct observation can be made of the latter."[295] The point at which this claim will experience its maximum difficulty for some readers is when Laszlo will argue later that all entities have some degree of subjectivity or consciousness.[296]

His discussion of Socio-Cybernetics is of special interest in that it attempts to justify the use of the language of thermodynamics in social systems. Greater social systems have greater negentropy. The entire discussion of social systems according to the system of isomorphs with other natural systems is problematic; it is even questionable whether they should be called "natural systems." Laszlo even admits at the end of the treatment that "the empirical identification of the levels of a theoretical hierarchy of social systems remains problematic."[297]

In comparison with his extensive treatment of natural systems, the discussion of "cognitive systems" is brief. It is concerned with the Cartesian split between cognitive and material reality, and

asserts that only a *biperspectivism* (cf. Whitehead's dipolarism) can give a satisfactory account of the problem. The method explores the properties of cognitive systems for traces of independent variables according to the principles of General Systems Theory. Cognitive systems are comprised of mind-events which interact with their environment through perception (input) and conation (output).[298] These mind-events, according to Laszlo who in this regard reflects the work of Whitehead, are as widespread in nature as natural systems. His working principle is as follows:

> Empirical evidence is poor . . . in regard both to affirming and denying the existence of mind-events for systems radically simpler than our own species. . . . In the absence of reasonable cut-off points, where we could draw a line and say "above this level there are mind-events, and below this there are none," we must reckon with the possibility, explored by many great thinkers in the history of ideas, that mentality is a correlate of *all* physical existence.[299]

The same systemic properties are unfolded for cognitive systems as for natural ones: wholeness and order (Systemic State Property); adaptive self-stabilization (Psycho-Cybernetics I); adaptive self-organization (Psycho-Cybernetics II); and intra- and intersystemic hierarchies (Holon-Property). Perhaps it is sufficient to note here, since he explores some of the implications of this view later, that Laszlo recognizes a possible difference between cognitive and natural systems, in that the former are information – and not energy – processing systems, such that "entropy measurements may not be applicable to them; however, we can still apply the concept of information, and the two concepts are formally equivalent."[300] Such a conclusion runs headlong into the brain–mind problem, and with this problematic he brings the section of General Systems Theory to a close, and turns more generally to systems philosophy per se.

The promise he holds out for this distinctive approach to problems of philosophy is reflected in the imposing list of chapters:

> SYSTEM: Framework for an Ontology
> HIERARCHY: Framework for a Philosophy of Nature
> CONSCIOUSNESS: Framework for a Philosophy of Mind
> COGNITION: Framework for an Epistemology
> FREEDOM: Framework for a Philosophy of Man

VALUE: Framework for a Normative Ethics
SURVIVAL: Framework for a New Age Ethos
ULTIMATE PRINCIPLES: Framework for a Metaphysics

Since it is not possible to explore here the wealth of positive ideas which are introduced by Laszlo in these chapters, I shall accordingly select from them those which pertain distinctly to the question of entitivity.

The most serious problem with which he deals is the psychophysical dichotomy, usually attributed in its classic form to Descartes. The problem of discovering isomorphisms lies in the fact that natural events involve energy transfers which issue in observable modifications of state, whereas mind-events are accessible only through introspection. He rejects the Lockean bifurcation of nature, yet admits that the problem with which such theories deal is real: "It is to exhibit, within one system of consistent relations, mental events such as the redness and warmth of the fire, and physical events, such as the kinetic motions of the molecules of carbon and oxygen and the radiant thermal energy acting on the sensory receptors of the body."[301] Of the two major theories available presently, i.e. the brain–mind *identity* and brain–mind *correlation*, he opts for the latter, in the non-causal form. The fundamental ontological claim is made to the effect that there is a natural–cognitive system, observable from two distinct points of view (biperspectivism): "When 'lived,' such a system is a system of mind-events, viz. a 'cognitive system.' When looked at from any other viewpoint, the system is a system of physical events, i.e. a 'natural system'."[302] The ontological principle which emerges is this:

Sets of irreducibly different mental and physical events constitute an identical psychophysical system, disclosed through the invariance of the respective theories. The basic entities of systems philosophy are non-dualistic psychophysical systems termed "biperspectival natural–cognitive systems."[303]

A rejection of either side in the interest of a monism, or a claim that they are identical, results in untenable consequences, or so he argues.

Out of this biperspectival position, which he regards as the cornerstone of systems philosophy, Laszlo attempts to articulate a philosophy of nature. Herein he struggles with the problem of

mentation in natural-cognitive systems, taking great pains to avoid "attributing levels of mentality to systems proportionately to their position in the level–structure of the microhierarchy."[304] His reasoning here may be somewhat *ad hoc* in that otherwise he would be put into the (to him) somewhat embarrassing position of attributing "a higher grade of mentation to social systems than to biological ones."[305] The reason he gives is that empirical evidence is against it, though it is worth noting that Laszlo's ontological hierarchy reaches a limit just at the point Whitehead's does, namely, in human mental–physical experience; for although Whitehead used the sociological term "societies" for nexūs of actual entities, he does not seem to envisage an ontological scheme composed of complex social groups. Teilhard, on the other hand, does project his ontological schematization of complexification into such aggregates, so there is philosophical support from that quarter.

Laszlo attempts to raise his claim that social systems are simpler mental systems than that of their most modest member, to the level of a principle in the form of the following thesis: "*The level of mind-events of a system is proportional to the level of differentiation and functional integration of its subsystems.*"[306] The fundamental difficulty which seems to plague this thesis is that, though its members are bipolar (mental and physical), the extent to which either can be claimed for trans-individual supersystems, or societies, is problematical.

Laszlo in this context expressly voices the question paramount in my essay, i.e. "*What is real*? or *What are the principal furnishings of reality*? and gives the simple unequivocal answer: "*natural–cognitive systems.*"[307] His most advanced assertion then follows:

> Classical conceptions of real things, as naturally originating solid particulars, must be surrendered as inconsistent when the more fertile perspective of organizational invariance is adopted as the criterion of real entities. And when we do adopt organizational invariance as the criterion, then relative persistence, origin, substance, level of integration, manifest functions and properties, are so many specifications of *characteristics* of systems and not touchstones of their *reality*. According to the here advanced theory, any organization of events that satisfies the state and function postulates of systems is real (concrete, veridical), and all such actualities are biperspectival, analyzable to physical as well as to mental sets of events.[308]

And then even more far-reaching:

> The consequent proposition, that transient social organizations, as well as artificially created machines, have mental events, must be accepted; using the differentiation and functional level of integration of subsystems as the criterion of the mentality of the systems, we do not attribute anything like human minds to less organized systems. And if each of us has mind-events and is systemically organized, then other systemic organizations have mind-events in the analogously oriented introspective analysis.[309]

He concludes with a pregnant remark: "When organization is the criterion of existence, then it is also the criterion of mentality; the alternatives are either an arbitrary cut-off point for mind, or the logically consistent but unfruitful tenet of solipsism."[310] It should be clear from such claims that systems philosophy is an attempt to go beyond Whitehead, though the nature and degree of its success is a problem which will be considered later.

If one seeks a label for Laszlo's philosophical stance, he will find one ready to hand from the author himself in the notion of an integrated pluralism for which the characterization by Mario Bunge is chosen: "an ontology that proclaims both the diversity and unity of the world."[311] It allows for "emergence," but rejects "metaphysical" theories of emergence out of nothing. He is even able to speak, as does von Bertalanffy, of purpose, but is quick to add: "It is not *teleology*, the realization of an existing purpose, but *telonomy*, the emergence of purpose itself or, more exactly, of the dynamic organization which manifests it."[312] He is careful to add that this takes place "without mystery and special acts of creation,"[313] though it would seem that he is able to make such assertions because he is assuming emergence of something given, and does not bother to explore the ground of the given.

Of the remaining topics, three deserve to be given some attention: cognition, survival, and ultimate principles, though the last is sketchily presented.

Under the heading "cognition," Laszlo articulates the main features of a systems epistemology. He contrasts "the new theories of perception and cognition" with the old Cartesian and Newtonian theories which "held man to be a spectator of an objectively existing universe of matter and substance."[314] Laszlo rejects classical empiricism as well as idealism in favor of what he refers to "as an ongoing transactional relationship

between man and his environment."[315] Later he expands this notion: "In this interaction, the need-patterns of the perceiver are co-determinant, with the properties of the perceived object, of the content of perception."[316] Under the subheading, "Scientific Cognition," he elaborates the process whereby the self establishes an ego-boundary, thus differentiating itself from the non-self, or world. In the final stages of the process a fixed boundary develops between things *out there* ("objects") and the self *in here.* Scientific cognition differs from ordinary perception in that "in science the analysis of percepts to constructs is conscious and deliberate."[317] Laszlo then indulges in a major analysis of aesthetic and scientific experience, with the end-result of accounting both for the emergence of style in art and paradigms in science and their transiency. Through the study of their isomorphs as types of cognition Laszlo is able to demonstrate the *relational* character of world. The final epistemology arising from systems philosophy is this:

> Knowledge, on this view, is neither imposed by the objective world upon the passive receptors of the perceiving subject, nor is it the arbitrary product of human fancy and convention. It is the outcome of man's persistent attempt to lend meaning to his experience by evolving, in slow but accelerating succession, commonsensical gestalts and the manifold constructs of the arts and sciences.[318]

What is lacking in this statement is the attendant ontological theory of relational reality which has already been given expression in an earlier context and will again emerge in the final chapter. To this I now turn, intentionally reversing the order of the last two chapters.

(b) UNIVERSE AS SYSTEMS MATRIX. Many advanced insights of modern science and philosophy feed into Laszlo's metaphysical schema of the universe. The recurring word *continuum* in the selection betrays a debt to Whitehead:

> We are led to conceive of the universe as a giant matrix out of which arise the many phenomenologically distinctive entities. *We can conceive of no radical separation between forming and formed, and between substance and space and time.* We do not have existing substantial things, located at discrete points in space and time. Rather, *the universe is conceived as a continuum, defining both space and time, and the spatio-temporal events which disclose*

themselves to empirical observation. The latter can be thought of as "stresses" or "tensions" within the constitutive space–time matrix, emerging within the phenomenal field. . . . Hence there will be no action-at-a-distance, despite causal or functional correlations of spatially and temporally distant events. The connections are propagated within the cosmic matrix, limited by a constant, such as the speed of light in vacuo. Interaction can thus be defined by the light-cones of Minkowski and Weyl.[319]

This statement does not advance beyond the work of, say, Einstein and Whitehead. But on this foundation, Laszlo then builds up a *dynamic* systems view of the world:

Within the range of interaction defined by the cones, the cosmic matrix evolves in patterned flows, one actualized flow conditioning the emergence and development of the rest. Some flows hit upon configurations of intrinsic stability and thus survive, despite changes in their evolving environment. The flows represent recurrent sets of events which jointly constitute the invariance of the flow: these we call *systems.*[320]

After further detail, he concludes this generalized cosmology with the statement: "In the final analysis, it is the matrix which orders itself, bringing about a build-up of organization in some sections, at the expense of smoothing out complex flows in others. But in those areas where flows complexify, the matrix forms multi-dimensional fields, with elaborate hierarchical patterning."[321] In some ways this cosmology represents a generalizing of the Big Bang Theory, which is not surprising because it is the major scientific evolutionary model of the cosmos. I say "generalized," for its "entities" are the relational entities of systems thought, whereas in the usual scientific histories of the emerging world order the entities are radiational and material. If for no other reason, this systems view of the cosmos merits attention for its ability to generalize the language of science by the language of systems. Another benefit of the systems model is that one can freely move from physical to biological to sociological development, whereas the standard physical model is limited to the physical realm. As I see it, the systems model also has the advantage that it does not exclude the Steady State model, so long as that explanation is confined to the physical realm. Under those conditions, "the evolving of the cosmic matrix" corresponds to physical aggregates on the galactic scale and the evolution of advanced, because more complex, systems. On this base Laszlo is able to articulate a profound

view of what is meant by "things" and "the phenomenon of mind." Essentially, "entities" are "self-maintaining invariances" of constant and complex flows, while "those which have perceptually observable properties furnish the referent of 'things'."[322] By extending his biperspectivism, he arrives at a theory of mind which has important consequences for my relational perspective:

> The phenomenon of mind is neither an intrusion into the cosmos from some outside agency, nor the emergence of something out of nothing. *Mind is but the internal aspect of the connectivity of systems within the matrix.* [Italics mine.] It is there as a possibility within the undifferentiated continuum, and evolves into more explicit forms as the matrix differentiates into relatively discrete, self-maintaining systems. The mind as *knower* is continuous with the rest of universe as *known.* Hence in this metaphysics there is *no gap between subject and object* [italics mine] – those terms refer to arbitrarily abstracted entities.[323]

Although this *Visio Mundi* is in many respects Whiteheadian, Laszlo is careful to reject the dichotomous category of possibility–actuality which figured so crucially in the former's metaphysics. For Laszlo, possibility is incorporated in actuality rather than being placed on a separate, transcendent plane. "What is, is a partial realization of what can be." "The universe is *causa sui.* . . . There are only internal relations. Platonic *ideas*, or Whiteheadian *eternal objects* are rejected as uncalled for; likewise the notions of a transcendent God or other deity. Ordering is from within."[324] The only universals admitted are functionally rather than representationally true.[325] He then takes the cutting edge off his massive construct by concluding that he has attempted to demonstrate, not the necessity, but only the feasibility of systems metaphysics within what he calls "the cognitive endeavor."

I conclude this discussion of Laszlo's *magnum opus* on a religious note, one which he provides under the heading of "SURVIVAL." Doctrines of emergence present us with new perceptions of the future of mankind. Laszlo holds out as the ideal the achievement of a "*world* system of mutually symbiotic societies."[326] The loss of individual autonomy to the good of this world system is to be welcomed by those who participate deeply in what Laszlo calls "Reverence for Natural Systems." The questionable individualism of the past was rooted in the Protestant ideal of the exploitation of nature. The alternate ideal of *reverence* leads one to look to

nature for priorities. Nature, Laszlo holds, builds "role-structures" (Boulding's term) instead of particulated individuals.[327] In the search for new norms based on this insight, Laszlo arrives at the following formulation: "The particular exhausts its significance in its relation to the structure. The norm, ultimately, is given by the highest suprasystem: the hierarchy."[328] It is only natural that freedom is reconceptualized to conform to this new norm. The reader is told that "Nature builds systems by adapting parts in wholes, and the wholes as parts in superordinate wholes. Thus nature's norm is the optimum functioning of the hierarchical suprasystem containing all subsidiary systems: it is this system which imposes the final constraints on the degrees of freedom of all subsystems."[329] Of all species, he continues, only man has upset the balance of his environment and now faces the dire consequences of his exploitation of nature. Survival consists in the reversal of this trend, i.e. in learning to "envision the biosphere as a whole. . . . We must regain our implicit natural values; our instinctual and long-buried adaptation to the order of nature in the microhierarchy."[330]

Something of the religious dimension of this natural reverence finds expression in the following form:

> To be part of nature is to have a reason for existence. To be one of the most evolved systems in nature is reason enough for self-confidence and the wish to live and propagate. We are not alone: we are in nature.[331]

This new attitude, Laszlo rightly argues, "is not mechanistic, manipulative, and exploitive of the natural order"; rather it insists on "universal and more meaningful human relations, closer ties with nature, the abolition of egoistic, materialistic values, and the bringing about of a communal society based on love and mutual understanding."[332]

On this note I bring to a close this highly truncated version of what I believe to be one of the most successful of modern attempts to revitalize the metaphysical enterprise. While I have many reservations about advocating Systems Philosophy as the new orthodoxy, I have to admit in advance that the programmatic effort of Part II owes much to Laszlo's insights. As already indicated, I respect especially the drive toward ultimate generalization with its attendant affirmation of the relational character of reality. Not always

happy with Laszlo's jargon, I nevertheless share his negative judgments on the analycity and the particulate entities of classical physics.

CONCLUSION TO PART ONE

My intention in Part I has been to amass the evidence to support two theses: (1) Newtonian physics sponsored a paradigm of unusual tenacity which pervaded the whole of Western experience, bringing about a primary orientation in philosophy as well as science to the polarity of subject–object thinking about reality; and (2) that within the mainstreams of modern physics and metaphysics a new paradigm has commended itself – a paradigm which is trans-polar, i.e. relational. In this connection I have argued that the impasse in modern philosophy represented by its two fundamental polar opposites, idealism and realism, need not continue to dominate the modern scene, because it is a dilemma residing not in the nature of our experience, but rather in the form of our conceptualization of experience. The anxiety associated with the dilemma is acute: it is evident in the intensity of the political East–West dialogue in which Dialectical Materialism (i.e. realism) constantly confronts the Western heritage of idealism. It is apparent even *within* the West as existentialists and phenomenologists have amassed their energies to effect an "overcoming of the subject–object dichtomy." I hope to show in a subsequent volume on religion how the paradigm of subject–object thinking has determined to a great extent the agenda of religious philosophers as well as of religious folk for many decades.

The religious perhaps may be excused for failing to see the potential for understanding religious experience which resides in the new developments in physics; it is only the process theologians who somewhat indirectly benefited from developments in physical theory in this century, though until recently[333] few of these thinkers have seemed sensitive to the fundamental interaction of physical theory and metaphysical insight which permeated Whitehead's vision.

The existentialists and phenomenologists in the first half of this century were deeply opposed to the character and influence of objective science, but seem to have been strangely unaware that within physics itself their scientific contemporaries were developing new options of potential usefulness to phenomenologists. The result of this unfortunate neglect was that much of their attack on science was immediately obsolete. Furthermore, ignoring the insights which were available in physics and the new physics-oriented metaphysics, the phenomenologists – and I think of Husserl in particular – tended to reach conclusions about experience and reality which, rather than transcending subject–object thinking, remained frozen within one of the classical polarities, namely, idealism.

To the extent that there is a distinctly modern Western mentality, it is the result in part of the influence of classical physics upon the popular consciousness. Elsewhere I have indicated other influences which have also given Western consciousness a subjectivist bias.[334]

My intention in Part II will be to utilize some of the newer models of modern physics and of certain metaphysical schemes in the formulation of a metaphysical system which hopefully will make some small contribution toward the restoration of wholeness in our culture.

PART TWO

FOUNDATIONS OF A RELATIONAL METAPHYSIC

one's not half two.
it's two are halves of one.

– e.e. cummings*

*e.e. cummings, *Selected Poems 1923–1958* (London: Faber and Faber, 1960), p. 57.

INTRODUCTION TO PART TWO

The question of fundamentals is properly a metaphysical question, whether it is raised by the theologian about the full range of religious experience or by the cosmologist about the totality of the physical world. To the extent that the theologian or scientist raises the question about the reality of religious or physical statements, he functions as a philosopher, and more particularly as a metaphysician. The principal lesson learned from the recent preoccupation with philosophy of language is that even the question of the truth or falsity of statements is a metaphysical affair. All human interests are interlaced with fundamental metaphysical assumptions by which those interests are legitimated, whether wittingly or not. The recognition of this state of affairs is the beginning of critical philosophy and, as I shall argue, the foundation of creative science. The full-scale assessment of these assumptions is the condition for the possibility of a thematic presentation of fundamentals which is the unique task of metaphysics.

In Part I, the groundwork was laid for a relational metaphysics through a sustained re-presentation of developments in Newtonian physics and their role in determining – thanks largely to Kant – the subsequent subject–object reference frame of modern philosophy. I attempted to show that, while philosophy, and to some extent science, are still largely dominated by the (Newtonian) subject–object scheme, the revolutionary developments of Relativity Theory and Quantum Mechanics in the scientific community in the twentieth century have set the stage for a new paradigm. It is a *relational* paradigm in which the conception of particulate entities which underlay the notion of "object" and gave it a certain respectability has been rendered obsolete. The positions of Whitehead and Laszlo were described in some detail as offering

the most appropriate attempts to construct metaphysics under the conditions implied in the new physics.

In Part II, a fully relational metaphysical scheme is to be set forth and defended which hopefully will be both coherent and compelling. The accompanying interpretation of experience strictly in accord with this schema may provide many readers, whose search for elusive "objects" is a source of frustration, a meaningful intelligent option for understanding their experiences.

Due to the scope of issues synthesized in this concluding section, the presentation is vulnerable to attack on many fronts. Some metaphysicians whose professional sentiments are with options deliberately rejected may find the arguments less than compelling, while some physicists may find the position on the complementarity of religious and cosmological views of reality threatening, if not absolutely unintelligible from the perspective in which they work. In the spirit of modern metaphysics, I do not claim to have access to new data. Rather – in the words of the theologian Paul van Buren – this metaphysical effort is nothing more or less than an invitation to see things in a new way. To the degree that the position now to be set forth is coherent and inherently adequate, *many* – I do not say *all* – of the long-standing problems of philosophy should lose their urgency. Even saying this, I do not claim the desired completeness which the reader may rightly expect. Herein are but foundations; only a small part of what may be built upon them can be suggested in this context. More is promised at a later time.

CHAPTER III

A RELATIONAL AXIOM: THE DOCTRINE OF UNIVERSAL INTERNALITY[1]

Any metaphysical system can be characterized by the answer which it gives to the question, what is real? Idealism, e.g., assigns fundamentality to mind; realism, to an objective world. These two options are chosen not only to illustrate a point; they have in fact dominated the history of Western philosophy as its principal poles. It has seemed to most philosophers that subjectivism and objectivism are logical opposites, there being no *tertium quid.* There have been many contemporary philosophies that have sought to "overcome the subject–object scheme of consciousness," but closer scrutiny will show that in the final analysis most give evidence of allegiance to one of the historical poles.

The system set forth and defended in this essay is a *relational* metaphysic. *Relational* here points to a *transpolar* philosophy, whose law is as follows: given any classical entitative polarities, fundamentality is to be assigned to neither *term* (e.g. mind or world), but to the *relation.* It is evident immediately to those conversant with the recent history of philosophy that the position to be articulated assumes the legitimacy of the case for internal relations first given modern form by F.H. Bradley, and most recently defended by Brand Blanshard.

Autobiographically, it was an intensive study of relativity and quantum mechanics which led me to see the tenuousness of the subject–object paradigm underlying much modern philosophy and theology. The emerging relational paradigm in science and in certain scientifically astute metaphysics gave me a new appreciation of Leibniz, on the one hand, and of certain Anglo-American metaphysicians on the other, such as Whitehead, Bradley and Blanshard. The relational metaphysic which resulted from these inquiries is neither Leibnizian nor Whiteheadian, however much it owes to these philosophical traditions.

A consistent doctrine of internal relations seems essential to the successful articulation of a relational metaphysics. It is the most cogent assumption for setting forth the inherent intelligibility of a fully relational view of reality. A quasi-chronological approach has been chosen, since this procedure allows the reader to see the options as they have arisen.

A. THE MODERN DEBATE ON INTERNAL VERSUS EXTERNAL RELATIONS

1. F.H. Bradley: "All Relations Are Internal"

It is customary to trace the origins of the modern debate about relations to F.H. Bradley's *magnum opus, Appearance and Reality*, first published in 1893.[2] The unstated principle underlying Bradley's controversial book is Hegel's claim that "the rational is the real." Armed with this fundamental assumption, Bradley confidently moves through the whole of experience and distinguishes appearance from reality by showing that many treasured concepts often thought to touch reality, such as "relation and quality," "space and time," "things," and "things in themselves," run headlong into contradiction, and so belong to appearance rather than to reality. When he treats "relations and qualities" in the first section on "Appearance," he finds both concepts "unintelligible." Here one reads the boldest admission of the logical difficulties plaguing the whole question of relations and their terms. The unintelligibility of the concept of *quality* resides for Bradley in the following consideration: given ArB,

> A is both made, and is not made, what it is by relation; and these different aspects are not each the other, nor again is either A. If we call its diverse aspects a and α, then A is partly each of these. As a it is the difference on which the distinction is based, while as α it is the distinctness that results from the connexion. A is really both somehow together as $A(a - \alpha)$. But ... *without* the use of a relation it is impossible to predicate this variety of A. And, on the other hand, *with* an internal relation A's unity disappears, and its contents are dissipated in an endless process of distinction.[3]

Bradley insists that one fares no better with *relations*, for "they are nothing intelligible, either with or without their qualities." He continues:

A relation without terms seems mere verbiage; and terms appear, therefore, to be something beyond their relation. . . . But how the relation can stand to the qualities is, on the other side, unintelligible. If it is nothing to the qualities, then they are not related at all; and, if so, as we saw, they have ceased to be qualities, and their relation is a nonentity. But if it is to be something to them, then clearly we now shall require a *new* connecting relation.[4]

His conclusion is that "a relational way of thought – any one that moves by the machinery of terms and relations – must give appearance, and not truth."[5] It may seem strange that a philosopher who made such disparaging remarks about terms and relations should be the principal modern source for the doctrine that all relations are internal, but such is the case; for in the Appendix to the second edition, Bradley "clarified" these concepts in such a way that he felt obliged to defend the doctrine of internal relations. The exact interrelationship of these somewhat anomalous parts of his work is still debated. It seems to me that the discussion of terms and relations under "Appearance" was a logical exercise required of Bradley in his movement toward "the real," whereas, his defense of internal relations in the "Appendix" was a necessary consequence of his monistic ontology, articulated under the caption "Reality." Since it is the latter, namely, the clear statement of the case for internal relations, that stimulated subsequent discussion in this century, it may be regarded as a somewhat free-standing principle with its own intrinsic merits which are eminently recognizable even by those who do not share Bradley's whole vision. If this assumption is valid, it is proper to consider Bradley's defense of internal relations on its own terms.

He first concludes that "qualities . . . can have no meaning except as contained in and as dependent on some whole."[6] All efforts to prove that qualities exist free from all relations or independently prove at most that a certain quality "may exist indifferently in various relations." Bradley concedes that "at first sight" external relations do seem possible and even to exist, as for example, in change of location and in comparison. But if one correctly perceives space by itself and its barely spatial relations, he will conclude that these are "mere abstractions from a more concrete qualitative unity."[7] It is, in fact, the whole notion of

externality which Bradley opposes; to him it is nothing more than "our ignorance set up as reality."[8] It is but an "inconsistent aspect of fact," hence, appearance and not reality. Bradley did not have available to him the subsequent development of quantum theory from which to draw illustrations for his ideas and, without it, was forced to admit the possibility of a "relatively external" quality. When he turned from the problem of space to that of *comparison*, he was even more confident on logical – if not indeed ontological – grounds that the act of comparing two qualities does not simply change mere extrinsical relations. In "comparison," however, the terms *are altered*, "though in respect of an abstract quality they remain the same."[9] A further consideration of a test case of comparison leads him to his boldest affirmation of monism:

> if you could have a perfect relational knowledge of the world, you could go from the nature of [a compared quality] to these other characters which qualify it, and you could from the nature of [this quality] reconstruct all [persons endowed with this quality]. In such perfect knowledge you could start internally from any one character in the Universe, and you could pass to the rest. You would go in each case more or less directly or indirectly, and with unimportant characters the amount of indirectness would be enormous, but no passage would be external.[10]

He goes on to add, in the same vein:

> Nothing in the whole and in the end can be external, and everything less than the Universe is an abstraction from the whole, an abstraction more or less empty, and the more empty, the less self-dependent.[11]

In a way which ties this discussion to the statements about relations and qualities made earlier in his book, Bradley insists that both terms and relations are abstractions, and depend for their being always on a whole which they inadequately express. How a relational metaphysic can build on such a view will be explained later. It is sufficient here to note that Bradley did admit that relational thinking, though imperfect, is "an advance and a necessary step towards that perfection which is above relations, supersedes and *still includes them*."[12]

The historic significance of Bradley's epoch-making work, *Appearance and Reality*, lay not in a univocal theory of relations, which it does not seem to present, but in the clear option it pro-

vided to the traditional view that some relations are internal and some, external. And the option had behind it the considerable weight of Bradley's comprehensive view of reality. It could not be ignored; it had to be admitted as reasonable, or to be challenged outright. Both in fact happened, and it is the latter which will be considered first.

2. Bertrand Russell: "All Relations Are External"

The two early, vigorous opponents of Bradley's idealistic monism were Russell and G.E. Moore. In his early writing under the influence of Meinong, Russell espoused an atomistic realism in which all relations were held to be external. He could not believe that mathematical entities become what they are through relation; rather, logical considerations require that terms have an independent existence. It is fairly easy to see that a consistent theory of external relations entails both realism and atomism. In his attack on Bradley, Russell was at first preoccupied with cognitional theory; every act of cognition presupposes an independent term known in cognition, and existing independently of it. In place of Bradley's coherence view of truth, Russell was forced to espouse a *correspondence* theory.

Russell felt that he could put the lie to Bradley's case by discounting the latter's claim that a doctrine of relations involves, necessarily, a dangerous infinite regress, i.e. that between every term and its relations it is necessary to postulate additional relations and so on. In 1902, in his first major work on mathematics, entitled *Principles of Mathematics*, Russell agreed with Bradley to the effect that there is an infinite regress in relational thought, but attempted to show that "the endless regress, though undeniable, is logically quite harmless."[13]

Russell's principal attack on monistic idealism appeared in an essay entitled "The Nature of Truth," published in the "Proceedings of the Aristotelian Society of 1906–7,"[14] in reaction to Joachim's book of the same title. My interest in the essay lies in its critique of what Russell calls "the fundamental assumption of the whole monistic theory," namely, its doctrine of relations. Russell states the axiom of internal relations, basic to monism, as follows: "Every relation is grounded in the natures of the

related terms."[15] He understands this axiom to mean that "the fact that two objects have a certain relation implies complexity in each of the two objects, i.e. it implies something in the 'natures' of the two objects, in virtue of which they have the relation in question."[16] This axiom, which Russell holds to be "equivalent to the monistic theory of truth," he firmly rejects. The holistic conception of reality which the axiom entails Russell accurately and concisely formulates as follows:

> For if we consider "A is related to B," the A and the B are also related to everything else, and to say what the A and the B are would involve referring to everything else in the universe. When we consider merely that part of A's nature in virtue of which A is related to B, we are said to be considering A *qua* related to B; but this is an abstract and only partially true way of considering A, for A's nature, which is the same thing as A, contains the grounds of its relations to everything else as well as to B. Thus nothing quite true can be said about A short of taking account of the whole universe; and then what is said about A will be the same as what would be said about anything else, since the natures of different things must, like those of Liebniz's monads, all express the same system of relations.[17]

One could search in vain in the literature of monism itself for a more adequate statement of its comprehensive claim about reality; nevertheless, Russell's adequacy in grasping its fundamental insight is directly proportional to the intensity of his hostility to this position of his mentor, Bradley.

It is not surprising that in constructing his case against Joachim, Russell again appealed to Bradley's own seemingly negative argument about relations, viz. that the axiom leads to the denial that there are any relations. He adds to Bradley's arguments some of his own, one of which is of special interest, namely that a doctrine of internal relations is equivalent to the view "that every proposition has one subject and one predicate." This is so because "a proposition which asserts a relation must always be reduced to a subject–predicate proposition concerning the whole composed of the terms of the relation."[18] According to Russell, the implication of this view that there is finally only one proposition with one subject, namely the whole, and one predicate runs into the anomaly that this involves distinguishing the subject from the predicate, as though they could be diverse and, he adds, "even this is not quite true."[19]

Russell next turns to a critique of the two basic assumptions of monism: first, the law of sufficient reason, and second, the fact that "if two terms have a certain relation, they cannot but have it, and if they did not have it they would be different."[20] Obviously it is the second of these grounds that is of interest here. His argument is essentially as follows. If A and B are not related to each other in such a way, it does not follow – as the monists hold – that they would be other than they are; rather, if they were not so related, "every imaginable consequence would ensue." His logical point is that "if they are so related, the hypothesis that they are not so related is false, and from a false hypothesis anything can be deduced."[21] Strict logic forces him to alter the statement in such a way that the argument is reduced to a definition of internal relations. Thus, the argument is purely rhetorical and is viciously circular. One further argument against the doctrine of internal relations, as mentioned above, is that it runs into insurmountable difficulties because it violates the essential subject–object pattern of all propositions. All I want to say about this now is that this particular objection to the doctrine is itself bound up with conceptual difficulties which run rampant through Russell's logical atomism. Russell's pluralism was a *blik* just as "storm-free" for him as was monism for Bradley and Joachim. A study of these two fundamentally different visions and the argumentation used in their defense should demonstrate the close connection between logic and ontology in every fundamental metaphysical vision.

The force of Russell's logic was an important ingredient in the early demise of British idealism in this century. Since that time, logical atomism has exhibited such logical and ontological difficulties that it is now appropriate to take a fresh retrospective look at the position of monism which was badly maligned by Russell et al. in the new positivistic philosophy.

In the book, *The Nature of Truth,* Joachim expressed concern about the impasse between monism and pluralism in these words:

> For any monistic philosophy the fundamental difficulty is to find intelligible meaning within its system for the relative independence of the differences in the One. For any pluralistic philosophy the fundamental difficulty is to render any union of its ultimate simple entities intelligible without destroying their simplicity.[22]

Although somewhat critical of monism, Joachim expressed special dissatisfaction with Pluralism and its fundamental claim about the externality of all relations, concluding against Russell that the theory of external relations is simply a name for the cognitional problem to be solved. "How can elements, each absolutely simple and in itself," he asks, "coalesce to form a complex in any sense a unity?"[23]

Clearly, the idealists had met a formidable foe in Russell with the result that British Neo-Hegelianism suffered a serious setback. No less formidable a foe of idealism on this side of the Atlantic was William James, whose articulation and defense of pluralism created an American legacy. His attack on monism came in his lectures, *A Pluralistic Universe*, first published in 1909, and more particularly in Lecture II, entitled, "Monistic Idealism."[24] It is obvious to anyone familiar with these lectures that pluralism developed as a specific alternative to British and American monism, if the name itself is not evidence enough. James, one of the first philosophers to write in the American vernacular, correctly perceives what is at stake between these two fundamental options in philosophy, though his logical defense of pluralism is somewhat loosely formulated.

To James, the timeless world of the monists represented an alien sphere from which he wished to be liberated conceptually by pluralism which, "in exorcising the absolute, exorcises the great de-realizer of the only life we are at home in, and thus redeems the nature of reality from essential foreignness."[25] Furthermore, he abhorred Bradley's Absolute, calling it a "metaphysical monster" with an "elaborately foreign aspect."[26] To James, the *absolute* was an unnecessary *deus ex machina* contrived by the idealists; *unnecessary*, because to him, it ignored the "immediately given coherence of the phenomenal world."[27] His chief argument against monism was that it represents an unfortunate extreme: "The whole complete block-universe through-and-through, therefore, or no universe at all!"[28] What he prefers in lieu of this extreme is "a universe really connected loosely, after the pattern of our daily experience."[29] Here lie the beginnings of the objection to universal internality which Hartshorne will later elevate to a formal modal–logical argument, but which in James is still as loosely framed as his loosely connected universe, namely, that

sanity can be restored to the debate only by insisting that there is *some* connection between things. As James puts it:

> The whole question revolves in very truth about the word "some." Radical empiricism and pluralism stand out for the legitimacy of the notion of *some*: each part of the world is in some ways connected, in some other ways not connected with its other parts.[30]

By insisting upon *some* connectivity, rather than all, he argued – against the monists – that there are such things as external relations. The weakness of his argument in defense of such relations is commensurate with his statement later on that his intention in these lectures is limited to the claim that the philosophy of the absolute is "not proven," adding, "please observe that I go no farther now."[31]

In the Appendix to these lectures, James chooses as the fundamental thesis of pluralism the "notion of reality as changing." In a move which must have been quite independently influential upon Whitehead and Hartshorne, James approaches the question of relations from the primordiality of successiveness:

> In every series of real terms, not only do the terms themselves and their associates and environments change, but we change, and their *meaning* for us changes, so that new kinds of sameness and types of causation continually come into view and appeal to our interest. Our earlier lines, having grown irrelevant, are then dropped. The old terms can no longer be substituted nor the relations "transferred," because of so many dimensions into which experience has opened.[32]

His sense of the invasion of the mind by the flow of experience prevented James from retiring to the comfortable seclusion of monism's changeless realm. But, as the above excerpt clearly betrays, James' logical defense of his position was a logically circular restatement of his basic tenet.

The position of G.E. Moore, who first gave strict logical form to the claim that some relations are internal, some external, was a further, and almost final, veto of idealism.

3. G.E. Moore: "Some Relations Are Internal, Some External"

Moore is writing in the new philosophical climate which his essay on "common sense" helped to initiate; nevertheless, his essays in *Philosophical Studies* still engaged in polemic with earlier thinkers,

such as Bradley and Joachim. Particularly relevant here is his essay on "External and Internal Relations," which did much to determine the form which the debate would take in subsequent years. Moore sets out in this essay to bring the problem under strict logical scrutiny, an aim which on my reading of the discussion alters somewhat the conceptions of those who represented the debate early on. In an idiom which portends the impending era of positivism, Moore insists that it is "by no means easy to make out exactly what these philosophers [i.e. Bradley and Joachim] mean by [their] assertions."[33] In the absence of certainty about what they meant, Moore is content "to try to define clearly one proposition, which, even if it does not give the whole of what they mean, seems to me to be always implied by what they mean, and to be certainly false."[34] That is to say, if one is willing to concede Moore's proposed reformulation of the doctrine of relations, logic would require one to hold that some relations are internal, while others are "purely external."

After excluding "confused" formulations of the dogma of internal relations in its historic form, Moore offers a re-statement of what is precisely implied in the dogma, namely, that "in the case of every relational property, it can always be truly asserted of any term A which has that property, that any term which had not had it would necessarily have been different from A."[35] The two aspects of the proposition which first engage Moore are: "would necessarily have been," and "different from A." In the former he believes that he has given logical content to Bradley's "metaphorical" (sic) claim, rephrased by Moore, that all *relational properties modify* their terms. I shall argue later that this reformulation alters the pure doctrine of internal relations, but for the present I shall follow Moore's presentation, since it serves as the basis for a third option in the debate which has recently received support and elaboration by Hartshorne.

Moore interprets the phrase "would necessarily have been" in this way: "To say of a pair of properties P and Q, that any term which had P would necessarily have had Q, is equivalent to saying that, in every case, from the proposition with regard to any term that it has P, if *follows* that the term has Q."[36] If this proposition is true – and Moore concedes that it is true of some relational properties, but not all – specific content is supplied to the other

phrase "different from A"; for "to say of a given relational property that it . . . is internal to a given term A which possesses it, is to say that from the proposition that a thing has not got P it follows that the thing is different from A."[37] After noting that it must still be decided whether *different from* means *numerically* or *qualitatively* different from B, Moore argues that both are false if applied to *all* relational properties. His chief complaint against those who hold the dogma that all relations are internal is that they claim that "any term which does in fact have a particular relational property, could not have existed without having that property."[38] Moore's reluctance to accept this view is grounded in his contention that it violates common sense. That this final arbiter of truth for Moore is not in fact a reason, but merely a name for his reluctance, should be clear from the statement which follows:

> It seems quite obvious [sic] that in the case of many relational properties which things have, the fact that they have them is *a mere matter of fact*; that the things in question *might* have existed without having them. That this, which seems obvious [!], is true, seems to me to be the most important thing that can be meant by saying that some relations are purely external.[39]

Whatever logical advantage Moore seems to have gained over Bradley and Joachim at this stage in his argument is based in part, at least, on the fact that he has introduced the question-begging term, "relational property." It is only of the doctrine of internal relations as restated with this term that he can say that "it may be true that A has in fact got P and yet also true that A might have existed without having P."[40] I would argue, *contra* Moore, that Bradley et al. did in fact mean that if A has not got P, then it would not exist without having P. The reason for this is clear: that what A is, is *defined as* "having P." Therefore, it is nonsense to say that if A has not got P, it *might have existed* without having P. Those who hold to a monism by virtue of the doctrine of internal relations must regard the view of Moore (which includes that of Russell) as nonsense, for monism requires for its foundation the view stated above, that if A has not got P, then it would not exist. This is the position that will be espoused, *mutatis mutandis*, and defended later in this relational metaphysic.

Moore, at this stage of his presentation, attempts to show on strictly logical grounds that the consistent doctrine of internal relations leads necessarily to the (false) position that relational

properties are *necessary truths* about things. Moore is troubled by this consequence because it seems to eliminate the category of "matter of fact" which seems so central to "common sense." In the last analysis, he is only able to say of his own view, that "some relational properties certainly are *not* internal," only the following: "And in defense of this proposition I do not know that I have anything to say but that it seems to me evident in many cases that a term which *has* a certain relational property *might* quite well not have had it."[41]

Moore is quite right to see a connection between the consistent doctrine of internal relations and Leibniz's principle of the Identity of Indiscernibles, the latter of which – as might be expected – he regards as false. His reasoning is worth citing:

> For if it [i.e. the principle of the Identity of Indiscernibles] be true, in the case of every relational property, that any term which had not that property would necessarily be qualitatively different from any which had, it follows of course that, in the case of two terms one of which has a relational property, which the other has not the two are qualitatively different.[42]

It is *precisely* this claim that characterizes the doctrine of universal internality, so that Moore is partially correct to point out toward the end of his essay, that the dogma "consists in the joint assertion of two indefensible [sic] propositions: (1) the proposition that in the case of no relational property is it true of any term which has got that property, that it *might* not have had it, and (2) the Identity of Indiscernibles."[43] The only question-begging element in his statement lies in the word "indefensible," for to some, it is the most logical fundamental claim a metaphysics can make.

4. An Interlude: A.C. Ewing

Given the three fundamental positions on internal and external relations, all subsequent debate attempted either to clarify the issues or to defend a particular option, or both. Before turning to what may be called the contemporary status of the debate, attention should be given to one more document which played a role in the interim, namely, A.C. Ewing's major work, *Idealism: A Critical Survey.*[44] His extensive critique of the discussion about relations is, in his own words, inconclusive in some vital aspects,

though it is clear that, as an idealist living at a time made more difficult by the emerging positivism, he rejected the view that *any* relations are external, though in what sense they may all be said to be internal is left somewhat unresolved. The most that Ewing contributes to the discussion is some organization and clarification of the claims made by his idealistic predecessors *vis-à-vis* internal relations. It would be laborious to review *in extenso* his catalogue of possible meanings of internal relations; it would in fact be almost pointless to enumerate all ten senses of the term which he finds among thinkers like Bradley, Laird et al., for at the conclusion of the list he admits that the seventh, eighth, ninth, and tenth senses "we have neither proved nor disproved," this despite the fact that he adds – correctly – that it is these last four which "seem to constitute what idealist philosophers have chiefly in mind when they assert that all relations are internal."[45] Much rests on his "seventh sense" of the meaning of internal relations: viz. "where two terms are related in some specific way, it is always true that they could not both have been what they are without the relation being present."[46] At this point in the development of his critique, Ewing is uncomfortable with this position, being convinced that "in all cases of relations between concrete terms *one* of the terms could have been the same without the relation being present." Here and throughout his analysis of the concepts of relation, having indicated serious logical difficulties in the idealists' arguments, Ewing summarizes their monistic theory with great feeling.[47] Having distinguished between *causal* and *logical* dependence of terms, he stands ready to admit a causally–internally related universe, but stops short of the logically–internally related universe of the idealists, the latter of which he describes as follows:

> Most advocates of the internal relations view seem to have held that any particular thing was not only causally but logically dependent on the other things to which it was related, for they insist that it is self-contradictory (i.e. logically and not only causally impossible) without them. Anybody who maintained that everything was internally related in this sense to the rest of reality would mean that reality was a system such that any part of it would ultimately be found to be logically incoherent and self-contradictory if abstracted from the rest, but when seen in the light of the whole would be seen to follow from it by an intelligible logical nexus, and not merely coexist with the other things in the universe as matter of fact.[48]

However much Ewing is attracted to this position, he feels that it is based on inadequate argumentation. Nevertheless, when he states his conclusions to this discussion, the degree to which it differs from the idealists is minimal. For example:

> The world known by us constitutes a system in which every particular is linked to the rest of the system by a relation of logical entailment. The presence of this relation is obviously incompatible with the extremer forms of pluralism. It implies that the nature of any one thing taken by itself is incomplete and internally incoherent without the whole system on which it depends. Things by their very essence belong together.[49]

Then he demurs: "But it does not imply that reality has as high a degree of unity as is present in one substance or one mind."[50] Ewing closes his essay on the one certain theme running throughout: despite the difficulties with the doctrine of internal relations, the "view of the world as consisting of separate terms connected only by relations indifferent to the nature of these terms . . . is in any case quite untenable."[51] I conclude that, if no relations are *external*, not only is Russell's view excluded by Ewing, but also Moore's. Ewing finally subscribes to a doctrine of internal relations, although it is a highly qualified one.

I have attempted to provide a fairly representative survey of opinion on the early debate about internal vs. external relations. Other philosophers could be mentioned, but my purposes are best served by turning directly to two contemporary spokesmen who update and enrich two of the earlier options, namely, Hartshorne and Blanshard.

B. CONTEMPORARY OPTIONS

Charles Hartshorne defended Moore's view, though for what might be called "Whiteheadian" reasons rather than considerations of "common sense"; Brand Blanshard revitalizes the dogma of internal relations. Both are thinkers of great stature on the modern philosophical scene, so I am under obligation to give careful attention to their positions and to state rather precisely why I reject Hartshorne in favor of Blanshard.

1. Charles Hartshorne: "A Logic of Ultimate Contrasts"

The logical and ontological dimensions of a metaphysical scheme are often so closely intertwined that it is virtually impossible to assign priority to one over the other. Nevertheless, it is probably just as true of Hartshorne's position as of Bradley's, that the ontological vision is the fundament toward which logical clarity is directed. Anyone who reads Hartshorne's major works in chronological sequence, from such early writings as *Man's Vision of God* to his recent *Creative Synthesis and Philosophic Method*, becomes aware of the increasing attention to *logical* aspects of the issues. One hears more about Whitehead in the early works, more about Peirce in the later. To the general reader of Hartshorne, the sophisticated logical arguments are *meant* to be compelling and irrefutable. If it can be shown that the ontological basis of his surrelativism heavily conditions his logical defense, then one is free to reconsider the option of universal internality which he rejects.

As might be expected, Hartshorne's first extensive treatment of the problem of internal vs. external relations appeared in a discussion of God in his book, *Man's Vision of God.* In this early defense of God's *primordial* and *consequent* "aspects," he rejected both absolute universal internality and absolute universal externality, judging these to be "oversimple extremes." Instead, they were brought together by Hartshorne in an ontological alliance, as aspects of a unity (such as God). It requires no great insight to realize that, for Hartshorne, primordial *means* "not internally related," and "consequent" *means* "not externally related." The most serious problem he faced was the contrariety of his basic concepts, which he resolved by labeling them "aspects." On reading Hartshorne's general argument for the complementarity of external and internal relations in all experience, one gets the distinct impression that he assigns a more fundamental role to internal than to external relations. G.E. Moore would agree with the first paragraph of his case, which reads as follows:

> If I think of whiteness, whiteness is not made anything other than it was before by this relation to my consciousness, and this relation is thus external to whiteness, but my consciousness is altered to just the extent of the relation.

[Russell goes this far, but no further.] It is clear in this instance that the externally related term, whiteness, is abstract and the concrete term, my consciousness of the whiteness, is inclusive of the relation, is an internally related term. Or, suppose we consider the relation between the whiteness and my personal identity as a certain individual. I can enter into this relation without becoming a numerically different individual.[52]

The terms "abstract" and "concrete" point to a Whiteheadian qualification of the argument which opens the door to a very distinct emphasis on internality which is evident in the conclusion of the paragraph:

But I cannot do so [i.e. enter into relation with this whiteness] without alteration in the concrete state which I as such an individual enjoy. Had I thought of blueness instead of whiteness, I might have been the same individual, but this means that I might have enjoyed the same past . . . and I might even in the present have had the same general, more or less *abstract*, characteristics, but my total *concrete* being would have been slightly different [sic].[53]

Since for Whitehead the term "concrete" is synonymous with "actual," it is apparent that Hartshorne's argument moves beyond Moore, and is in some respects sympathetic with monistic thought. This fact is evident in a further statement:

The interaction between two molecules is slightly peculiar to those molecules, yet it is one thing even though they are two, or rather, it is one thing with various aspects. In this oneness is expressed the unity of the world. All relations, internal and external, involve a substantial unity embracing the relata.[54]

What prevents Hartshorne from subscribing to the thesis of universal internality is his preference for dipolar theism inherited from Whitehead. Accordingly, God's primordial, i.e. external, relation to the world belongs to a vision which is incompatible with idealistic monism. Whether dipolarism is logically superior to monism depends upon whether Hartshorne's "logic of ultimate contrasts," worked out in close connection with Peirce's thought, is able to justify the measure of unity Hartshorne claims for all "individuals."

Seven years later, in his work, *The Divine Relativity*, Hartshorne gave a more sustained and systematic defense of the logic of what he has, by this time, come to call "surrelativism." The title of Chapter II, in which his theory of "relatedness" is set forth with great clarity, reflects exactly what that theory must be: "God is

Absolute, Yet Related to All." Using the idiom of the recent debate, the title could be paraphrased as follows: "God is both externally and internally related to the world." One major sentence can be arranged in a special way to show how integral to Hartshorne's theism is his theory of relations:

The way is cleared for constructing a consistent doctrine of divine relatedness, both in

its	*external*	and its	*internal* [aspects]
its	*absolute*	and its	*surrelative* [aspects]
both in its	*transcendent independence*	and in its	*transcendent dependence* or *sensitivity*
its	*absolute* or *non-reflexive*	and its	*relative* or *reflexive,* supremacy
its	*A-Perfection*	and its	*R-Perfection*
its	*non-self-surpassing*	and its	*self-surpassing,* surpassing of all others[55]

That Hartshorne turns immediately to a discussion of Bradley is to be expected, for idealism's thesis of universal internality is the most serious threat to God's primordial aspect. It should be clear by now that Hartshorne's conception of absoluteness, which is based on externality, is fundamentally different from Bradley's Absolute, based on universal internality. He must somehow show that there is a fundamental misconception in Bradley's thesis. The basic error of idealism was its "unfounded notion that supremely excellent means 'in all respects absolute,'"[56] whereas Hartshorne wants to prove that "absolute is identical neither with supreme nor with inclusive." He appeals to Moore's essay quoted above to prove that, at least in some instances, some relations are internal, some external, thus holding that both Russell and Bradley are wrong. It initially appears that Hartshorne has played into Bradley's hands when he asserts, "Relatedness to the given objects [of experience] is no addition to the being of the subject – as an actual awareness or experience – but is that being";[57] but what is being conceded here is that relations have a *sense* or *direction*, according to which A [the subject] is *internally* related to B [the object], and B is *externally* related to A "if that means that the term has a relation of inness to the relation."[58] To state the objections which I have to this thesis of directionality would require a more extensive portrayal of Hartshorne's logic than he

has offered us up to this point in his argument. A critique will be offered only after his recently schematized "logic of ultimate contrasts" has been set forth.

Having established to his satisfaction that Bradley was wrong to deny the reality of external relations, Hartshorne proceeds to argue that the denial of the reality of internal relations (here recalling Part I of Bradley's work, *Appearance and Reality*) logically entails giving up all relations, an act which would undermine all thought. At this point in Hartshorne's classic, one moves into the center of his conception of God, his arguments serving to elaborate his ontology.

In setting forth the sense in which it may be said that God is absolute, he lays down the categorical principle that there is a "general and weak meaning of absolute, namely, independence of at least some relations of which the thing said to be absolute is a term."[59] In the argumentation Hartshorne again, as in his earlier book mentioned above, turns to the categories of abstract and concrete, meaning by the former term a "factor of reality not wholly dependent on relationship." Having proved to his satisfaction that arithmetical examples entail external relations, in that such entities are abstract, he feels compelled to ask whether relations among two concrete entities present a different logical situation. It is significant – and to be expected from a Whiteheadian – that his example of a concrete object of awareness is "a past event." Appealing to causal directionality, Hartshorne argues that particulars are *retrospectively* related to particulars, but not *prospectively* so. For example, there was in the consciousness of George Bernard Shaw a relation to Shakespeare, but the converse does not hold. For if the past contained the present in itself, as does the present the past, then nothing novel could occur. This example is not just incidental to Hartshorne, for his case for the directionality of all relations, i.e. that there is a *one-way* relation between A (present) and B (past), is fundamentally rooted in his vision of successiveness, In his most recent work which puts the finishing touches on the logic of dipolar theism, it is not unexpected that he appealed primarily to modal logic, which he defines as "a logic of temporality."[60] Before turning to this later work, I shall summarize the conclusion of his argument from *The Divine Relativity*. Since the book is about theism, it

may be appropriate to sum up its principles in a statement representative of Hartshorne's dipolar deity: because not all relations are external, God cannot be wholly absolute; because not all relations are internal, he cannot be wholly relative. Modally speaking, he insists: "The only way to keep both the absoluteness and the inclusive knowledge required by the religious idea is to restrict the absoluteness to an abstract aspect or dimension of the supreme being."[61]

In the Appendix to the chapter under consideration, Hartshorne enters more deeply into the logical foundations of his surrelativism. Although from my perspective it is objectionable to do so, Hartshorne intrudes into the argument the idiom of subject–object, stating his notion of the one-way directionality of relations in the problematic form: the earlier (the object) is non-relative to the later (the subject): the later (the subject) is relative to the earlier (the object).[62] It is because this subject–object polarity is an essential feature of the Whiteheadian system that I venture to move beyond it to a more adequate relational paradigm. A definitive clue to the likelihood that Western notions of temporality go hand in hand with subject–object thinking is supplied by the following excerpt:

> Subjectivity as such is relativity, objectivity as such is nonrelativity. And if it be objected that "objectivity as such" manifestly involves relation, the relation of being known, the reply, once more is that this is a "determinable" relation to mind as such and in general, not a determinable relation to any given mind or set of minds, even the cosmic set. The object can be object if *any* mind, some mind or other, knows it; but the subject is an ignorant subject, deficient as such (at the limit nonexistent) insofar as it is nonrelative or neutral to the question, *which* objects, of those that might exist, do exist?[63]

In such arguments – to my mind at least – the notion of temporality, so fundamental to Whitehead, Bergson and Hartshorne's other mentors, is the questionable ground for the derivative theory of relations and its subject–object dependency. To show that this is the case, I shall focus on Hartshorne's most extensive logical defense of his position to date, his recent work, *Creative Synthesis and Philosophic Method.*

Although much of his earlier argumentation is reproduced in this later work of 1970, Hartshorne here subjects the question

of relations to its most rigorous critique. Still rejecting the extremes of Bradley and Russell, he summarizes the thesis of neoclassical metaphysics in an exact – and we might add, instructive – manner: "Only indeterministic yet intrinsic causality, whereby events are relative to their predecessors but not to their successors [is real]."[64] Including a new, but vital term, "non-symmetrical," Hartshorne states the ground principle as follows: "Thus one-way relativity (positive in one direction, negative in the other) covers the whole story. Relativity as directional or non-symmetrical is the absolute principle."[65] His fundamental task will be to show the logical priority of non-symmetry over symmetry, but to accomplish this – it should be noted – he must, on his own admission, depend exclusively on a logic of temporality. It is appropriate, accordingly, to focus attention on two major chapters of the book: viz. Chapter VI, "A Logic of Ultimate Contrasts," and Chapter IX, "The Prejudice in Favour of Symmetry."

Consistent with Hartshorne's dipolar metaphysic is his logic of ultimate contrasts, according to which "polarities are ultimate."[66] His basic doctrine, as he calls it, is that the two poles of every abstract contrast of experience, such as complex–simple, effect–cause, "stand or fall together; neither is simply to be denied or explained away, or called 'unreal.'"[67] One must not think, however, that dipolarism is dualistic, for it is not *equipolar*; priority in some sense is assigned to the concept expressing the total reality, "not because the correlative contrary concept [in his 'Table of Metaphysical Contraries'] can be dismissed or negated, but because the referents of the latter are included in those of the former, while the converse inclusion does not obtain."[68] The most fundamental conclusion to be drawn from this table is that the basic principle is relativity; "absolute" – so fundamental "erroneously" to Classical Theism and idealism – is "merely the negative of relative," negation being but "a subordinate principle."[69]

It is the essence of his position that the data of human experience are not simultaneous, and hence do not involve *symmetrical* relations. The temporal flow provides an asymmetry, and it is this fundamental principle of "successiveness" which is argued in the remainder of the chapter. It is no small wonder then that he can say, categorically, that "history is the cognitive paradigm,

not mathematics."[70] I shall not argue against the fundamentality of temporality at this point, but will proceed directly to the chapter on symmetry, in the hope of showing that the logical priority he ascribes to asymmetry is the logical consequence of making the notion of successiveness absolute.

In the chapter on "The Prejudice in Favour of Symmetry," Hartshorne appeals to Peirce's logic of relations to demonstrate the logical excellence of one-way, or asymmetrical, relations. He wishes to prove that symmetry is a special case, asymmetry being the general principle. On Peircean principles of trichotomous relations, he meticulously argues that "symmetry within an overall asymmetry" is a "paradigm for metaphysics."[71] In effect, for Hartshorne, asymmetry *equals* directional order. The question arises: does he derive directionality (i.e. temporality) from Peircean logic, or is the "consequent" directionality derived from the Table of Metaphysical Contraries because it underlies their formulation? If the latter is the case – and I am assuming so – then the "logic of ultimate contraries" becomes derivatively important . . . and I might add, less than absolutely compelling.

Hartshorne is convinced that the question of internal vs. external relations has never before been properly evaluated, in that Bradley rejected asymmetry, Russell was aware of it but failed to generalize his judgment that asymmetry had been neglected, and Moore, who correctly understood that some relations are external, some internal, failed to see that the logical problem is one of asymmetry *per se*.

Most of the classical examples of symmetry were taken from perception, so Hartshorne turns to this particular problem only to emerge with the predictable insight that symmetry has been judged fundamental in perception because of a category mistake, namely, that perception has been regarded as simultaneous! This leads him to say categorically that:

> The very idea of perception as a form of knowledge is that of a one-way dependence upon an independent reality. We perceive something because it is there; it is not there because we perceive it [sic]. In other words, the perceiving is an effect; and the perceived a causal condition of that effect. How can simultaneity be the temporal structure of such a one-way act?[72]

My own reaction to this statement is that "the very idea of perception" does not necessarily vindicate any theory of perception

over another. The reason it seems so to him is that he understands the term "perception" derivatively from a more fundamental notion, namely, successiveness.[73] I am strongly inclined to the conclusion that the choice between symmetry and asymmetry cannot be reduced to the clinical purity of modal logic, but is a consequence of ontological assumptions much more deeply held.

In the remainder of his case against asymmetry, Hartshorne clearly betrays that the defense is really in the service of dipolar theism. Statements such as "the subject–object duality is ultimate,"[74] and "'symmetry' is the zero case of directionality,"[75] are but ingredients in a larger vision of God. The final statement of the chapter deals with fundamentals of a "theistic philosophy," and it is here that what is ultimately at stake in Hartshorne's reasoning about relations is best expressed:

> Relations to God are intrinsic to a creature, constitutive of its very existence; but relations to the creatures are extrinsic to the mere existence of God (though not to his total actuality, including his contingent qualities).[76]

Every ingredient in this assertion is integrally dependent upon his theory of relations as set forth early in his career, so that my rejection of his view that some relations are external, some internal, leads me to adopt a fundamentally different conception of deity. What the conception will be must await a preliminary sympathetic appraisal of Blanshard's recent defense of the thesis of universal internality. Before entering upon that venture, I should do well to illustrate, once and for all, the reasons for claiming above that Hartshorne's logical defense of surrelativism is dominated by his ontological assumptions. I shall argue that these assumptions uniquely account for what seem to him to be logical insights, but which on a different reading could be construed – logically – in the opposite way.

When, in the chapter on symmetry in *Creative Synthesis and Philosophic Method*, he sets out to prove that not all relations are symmetrical (although *some* are: x is equal to y and y to x), he points out that "x greater than y, y greater than x, are not only different, they are contradictory."[77] Certainly, "greater than" is not *eo ipso* asymmetrical, unless one wishes to attach the question of symmetry to "size." There is perfect symmetry

to "x greater than y," if it is considered purely as a logical relation without regard to the nature of the entities. The only situation in which "x greater than y, y greater than x" would be contradictory is when they are affirmed of same x's and y's. Symmetrical thinkers (*pace* Hartshorne) never indulge in such nonsense. When he moves from the relation of comparison to what he calls "relations of existential or dynamic connectedness," the examples which he entertains (e.g. effect to cause, experience to things experienced, events to predecessors) are so obviously conditioned by his notion of successiveness that no further criticism is needed.

In *The Divine Relativity*, Hartshorne argues – against the idealists' extreme – that "in assigning to X as its internal property relation-to-Y we do not deny the twoness of X and Y. We say only that X is inclusive of the other entity."[78] I contend that the supposed "twoness" of X and Y is just what the idealists could not accept as a logical conclusion from X-related-to-Y. In the step to be taken "beyond" the idealists later in my own presentation, I shall insist that it is just as reasonable to assert that X and Y are not two "things," but merely functions of the relation. Since for Hartshorne only a subsequent X can be related to a previous Y, the "twoness" is essential, but derives from the priority of the successiveness assumed in the argument.

The reader is invited to examine virtually all of Hartshorne's logical examples this way. It should become apparent that the directionality which he sees in these logical examples lies, for the most part, if not solely, in the eye of the beholder!

Hartshorne's lifelong devotion to the enrichment of classical theism is rightly directed, for his panentheism moves properly toward "relatedness" as the key to the divine nature. From a fully relational perspective, however, it errs in affirming that there is a non-relational aspect of God, his *primordial* aspect, i.e. that dimension of his being which is independent of other beings. I realize that in dipolar theism it is but an *aspect*, so that a unity is maintained. Later in this chapter I shall set forth a fully relational conception of deity which also centers in "relatedness," but rejects panentheistic statements such as "the world is in God." One might be tempted to think that a relational metaphysic requires a return to pantheism, in which God is the world. But I hope to show that this conclusion misconstrues the ontological

situation. To establish the sense in which *God* is related to *World*, I shall need to proceed to a relational hermeneutic, from which shall emerge the conclusion that *God* and *World* encapsulate two complementary languages about reality. God and World are complementary aspects of one relational Whole, namely, reality considered as a totality. Even with this model, there remains the constant danger that these terms will fall victim to the "fallacy of misplaced concreteness" – to use the phrase precious to Whitehead and Hartshorne – and to myself, for that matter. To say more at this point is premature; I must first conclude the consideration of the question about internal and external relations by presenting the main features of a position which, in some ways at least, will be valuable later on, namely, that of Brand Blanshard.

2. Brand Blanshard: "The Coherent World"

Blanshard, who studied at Oxford in the last days of the great influence of Bradley, Joachim and Bosanquet, has remained committed to this position throughout the long period of Logical Positivism and Language Analysis.[79] He is one of the leading contemporary representatives of the position that all relations are internal. It is important to review his arguments here, since they update this option as it is represented in recent developments in philosophy.

As was true of the idealists before him, Blanshard's basic commitment philosophically is to the "intelligibility of the world." Since this intelligibility is for him integrally related to the criterion of coherence, it is perhaps justifiable to sum up his position in the brief construct, "The Coherent World." His choice of a key term in this respect is "system," of which he writes:

> The immanent end of thought is a system at once perfect and all-embracing; in such a system necessity would be complete; and it is the working assumption of thought that reality *is* such a system. For the aim of thought is to explain things; its assumption is that things are explicable; and explicability *means* full systematic necessity.[80]

It follows from his premise that the ideal of thought involves the necessary proposition that "the world which thought is called on to construe must be a system of parts related internally."[81]

The intelligibility of the world rests for him on a certain "inner necessity" which it is the unique task of thought to elucidate. The term "necessity," like that of "intelligibility," is bound up with logical considerations, and it is the claim that all things are connected by logical necessity that links his thought to the early idealists.

In articulating the position that all relations are internal, Blanshard first takes into account the case for external relations. His clear statement about what makes a relation internal or external is reminiscent of the views of certain earlier representatives in the debate:

> A relation is internal to a term when in its absence the term would be different; it is external when its addition or withdrawal would make *no* difference to the term.[82]

His approach is first to show that the view that all or some relations are external undermines the intelligibility of the world, and he does this primarily by showing that logical operations – commonly held to be operations between external terms – *presuppose* the kind of universal internality excluded by these tenuous views. Against the atomistic externality of Russell et al., Blanshard holds – correctly I think – that all implication assumes a system, a whole in which the parts are related. He maintains that implication cannot be defined in reference to p and q alone, as the atomists assumed. The antecedent and consequent are not "capsules," as Russell argued, but ingredients in a system the denial of which leaves entailment in the realm of mystery. Logical statements about triangles cannot be meaningful – as some have assumed – without the specification of the kind of space – Euclidean or Riemannian – in which those triangles are thought to be located. Furthermore, the law of contradiction is not some isolated logical fact, but is so integrally related to the nature of things that its denial "would carry down with it the intelligible world."[83]

According to Blanshard, the issue between external and internal relations is one of the most fundamental in all of philosophy. Universal externality is logically precluded on the grounds that its acceptance, as well as the acceptance of *any* external relations, would mean the destruction of the foundations of logic. He is aware that the claim that *all* relations are internal flies in the face

of common sense, that the so-called dogma of universal internality "seems preposterous on its face";[84] therefore he devotes considerable attention to the objections to the dogma which are raised by those who hold to some kind of externality. For example, some maintain that the entire scientific enterprise presupposes the isolation of recurrent phenomena:

> Is not scientific method as truly a means of dissociating things that are not relevant as of connecting those that are? Every one of the experimental canons . . . does its work by elimination, that is, by showing that all but certain factors are *un*connected with a given result, either because they are present when it is absent, or absent when it is present, or independently variable.[85]

Blanshard's argument against such a reduction is that, although the scientist does eliminate certain factors in order to determine the efficient or precipitating cause, these factors are not *absolutely* irrelevant. The successful movement in physics toward a unified field theory suggests to Blanshard that science is proceeding toward theories of maximum relatedness. Thus he can conclude: "One lesson of the extraordinary development of physical science in the present century is that *any* assertion of pure externality is to be received with suspicion."[86]

Blanshard next considers the claim that the success of logic is based on the absolute independence of abstract universals. According to traditional logic, "everything is declared accidental except the other universals that are found invariably in its company." Hence, there is "the most intimate connection between the doctrine of abstract universals and the doctrine that things may be related externally."[87] To show the weakness of this view of formal logic, Blanshard first agrees that "reasoning proceeds through universals," but then denies that the operations of formal logic – as commonly supposed – are possible on the basis of the abstract identity of unrelated terms. Inference presupposes, quite to the contrary, that the terms of a syllogism do not remain wholly unaffected by being shown in relation to each other.[88] The formalist tradition errs in asserting the *absolute* link between abstract universals and external relations. The truth of the matter is less than absolute. It is "that the method of abstract analysis *is* applicable to wholes in the degree to which their parts are unified (in the sense of being related externally) and *not* applicable in

the degree to which they are unified; that since none of the wholes of actual experience are mere and pure aggregates, it is *perfectly* applicable nowhere, but since none of them are ideal unities either, it is *in some measure* applicable everywhere; finally, that since the ideal of thought is a system completely unified it will hold *nowhere in the end.*"[89] Formal analysis does exclude by singling out "constituent elements," it is true, but in doing so "we invariably shut out of our vision some of the relations our term possessed while still embedded in nature."[90] Analysis is a legitimate, but admittedly "lower level," operation which belongs in fact to a more holistic enterprise, for we never actually find this "hard, sharp disparateness of 'terms.'"[91] To set up the two terms of a syllogism "like posts in a plain, and then formally chain them together," he asserts, "is a process that, however useful, still mutilates the face of nature."[92]

To conclude this simplified presentation of Blanshard's extensive and complex case against externality, it is appropriate to indicate that his central concern is to show that the kind of *necessity* called for by thought is possible only through a theory of internal relatedness. It is in fact presupposed even by those empirical and *a priori* operations which claim to rest on externality, but which would not be possible on those grounds alone. Having proved this to his own satisfaction – and to mine – he turns to an exact statement of the theory of internal relations.

It is not without great significance that the final chapter of Blanshard's book, *The Nature of Thought*, is devoted to the topic, "Concrete Necessity and Internal Relations," for the two terms are essential to his thesis that the world is intrinsically intelligible. He restates his fundamental theme at the beginning of the chapter: "The world could be accounted intelligible only if it were a system, all inclusive and perfectly integrated, and that such integration would be achieved only if the parts were internally related."[93] To prove the high probability of this thesis, he first assumes – against common sense – that all things are related at least by the relation of difference. He cites Hegel and McTaggart as his allies in maintaining that "if a thing is as truly (though perhaps not as usefully) characterized by *not* being x as by *being* y, then clearly a change in its relations of difference would mean a change in itself. It is thus related internally to everything else in

the universe."[94] Although Blanshard rejects all claims for external relations, he does concede – in what he calls a refinement of the internal relations theory – that not all "relational properties" (using Moore's term as a concession) of a "thing" belong *equally* to its nature. "Their removal," he concedes, "would involve the alterations of the thing [sic] in very different degrees."[95] Blanshard here begins to betray an identification of the concepts of "term" and "thing" which, in my opinion, is ultimately damaging to his case. The clue to this weakness lies in Blanshard's inadequate view of the term "concrete" which figures so prominently in the titles of the two final chapters which deal with relations. All of his examples indicate that by "concrete" he means "specific things" like buildings, stones, etc., or as he says at one point: "objects . . . in their real or natural habitat," i.e. "as they exist in nature."[96] The counter-term "abstract" is then reserved for "universals," leaving the impression that their intangibility renders them non-concrete. If, as I have suggested from the beginning, the fundamental test to put to a metaphysic is the question, what is a thing? then Blanshard's otherwise brilliant defense of internal relations is marred by the lack of an equally discerning understanding of the nature of a "thing." I shall return to this problem shortly; it is raised here only to show that his concession to the externalists that "internal relatedness is a matter of degree" suffers from this inadequate portrayal of the difference between "terms" and "things." In a relational metaphysic, as will be outlined in due course, they must be carefully distinguised, with no concession being made to "degrees of relatedness."

Clear evidence that Blanshard identifies "terms" and "things" is at hand in his extensive discussion of the nature of a "thing" which comprises Chapter III of his historic work on the nature of thought.

For a metaphysical perspective, the chapter is a clear disappointment. In lieu of a deep penetration of the nature of "thingness," one finds a curious equation of "thing" with "stuff." At one point he betrays his precise meaning when he speaks of the threat of recent microphysics to our "'thingy' world."[97] Since his argument is basically about perception, his notion of "thing" is virtually limited to "physical things." Accordingly, the word "real" is set over against "illusion," rather than "abstraction" as in a relational

scheme. Only twice in his discussion of a "thing" does he approach the complexity the problem deserves. In the first instance – to my great surprise – he sidesteps the fundamental issue by the remark: "These are matters for metaphysics, not for psychology."[98] In the second, he concludes, quite uncritically, that:

> Even when the search for the "it" of a physical thing has baffled us, and we can find nothing but qualities, we continue to use "it" of the qualities. . . . What the substance–attribute relation really is is a matter often disputed among philosophers, but this much would seem to be clear, that *it is too fundamental to our ways of thinking to admit of psychological explanation.*[99]

I might be more content with this tentative remark if later in this two-volume work he had dealt with the *metaphysical* question of "thingness," but, alas! he does not.

Since the book, *The Nature of Thought*, appeared some forty years ago, it may be instructive to take account of Blanshard's most recent remarks on "internal relations" in the key paper for a symposium on internal relations, held at Smith College in May 1967. The title of his address was: "Internal Relations and Their Importance to Philosophy."[100] Four critics responded to his paper, after which he supplied "A Rejoinder to My Critics."[101]

Despite his departure from some aspects of idealism in his Paul Carus Lectures of 1959, entitled *Reason and Analysis*,[102] Blanshard's more recent remarks on relations at the Smith symposium do little more than summarize the earlier treatise on *The Nature of Thought*. The symposium did provide him an opportunity to answer some criticisms of his position raised earlier by Ernest Nagel in an article entitled "Sovereign Reason."[103] Two of Nagel's most severe criticisms of Blanshard's position on internal relations are – on my view – effectively dealt with by the latter, who then feels free to reiterate his earlier arguments. The value of this résumé of his thought lies largely in the additional examples he provides on the equation of causality with necessity; its weakness lies in the fact that the notion of "thing" is still not subjected to sufficient scrutiny.

Although Blanshard's critics are adept at advancing logical objections to the doctrine of universal internality, they are not successful – either in his view or mine – in dealing a deathblow to the doctrine. It is a disappointment that none of the critics

objects to his notion of a "thing." I am bold to think that if the nature of "things" is clarified by taking what I call "the step beyond," no concession to externality – even for a moment – would be appropriate.

Although the relational metaphysic soon to be presented in detail goes "beyond" the dogma of internal relations, that dogma remains for it an important axiom.

C. A RELATIONAL AXIOM: THE THESIS OF UNIVERSAL INTERNALITY

The categorical transpolar law which was introduced at the beginning of this chapter is intelligible only against the background of the thesis of universal internality which has been stated and rigorously defended in the subsequent argumentation. The position that "all relations are internal" has commended itself as the most economical principle, as well as the most elegant, among recent options for making sense of our experience. The monism it necessarily entails is metaphysically more defensible than either the dualism or atomism attendant upon the thesis of universal externality which – according to Blanshard – undermines the operations of logic.

In the final chapter, I shall set forth a detailed outline of a relational metaphysic by developing the arguments for universal internality into a new thesis which, hopefully, will prove to be simple, comprehensive, and elegant. Its schematization of reality is but a foundation upon which many edifices can be built, some of which will be hinted at, but none finally constructed in this essay. The reader will doubtless evaluate this proposal of a relational metaphysic in progressive stages, asking first whether it is defensible to accept the thesis of universal internality. Next, does it meet the test of comprehensiveness? of coherence? Only if these are answered in the affirmative will the positive result claimed for relational thinking logically follow, namely, a liberation from the inexpedient search for "subjects" and "objects" housed in our languages about reality.

CHAPTER IV

A STEP "BEYOND": RELATION IS FUNDAMENTAL

The thesis of universal internality, which functions as an axiom of this relational metaphysic, sets the stage for a wholly adequate answer to the question with which this inquiry began, namely: "What is a Thing?" It should be pointed out, however, that none of the monistic idealists was able to frame an adequate answer in terms of that thesis alone. It was as though the thesis, while intrinsically reasonable, resolved the question of reality by elevating one of the options of classical polar thinking, namely, idealism, to the level of a dogma. Even though the thesis of universal internality is a close approximation to a relational view of reality, those who held it most tenaciously assigned fundamentally to the mental, or rational component of experience.

When idealism's doctrine that all relations are internal came under attack from Russell, G.E. Moore et al., the consequence was a retreat to the opposite pole, realism. Neither school of thought deeply questioned the legitimacy of polar thinking; both were still operationally committed to the subject–object paradigm which, if I am correct in the case made in Part I, was the legacy of Newton and Kant. Not even Hegel – as understood by the British idealists – transcended the paradigm, although the ingredients for doing so are all there. If the question is posed whether philosophy must forever be condemned to the choice between these classical poles, the possibility of a negative answer lies in the successful proposal of a transpolar scheme, which meets the conditions (1) of coherence, (2) of adequately accounting for the whole of experience, and (3) of doing so without assigning priority to mind or world. It must also fully account for the historical emergence of the paradigm of subject–object thinking, while at the same time indicating its limitations. And it achieves this end by generalizing the conditions of experience in such a

way that polar thinking becomes a special case of a more comprehensive theory which, when fully grasped, restricts the range of the previous paradigm.

A relational metaphysical scheme does not *eliminate* the idiom of polar thought, but rather requires that the poles be viewed as less than fundamental. The poles are subsumed under a higher category by applying to the question of their reality the strict dogma of universal internality. Because of the predominantly "polar" legacy of Western thought, it seems historically appropriate to designate the relational metaphysic by the term "transpolar." While not wholly adequate, this term is faithful to the intentionality of the system. If the reasoning which constitutes this new relational scheme succeeds in being truly "transpolar," future philosophy will be liberated from what in my view are long-standing pseudo-issues which came into being through conceptual constructs of limited usefulness. Just as leaps in physics took place through reconceptualizations which often eliminated previously held entities or forces, so the hope of transpolar metaphysics is that this reconceptualization of the epistemological and ontological problems of thought will eliminate many supposedly fundamental "entities" whose acceptance has plagued Western thought almost from the beginning.

A. RELATIONAL ONTOLOGY *IN STATU NASCENDI*

A personal note: Once I had become aware of a relational paradigm through work in the physical sciences, I was sufficiently "awakened from my dogmatic slumber" to realize the deep significance of Buber's writings on I–Thou. In my early studies, I followed the lead of many who saw Buber primarily as an advocate of what was termed "interpersonal relations." In this country it was the psychologists who saw Buber's potential; but they transmitted to others an interpretation of I–Thou without a full appreciation of its ontological grounding. I made no special effort to probe Buber's thought for myself for many years. It was the reading of Robert Wood's important volume, *Martin Buber's Ontology*,[104] as I reflected upon new possibilities for overcoming certain impasses in metaphysics, that led me to

appreciate the ontological principle of relation which underlies his thought. At about the same time, I became more aware of the significance of Feuerbach in this regard, and was reminded of his influence upon Buber and other philosophers who figure in what Buber has called "The History of the Dialogical Principle." Since both Feuerbach and Buber have been influential upon the specific formulation of relational ontology to be set forth in this chapter, I shall present those features of their thought which have influenced my own, being careful to indicate where I differ from them. The decision to deal with Feuerbach and Buber, and to leave out of regard others who have represented this perspective, is based upon the personal judgment that it is only these two who have clearly advanced the notion in significant ways.

While developing the perspective of a relational ontology, I was made aware of the major article by Syed A.R. Zaidi in *The Review of Metaphysics*, entitled "Toward a Relational Metaphysics."[105] Since I had already arrived at this position independently, I gained little from his presentation. But because readers will be interested in the relationship of this relational metaphysic to his, at the end of this section I shall present his thesis in brief, and indicate why I feel it fails to be a thoroughgoing articulation of a relational metaphysic.

1. Ludwig Feuerbach

> "I" is only a linguistic ellipse, that, merely for brevity's sake, leaves out half of what is understood by itself.[106]

As Feuerbach was so painfully aware, his writings seemed to invite misunderstanding. The great work of his youth, *The Essence of Christianity*, which he intended as an alternative to historic idealism and materialism, so quickly acquired "the stigma of idealistic onesidedness"[107] that he was virtually compelled to draft a work on nature religion in order to express his views more fully.[108] Even with the addition of this work, of his public lectures on religion already cited, and of his more decidedly systematic works in philosophy, the "stigma" did not vanish. To the extent that he was anti-Hegelian, he was considered an ally by the other Left Hegelians, but many of these accused him of a "residual

idealism" which would separate his thought from the emerging Dialectical Materialism. The irony of history is that those who most praised Feuerbach's philosophy, namely Marx and his colaborers,[109] quickly became disaffected with his thought, due primarily to what they regarded as his inability to make the transition from theory to *praxis*.[110] They could take some assurance in this claim from the fact that Feuerbach had himself admitted that he was an idealist in the domain of practical philosophy.[111]

There has been too great a tendency, in my opinion, to accept the judgment of the Dialectical Materialists on Feuerbach, and so to regard him as materialist with idealistic residue. In fact there has been considerable difference of opinion among interpreters as to what label best fits his philosophical activity. To the extent that it is appropriate to characterize his thought by pre-Feuerbachian terms, perhaps the most appropriate designation is that of "anthropological materialism" suggested by Schmidt in the work previously cited. I hope to show, however, that Feuerbach fully intended to transcend these historic categories by bringing together the defensible features of idealism and materialism in a truly "new philosophy." My intention in this defense is not to try to make a contribution to Feuerbach scholarship; it is rather to show that his philosophizing was a serious, and somewhat successful, effort to frame a relational ontology. Even if I should fail to be convincing in this regard, I believe that in this process the occasion will present itself to indicate those unique features of Feuerbach's thought which justify the exalted place which Buber assigns him in the "History of the Dialogical Principle."[112]

As previously indicated, it is customary to characterize Feuerbach as some kind of materialist. His statements about "physiology," i.e. Nature, seem inevitably to lead in this direction. In those historic lectures on the essence of religion, which provided him the opportunity to correct emerging one-sided estimates of his thought, Feuerbach dramatically argued: "The being which in my thinking man presupposes, the being which is the *cause* or *ground* of man, to which he owes his origin and existence, is not God – a mystical, indeterminate, ambiguous word – but *nature*, a sensuous, unambiguous word and thing."[113] Speaking more categorically in a later lecture in the series, he claimed that "it is in nature that we live, breathe and are; nature encompasses man

on every side; *take away nature and man ceases to exist*; he subsists through nature and is dependent on nature in all his activities, in every step he takes."[114] Later: "I presuppose nature . . . I am an earthly being."[115] Surely it is a materialist claim that is being expressed in his most elaborate declaration about nature, viz.:

> Nature is the being, or the sum of beings and things, whose manifestations, expressions, or effects, in which its existence and essence consist and are revealed, have their ground not in thoughts or purposes or acts of will, but in astronomical or cosmic, mechanical, chemical, physical, physiological, or organic forces or causes.[116]

The difficulty of deciding the depth and scope of his materialism is compounded by the fact, not to be underestimated, that in most of his writings Feuerbach is concerned primarily with *anthropology*, and accordingly says very little by way of amplification of these major statements about nature. I say that this is not to be underestimated because I believe it to be intentional on his part. I cannot justify this claim without first probing in some depth the nature of his anthropological insights. Before engaging upon that task, however, I need to give some indication of his direct rejection of idealism, for such statements have commonly been interpreted as further evidence of a clear materialism. For example, in *The Essence of Christianity*, he argued anti-idealistically: "I do not generate the object from the thought, but the thought from the object; and I hold *that* alone to be an object which has an existence beyond one's own brain."[117] As a sensualist, he argued that the object of the senses is "out of man."[118] His characteristic "Sensualism" was in itself an anti-idealistic stance. And if these considerations alone do not justify labeling him a "materialist," one can always add to the weight of evidence the fact that his mature work, entitled *Ueber Spiritualismus and Materialismus*, included a special section with the caption, "Kritik des Idealismus."[119]

The question remains nevertheless: is an anti-idealistic position necessarily a materialistic one? The affirmative answer supplied by Feuerbach's Marxist interpreters must be rejected as simplistic, for reasons yet to be elucidated. Another question is worthy of attention: does the presence of "non-materialistic" ingredients in Feuerbach's position justify the label "idealistic vestiges"? So

the early Marxists assumed, but probably because they did not fully perceive his philosophical intention.

In his writings on the nature of Christianity and of religion, including the later lectures on the subject, he laid the groundwork for a fundamental aspect of his thought which Löwith calls his principle of "Altruismus."[120] This principle is the dialogical I–Thou relationship which reaches its most mature form in his later work on spiritualism and materialism. In that final form, as I shall attempt to show, there is fully manifest a relational ontology *in statu nascendi.* Once this estimate is accepted, it becomes justifiable to interpret those early statements about I–Thou in the theological writings as the embryonic stages of a relational philosophy. I am fully aware that some will judge that my own metaphysical program biases the way I read Feuerbach, but when the inadequacy of standard interpretations of his thought[121] fully to comprehend his intentionality with respect to the historic options of idealism and materialism is realized, perhaps a new theory will be welcomed. Here again, originality is not my goal; I rather hope to show its potential usefulness as a resource for framing a relational ontology. Such a usefulness remains, as I see it, whether or not Feuerbach himself actually reached the goal toward which his thought inexorably moved.

Having claimed that his I–Thou principle develops in such a way as to justify interpreting his early formulations of it by the later ones, I shall nevertheless refrain from treating these ideas as if they all form a "system." A more viable case can be made by proceeding developmentally, and then returning from the later stages to the earlier to indicate the extent to which they constituted a continuum or "trajectory" of thought.

It is common to interpret Feuerbach's first statements about I–Thou, which appeared in *The Essence of Christianity*, as a kind of interpersonal psychology set on the foundation of a materialism. Some of his statements seem to justify such an interpretation, as e.g.: "That he (i.e. man) is, he has to thank Nature; that he is man, he has to thank man; spiritually as well as physically he can achieve nothing without his fellow-man."[122] Even though the context from which the quotation is taken supports the claim of a fundamental materialism, it also makes clear that "the sense of Nature" which one has emerges only in and through one's fellow-man:

> The *ego* first steels its glance in the eye of a *thou* before it endures the contemplation of a being which does not reflect its own image. My fellow-man is the bond between me and the world. I am, and I feel myself dependent on the world, because I first feel myself dependent on other men. If I did not need man, I should not need the world. I reconcile myself with the world only through my fellow-man. Without other men, the world would be for me not only dead and empty, but meaningless.

He sounds very materialistic when he continues:

> A man existing absolutely alone would lose himself without any sense of his individuality in the ocean of Nature; he would neither comprehend himself as man nor Nature as Nature. The first object of man is man. The sense of Nature, which opens to us the consciousness of the world as a world, is a later product; for it first arises through the distinction of man from himself.[123]

At times he seems only to suggest that through a *thou* I first learn that I am a man;[124] at others he goes so far as to claim that "where there is no *thou*, there is no *I*."[125] It is not possible, given these pregnant remarks about man and nature, to decide from this work alone how fully Feuerbach intended his anthropological principle to inform his perspective. Early in the work there is a section which seems at face value to bring his physiology (to use his later word) under the domination of his anthropology. There he claimed: "'Man is nothing without an object . . . the object to which a subject essentially, necessarily relates, is nothing else than this subject's own, but objective nature."[126] Lest one be tempted to restrict his meaning of "object" in this context to "fellow-men," he specifically illustrates his point by reference to "sensuous objects" like the moon, sun, and stars. If it should be argued that in this statement Feuerbach is speaking only of the "sense of nature," the question could emerge: How does man (especially Feuerbach) move from this idealistic anthropology into materialistic claims about what nature is *an sich*? I am convinced that these disparate ideas are held together only by a latent relational insight which becomes more prominent in his later writings. Otherwise, how could one bring under one principle the divergent claims that "the object of the senses is out of man"[127] and "the object of any subject is nothing else than the subject's own nature taken objectively"?[128] I take this query to be valid, despite Feuerbach's claim that the latter statement applies to

"religious objects" and the former to "natural" ones. Certainly, an object of sense is an object of a subject! Marx and Engel did not see the disparity because they agreed with what they interpreted to be both his idealism *vis-à-vis* religious objects and his materialism *vis-à-vis* objects of nature.

The more formal systematic writings which appeared between *The Essence of Christianity* and *The Lectures on the Essence of Religion* gave Feuerbach further opportunities to develop the principle of altruism. In his *Grundsätze der Philosophie der Zukunft*, published in 1843, Feuerbach fundamentally opposed the idealistic notion of man as primarily "ein denkender Mensch." For the new philosophy he projects "has for its subject neither the I, nor the absolute, i.e. abstract, mind, not even reason by itself, but rather the real and entire nature of man."[129] Two further statements from this work amplify his position notably: "The nature of man is contained only in community, in the unity of man with man – a unity which rests on the reality of the distinction between I and Thou";[130] and "Man with man – the unity of I and Thou – is God. . . . The true dialectic is no monologue of the thinker with himself, it is a dialogue between I and Thou."[131]

In an anti-Cartesian work of 1846, entitled *Wider den Dualismus von Leib und Seele, Fleisch und Geist*, Feuerbach announced his intentionality in such bold terms that it would be problematic from then on simply to identify him with either idealism or materialism, viz: "Truth is neither materialism nor idealism, neither physiology nor psychology; truth is only anthropology."[132] It must be admitted, however, that in another work published the same year, namely, *Fragmente zur Charakteristik meines philosophischen Entwicklungsgangs*, Feuerbach continued to make statements about man and nature which sound as though his view is an anthropology built upon materialism; I have in mind particularly his remark that "the man who sprang directly out of nature was (also) only a pure natural being [*ein reines Naturwesen*], no man in fact. Man is a product of man, of culture, of history."[133]

His *Lectures on the Essence of Religion*, published in 1851 after his "star had already set,"[134] afforded Feuerbach a unique opportunity to present his dialogical thought in an enlarged perspective. In the earlier, more biographical lectures in the series, he con-

stantly stresses that his intention from the beginning had been to juxtapose physiology and anthropology. It was in the Tenth Lecture that he made the ultramaterialistic claim cited earlier, viz. "Take away nature and man ceases to exist." As the series closes, Feuerbach seems more boldly to approach a truly relational principle: "There is no such thing as a not-I without an I or *vice versa* [N.B.] – this fusion of I and not-I is the secret of essense, of *individuality*. The one determines the other."[135] It has seemed natural to interpret such statements purely anthropologically, and so far such a course of action may be justified.

Feuerbach's essay "On Spiritualism and Materialism," his last major work, leaves me with the distinct impression that his deepest reflections on relationships were leading him to formulate his final perspective in more truly relational terms. There are the usual statements about I–Thou which can be understood anthropologically, e.g.: "The real I is only the I standing over against a Thou."[136] In amplifying the meaning of this claim, however, he introduces the notion of human sexuality to ground his assertion. He writes:

> Man/woman is a synthetic concept: for I cannot feel or think myself, without going out beyond myself, without binding myself at the same time . . . to a corresponding being.[137]

Sexuality announces that I "am essentially a being relating myself to another being outside myself; that I am nothing (!) without this relationship."[138] The masterstroke comes when he sets the question, "Is the world only a representation and perception of myself, or an existence outside of me?" on the same level with the question: "Is the woman (wife) or man (husband) only my perception or a being outside of me?" To the extent that the former question is exhaustively to be answered by the principle implied in the latter, both idealism and materialism are superseded by a relational ontology. In one of the most interesting analogies in philosophical literature, Feuerbach speaks of the full reality of a cat as "cat–mouse." Why, then, do cats kill mice? His answer is noteworthy: The cat "kills only some mice, not all, because with the annihilation of all animal objects enjoyable to itself, it would annihilate itself; because in order itself to live, it must let others live."[139] Changing the example and the image, he proceeds to the remarkable conclusion:

We can only eat what is edible, only see what is visible, only touch what is touchable, so that the simplistically so-called *object* is just as appropriately *object–subject*, as is the simplistically so-called subject essentially and routinely *subject–object*, i.e. the I (is) a Thou–I.[140]

As if clearly stating his lifelong insight for the last time, he asserts in a slightly different idiom:

Not I, no! I and Thou, subject and object, distinct yet inseparably bound together, is the true principle of thought and life, of philosophy and physiology. The distinction between I and Thou is the distinction between fantastic and real light. Light of the nerves without sunlight is as much as an I without a Thou, a woman (wife) without a man (husband), or vice versa.[141]

It would seem to be fully justifiable to view these words as the closest approximation in his writings to the expression of a relational principle. Since he regarded this final assertion as fully consonant with his whole philosophical effort spanning more than thirty years, I feel comfortable with the claim that the ambiguities surrounding the question of idealism and materialism in his thought are the result of his less than fully adequate attempt to forge a new way beyond these options. The full fruition of his insights would have to await the coming of a distant pupil, Martin Buber. In some ways, however, all the necessary groundwork had already been laid, both phenomenologically and ontologically, by Feuerbach. Marx was right: "There is no other way to truth and freedom than through Feuerbach." Where Marx erred was in thinking that the way through Feuerbach leads necessarily to but one goal.

2. Martin Buber's Ontology of "das Zwischen"

The word "I" is the true shibboleth of humanity.[142]

It is not insignificant that in 1896 Buber studied with F. Jodl, the Viennese professor who edited Feuerbach's collected works. On his own admission Feuerbach was a major influence on his thought. but it would be some time before Buber would see these things for himself and so embody them in his writings. In his essay on the "History of the Dialogical Principle,"[143] Buber devoted but one page to Feuerbach, giving him due praise for advancing the notion of I–Thou, but faulting him for failing clearly to amplify

its true content.[144] It should be remembered, however, that this Afterword is a commentary on the work, *Between Man and Man*, in which Buber's more general appraisal of Feuerbach[145] concludes with the confession: "I myself in my youth was given a decisive impetus by Feuerbach."[146] I stress this dependence of Buber upon Feuerbach because of my conviction that in terms of the pure concept of I–Thou, Buber does not greatly improve upon Feuerbach; nor does the former move much beyond Feuerbach in articulating the phenomenological origins of the notion. My debt to Buber rests on the fact that it was he, not Feuerbach, who clearly saw the ontological implications of making the I–Thou principle fundamental.

Buber disdained metaphysics because, in Wood's words, it seemed "to imply statements about the transexperiential that often get in the way of our penetrating the experiential";[147] but he did speak of his fundamental position as an ontology. He even spoke of his perspective as "ontologism," despite his cautions about "isms" generally.[148] If one should distill out of his writings a fundamental principle, it would have to be an ontological one, namely, the ontology of "the Between." It is the foundation for all he affirms about individual and social existence, faith, morality, and nature. One could, following Wood, call his ontology "a *description* of what is deepest in our experience";[149] but the inappropriateness of calling Buber's fundamental insight an ontology of experience rests on the quite specialized role he assigns to the term "experience" as characteristic of the I–It attitude.

Buber's written legacy is poetic, anecdotal, aphoristic. He offered no doctrine per se, but seemed to welcome the subsequent efforts of others to systematize his thought. Such does not prove to be too difficult, because there is implicit in all his mature writings a clear foundational insight which is never violated. He could not violate it without violating himself, for his life was an embodiment of the dialogical principle.

It is tempting to present Buber's ontology by means of an extensive paraphrase of *I and Thou*, somewhat as Wood has done. But since he has done it so admirably and along lines very close to my own understanding of Buber's thought, I shall summarize the ontological principle with Wood's help.

As a deeply mystical person, Buber labored to clarify the status of "world" and so began his classic work, *I and Thou*, with this notion. As a *Sprachphilosoph*, he amplified the meaning of world through the concept of "Word." As a philosopher for whom philosophical anthropology was a lifetime preoccupation, he focused on the world-as-it-is-for-man. These three notions dominate the opening paragraph of *I and Thou* which is a succinct statement of the whole:

> The world is twofold for man in accordance with his twofold attitude.
> The attitude of man is twofold in accordance with the two basic words he can speak.
> The basic words are not single words but word pairs.
> One basic world is the word pair I–You.
> The other basic word is the word pair I–It.

Every sentence of the paragraph as quoted to this point manifests duality: "twofold," "two basic words," "word pairs," "I–You," and "I–It." Corresponding to this duality is the polar nature of the self:

> Thus the I of man is also twofold.
> For the I of the basic word I–You is different from that in the basic word I–It.[150]

To the You-World and the It-World correspond two different "I's"; only to the I of I–Thou is the unitive structure of reality disclosed as relation, as the Between. The I of I–It experiences multiplicities.

Through a simple story which mirrors the whole course of his life, Buber explains the experienced multiplicity as derivative of an underlying unity. Since this story was so fundamental to his thought, I shall recount it here:

> On a gloomy morning I walked upon the highway, saw a piece of mica lying, lifted it up and looked at it for a long time; the day was no longer gloomy, so much light was caught in the stone. And suddenly as I raised my eyes from it, I realized that while I looked I had not been conscious of "object" and "subject"; in my looking the mica and "I" had been one; in my looking I had tasted unity. I looked at it again, the unity did not return. But there it burned in me as though to create. I closed my eyes, I gathered in my strength, I bound myself with my object, I raised the mica into the kingdom of the existing. And there . . . I first felt: *I*, there I first was I. The one who looked had not yet been I; only this man here, this unified man,

bore the name like a crown. Now I perceived that first unity as the marble statue may perceive the block out of which it was chiseled; it was the undifferentiated, I was the unification.[151]

This experience reveals the two basic categories, *Gegenwart* (Presence) and *Gegenstand* (Object), which so profoundly encapsulate his thought. The *a priori* of the experience is an undifferentiated unity, a relation in which the multiplicities of self and thing have not yet emerged. This state is immediacy, presence, unity. At second sight ("I looked at it again"), the immediacy dissolved into the multiplicity of "I" and "It", of subject and object. Accounting for this polarity of "experience" (in his specialized sense of the term) without succumbing to an ultimate dualism became a fundamental task for Buber.

Gegenwart and *Gegenstand* are derived as categories from a phenomenological inspection of what was given to him in such encounters as reported above. Out of the primal unity of Presence= Presentness there emerged co-ordinately (my term) an independent "I" over against an "Other," an It, with a loss of Presentness in that the It is of things past. The I of I–It *experiences* an object. There is no genuine reciprocity, no relation, because the I–It attitude is only a *partial* act, i.e. it is not entered into with one's whole being. The I which thus emerges is the *ego*, the conscious subject; this separated I engages in the functions of "experiencing" and "using." There is here only difference without a relation of identity.

For Buber the emergence of the separated I signals the loss of a pre-reflective primitive and childlike unity, the sphere of the Between. In fact, it is primarily through an inspection of the life of primitive folk and children that Buber is able to describe the pre-reflective experience. In both there is an underlying I–Thou relation, rich in natural associations, poor in objects. It is the state of Presence in which there is "the mutual givenness of subject and object, the primary togetherness which antedates their separation."[152] In the history of the race and of children this primal unity becomes differentiated with an attendant loss of immediacy. While some may regard this as a Fall from which there is no redemption, Buber regards it as the opening of new possibilities of higher unity, expressed by him as the realm of spirit.

The objectification process Buber sees as a vital step in the

maturation of the I–Thou relation, for only thereby does the conscious I learn "to see the other side," i.e. to experience the Other in its Otherness. Although Wood argues that Buber also believes that "if man is to do his work in the world, precision and consequently objectification are necessary,"[153] I am inclined to think that in this claim he is imposing on Buber his own agenda. On my view, Buber is *describing* rather than *prescribing*, and leaves open the possibility of a full life in the world which might have had a different scientific and philosophical legacy. Buber does in fact see Western history as a progressive increase in objectification which has become oppressive. His problem is how to reverse this movement, how to "return" to a life of freedom and destiny out of the oppressive It-World of doom. When he inspects the lives of those religious folk who have done so; when he probes into the deeper moments of his life, he discovers that the co-emergence of the separated I and the It-World has created conditions for a more intense mutuality. For in the place of the primal undifferentiated unity, a more profound meeting is possible, i.e. an identity-in-difference in the full sense. At the same time, as Wood notes, the way is prepared also "for more profound alienation if the I begins to rejoice in its state of separation and in the power it gains over the Other through objectification."[154]

Only in the I–Thou encounter is personhood actualized. The I of I–Thou is different from the I of I–It; it is the I of personhood. A person, as opposed to an *ego* (Buber: *Eigenwesen*), is one who participates in reality, in the reality of the Between. A Person is one whose whole being (co-)re-sponds to the Other.

The reality is the Between; actuality, i.e. actualization, occurs in meeting. One must avoid thinking of the I and the Thou as independent substances which are enriched in the meeting; rather, for Buber, if I understand him correctly, the I of I–Thou has actuality only as coactuality. The reality *is* the Between, the primary word that manifests the transcendent ground of meeting. There is no "I-as-such"; the only actual (Feuerbach: *wirklich*) I is actual in relation, and relation is reciprocity. It is a poor formulation of Buber's thought to represent his ontological principle as "I *and* Thou." It is rather: "I–Thou." His book carried the somewhat misleading title, "I and Thou," because it set out to explain not only the actual I of I–Thou, but the I of I–It as well.

Buber insisted that personhood is no permanent state of being, for every Thou is destined to become an It again and again. But the dialectic of existence is based on the fact that every It can become a Thou. The Other manifests itself as "Thou" or "It" in accordance with man's twofold attitude. The I of I–Thou, i.e. the Person, and the I of I–It, i.e. the ego, do not specify two types of humanity, however; they are rather poles between which men oscillate.

So far I have given a secularized version of Buber's ontology which, for that reason, is incomplete. My intention in so proceeding was to isolate the ontological insight as much as possible from its theological grounding, because it is such a secularized version which has influenced my own thinking. Buber was an intensely religious person whose sense of the immediacy of God illumined his life and thought. In fairness to him, therefore, some attention must be given to what he regarded as the essentially religious foundations of his ontology.

Buber's vision of God is articulated on the basis of a strong sense of the finitude of every Thou, of the incompleteness of every Encounter. As he says: "The innate You is actualized each time without ever being perfected."[155] This lack of completeness can only be overcome by an "immediate relation to the You that in accordance with its own nature can never become an It."[156] This is the Eternal Thou Who can never become an It; Who is the ground, i.e. the givenness of the possibility, of every I–Thou. Because "the other side" can never authentically become an object, but remains that toward which we proceed, whose presence we await, it is Grace.[157] In calling this Eternal Thou "God," Buber affirms that He is both "Wholly Other" and "Wholly Same"; "the wholly present."[158] Here the Hebraic notions of God as Elohim=The Transcendent and as YHWH=Addressing Presence combine to inform a vision of God as both remote and near. His nearness, His presence as world, means that turning from the world is moving away from God; His remoteness makes every turning from God toward the world an act of idolatry. Faith is not to be distinguished from idolatry by its object (since God is never an object), but by the Thou-relationship which is unique to it.

The constant danger of trying to locate reality in time and space is as apparent to Buber as it was to Leibniz, but Buber

attributes it to the lure of the It-World. For Buber, only the It-World lies in time and space; it is a world in which causality holds unlimited sway.[159] In sick ages, when men succumb to the It-World by failing to perceive the Thou which hovers over it like the spirit over the waters, common causality becomes an oppressive doom.[160] Reality, the Between, the manifest Thou does not inhere in space and time; it is immediacy which is not reducible to a set of coordinates.

These insights indicate that Buber was seeking some alternative to the finality of objective science. He was equally concerned about the disappearance of the world into the thinking subject. Out of this concern there came about what Karl Heim called a second "Copernican revolution" in philosophic thought. In the first such revolution, instead of subjects moving about objects, Kant saw the opposite; the objective world as a function of cognitive subjectivity. According to Wood, Buber brought about the second revolution by introducing the notion of an ontologically prior relation of Presence, binding subject and object together in an identity-in-difference which he termed the I–Thou relation and which constitutes the region of what he calls the Between (*das Zwischen*).[161] "Subjects" and "Objects" are not fundamental, as certain philosophies make them; they rather arise co-ordinately as derivatives (my term) by the objectification process.

The relational metaphysic soon to be elaborated grew out of much the same problematic as did Buber's; viz. the problem of subject–object as applied to things, persons, and God. It owes much to him by way of inspiration and substance. As will become apparent, however, it differs in being a secularized version in which a theology is present, but not ultimate. In this respect my debt is more immediately to Feuerbach, whose derivation of the I–Thou relation is more phenomenologically than theologically grounded.

3. Syed A.R. Zaidi: "Towards a Relational Metaphysics"

Zaidi understands the *aim* of metaphysics to be "the formulation of a simple and coherent conceptual system of absolute generality." In accord with this aim, the principal task of the metaphysician is "to tell us what are the fundamental particulars, of which one

may say that is ultimately all there is, and yet be assured of an unabridged version of reality."[162] The thesis which he proposes is important in both its negative and positive features: "that the fundamental particulars are not objects of which qualities or relations are predicated, nor are they instances of qualities of which relations are predicated. They are simply relations of a certain kind, in a sense of the term 'relation' which must be made clear."[163]

In unfolding this thesis, Zaidi locates the generally held position that qualities are fundamental in the inadequate metaphysics of common sense. Much of his article consists of a dismantling of the philosophical form of this general doctrine of common sense, and for this reason, overlaps with my own work to a limited extent. Even so, our intentions are similar, and the final formulations not wholly dissimilar.

Zaidi's concern is with the long-standing distinction between "quality-dependent relations" and "independent relations," a distinction which is gradually overcome later in his article. Most prior metaphysics (Hume, Leibniz) held to the absoluteness of quality,[164] with the inevitable result that these became metaphysical "monisms of unities" that were unable to be cogently "related to each other." In such metaphysical systems no meaning can be assigned to the term "Universe."[165] Zaidi concludes, after much argumentation, that no adequate metaphysics can be based on the category of quality alone.[166] Since it must be supplemented by a scheme of independent relations, it is less economical than a metaphysics based on independent relations alone, and hence "inadequate."

It is significant for my own formulation of a relational scheme that Zaidi makes a place for quality, namely, as a "derivative," or secondary feature of reality. The qualities (which are the fundamentals of prior metaphysical schemes) become the "relata" of a relational metaphysics, i.e. "the subjects or 'supports' of any relation."[167]

Zaidi next faces the objection that his case is poor "because particular relations can never be identified without reference to unities of some sort, for example, things."[168] The answer he frames, which separates his metaphysics from my own, is as follows:

> This objection is a non sequitur, because it fails to note the difference between conception and identification. I do not claim that particular relations can ever be identified without reference to unities; however, I do claim that certain particular relations can be so conceived.[169]

The implication of his claim is that his metaphysics of relation is rational rather than empirical. Such a claim is fully consonant with his earlier remark: "Nor do I deny that experience is experience of unities (and qualities), as well as of relations; in other words, I do not deny that the ordinary framework articulates the structure of what is experienced in the terms that it is experienced."[170] It is no wonder, then, that Zaidi will call all interpretations of experience "free intellectual creations," thus resorting to a position some hold to be true of scientific theories.[171] On this point I differ with Zaidi, for I shall maintain and try to demonstrate in the final chapter that a proper phenomenology of experience discloses relations, not qualities (or relata) to be fundamental.

The remainder of his article is given over to the defense of the thesis "that relations of identity are the fundamental particulars."[172] They constitute actuality, the total fabric of which comprises the world in its totality. Quality is explained as having the derivative status of potentiality.[173]

In the belief that physics should be taken seriously, Zaidi proceeds to equate relations of identity with the world-lines which are the "ultimate entities of physics." With this assumption he is able, somewhat ingeniously, to explain "relata" as the space–time points which constitute world-lines.[174] Appealing to Whitehead, Zaidi concludes that "matters of fact" are "interrelations" and "transitions." His claim that "the fundamental particulars of the relational framework are inherently transitional" is a significant step toward a viable alternative to philosophies which make "process" fundamental. In this way Zaidi gives content to his claim that "activity" is more fundamental than "status"; that "actuality" is "activity." In my own presentation later in this chapter a similar claim is made. However, I avoid linking relations with world-lines, or any supposedly ultimate entities of current physics.

Zaidi next turns attention to what is an essential task of any metaphysics which denies fundamentally to quality, namely, to

show in what sense the latter is a derivative. For him, as for C.S. Peirce,[175] quality is a form of potentiality.[176] Only relations of identity are determinate; qualities and instances of qualities are indeterminate. Another way of saying this is "that the structure of relations of identity is absolute, that it is what it is irrespective of anything else, and that we do not need instances of quality or unities or even relata as fundamental entities in order to conceive of this relational structure."[177] He follows Hume in holding that the "question of what qualities there are is not decidable a priori";[178] there is contingency in the sense that an instance of quality is a "factoring" of a world-line, i.e. a division of a space–time curve into "two sets of relata, each of the first being a cause of each of the second."[179]

Zaidi must indicate how the structure of determinateness is to be known, since he has admitted that experience discloses both qualities and relations of identity. It is at this point that his theory of "factoring" becomes important; for "an instance of quality in a spatio-temporal location, when it is taken together with the other relevant instances of quality that are its context, allows us to infer the structure of the determinateness in which it is a 'factor'."[180]

His discussion of space and time, which is primarily important for its inversion of Whitehead's claim that "actuality is incurably atomic," is followed by extremely significant remarks about the consequences of accepting his assumptions about fundamental particulars. One of the most important of these conclusions is that, since qualities can have no *direct* meaning, "a statement asserting the existence of a unity or quality makes no sense."[181] He cites in support a little-known remark of Nietzsche:

> Quality is a perspective truth for *us*; not an in-itself. . . . The world, apart from our condition of living in it, the world that we have not reduced to our being, our logic and psychological prejudices, does not exist as a world "in-itself"; it is essentially a world of relationships.[182]

The fundamental issue dealt with at the close of Zaidi's article is the role of consciousness within the schema of a relational metaphysics. To what extent does "consciousness constitute objects"? He draws upon Carnap's distinction between "internal and external questions" to make the twofold claim:

that without consciousness (defined as the-"intending"-of-an-object) there are no objects is an absurdity due to the failure to distinguish "internal" from "external" questions; whereas the claim that without consciousness objects cannot disclose their sense is a truism, if the disclosure of sense means nothing other than some form of the "intending"-of-an-object.[183]

While not insisting that relational metaphysics "transcends" realism (including materialism) and idealism, Zaidi goes to some lengths to indicate that its assumptions are unique with respect to these historic options. His thesis on experience which concludes the article illustrates the sense in which his option is unique:

> Experience is a complex structure of relations of identity; but not all relations are either experience or parts of (structures of relations of identity that are) experience.[184]

On my reading, this statement represents a disjunction *between* "experiencing"-and-"what-is-experienced" *and* "what-is-not experienced," which could easily be construed as a form of covert realism. From the beginning of this report on Zaidi, I have insisted that experience is something more fundamental than he will concede; I cannot agree with him that experience is a part of reality responding successfully or not so successfully to other parts. Zaidi too readily thinks of "experience" in terms of "what a subject does," whereas in my view a relational metaphysic, if it is truly to transcend idealism and realism, must assign a derivative status to the categories of both "subject" and "object." His metaphysics is relational by virtue of simply juxtaposing "consciousness" and "unconscious objects," and claiming that both are "structures of world-lines." In the relational metaphysic soon to be set forth in this chapter, no *fundamental* meaning is attached to "subjects" or "objects"; they are rather claimed to be co-derivatives of relations that are fundamental.

It is difficult to decide exactly where Zaidi stands on the claim that I shall make to the effect that "*all* relations are real (i.e. fundamental)." At the outset he seems to concede to Hume et al. that there are such things as "quality-dependent relations," but that they are not fundamental. It is only "independent relations" that comprise "fundamental particulars." I shall argue in a more thoroughgoing way that all relations are fundamental, and that

to the extent that what is actually being specified *is* a relation, it is not "quality-dependent." From my relational perspective, it is simply nonsense to speak of a "quality-dependent relation." Zaidi may agree with this claim in the final analysis, but his presentation proceeds in a way that leaves the issue ambiguous.

Under the heading "Relational Ontology *in statu nascendi*," I have tried to trace what I believe to be the major attempts to provide an alternative to traditional metaphysics by singling out relations as fundamental. Having done this, it is proper to set forth in some detail the main features of my own relational metaphysic, since I have alluded to it from the beginning without giving much of a clue about its content.

B. A RELATIONAL METAPHYSIC

1. The Law of a Relational Metaphysic

If this relational metaphysic is critical of monistic idealism at any point, it is that it did not bring its own monistic essence under the rubric supplied by universal internality. I now propose to take a step "beyond" the idealists, by arguing that when the doctrine that all relations are internal is applied rigorously to the question of reality the conclusion follows that: RELATION IS FUNDAMENTAL. Once this claim is assured, it becomes the most reasonable principle for the illumination of all ingredients of experience. The same comprehensive law is hereby to be applied to components of experience as to the question of the comprehensiveness of thought itself. The conclusion that "relation is fundamental" leads to a categorical law of transpolar thought which may be stated as follows:

> Given any classical *entitative* polarities, fundamentality is to be assigned to their relation.

The principal result of this law is that all "classical entities" dissolve; the only true entities are "relations."

Some of these classical entitative polarities are: mind–matter

(mental–physical); subject–object; mind–brain; God–World. Non-entitative polarities, such as truth vs. error, determinism vs. indeterminism, though illuminated by transpolar thought, are not brought under its categorical law. This law thus becomes the primary instrument for deciding what is an "actual entity" – to use Whitehead's term. I prefer to avoid the term "actual," because it suggests dependence upon the polarity of actual vs. potential, which I judge – with Laszlo – to be superfluous. I call entities "reals" in accordance with the theory that metaphysics is the study of reality. I also reject the polarity of "concrete vs. abstract" when this is used to distinguish the "conceptual" from the "sensory." The category will be used, however, in a Whiteheadian-Hartshornian sense, according to which the term "concrete" means real, and the term "abstract" pertains to non-fundamental (i.e. derivative) factors of experience. Some may wish to speak of "concrete relations," but it is tautologous to do so, since only "relations" are real. There are no "abstract relations"; the term "abstract" is reserved for what shall be designated derivative components of experience.

What "evidence" is there for the thesis, that: given any entitative polarities, relation is fundamental? I assume with the monistic idealists that the view that all relations are internal has greater intelligibility than that all are external, or that some are external, some internal. To the inherent intelligibility of their thesis is added the cumulative testimony of theoretical physics as outlined in Part I. Both in Relativity Theory and in Quantum Mechanics, the conceptual subject–object schema with its particulate entities has proven inferior to more decidedly relational schemes. The most valuable and far-reaching of the conceptual implications of Relativity and Quantum Theory is the qualification of the notion of "entities" which is authenticated above by Bohm and Cassirer. As indicated in Part I, Bohm held that no thing has complete autonomy; every thing has only relational characteristics. Cassirer went further in saying that the only true invariants are "certain fundamental relations and functional dependencies retained in the symbolic language of our mathematics and physics."[185] This insight into the nature of entities represents – to use the words of Einstein – the most profound and fruitful change that has come to physics since Newton. It might legitimately be asked why

it was theoretical physics rather than some other branch of natural science that first came to this relational notion of entitivity. The answer lies in the peculiar nature of physics as a discipline. One of the most adequate formulations I have found in the literature appeared in a recent issue of *Zygon*. The statement, drafted by Richard Schlegel of the University of Michigan, is both eloquent and precise.

> Physics is the most abstract of the natural sciences, since *it does not take any particular set of entities as its subject*. . . . Physicists attempt to describe and explain the properties of space, time, matter, and energy everywhere in the universe. Their science is expected to be valid for discussions of all material [sic: better "physical"] things: of stars, of man-made machines, or of living cells, *without, however, taking as its domain the particular properties of any of those entities.*[186]

It is quite understandable that, given such a characterization of the aims of physics, it is reasonable to argue that metaphysics and physics share in part a common task. Their differences will be stated toward the end of the chapter. My intention at this point is simply to *reinforce* the intelligibility of the thesis of universal relatedness by appeal to theoretical physics.

David Bohm's statement above is less comprehensive than Cassirer's. but would be acceptable to anyone predisposed to the thesis of universal internality. I have tried to be faithful to Bohm's intention in such a claim, as is apparent from his magnificent concept, "The Indivisible Unity of the World." Bohm's statements are, in the main, consonant with the thesis of universal internality. There is one pregnant suggestion, however, which does point to the step "beyond," which would affirm the relations themselves to be real. Already quoted in Part I, it reads: "[the world] must be regarded as an indivisible unit in which separate parts *appear as valid approximations only in the classical limit*."[187] This statement alone, if pressed to its logical conclusion, could yield a relational metaphysic; for when the classical limit is transcended, the "classical objects" – one could say – become bare approximations of reals. But Bohm does not go this far, and for an idiom of a fully relational scheme I must return to Cassirer's imaginative insight, based on Relativity Theory – and thus due to the *early* Einstein (however much he may have departed from it later) – that the

true invariants of the universe are "fundamental relations and functional dependencies." Cassirer's terminology will be reflected in the relational metaphysical scheme which will be presented shortly.

As has been mentioned above, it is my hope that this relational metaphysic will fulfill the three conditions: (1) of coherence, (2) of adequately accounting for the whole of our experience, and (3) of doing so without assigning priority to mind or world. If it should fail to meet either of the first two conditions, it would have to make way for a more coherent or comprehensive explanation of experience; if it should fail in the last, it would remain tethered to polar thinking, and would thus fail to be fully relational.

A key concept in this relational scheme is the term "bi-perspectival." Although the use made of it is somewhat novel, it retains in part the character of its use in the thought of Laszlo from whom the term is derived. Its origin is in Whitehead's dipolar scheme, as Laszlo admits. The latter uses it primarily to solve the mind–brain problem with the result that *all* systems are said to be both *natural* and *cognitive.* This duality is not fundamental, since it derives from viewing all systems in a special way. In my scheme this idea of "bi-perspective viewing" functions to account for the "abstract" (i.e. derived) as opposed to "fundamental" (i.e. concrete) features of experience.

Now it is appropriate to offer the relational scheme for which all that has been said is a propaedeutic.

2. *Fundamental Tenets of a Relational Metaphysic*

a. The Relational Paradigm: RELATIONS AND PERSPECTS

i. Relations are fundamental. Symbolically I maintain that: Given aRb, it is the R(elation) that is fundamental. Using Whiteheadian terminology I should say that relations are the *res verae*, the "true entities." I further suggest that the notation aRb is more appropriate than ArB for a truly relational metaphysics since it more adequately mirrors the priority of the *relation* over the *relata.*

For those to whom the first tenet is not immediately the case, a further explanation is provided. I have subscribed to the dogma of internal relations, according to which, given aRb, *a* and *b* are what they are by virtue of R. This argument need not be reiterated since it has already been discussed in the context of recent thought. I am simply taking the next logical step, namely assigning not only priority, but fundamentality to the relation; *a* and *b* thus become explicitly what they were implicitly for the thesis of universal internality: namely, "functional dependencies" of relations.

I have previously argued that the monists laid the foundations for such a view, but did not press the implications of their position. I add to the weight of their testimony the major gains in theoretical physics in this century which found it increasingly difficult to account for physical phenomena in terms of the classical Newtonian models which assigned fundamentality to particulate objects. Since my claim that "relation is fundamental" is an *assumption*, I can only appeal to the cogency of the inferences to be drawn from it *vis-à-vis* all the features of experience. If these implications threaten cherished landmarks – as they will – the hope is that the landmarks which replace them will add a greater degree of intelligibility to our experience.

The thesis that "relation is fundamental" is to be understood exhaustively; i.e. that *only* relations are real. I am aware that this claim is not Leibnizian, although I have argued that he played a key role in the creation of a relational paradigm. He held that the reals are *monads* whose relations to each other, constituting time and space, were ideal. Leibniz's significance for relational metaphysics is historic, in that his monadology was the only scheme contemporary with Newton that rationally accounted for the derivative character of "bodies" and the ideality of space and time. My inversion of Leibniz achieves the same ends, but, hopefully, more economically and comprehensively, having the added feature of being monistic, whereas the monadology was atomistic.

The basic assumption that only relations are real includes logically the correlate that *all* relations are real. I do not distinguish between *concrete* and *ideal* relations, for this would admit a false duality into the schema. The adjective "concrete"

is implied *ex hypothesi* in the noun "relation." I shall utilize the terms "abstract" and "abstraction," but only for *derivatives* rather than *fundamental* features of experience.

A further correlate to my basic assumption is that relations "do not move." Leibniz and Whitehead said the same about monads and actual entities, i.e. about real simples,[188] and there is sufficient reason to hold this to be true of relations. With both Leibniz and Whitehead I maintain that space and time are not fundamental; but against Leibniz I do not hold that time and space are "ideal relations," because *per definitionem* no relations are *ideal.* Space and time are to be regarded as derivatives.

Correlative to the relational postulate is the thesis that relations are *pure activity*. While every aRb includes the notions (which I call "derivative") "acting on" and "acted upon" which appear when any R is inspected a certain way; ontologically speaking, it is the "acting" that is real. "Acting on" and "acted upon" exist only as aspects of the "acting" which is the relation. I reject Leclerc's claim that "the actuality is the *substance in relation*";[189] rather I say that the substance *is* the relating. His view that "there can be no relation actualized apart from the acting, the relating"[190] is right but my reason for maintaining this – as opposed to his – is simply that the acting is the relation. Thus I hold substance to be the relation.

The basic thesis must now be extended to account for what are here termed "derivatives." I must show what these derivatives are, and why they are labeled as such.

ii. The terms of relations, i.e. the "relata," are derivatives of experience which, because they arise from bi-perspectival viewing, are called "Perspects." Monistic idealism held that the terms of a relation are what they are by virtue of the relation. What they are, however, was not clearly delineated, except that the relata are completely determined by their relation. The step which I propose to take "beyond" the monists is *logically* an advance, if not in every case *ontologically* so. I thus admit some difficulty in determining exactly what the monists meant by a "thing," if indeed they all had the same answer. In any case, what follows makes *explicit* what I deem to be *implicit* in the thesis of universal internality. My claim is this: that the so-called "terms" of every

relation (*a* and *b* of every aRb) arise from viewing the R(elation) bi-perspectivally. Thus they are called "Perspects," or more accurately, "Bi-Perspects." Bi-perspectival viewing gives rise not to just any "terms" whatsoever, but to the related terms, *a* and *b*. How can this be accounted for? One answer is that the relation lends itself to bi-perspectival consideration. I am tempted to claim that sufficient evidence for this view is afforded by the fact that for centuries in the West the relata have not only been uniquely isolated for consideration, but have been assigned fundamentality. A more developed account of the genesis of derivations from fundamentals will follow in Chapter V.

This thesis: Given any R, the terms *a* and *b* emerge when R is considered bi-perspectivally, needs amplification. If one inspects any R (activity) *ingressively*, an *a* term (acting on) becomes manifest. If one inspects any R *effectively*, a *b* term (acted upon) appears. The terms are thus "derived" from considering the relation in a way that seems natural, since it is so common. No deception or illusion is involved in this operation, so long as no fundamental claim is made for the reality of either, or both, of the terms. I avoid this danger by choosing the word "bi-perspect" to characterize the terms of relations, thus implying that *both* terms of *every* relation are derivatives. No exceptions are admitted; there are no features of experience which fall outside this relational scheme.

Even though no dimensions of experience are omitted from the twofold classification of relations and perspects, the amplification of the scheme requires one further major rubric, namely, The Hierarchy of Relations and their Perspects.

b. The Hierarchy of Relations and Their Perspects

The question of simples vs. compounds is as old as critical philosophy. It received one of its most adequate modern treatments from Leibniz, who maintained – and I judge rightly so – that unity is a feature of substance. My view is that unity is a feature of relations. The "early" Leibniz held compounds to be aggregates of simples to which the term "unity" does not apply. Although he had difficulty accounting for the distinction between organic and non-organic beings with this simple scheme, as I shall show shortly, it did have a useful function in his metaphysics.

In fact the scheme provided the foundation for his important concept of "physical existents," namely, that they are not simple (real) entities, but aggregates whose status is derivative – that is to say, grounded in substances.

The notions of simple, compound and – to add one other, totality – enable a fully relational schematization of reality to account for all the features of experience. Therefore, this hierarchy of relations and their perspects includes the following notions: Simple Relations and their Bi-perspects; Composites of Relations and their Compound Perspects; and The Totality of Relations and their Omni-Perspects. By treating these categories in greater detail, I hope to explain the choice of terms and to justify the exact way in which they are combined.

i. Simple Relations and Their Bi-Perspects: A Paradigm for a Relational Ontology. I have argued that only relations are concrete, and in the following sub-characterizations no exceptions to this claim are permitted.

All perspects are bi-perspects, i.e. their identity as derivatives is grounded in their co-determination. The bi-perspectival viewing that gives rise to *a* does so only by giving rise simultaneously to *b*, and vice versa. An aR or an Rb would simply be an incomplete symbol.

Experience is itself a relation, a "relating." This relational metaphysics is empirical therefore in this sense and in this sense only. As will become evident in the next sub-category, empiricism in its exclusive ordinary sense of "experiencing objects" is excluded. It is generally based on the false assumption that relations are external features of enduring terms, such as subjects and objects. Although I do not eliminate such terms, they are explained in such a specialized way as to be completely secondary. It is not possible to spell out in detail what is meant in these remarks without entering more completely into the problem of compounds.

ii. Composites of Relations and Their Compound Perspects. "Composites of Relations" are also relations. To justify the use of the term "composite" with relations and "compound" with perspects, I must enter more deeply into the problem of compounds.

According to Leclerc, the notion of "compounds" was the problem on which Leibniz foundered. He was forced in later life to modify the strict condition of the *Monadology* that only simples are real, and thus to admit the reality of some compounds in order to explain the existence of organisms. An important advance beyond Leibniz is achieved by Leclerc, whose insights into the nature of compounds and aggregates will be useful later on.

(a) COMPOSITES OF RELATIONS. Composites of Relations are "compounds," i.e. aggregates of relations. In maintaining that these compounds are also relations, and hence "real," I am in agreement with Leclerc against a long line of tradition (which includes Leibniz and Whitehead) which, according to Leclerc, believed that "only the constituents of compounds are to be identified as substances, as the true existents, all compounds being derivative existents and thus having an ontological status different from that of the constituents."[191]

Composites of Relations are aggregates of *some* relations which are themselves relations. They are complex parts of what I shall call the Totality of Relations. The spectrum of relations thus runs: simple – some (i.e. composites) – all (i.e. totality). While some may wish to admit only simples and their totality, the category of "Composites of Relations" is here regarded as essential to account for (1) the diverseness of experience, and (2) the discreteness of the units of experience. It is somewhat analogous to Whitehead's notion of "events" which he defined as "nexūs of actual occasions."[192] To Composites of Relations may be applied, *mutatis mutandis*, what he said about events, namely, that they are "the most concrete facts capable of separate discrimination."[193] When this claim is translated into relational categories, it leads to the thesis that the Composites of Relations account for the manifold diverseness and the discreteness of the units of experience. I distinguish between "discrete units of experience" and "the discreteness of the units of experience": the former applies logically to simple relations; the latter explains the factual diversity of experience. Thus both diverseness and discreteness are grounded in compositeness, so that it becomes improper to think of the Totality of Relations as an amorphous Whole. Rather, it has an inner structure which is disclosed in a relational meta-

physic. Pluralism denies all but simples. Monism is constantly lured into the non-discriminate Whole. Both extremes are conserved in a relational metaphysic, but not as extremes. They are rather ends of a spectrum, or, as might be said, elements of a hierarchy of relations. Since Composites of Relations are also relations, they lend themselves to co-aspectual consideration. These co-aspects of Composites of Relations I call Compound Perspects.

(b) COMPOUND PERSPECTS. There is no doubt that we interpret certain of our actions as engaging impenetrable bodies. From this we go on to speak of our own bodies. I find no fault with this impression, unless it becomes paradigmatic for reality itself, as was the case with Newton. I judge that Leibniz was correct in maintaining that "bodies" are derivative rather than real. I cannot hold with him, however, that "bodies" are aggregates of "simples," for the only "aggregates" of simples I have so far allowed relationally are "Composites of Relations." What then are such "objects" as ponderable masses? The answer, which may well be the most important advance over Leibniz in this entire relational metaphysic, is this: "bodies" are "Compound Perspects" of "Composites of Relations." Hence I speak of "compound perspects" as a way of accounting for empirical data as commonly understood. Compound Perspects are not concrete, but abstract; they are in fact counterparts of Whitehead's abstractions, although delineated in a fundamentally different way.

While I accept Leclerc's claim for the ontological reality of "groups," his reason for it, that the "group character" is grounded in "the relation between the constituents,"[194] is not accepted, unless one interprets "constituents" to mean "relations" (which he does not). It should be apparent that Leclerc's reasoning is still wedded inextricably to the notion that I have rejected, namely, that relations are ideal and grounded in their substances. In a fully relational metaphysic, only the relations are real, and their "composites" are real because they too constitute relations.

The category under immediate consideration, namely, "Compound Perspects," arose in part in the effort to account for phenomenal features of what may be called "the middle range of the empirical." For some, obviously, the term "empirical" is used

in a restricted sense for the data of sensory awareness. Micro- and macrophysics (cosmology) have demonstrated that the senses, as usually understood, provide access only to what may be called "the middle range" of phenomena, using the word in the technical physical sense. Those "empiricists" are thus forced increasingly to include ever smaller and larger entities to preserve the empiricism, even to the precarious point where the entities at both ends of the spectrum appear to be purely theoretical on their own admission. A relational metaphysic concludes that what has historically been deemed "empirical" is but a "middle range of phenomena" which it generalizes by so describing it. My relational perspective thus remains "empirical" not by the questionable subsuming of ever more theoretical entities under its category, but by qualifying the notion of "empirical data" *per se*, as I have shown. I acknowledge the usefulness of the category of the "sensory" to the extent – and to this extent only – that it is a helpful way of describing "the middle range of the empirical." My reason for making this concession is that the notion of sensory data has been fundamental to an entire stream of philosophical thought. But precisely this notion has run into difficulty in modern theoretical physics and must be modified, or in my view – *generalized.* A fully relational scheme makes such a generalization possible.

I need to elaborate on the notion of "Compound Perspects" since it holds the key to the cogency of the system. Since "Composites of Relations" are also relations, they may be viewed bi-perspectivally, thus giving rise to the notions of "Ingressive" and "Effective Compound Perspects." These "Compound Perspects" are derivative features of our experience which are regarded in the "common sense" view of reality as concrete, but which are here labeled "abstractions" in a Whiteheadian sense. The "commonsense" position which maintains their reality is guilty of what he called "the fallacy of misplaced concreteness." Nevertheless, the "subjects and objects" generated by such a view are often useful in daily social intercourse and no deception is involved unless they are regarded as fundamental.

It is the fact of these "Compound Perspects" which accounts for the notions of "the subject self," "object-selves," and "object-things" which have been the bane of the metaphysicist's existence. This relational scheme shows how these notions arose and how

they are to be restricted. I shall present them (as listed above) in a special sequence.

(1) *THE SUBJECT SELF.* In my view the notion of "the subject self" is an abstraction to which fundamentality cannot be assigned without raising the spectre of idealism. I maintain that the notion of "subject" emerges from the *ingressive* consideration of "Composites of Relations" which produces concepts like "the experiencer," "the conceiver," and the "I". Idealism is the extreme which resulted from failing to realize that "the subject," the "I", is in fact a *bi*-perspect, which is codeterminate (=co-ordinate) with "Effective Compound Perspects" such as "physical objects." Realism – or Dialectical Materialism – in assigning fundamentality to an objective world, makes the converse mistake. Quantum mechanical considerations – at least on Bohm's interpretation – indicate the weakness of both the idealist and realist attempts to account for reality. I add to this testimony the intrinsic cogency of this transpolar metaphysic, hoping in this way to provide a way beyond the impasse of modern philosophy. Such is the hope of certain other philosophical efforts as well, such as phenomenology, though it remains questionable whether phenomenology is able to achieve its goals without falling prey to idealism, as was the case with Husserl.

The view that the self is "located in space and time" has been gradually eroded in modern philosophy. Metaphysicians like Leibniz and Whitehead have established selfhood on quite different assumptions – assumptions which are fully commensurate with modern physics, as I have attempted to show earlier in this essay. Selfhood is to be understood "relationally," and not through the usual Western category of "subjectivity." For the latter is but an abstraction which Western thought has wrongly accorded fundamentality. From a relational perspective, it is mandatory to regard both "subjects" and "objects" as abstractions, i.e. as derivatives of relations. It is important to remember that this denial of their fundamentality is accompanied by the claim that they are legitimate "functional dependencies" of reals (i.e. relations).

I do not intend to devote much attention in this essay to the riches of increasing subjective interiority which has become so prominent a feature of modern Western life. Buber, the existen-

tialists, and the phenomenologists have already done much in this regard. The suggestion is worth considering, however, that much of the personal *Angst* and its attendant ills in the West may have as their source an inability to keep in focus the relational (bi-perspectival) nature of personal existence. Perhaps what is needed is neither a further stress on interiority nor a further retreat from exteriority, but a probe into something like a *con*teriority in which the relational nature of selfhood is recovered.

(2) *OBJECT-THINGS.* For the moment I shall postpone consideration of the notion of "object-selves" since it is a problem which requires prior clarification of the notion of "objective things." It is not difficult to predict that I shall account for the notion of "objective things" by appealing to the category of "Effective Compound Perspects." Thus "object-things" are here understood as "derivatives," hence "abstractions."

I have already noted how the commonsense notion of "things" has been strained by the microentities of theoretical physics. I now propose that the commonsense notion of things is not only physically problematical, but also metaphysically dubious. It arose from according fundamentality to "abstractions," as did the co-ordinate notion of the "the subject." The ills which have accompanied this mistake in judgment are many and they are enormous; materialism which makes an ideology out of the derivative notion of matter is perhaps its worst by-product.

We now stand face to face with our fundamental query: What is a Thing? The answer from a relational inversion is as follows: If by "things" one means the real features of experience, then the answer is "relations." If "objective things" are meant, then these are not ideal aggregates of substances, as Leibniz thought, but co-aspectual derivatives of aggregates, i.e. "composites of (some) relations." Such derivatives are "abstractions" – a Whiteheadian term carried over into a new context.

In exploring recent philosophical systems for relevant concepts, I was initially tempted to adopt Ervin Laszlo's specialized systems-terminology, in which the reals are "organizational invariants." This notion led him to contend that the only true invariants are "systems," which when viewed bi-perspectively, result in the exhaustive category, "natural–cognitive systems."

In intention, systems philosophy and this relational metaphysic are similar, but it should be apparent that Laszlo's term "system" is equivalent not to my notion of "relation" but to what I have called "Composites of Relations."

The inversion which I claim to be an essential feature of a relational metaphysic has benefited significantly from the insights of Leclerc, who tries to solve the question of entitivity by further inspection of the notion of "compound vs. simple." I am in full accord with his judgment that "the conception of 'compound substance' is not a logical self-contradiction, nor is there sufficient reason for regarding it as metaphysically impossible."[195] He encounters serious problems, however, in trying to clarify this notion within the parameters laid down by Leibniz. If instead of his approach, one inverts Leibniz's categorical scheme in such a way that the relations are real and the relata become derivatives, the notion of "compounds" is absolved of certain pseudo-aspects.

I shall illustrate by considering the particular problem which led Leibniz late in life to change his mind about "substance," and which even Whitehead labored to clarify, namely, the status of the "organic." According to Leclerc, Leibniz was never able by means of his scheme to account for the difference between non-organic and organic entities. Whitehead solved the problem by making the difference one of degree rather than kind, as do Laszlo and Leclerc. Both Whitehead and Leclerc[196] lose something of what they have gained, however, by then ascribing undue significance to the dichotomy between "living" and "non-living," a polarity which has outlived its usefulness even in modern science. According to this relational metaphysic, "phenomena" so-called are "derivatives" of "Composites of Relations."

Relational metaphysics accounts for "phenomenality" by introducing the notion of "restricted mutuality" (see 3iii below); further, it accounts for what has been historically distinguished by the terms, "living vs. non-living," by recourse to a theory of "gradations" on a spectrum of "restricted mutuality."

The third, and final sub-category of Compound Perspects is that of

(3) *OBJECT-SELVES.* Utilizing the category of "Other" as illumined by Buber, I shall set forth the notion of "object-selves" in a series

of propositions, the first of which summarizes the general rule for "Compound Perspects."

(i) Composites of Relations are the fundamentals underlying the co-derivative notion of "the objective other." These co-derivatives are called "Compound Perspects" because they emerge from the co-ordinate operations of ingressive and effective viewing. *Qua* Composites of relations, all co-derivatives are either "subject" or "object-other," there being no exceptions. On this basis a further proposition is offered:

(ii) The "Other" takes on the character of "objective things" or "object-selves" in accord with the specific contents of the manifold Composites of Relations. Here a new notion has been introduced which requires some explanation. Composites of Relations account for the discreteness of the units of experience; as such they are roughly comparable to what are ordinarily called "experiences." Certain verbs express these "experiences," but usually in a very inadequate way. The truncation of language in the interests of simplicity accounts for this inadequacy, as I shall elaborate in Chapter V. Nevertheless, there is still preserved in language an authentic difference between types of experiences; namely, between those experiences which embody full mutuality and those in which mutuality is limited. An experience like "seeing," for example, is in its linguistic formulation telescoped into the single verb "to see." However, it must be considered that the simple verb "to see" is a poor representation of the richness of experience involved in what it describes. "Seeing one's newborn daughter" involves a verbal notion analogous to "seeing a raindrop," but the difference between the verbals is vast. In conventional explanations it would be said that the difference is explained by the difference of objects involved in the two examples cited. I would agree that this makes sense if the explanation is at the derivative level. I want to argue, however, that these two examples are best accounted for by the claim that the first is a different activity, i.e. "seeing-with-full-mutuality," from the second, i.e. "seeing-with-limited-mutuality."

The notion of "full" vs. "limited mutuality" is complex and not self-evident. One may imagine a spectrum ranging from "full" to "very restricted" mutuality; the relational nature of reality entails that all Composites of Relations involve some degree of mutuality.

In proposition (ii), an attempt has been made to express in a relational way the claim of Laszlo that all fundamental entities have a subjectivity commensurate with their physical complexity, and the claim of Whitehead that all actual entities have a mental and physical pole. The principal objections to this general claim are usually informed by the kind of objectivation of experience which, judged from the perspective of a relational metaphysic, results from making derivatives play the explanatory role of fundamentals.

My dissatisfaction with conventional language may seem strange to a generation of philosophers so content with ordinary language. To express fully what I understand to be involved here would involve the formulation of a new theory of language which I cannot develop at this point. In Chapter V, I intend to discuss this issue further in the general context of a phenomenology of experience as "relating." Having indicated something of the nature of the difference between Composites of Relations, I proceed to the final propositions:

(iii) The *effective* consideration of those Composites of Relations involving *full* mutuality leads to the notion of "object-selves;" and correspondingly,

(iv) The *effective* consideration of those Composites of Relations involving *limited* mutuality leads to the notion of "objective things."

iii. The Totality of Relations and Their Omni-Perspects. Up to this point in the presentation of the hierarchy of relations, I have been careful to preserve only one basic distinction, namely, between *relations* ("simple" and "composites of") on the one hand, and *perspects* (simple and compound) on the other. In now elucidating the notion of the "totality of relations" care will be taken to respect these categorical claims.

(a) THE TOTALITY OF RELATIONS. In accord with the thesis of universal internality which is an axiom of this relational metaphysic, I hold the "Totality of Relations" to be the "composite of *all* relations" which is itself a relation. A paradigm for considering the aggregate of all relations to be itself a relation is afforded by the notion of "system" as articulated in the writings

of the monists whose thesis of universal internality logically entails the notion that the relation of all internal relations (there being no other) is itself an internal relation. In their own words, their claim is for a universal internal relatedness. It is helpful to recall Blanshard's claim quoted earlier that the thesis of the intelligibility of the world rests on the claim that it is a system, "all inclusive and perfectly integrated," the integration meaning that all its parts are internally related.[197] The very term "monism" implied the inclusion of the Many into the One by the use of one consistent principle, relevant to the explanation of the "parts," which could be applied to the "Whole." The Parts are "appearance"; only the Whole is "real." Bradley held the "phenomena" to be not "unreal," but derivatively real. His own way of subsuming parts into the Whole was to talk of "degrees of reality," the "phenomena" occupying a low point on the scale. In the final analysis, his polarity of Appearance and Reality was not meant to be radically disjunctive. I betray a debt to this tradition by the distinction between "real" and "derivative," in that the latter term is not intended to be synonymous with "unreal" or "illusory."

The relational metaphysic which I am articulating intentionally builds on the foundation of monism, without assenting to its preference for the subjective pole of the classical polarity, mental vs. physical. A choice for "the Whole" – a categorical way of speaking of the Totality of Relations – is not a choice *between* "mental" and "physical," but an inclusion of both. To achieve this "transpolar" goal, I simply bring to bear on the Totality of Relations the bi-perspectival methodology. Here the correlation theory of the mind–brain problem to which Laszlo, *inter alios*, subscribes is usefully extended to the totality of relations. The bi-perspectival consideration of $aR_{totality}b$ gives rise to two derivative features of that totality. Since they arise from a co-aspectual consideration of "reals," neither "term" is to be accorded priority. As with perspects and compound perspects, they are co-determinate, or as I prefer to say, "co-ordinate." Since they arise from a bi-perspective, it is appropriate to call them "perspects"; and since these "perspects" are "aspects" of *the Whole* ($R_{totality}$), I give them the unique designation, "Omni-Perspects."

(b) THE OMNI-PERSPECTS: *GOD* AND *WORLD.* In my earlier exposition of the nature of perspects, I emphasized that they come to our attention as *bi*-perspects. Neither is adequate as a sole amplification of the relation; one complements the other (i.e. completes the amplification). They are co-ordinate aspects, neither of which is to be assigned superiority over the other.

Bi-perspects also have a feature which became apparent earlier in the presentation of the hierarchy of relations: when the relation (=activity) is viewed *ingressively*, a different aspect of the real emerges (namely, the ingressive perspect=acting on) than when the relation is viewed *effectively* (the latter giving rise to what I have called "effective perspects"=acted upon). This state of affairs accounts for "aspectual" features" which have often in the history of thought been considered ultimate. Anyone who is inclined to accept the theory of their genesis as just outlined will also accept the judgment that the derived aspects are not to be accorded fundamentality. These statements apply as legitimately to "Omni-Perspects" as to "Compound Perspects." The implications of this judgment for metaphysical theory are far-reaching, as I shall now try to illustrate.

(1) *THE* INGRESSIVE *OMNI-PERSPECT: GOD.* Simple relations are paradigmatic for "Composites of Relations" and "The Totality of Relations," in that they provide an ontological "key." It was learned from this paradigm that *a* and *b* emerge bi-perspectivally; that *a* arises from the *ingressive* consideration of R, and *b* from the effective; and that no perspect is fundamental. When this paradigm was extended to "Composites of Relations," it was learned that the *ingressive* consideration gave rise to the aspect of "subjectivity" and the *effective*, to the aspect of "phenomenality." Now the paradigm must be applied to the Totality of Relations. It follows that the *ingressive* consideration of the Totality will yield a co-aspect of the totality different from the *effective.* The ingressive regard for the totality yields an "originative subjectivity" to which idealists accorded ultimacy by failing to see that it is a bi-perspect, not a complete concept. But they were right in regarding it as of prime significance. Their action, though questionable in its extreme, was a vital corrective to the tendency of some realists to deny fundamentality to the notion of subjectivity.

The "subjective" aspect, or perspect, of the Totality of Relations is different from that of Composites of Relations, and the difference is symbolized by the neologism, "Omni-Perspect." The "Ingressive Omni-Perspect" admits of an "originative subjective" aspect of the Totality of Relations, but rejects notions such as "Absolute Subjectivity," "Absolute Mind," "Absolute Consciousness," because "absolute" loses sight of the fact that it is a "function" of the Totality of Relations considered as an internal relation.

The Ingressive Omni-Perspect, like the Effective, expresses an aspect of the Totality of Reality. But it is a deception to accord either "Omni-Perspect" fundamentality or "entitivity," as though it is the ontological ground for the other. Nevertheless, the history of religion and philosophic speculation is replete with attempts to do just that.

GOD. The classical theistic options are: *monotheism*, which asserts that God is the Absolute and that the world is derived; *pantheism*, according to which God is the World; and *panentheism*, which is the belief that the World is *in* God (pan-en-theism – "the all-is-in-God"). This relational metaphysic respects these attempts to speak symbolically of reality, and explains the nature of these classical options by its genetic paradigm. The term "God" in monotheism is the mythological "correlate" to the notion of "The Ingressive Omni-Perspect." In metaphysical monism, it is the speculative correlate. God-language, whether mythological or speculative, represents the "idiom of ultimacy" to most of these traditions, even to pantheism in some of its historic manifestations. This relational metaphysic acknowledges the conceptual richness of God-talk, but objects to regarding it as "ultimate." There is no doubt that it is a more exalted idiom than the one which was developed to describe what I have called Compound Perspects, but to ascribe ultimacy to it, is to lose sight of its coordinate nature with another equally rich idiom which developed that feature of the Totality of Relations disclosed in what we have called "The Effective Omni-Perspect," namely, World or "Nature." The notion of the "Effective Omni-Perspect" points to the "phenomenal" aspect of the Totality which is of equal import with the "originative subjective" aspect.

The problem can be approached another way. *God* and *World*

are two designations which point toward reality, but neither has priority. The Totality of Relations is an internal relation whose terms, God and World, are exhaustively what they are through the relation, hence they are co-ordinate derivatives which emerge when the real, the relation, is viewed co-aspectually. The terms God and World do not, therefore, indicate two "realms," but co-perspectives on the only "realm" there is, metaphysically signified in the term: the Totality of Relations. Religion and Cosmology present two complementary idioms about the real, neither being complete without the other. Furthermore, the temptation to make either one ultimate raises the spectre of the fundamentality of the subject–object paradigm and sends its devotees on a fruitless search for the reality of the religious or natural ultimate.

If neither *God* nor *World* is viewed as ultimate, but both are rightly seen as co-ordinate aspects of reality, the criticism of historic forms of theism and naturalism which follows from this admission is clear. Theism and Cosmology represent vital, but co-ordinate aspects of the One Reality.

Whenever priority has been assigned to one of these Omni-Perspects, an "ism" has developed: either *the-ism* which claims ultimacy for God-language, or *natural-ism* which assigns fundamentality to the language of Nature. A relational metaphysic assigns fundamentality only to the one totality to which they point in separate, but complementary ways, namely, the Totality of Relations.[198]

On the question of the complementarity of religious and scientific perspectives, and the ills attendant upon making one or the other fundamental, this relational metaphysic is univocal. Nevertheless, the claim for their "complementarity" is an admission of the legitimacy of each perspective within the limits which metaphysics has disclosed for each.

THE RELIGIOUS PERSPECTIVE. It is customary to emphasize the "ultimacy" of the religious dimension of life. Tillich taught us to define religious faith as "ultimate concern." It has long been a feature of Christianity to assume that its theology is a unique disclosure of ultimate truth, a "revelation" which is privileged. From a relational stance, terms like "ultimate concern" and "revelation" are legitimate if taken as doctrinal assertations of

the *importance* of the religious view of reality, but ill-conceived if they lead to a condescending attitude toward cosmology. Theology as the rational consideration of the claims of religion has done much to attenuate the religious disdain of cosmology, but it has done so at the cost of making the latter a useful, but not equally significant enterprise. The religious are correct in their efforts to counter the claim of Natural*ism* which assigns fundamentality to Nature, for the latter's claim of ultimacy is also to be restricted. To say that each is penultimate is not to denude them of their significance; it is rather to place them in what I think is a proper perspective. What then is their significance, which is a co-significance?

Religion is a unique, if not ultimate, affirmation of reality. It is the celebration of reality in the forms of particularity which distinguish specific religious traditions. Their truth lies in the reality to which they direct our attention, however much the appeal of a given religious tradition lies in its particular features. The aspect of ultimacy which religious persons claim for their insights derives from the *ingressive* nature of the religious perspective, causing them to conceive of reality as "originative subjectivity," i.e. as the Personal Source from which all else is derivative and to which it is accountable. Mythology casts its relational insight co-aspectually in the form of "divine subjectivity," a fact due no doubt to the human proclivity for interpreting selfhood *ingressively*. This Divine Subject is the derivative correlate of the *mysterium tremendum et fascinosum* which is as much a component of rational religion as of simple piety. Christian theologians have often resisted attempts to speak of God non-relationally. In asserting that religion is not knowledge of God as he is *a se,* but as he is *pro nobis*, theology has admitted the "aspectual" character of religious language. As I shall try to show in a volume on religion from a relational perspective, Christian faith in its authentic historical formulations has remained aware of its own aspectual limitations. In a fully relational theology, *ultimacy* is assigned not to God-language, which has been explained as a co-perspect with World-language, but uniquely to the relational nature of reality. The unique feature of Christianity is a Christology which, when rightly understood, richly mirrors the relational nature of what is ultimate. But far too often, this remarkable aspect of its faith was distorted, e.g. by calling Christ "God" and thus hoping

to promote a historical symbol to a place of ontological ultimacy; by a kind of Christology which hails him as the Truth rather than as a *paradigm* of what is true. Judaism as an historical faith is rooted in an awareness of the authenticity of relatedness, as its ancient prophets richly manifest and as one of its greatest modern prophets, Martin Buber, has reminded us with inimitable forcefulness. But in Judaism, as in Christianity, the perennial appeal of the "remote God" has haunted these two faiths and caused distortions which resulted from making its vital *co-ordinate* concept exclusively *ultimate*. Their soteriological truth, which authentically reflects the reality of relations, became the basis for an ill-fated non-relational ontology.

It takes little insight to see that these claims run ahead of our experience. Too much of our experience is either omitted from this excessive regard for the religious or denigrated to so lowly an estate as to make some religious persons wonder why others dedicate their lives to such pursuits as cosmology which in their view are penultimate. A relational examination of these claims shows that the study of the Cosmos, often animated by a *Visio Mundi*, is an affirmation of reality co-equal with authentic religious experience.

(2) *THE EFFECTIVE OMNI-PERSPECT: WORLD*. Let us first consider the cosmological perspective and then articulate its significance relationally.

THE COSMOLOGICAL PERSPECTIVE. So far I have referred to the term "cosmology" without a clear specification of its content. Traditionally "cosmology" was a philosophical term specifying the most comprehensive consideration of "all there is." It was a metaphysical category of the widest application. With the success of modern scientific investigation of the physical world, it increasingly became a *terminus technicus* for the study of the large-scale physical structure of the universe. The great discoveries of astronomy in the twentieth century led to grandiose theoretical schemes of the totality of the physical universe which have so captured the imagination that the term "cosmology" has become synonymous with the theoretical–observational enterprise of scientific cosmology. It seems to many that these theories rest upon a more dependable foundation than all the speculative guesses about the cosmos which have dotted the history of metaphysics.

My intention in these statements is not to detract from the well-deserved accolades of scientific cosmology. It represents one of the noblest attempts in human history to understand our experience. Copernicus' cosmological theory became the catalyst for a sustained effort in physics whose *dramatis personae* are some of the most respected names of modern times, and rightly so.

Cosmology is unique among the natural sciences. It is normally regarded as a branch of physics, but is in fact the one toward which all other aspects of physics are directed. As such, cosmology is the most comprehensive aspect of the most general of the sciences, namely, physics. I indicated earlier that physics is the most abstract of the sciences in that it does not take any particular entities as its subject matter. Cosmology represents the extension of this methodology to the universe on its most grandiose scale. To achieve this end physicists had to make powerful assumptions. The one most common to all modern cosmological theorists is the so-called Cosmological Principle, according to which the universe presents the same aspect to all fundamental observers. It is not "known" that this is the case, but unless it is assumed, no progress can be made in cosmology. Another assumption made by some cosmologists is that our local laws of physics hold everywhere in the universe. Many cosmologists question this assumption in that recent astronomical phenomena seem to be more economically explained by experimenting with "new" laws. If the quasars are truly "cosmological" rather than "local" – as many astronomers believe – they may provide access for the first time in human history to physical processes in "non-local" parts of the universe. One of the difficulties with this claim is that the decision as to whether they are "cosmological" is primarily a function of the application of "local" laws, thus begging the question to some degree.

The Steady State Cosmology introduced by Bondi, Gold, and Hoyle was derived rigorously from a more comprehensive assumption, namely, the Perfect Cosmological Principle, according to which the universe presents the same aspect to all fundamental observers at all times. This assumption is not made on the basis of evidence as such, though its advocates believed it did not violate any observational data. As Bondi explained, the principle was chosen for its theoretical power, as evidenced by its elegance and simplicity.

It is not my intention here to enter into a discussion of the basic philosophical problems of modern scientific cosmology.[199] Nor is it crucial to my thesis to list various scholarly options among rival cosmological theories and then to state a preference for a specific one. It is important to indicate why cosmology represents not just another branch of physics. but a discipline closely allied with metaphysics. The principal reason for this claim is the uniqueness of its object of study, which is not some part of or process within the universe, but the universe-as-a-whole. It is legitimate to ask as a part of the foundations of cosmology, whether the universe is an "object" of study like other physical entities. In my view there is a basic difference, in that science generally investigates "Composites of Relations" from the perspective of "Effective Compound Perspects," whereas cosmology is defined as the study of the Totality of Relations from the bi-perspective of the "Effective Omni-Perspect." Thus the study of the Cosmos is a unique subject with specific tasks not shared by physics generally. While I have deduced this from a relational principle, others will share the same view for different reasons.

Wherever it is claimed that cosmology represents a unique discipline among the natural sciences, the question rightly arises: does the uniqueness of its subject matter threaten the scientific status of physical cosmology? It has been commonly held that scientific methodology involves comparison between phenomena, but to what can the universe-as-a-whole be compared? The dilemma of the cosmologist is reflected in the observation of M. Munitz that there can be no laws of the universe, since "it is superfluous to cast into universal form a law having only one instance."[200] Because of these questions which complicate any simple statement of the nature of cosmology, it is best to define physical cosmology from metaphysical rather than scientific considerations. In order to accomplish this, I must carefully specify from a relational perspective what is meant by "cosmos."

WORLD. When the Totality of Relations is considered bi-perspectivally, it gives rise to a duality of aspects: the *Ingressive Omni-Perspect* which manifests the features of "originative subjectivity"; and the *Effective Omni-Perspect* which accounts for the notion of "world," the physical *universum.* Scientific cosmology is the science of the phenomenal aspect of the Totality

of Relations. As such, it is a perspective on reality, complementary to the religious perspective. The constant temptation of the professional cosmologist is to regard the physical universum as the Totality itself, rather than as a perspect given bi-perspectivally with the religious. The result of this course of action is Natural*ism* according to which the *physical* becomes synonymous with the *real.* There is no doubt that Naturalism has served as an important focus on the *physical* in the face of the other-worldliness of the religious claims in the Western world. Its saints and martyrs were no less dedicated and their contribution to the richness of our experience no less important. From a relational perspective, however, its purview – like that of religion – is penultimate. To claim ultimacy for the *physical* is just as metaphysically suspect as to claim ultimacy for the *religious.* The metaphysical claims of this essay, viz. that "relation is fundamental" and that "the Totality of Relations is a relation," lead necessarily to the conclusion that the two seemingly most fundamental human pursuits, the religious and the cosmological, are not rivals between which one must choose, but *complementary* aspects of the nature of reality – that nature being disclosed in metaphysical inquiry, which is the study of the real.

The view of reality which has been set forth in this relational metaphysic is not new in every respect. To some degree it is in accord with the metaphysical insights of Leibniz, although it reaches its goal by a categorical inversion. Leibniz wrote of a "realm of nature" and a "realm of grace" which were co-ordinated supernaturally by a pre-established harmony. This *deus ex machina* was a constant embarrassment to critics of Leibniz and some have attempted to "demythologize" his language to make his vision smack more of modernity. I suspect that is the case with the statement of Beck quoted earlier in our essay,[201] for as it now stands – with a few minor changes of wording – it elegantly expresses much of what this relational metaphysic attempts to affirm. Whether it is correct to say, with Beck, that *for Leibniz* the phenomenal and noumenal realms "represent the same world looked at in two different ways and therefore the two explanations can never be incompatible with each other" is open to question. However that may be, it does state precisely a proper conclusion to be drawn from relational assumptions about fundamentals and their co-derivatives.

CHAPTER V

FUNDAMENTALS AND PSEUDO-FUNDAMENTALS

The method of this relational metaphysic has been the generalization of experience, and the enactment of this method has led to two related conclusions: (1) that the first step toward an ultimate generalization is the distinction between *fundamental* and *derivative*; and (2) that the fundamentals are *relations*, all else being derivatives of these fundamentals.

The first conclusion is crucial, for without it no real progress can be made toward the formulation of a valid metaphysical scheme. Metaphysics is in fact a quest for fundamentals, i.e. for those entities which are irreducible, and hence must appear in every fundamental description. A metaphysical scheme is of little value if it accords reality to "things" which are further reducible, or if it omits from its list of fundamentals "things" which are vital to fundamental descriptions.

At the same time, there are ingredients in social discourse which have often proved to be useful in a number of ways, but which cannot successfully be claimed to be fundamental. Nevertheless, these ingredients have had such a wide application that they have been accorded fundamentality by various metaphysical schemes. Any new metaphysical system which deprives these elements of their privileged status must accordingly justify this action and, as well, must indicate what subsequent status is to be assigned to them. In calling these elements "derivatives" this relational metaphysic determines their status genetically.

The second conclusion of this relational metaphysic is that relations are fundamental, i.e. that only relations properly belong in fundamental descriptions. This may not seem self-evident, since, to some, experience requires that terms of relations be regarded as equally fundamental to or more fundamental than relations. I tried to indicate in Chapters III and IV the difficulties

which attend such a claim. Since the claim that relations are fundamental is not self-evident, and further, since the formalism of the preceding chapter was set forth rather matter-of-factly, I feel obliged to devote some attention to a defense of the formalism which is the core of this relational metaphysic. The defense will take the twofold form of a phenomenological inspection of experience and an account of those conditions by which certain ingredients in social discourse formerly enjoyed the status of fundamentality, but can no longer do so from the stance of this relational metaphysic.

A. THE PHENOMENOLOGICAL DISCLOSURE OF FUNDAMENTALS

In the context of the discussion of Zaidi's article on relational metaphysics in Chapter IV, I took the position that a proper phenomenological inspection would disclose that the fundamentals of experience are relations. It is now appropriate to develop this claim. By doing so, I hope to show that the formalism of the preceding chapter not only does not violate public experience – an absolute condition for any viable metaphysics – but in fact can justify the claim of being grounded in experience. In saying this, I do not claim that the entire formalism reflects what is given immediately in experience, but only that it rests on an empirical foundation, in the special sense of "empirical" defended in Chapter IV.

A phenomenological inspection of experience can be said to disclose the fundamental features of experience, as this term is usually understood. According to the formalism advanced in this essay, it is more appropriate to say that experience is an array of fundamentals, while the derivatives are perspectival effects of various ways of interpreting the fundamentals. This statement entails the further amplification that experience is an array of relations.

It has been customary to assume that "experience," i.e. experiencing, is what an "experiencer" does. There must first be the experien*cer*, then the experien*cing*. Such a commonplace misconception has produced the extreme of the absolute ego or consciousness. One might ask: How can there be experien*cing*

without an experien*cer*? In my view it is equally cogent to reply with the question: How can there be an experien*cer* without experien*cing*? Both questions combine to point beyond their limitations to a larger insight, namely, that experien*cer*–experien*cing* –the experien*ced* expresses a unity. This is the basic truth in the otherwise idealistically understood phenomenological notion of intentionality, i.e. that experience is always experience *of something.*

I would like to venture the notion that more progress can be made and fewer problems encountered if it is assumed that the relation, i.e. experien*cing*, is fundamental, and that the notions of "experien*cer*" and "the experien*ced*" are regarded as derivatives which only arise under certain specialized conditions. Let me illustrate: if one isolates a given activity such as "hoping," it entails fewer difficulties to argue that "hoping" is the reality, while "the one who hopes" and "what is hoped" are derivatives. The reason for this claim is that *all* the presumed "subject" means, *qua* "hoping," is "the one who hopes"; and *all* the presumed "object" means, *qua* "hoping," is "that which is hoped." It is only when the presumed "subject," and "object," are understood in terms of the other relations associated with them does it become tempting to think of such subjects and objects as more fundamental than the relations. Another example is the verb "worship"; *qua* "worship," the term "worshipper" exhausts the subjectival dimension of the activity, and the term "the worshipped" exhausts its objectival dimensions. This means that the phrase "I worship God," to the extent that it represents a true slice of experience, exhaustively assigns the meaning "the worshipper" to the "I" and the meaning "the worshipped" to God. It is no more legitimate to assign ontological status to the "relata" in this example than in the previous one, although there are differences between them which require separate hermeneutical considerations. My intention in presenting both examples is simply to illustrate an economical alternative to previous ontological excesses.

Experience manifests multi-textured features, a fact which I have tried to account for by the statement that Composites of Relations are the smallest units capable of separate discrimination. The fact that ordinary language does not reflect this compositeness renders it difficult to illustrate, and so to demonstrate, the point

which I am making. Contrary to the beliefs of almost an entire generation of philosophers, I would argue that experience rather than language is the vital resource for the study of reality. Language truncates experience in the interest of communication, as should be apparent from a study of the languages of primitive peoples who often used "whole sentences" to express what in modern ordinary language would be reduced to one word. In the course of human development, to speak derivatively, language has gradually lost the lustre of these primitive insights into experience, and has accordingly ceased to be a faithful reflection of multi-textured experience.

It has long been held that a philosophical system stands or falls on its doctrine of the person. Relational metaphysics defends the notion of "the relational self," according to which "mutuality" exhausts its reality, as was the case in Buber's notion of I–Thou. It is analogous as well to the notion of Pure Experience as set forth by James, Bradley, and Nishida Kitaro (who refers to James), as I tried to demonstrate elsewhere.[202] Here I want to approach the subject of selfhood more classically, i.e. by beginning the discussion with the ideas of a philosopher whose notion of the self is similar to mine, but who avoids dependence on the word "relational."

The crucial notions of *function* and *time* figure prominently in the notable discussion of selfhood to be found in the famous book of my colleague, Peter A. Bertocci, namely, *The Person God Is.*[203] While I do not feel comfortable with the residual idealism in this work, I nevertheless think that the seeds are sown here for a Personalism which transcends the idealism of this position in its classical form. Bertocci goes to great lengths to counter the "substantival self" of C.A. Campbell, and replaces it with a "temporal self" which, unlike the former, is a "unified activity complex rather than a subject *of* activities and experiences, as Campbell suggests."[204] The result is that the self does not *have*, but *is*, its experiences. Bertocci's central claim is that "the self *is* a continuous unity of its activities which are indeed not reducible to the experienced qualities."[205] While I am aware that Bertocci's view is part of a philosophical program which differs substantially from my own, my view of the relational self closely approximates his remarkably economical insight that the self *is* what it is doing.

I am as aware as is Bertocci that the major problem raised by this interpretation of the person is that of time, or the *durée* of the self, i.e. its continuity through succession. His discussion of this complex problem still betrays certain features of the substantival self which he seeks to transcend, so I cannot concur in it without serious reservations. His notion of experienced time is, however, consonant with my own. Two of his statements in this regard strike me as particularly germane to a relational stance, the first being:

> Again: 'I' do not 'pass' into a future any more than I 'pass' out of the past. My being is always a 'now' which is said to be older than a 'then,' or earlier than a 'later,' only because of differentiations which we call memories and anticipations. 'I' do not move through pre-existent time as a ball might roll in space. I *am* my time and the changes which take place 'in' me are discriminated as past, present, and future by virtue of my capacity for remembering and organizing my experience, always in a present, as involving a past and anticipating a future.[206]

The second citation, which is prefaced by a claim of affinity with Whitehead's view, and which I shall use subsequently as a starting-point for my own discussion of time and personhood, reads:

> There is no passage of 'time,' but only the selective experience of a person who maintains the given unity of activity in the course of interchange with the world.[207]

Such a statement is based on the valid distinction between *physical* and *experienced* time, the latter being a dimension of experience which is not invalidated by the implications of Relativity Theory. Much too often, however, experienced time has been interpreted after the fashion of physical time. The Whiteheadian philosophers have done much to put the lie to this practice, but they too readily replace it with a view of the "succession of experiences" which still betrays vestiges of absolute time. Bertocci, citing Bowne, argues rather for the "experience of succession."[208]

From this relational perspective there is an experience of succession, but this experience is wrongly interpreted as a succession of experiences. "The Past" is never given immediately in experience, nor is "The Future." I venture to suggest that "The Past" is exhaustively the increasing texture of the present, while "The Future" is exhaustively the sense of the incompleteness

and non-finality of the experienced present. Whatever ontological meaning pertains to past and future pertains to them as experienced in the present. "The Past" is no*where* else and "The Future" is no*where* else. It is only the human proclivity for the Euclidean-type spatialization of time which has given such an impression. Another way of saying this is that experience does not take place *in* time; rather, temporality is a feature *of* experience.[209]

The subject–object paradigm of Western thought which I have linked most immediately to Newtonian physics assumed that there is an Absolute Time and Space *in* which experience occurs. When this assumption was rendered invalid by the development of Leibnizian concepts in the new physics, the way was opened for a new concept of experience, indeed, for a new paradigm of thought. Physical space and time cease to be the primary co-ordinates of experience, since they have been reduced by Relativity Theory to the status of what Mendel Sachs has termed merely the language or "logic that underlies an expression of the physical features of matter."[210] It is important to note in this regard that, while there are temporal and spatial dimensions of experience, there is no experience of space or of time. Failure fully to appreciate this fact lies at the root of many of the conceptual *Sackgassen* of Western metaphysics.

If one were to seek in recent Western thought for analogues to the relational view of the self here advanced, close analogues can be found in the thought of C.S. Peirce and William Ernest Hocking, on the one hand, and Merleau-Ponty on the other. Peirce was moving toward a social theory of personhood, but typically left only fragments from which to reconstruct his notion.[211] Hocking's last writings opened up a new understanding of the self as a field of fields," although he was insufficiently versed in the new physics to perfect the concept.[212] Among phenomenologists, Merleau-Ponty makes the most of the field concept of personhood. He was able by exploiting the recent gains in physics, as well as in the psychology of perception, to develop the notion of the self as "a phenomenal field."[213] With all the promise these theories held for transcending idealism, not one of these philosophers saw their full implications for developing a relational ontology.

B. THE GENESIS OF PSEUDO-FUNDAMENTALS (i.e. DERIVATIVES)

It is fundamental to this relational metaphysic to maintain that many supposed "entities" proposed in physics and current metaphysics lose the fundamentality claimed for them, once their emergence has been properly understood. Such pseudo-entities are: the subject self, object-selves, objective things, World and God. In the previous chapter a concerted effort was made to show why, from a relational position, these supposed "entities" are best regarded as "derivatives," i.e. as co-ordinate aspects of fundamentals. Now I must show under what conditions these "aspects of fundamentals" came to be regarded as fundamentals.

1. The Rational Objectivation of Myth

The mythological legacy of every world culture represents claims about reality which later generations must constantly re-assess. It is commonly assumed today that these mythologies should not be dismissed lightly, in that they transmit primordial images which have determined the conceptual worlds of many subsequent generations. Wherever mythological ways of thinking have given way to rational inquiry, the ancient traditions have become problematic, even to the point where a de-mythologizing has been deemed essential to modernity. Without commenting here on the propriety of this recent movement, I would indicate an aspect of it which is likely to be regarded as of permanent importance.[214] It is that myths become problematic when they are reflected upon rather than simply transmitted. Prior to the time when the myths are "broken" – to use Paul Tillich's term – it is unthinkable that questions about the truth of these episodes should be raised. Such questions characterize the critical, not the mythical, mind. Historical examples indicate that the transition from myth to criticism is virtually irreversible. One reason for this is that once critical questions arise, they generate an understanding of myth as false objectivation. Subsequent generations influenced by such criticism are unable to re-enter the world of such myths without first becoming convinced that "objectivizing" misses the intentionality of the mythical worldview. Even the concept of "mythical

worldview" betrays an objectifying mode of thinking which is foreign to the intentionality of myth.

Since it is how myth appears from "without" rather than "within" that is relevant to the discussion in this section of the essay, I wish to concentrate upon the impact of myth upon later generations increasingly removed from its original power. Despite the judgment of many that the intention of myth is in no way *referential* to those who originated it, it has indeed come to be so to subsequent devotees. With the loss of its original intention, myth is interpreted as establishing a realm of divine objects comparable in their reality to the human world, if not indeed more real. Affirming and even defending the reality of these objects becomes the new form of the ancient piety. The pre-eminent object is, of course, God, the denial of whose "objective" reality is the mark of unbelief. On my view all talk of the "objective" reality of divine beings is foreign to the true intentionality of myth. No myth in itself makes such demands upon us. Nevertheless, this confused understanding of the entities mentioned in myths has brought about a situation in which a non-objective interpretation of myth, such as this relational one, will meet considerable resistance from some quarters.

Whether advanced by a theologian or a philosopher, the claim that God is a personal objective reality, a being *a se*, rests upon an "objectivation" of a mythical insight which falsifies that insight. The world of myth is pre-subjective/objective, and if what I have claimed in Chapter IV is correct, the most accurate descriptive term to characterize it is "relational." That is to say: its message is not that the beings of the narrative exist, or existed, independently of each other, whether men or gods; it is rather that their existence was a co-existence. The beings, human and divine, are "character-izations" in a relational drama.

The best stewardship of these ancient traditions is to suppress the tendency to objectify them into worldviews. For such objectivation, whatever its intention, obscures the true intentionality of myth. This judgment applies equally to the divine beings in the myths as to the human. It would be a gross misunderstanding of my intention to think that all such beings are illusory, or unreal. My point is simply that the stories function primarily to indicate the relational character of reality. In the myths, as in

our experience, the *dramatis personae* are exhaustively what they are through their relationships. Myths show no other interest in them.

The central claim of this subsection is that even the seemingly most fundamental being, God, is portrayed in the mythical traditions as a co-being. Wherever this claim is accepted, the way is kept open for relational models of reality. Resistance to it belies both myth and experience.

2. The Visual Bias

Of all the senses, vision has played the largest role in the shaping of Western culture. In the medieval synthesis of Hebrew and Greek traditions, the highest experience was the *Visio Dei*. The etymology of the generic term, θεός, has even been linked to the verb θεωρέω, "to see."[215] The mathematics of vision, namely, geometry, and its cognate, optics, have played a fundamental role in shaping the Western scientific legacy, so much so that changes in geometrical models have always occasioned changes in the way the world is understood.

Vision and Theory are closely linked, conceptually as well as etymologically. A conceptual paradigm of universal scope is called a *Weltanschauung*, i.e. a "way of looking at the world." The same can be said of any theory. The term, "the visual bias," intends to draw attention to another aspect of the relationship between Vision and Theory. It is that the primacy of the visual sense in the Western world has largely been responsible for the content of its theories. The reason for this lies in the nature of vision, for it is the sense which uniquely provides the phenomenon of "distancing," or if a neologism is allowed, of "othering." The other senses, except hearing, neither promote nor facilitate such geometrizing. Hearing is a special case. Sightless persons, I am told, have a more participatory experience.[216] Geometry is not the language of their "space." Furthermore, cultures in which hearing has been deemed more fundamental than seeing produce neither geometry nor physical theory. I have in mind here Hebrew culture, which differed primarily from Greek culture in the primacy it assigned to hearing. It is no wonder that it was in the latter that the conceptual polarity of subject–object origi-

nated. The ability to "objectify" derives from the visual power of "distancing." Vision creates the conditions for the distancing of a subject from an object. These conditions are actualized in any culture which assigns primacy to the visual sense.

Martin Buber was aware of the "othering" involved in seeing. In the episode with the piece of mica which I cited earlier,[217] he indicates the way in which seeing can destroy an original unity of experience. It would be a misunderstanding of Buber's point to interpret his reservations about seeing as an overall negation of vision. For there is a "seeing" pertaining to the I–It experience which objectifies the other as an It, and there is a "seeing" which is a higher insight. The latter, however, does not negate the former; for as he says, "there is nothing I must not see in order to see."[218] There is a "seeing" that does not split the unity of experience, or once split, can restore it. It is the primacy of this higher sense which must be recovered if Western culture is to benefit from the relational thinking suggested in modern physics and metaphysics.

3. Epistemological Bifurcation

The spectre of the subject emerged in Cartesian philosophy simultaneously with the method of epistemological doubt. It could not have been otherwise, for one is the obverse of the other. Methodic doubt splits the knower from the known in an irreversible way. When Kant, under the influence of Descartes, posed as the first major question of philosophy the query, "What can I know?" the positing of the subject entailed the loss of the object. Epistemology, if made the initial question of philosophy, is a jealous god; it virtually prevents progress toward other questions. The primacy of epistemology in modern philosophy largely occasioned the dilemma of a forced option between idealism and realism.

Epistemological questions are not therefore illegitimate. There is a perceptual problem of illusion with which one must come to terms. From a relational perspective the possibility of illusion need not lead to methodic doubt. One must deal with illusion, to be sure, but within the context of the larger question, "What is real?" I have in mind here C.S. Peirce's criticism of Descartes, in which the former expressed the wisdom of doubting only what

has truly become problematic for one.[219] There will be sufficient confidence about those aspects of experience not under question to allow progress to be made in metaphysics.

Contrary to common opinion, epistemological doubt need not preface all metaphysical inquiry, even if epistemological questions must be faced by every metaphysician. In a relational metaphysics, the question of cognition is raised within the context of the reality question, and hence does not serve as its preamble. Whatever "splitting" of knower and known necessarily occurs, becomes ontologically trivial because the split components are viewed as derivatives whose unity is left undisturbed. The unity of knowing is left intact.

The list of conditions for the emergence of pseudo-fundamentals could probably be expanded. On my view the conditions cited are chiefly responsible for the false priority which has been assigned to certain derivatives in Western history. It is a fundamental feature of this relational metaphysic to claim that these pseudo-fundamentals continue to have a certain usefulness, but only as abstractions. They have no more right to be treated as ontologically significant than do time and space.

CONCLUSION TO PART TWO

The metaphysical system whose foundations have been laid in this volume has been developed to provide a new option to those dissatisfied with the present state of metaphysics. At the same time, by incorporating models from the new physics, it suggests new possibilities for positive interaction between physics and metaphysics. I hope to have shown convincingly that the alliance between metaphysics and classical physics resulted in a paradigm which proved to be of limited usefulness for both physics and metaphysics, a fact of which physicists seem to be more aware than philosophers. While there are difficult problems within modern physics, its emergence represents a major advance in the conceptualization of Nature, one which philosophers need to consider more deeply.

It also follows from the argument of this relational metaphysic that physical understanding needs to be balanced with religious insight, for the latter is a vision comparable in scope and complementary in character. In their co-profundity, they are both products of the imagination: physical understanding is generated by the imagination operating on principles of greatest economy; religious insight is the gift of imagination seeking the richest human characterization of reality. I have argued that they are not each about different "domains"; they are rather co-ordinate visions of what is given in experience. I base this claim upon their convergence toward a unified vision of the relational character of reality. To uphold either to the absolute exclusion of the other results in the loss of vital aspects of experience. There is no deep physical understanding that falsifies any genuine religious insight, and there is no authentic religious insight that invalidates any deep physical understanding. Wherever it seems to be otherwise, there is the need to probe more deeply into the issues. It

follows that depth of insight in one prevents pseudo-claims in the other. Western experience is full of examples of such claims and their dire consequences.

It might seem to follow from some aspects of this essay that I hold metaphysics to be a kind of elitist superdiscipline, the most grandiose of human undertakings. To the contrary, I would argue that religion and science are the most profound human activities. The metaphysician operates *within*, not above, the rich contexts of science and religion. No metaphysical system should be set forth to replace science and/or religion; rather, it is a principal task of the metaphysician to exercise vigilance to prevent the absolutization of any aspectual insight. Every person who engages in this activity, whether as a professional or not, is in fact a kind of metaphysician, and makes some contribution to the general human quest for understanding.

NOTES

INTRODUCTION

1. Martin Heidegger, *What Is a Thing?* trans. W.B. Barton, Jr., and Vera Deutsch, with an analysis by Eugene T. Gendlin (Gateway ed.; Chicago: Henry Regnery Co., 1967).
2. Thomas S. Kuhn, *The Structure of Scientific Revolutions.* International Encyclopedia of Unified Science (2nd ed., enlarged; Chicago: The University of Chicago, 1970).
3. Ibid., p. 6.
4. Ibid., p. 10.
5. Ibid., p. 52.
6. Cf. esp. Imre Lakatos and Alan Musgrave, eds., *Criticism and the Growth of Knowledge.* Proceedings of the International Colloquium in the Philosophy of Science, London, 1965, vol. 4 (Cambridge: Cambridge University Press, 1970).
7. Thomas S. Kuhn, *The Copernican Revolution: Planetary Astronomy in the Development of Western Thought.* Foreword by James M. Conant (Vintage Books; New York: Random House, 1959), pp. 129ff.
8. Owen C. Gingerich, "'Crisis' versus Aesthetic in Copernican Revolution," in *Vistas in Astronomy*, vol. 17, ed. Arthur Beer and K.Aa. Strand (New York: Pergamon Press, 1975), pp. 85–95.

PART ONE

1. Sir Fred Hoyle, *Astronomy: A History of Man's Investigation of the Universe* (Crescent Books, Inc., 1962), p. 10.
2. Ludwig Feuerbach, *The Essence of Christianity*, trans. George Eliot (Torchbook ed.; New York: Harper and Brothers, Publishers, 1957), p. 5.
3. Cf. Hans Jonas, *The Gnostic Religion* (2nd ed.; Boston: Beacon Press, 1963), pp. 254ff.
4. Cf. R.S. Westfall, *Force in Newton's Physics: The Science of Dynamics in the Seventeenth Century* (New York: American Elsevier, 1971), p. 284.
5. Gerd Buchdahl, *The Image of Newton and Locke in the Age of Reason* (London: Sheed and Ward, 1961), p. 4.

6. Westfall, p. 323.
7. Sir Isaac Newton, *Mathematical Principles of Natural Philosophy*, Great Books of the Western World, vol. 34 (Chicago: Encyclopaedia Britannica, Inc., 1952), p. 14.
8. For an excellent discussion of the conceptual struggle to understand "force," cf. Westfall.
9. Cited from an unrehearsed interview taped at The Institute of Theoretical Astronomy (now The Institute of Astronomy), Cambridge, England, in December of 1971. Professor Ovenden has kindly consented to this use of his remarks.
10. Max Jammer, *Concepts of Space: The History of the Theories of Space in Physics* (Harper Torchbook ed.; New York: Harper and Brothers, 1960), p. 95.
11. Albert Einstein, "Autobiographical Notes," in *Albert Einstein: Philosopher-Scientist*, The Library of Living Philosophers, vol. 7, ed. Paul Arthur Schilpp (LaSalle, Ill.: Open Court Publishing Co., 1970), p. 31.
12. Ibid.
13. Westfall, p. 509.
14. Ibid.
15. In the context of an extensive note on this question, Alexandre Koyré states his conclusion as follows: "I am, thus, morally certain that Clarke communicated to Newton both Leibniz's letters and his own replies to them." *From the Closed World to the Infinite Universe* (Baltimore: The Johns Hopkins Press, 1957), p. 301.
16. I. Bernard Cohen, ed., *Sir Isaac Newton's Opticks* (New York: Dover Publications, Inc., 1952). p. xxviii.
17. Ibid.
18. Cited from Cohen, p. xxx.
19. Cf. also Koyré, pp. 174ff; and Westfall, pp. 506ff.
20. Cohen, p. xxxiii.
21. For further details, plus an illuminating discussion of the differences between the *Principia* and the *Opticks*, cf. ibid., pp. xxxivff.
22. Westfall, p. 466.
23. Ibid., pp. 337ff.
24. Jammer, p. 96.
25. Ibid., p. 103.
26. Westfall, p. 445f.
27. Jammer, p. 114.
28. Ibid., p. 99.
29. Westfall, p. 385.
30. Cohen, p. 400.
31. Newton, *Principia*; cited from Jammer, p. 105.
32. Jammer, p. 106.
33. Ibid.
34. Ibid., p. 107.
35. Cohen, p. 403.

36. Jammer, p. 115.
37. Ibid., pp. 62, 66.
38. Cf. Thomas F. Torrance, *Space, Time and Incarnation* (London: Oxford University Press, 1969), esp. pp. 3f., 31f., 37f.
39. Ian Hacking, "Individual Substance," in *Leibniz: A Collection of Critical Essays*, ed. Harry G. Frankfurt (Anchor Book; New York: Doubleday and Company, 1972), p. 144.
40. Leroy E. Loemker, *Gottfried Wilhelm Leibniz: Philosophical Papers and Letters* (Chicago: The University of Chicago Press, 1956), p. 22.
41. Lewis White Beck, *Early German Philosophy: Kant and his Predecessors* (Cambridge, Mass.: The Belknap Press of Harvard University Press, 1969), p. 222f.
42. Ibid., p. 230.
43. Gottfried Martin, *Kant's Metaphysics and Theory of Science*, trans. P.G. Lucas (Manchester: University Press, 1953), p. 4f; cf. *Monadology*, par. 87.
44. Beck, p. 231.
45. Loemker, p. 37.
46. Martin, p. 7; italics mine.
47. Ivor Leclerc, *The Nature of Physical Existence*, Muirhead Philosophical Library (New York: The Humanities Press, Inc., 1972), p. 243.
48. Ibid., p. 247.
49. Ibid., p. 245.
50. Ibid., p. 246.
51. Ibid., p. 247.
52. Cited from Leclerc, p. 250; for his source, cf. Loemker, p. 583.
53. Alfred North Whitehead, *Process and Reality: An Essay in Cosmology* (Harper Torchbook ed., New York: Harper and Brothers, 1960), p. 108f. [cor. ed., p. 70] (See also Torrance, pp. 38ff., and Beck, p. 231). I am taking the liberty of supplying the page numbers from the new, controversial edition of *Process and Reality*, ed. David Ray Griffin and Donald W. Sherburne (New York: The Free Press, 1978), even though no passages I cite from *Process and Reality* differ in the Corrected Edition.
54. H.G. Alexander, ed., *The Leibniz–Clarke Correspondence* (Manchester: University Press, 1956), p. 26.
55. Ibid., p. 36.
56. Ibid., p. 43f.
57. Cohen, p. 402.
58. From his "Essay on Dynamics," *New Essays*; cited from Westfall, p. 288.
59. Alexander, p. 43.
60. Ibid., p. 92.
61. Ibid., p. 118.
62. On this idea, cf. infra p. 45.
63. Leibniz, "Principles of Nature and Grace"; cited from Westfall, p. 312.
64. Koyré, p. 274.
65. Ibid.
66. Einstein, p. 31.

67. Ibid.
68. Jammer, p. xiv.
69. Westfall, p. 505.
70. Karl Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* (3rd ed.; London: Routledge and Kegan Paul, 1969), p. 94.
71. Ibid.
72. Ibid., p. 177.
73. Ibid., p. 180.
74. Ibid., p. 180, n. 17.
75. Ibid., p. 94.
76. Ibid., pp. 184ff.
77. Ibid., p. 184.
78. Ibid.
79. Ibid.
80. Ibid., p. 191.
81. Ibid.
82. Cf. Beck, p. 432.: often called "the silent decade," it is "the period in Kant's life about which there is the least evidence and the most dispute, since we have large amounts of undatable writings presumably done during this decade, but few hard facts to guide us in tracing the course of his thought."
83. Letter to C. Garvie, 21st September 1798; cited from Popper, p. 177, n. 10.
84. Martin, p. 1.
85. Ibid., p. 16.
86. Ibid., p. 90.
87. Leclerc, p. 280.
88. In the exposition of Kant's pre-critical thought I am following Leclerc, pp. 276ff.
89. Ibid., p. 277.
90. Kant's *Monadologia physica*, sec. III, Prop. 12; cited from Leclerc, p. 278
91. Leclerc, p. 279.
92. Martin, p. 28.
93. Beck, pp. 441ff.
94. Ibid., cf. Table 2.
95. Ibid., p. 446.
96. Ibid., p. 447.
97. Ibid., p. 457, and n. 86.
98. This position was stressed recently by Martin, p. 44.
99. Norman Kemp Smith, ed., *Immanuel Kant's Critique of Pure Reason* (London: Macmillan and Co., Ltd., 1963 reprint of 2nd impression with corrections, 1933), p. 78 [A35–36, B52].
100. Ibid., p. 72 [A28, B44].
101. Martin, p. 38.
102. Ibid.
103. Ibid., p. 41.

104. Ibid., p. 11.
105. Ibid., p. 38.
106. Ibid., p. 92.
107. Ibid., p. 97.
108. Ibid., p. 95.
109. Ibid.
110. Ibid., p. 67.
111. Ibid., p. 89.
112. Ibid., p. 124.
113. Heidegger, p. 56.
114. Ibid., p. 77.
115. Ibid., p. 55.
116. Ibid., p. 104.
117. Ibid., p. 104f.
118. Ibid., p. 128.
119. Ibid., pp. 139ff.
120. Cf. also Heidegger, p. 140, for the following schema: "Now summarizing Kant's basic interpretation of knowledge, we say: 1 Knowledge for Kant is human knowledge. 2. Human knowledge is essentially experience. 3. Experience realizes itself in the form of mathematical physical science. 4. Kant sees this science and with it the essence of real human knowledge in the historical form of Newtonian physics, which today one still calls 'classical.'"
121. Ibid., p. 164.
122. Ibid., p. 163.
123. Ibid., p. 178.
124. Ibid., p. 182f.
125. Ibid., p. 180.
126. Caption in Heidegger, p. 184.
127. Ibid., p. 194.
128. Smith, p. 238 [A216, B267].
129. Heidegger, p. 204.
130. Ibid., p. 206.
131. Ibid., p. 223.
132. From d'Alembert's *Elements of Philosophy*; cited from Buchdahl, p. 7.
133. Ibid., p. 11.
134. W.C. Dampier, *A History of Science and its Relations with Philosophy and Religion*, Postscript by I. Bernard Cohen (Cambridge: Cambridge University Press, 1st paperback ed., 1966), p. 181f.
135. Ibid., p. 3.
136. Ibid., p. 198.
137. Beck, p. 501.
138. J.D. North, *The Measure of the Universe: A History of Modern Cosmology* (Oxford: Clarendon Press, 1965), pp. 16–50.
139. Ibid., p. 19.
140. Cf. ibid., p. 24.

141. H.A. Lorentz, A. Einstein, H. Minkowski, and H. Weyl, *The Principle of Relativity: A Collection of Original Memoirs on the Special and General Theory of Relativity* (New York: Dover Publications, Inc., 1952), p. 37.
142. The Quixotic effort of Herman Dingle to discredit it continues, but without devotees; cf. "The Case against Special Relativity," *Nature* 216 (1967): 119–122.
143. Lorentz et al., p. 75.
144. Ibid., p. 76.
145. A. d'Abro, *The Rise of the New Physics: Its Mathematical and Physical Theories*, vol. 1 (New York: Dover Publications, Inc., 1951), p. 80.
146. Also in the *Annalen der Physik*; cf. Lorentz et al., pp. 109–164.
147. Cf. d'Abro, p. 82.
148. Cornelius Lanczos, *Space through the Ages: The Evolution of Geometrical Ideas from Pythagoras to Hilbert to Einstein* (New York: Academic Press, 1970), p. 247.
149. For example: Banesh Hoffmann, in his recent book, *Albert Einstein: Creator and Rebel* (New York: The Viking Press, 1972), p. 112, published a facsimile of a letter of Einstein to George Hale, dated 1913, in which he asked the eminent astronomer "if the gravitational bending of light rays could be detected when the sun is not eclipsed."
150. Karl Popper, who has taught us much in this regard, advocated the use of the term "corroborate" to describe a theory whose predictions accord with experimental data; cf. his *Logic of Scientific Discovery* (rev. ed.; London: Hutchinson, 1968), ch. 10.
151. One recent attempt to make such measurements took place during the eclipse of 1973; cf. Bryce S. DeWitt, Richard A. Matzner, and A.H. Mikesell, "A Relativity Eclipse Experiment Refurbished," *Sky and Telescope* 47, no. 5 (May 1974): 301–306.
152. Ernst Cassirer, "Einstein's Theory of Relativity," in his *Substance and Function and Einstein's Theory of Relativity* (orig. published in 1921; New York: Dover Publications, Inc., 1953), p. 439.
153. Ibid., p. 379; italics mine.
154. d'Abro, vol. 2, p. 463.
155. Ibid., p. 468.
156. Dampier, p. 396.
157. David Bohm, *Quantum Theory* (London: Constable and Company, Ltd., 1954 reprint), p. 99.
158. Cf. Bryce S. DeWitt and B. Neill Graham, "Resource Letter IQM-1 on the Interpretation of Quantum Mechanics," *American Journal of Physics* 39 (1970): 724.
159. 1958; cf. DeWitt and Graham, p. 729.
160. Bohm, p. 161.
161. Ibid.; italics mine. For pertinent statements of Bohr and Heisenberg on these matters, cf. Karl Popper, "Quantum Mechanics without 'the Observer'," in *Quantum Theory and Reality*, ed. Mario Bunge, Studies in the Foundations, Methodology and Philosophy of Science, vol. 2 (Heidelberg: Springer-Verlag, 1967), pp. 10ff.

162. Bohm, p. 169.
163. Ibid., p. 172.
164. David Bohm, *Causality and Chance in Modern Physics* (London: Routledge and Kegan Paul, Ltd., 1957), pp. 145ff.
165. Ibid., p. 147.
166. Ibid.
167. Werner Heisenberg, *Physics and Philosophy: The Revolution in Modern Science* (London: George Allen and Unwin, Ltd., 1959), p. 52.
168. Eugene P. Wigner, "Remarks on the Mind–Body Question," in *The Scientist Speculates*, ed. I.J. Good (London: Heineman, 1961), p. 289; cited from Bryce and Graham, p. 732.
169. Popper, "Quantum Mechanics without 'the Observer'," p. 7; Bunge's position will be presented later.
170. Werner Heisenberg, "The Representation of Nature in Contemporary Physics," *Daedalus* 87 (1958): 100; cited from Popper, "Quantum Mechanics without 'the Observer'," p. 42.
170a. Max Jammer, *The Philosophy of Quantum Mechanics: The Interpretations of Quantum Mechanics in Historical Perspective* (New York: John Wiley and Sons, 1974), p. 105.
171. E.g., David Bohm and J. Bub, "A Proposed Solution of the Measurement Problem in Quantum Mechanics by a Hidden Variable Theory," *Reviews of Modern Physics* 38 (1966): 453–469.
172. *The Born–Einstein Letters: Correspondence between Albert Einstein and Max and Hedwig Born from 1916 to 1955*, edited with commentaries by Max Born, trans. Irene Born (New York: Macmillan, 1971), pp. 148ff., letter 81.
173. Ibid., p. 91, letter 52.
174. Ibid., p. 198, commentary to letter 91.
175. Ibid., p. 170, letter 88.
176. Popper, "Quantum Mechanics without 'the Observer'," p. 14.
177. Ibid., p. 17.
178. Ibid., p. 20.
179. Ibid., p. 37.
180. Ibid., p. 38f.
181. Mario Bunge, "The Turn of the Tide," in *Quantum Theory and Reality*, ed. Mario Bunge, Studies in the Foundations, Methodology and Philosophy of Science, vol. 2 (Heidelberg: Springer-Verlag, 1967), p. 3.
182. Ibid., p. 5.
183. Mario Bunge, "A Ghost-free Axiomatization of Quantum Mechanics," in *Quantum Theory and Reality*, ed. Mario Bunge, Studies in the Foundations, Methodology and Philosophy of Science, vol. 2 (Heidelberg: Springer-Verlag, 1967), p. 111.
184. Ibid., p. 105.
185. Ted Bastin, ed., *Quantum Theory and Beyond: Essays and Discussions arising from a Colloquium* (Cambridge: Cambridge University Press, 1971).
186. Popper, "Quantum Mechanics without 'the Observer'," p. 8.

187. Hugh Everett III, "'Relative State' Formulation of Quantum Mechanics," *Reviews of Modern Physics* 29 (1957): 459; I have italicized the last sentence.
188. Ibid., p. 459f., note.
189. Ibid.
190. John Wheeler, "Assessment of Everett's 'Relative State' Formulation of Quantum Theory," *Reviews of Modern Physics* 29 (1957): 465.
191. Bryce S. DeWitt, "Quantum Mechanics and Reality," *Physics Today* 23 (1970), pp. 30–35. Wheeler later turned from Copenhagen-type "observer"-based theories of quantum mechanics to a theory based on the notion of "participants."
192. Cf. Bryce S. DeWitt, "Quantum-Mechanics Debate," *Physics Today* 24 (1971): 26–44.
193. DeWitt concluded his article with the judgment that Everett's theory "has a better claim than most to be the natural end-product of the interpretation begun by Heisenberg in 1925"; ibid., p. 35.
194. Alfred North Whitehead, "Autobiographical Notes," in *The Philosophy of Alfred North Whitehead*, The Library of Living Philosophers, vol. 3, ed. Paul Arthur Schilpp (2nd ed.; LaSalle, Ill.: Open Court Publishing Co., 1951), p. 7.
195. Ibid.
196. Alfred North Whitehead, *The Principle of Relativity with Applications to Physical Science* (Cambridge: Cambridge University Press, 1922), p. v.
197. Alfred North Whitehead, *The Concept of Nature*, The Tarner Lectures delivered in Trinity College, November 1919 (Cambridge: Cambridge University Press [1920], 1971 reprint of paperback edition), p. vii; italics mine. Whitehead continues: "I would not however be misunderstood to be lacking in appreciation of the value of his recent work on general relativity which has the high merit of first disclosing the way in which mathematical physics should proceed in the light of the principle of relativity. But in my judgment he has cramped the development of his brilliant mathematical method in the narrow bounds of a very doubtful philosophy."
198. Alfred North Whitehead, *An Enquiry concerning the Principles of Natural Knowledge* (Cambridge: Cambridge University Press, 1919), p. vf.
199. The remarkable parallels between the thought of Whitehead and Charles S. Peirce suggest dependence of the former on the latter, although James K. Feibleman, who compiled these parallels, believes they result from mutual aims and sources of insight: *An Introduction to the Philosophy of Charles S. Peirce*, Foreword by Bertrand Russell (Cambridge, Mass.: The M.I.T. Press, 1st paperback edition, 1970), pp. 462ff.
200. Victor Lowe, "The Development of Whitehead's Philosophy," in *The Philosophy of Alfred North Whitehead*, The Library of Living Philosophers, vol. 3, ed. Paul Arthur Schilpp (2nd ed.; LaSalle, Ill.: Open Court Publishing Co., 1951), p. 66.
201. Ibid., p. 68.

202. Whitehead, *Concept of Nature*, p. 162.
203. Alfred North Whitehead, *Science and the Modern World, Lowell Lectures 1925* (New York: The Free Press, 1967; first published in 1925), p. 35.
204. Whitehead, *Process and Reality*, pp. 121ff. [cor. ed., pp. 78ff].
205. Cf. Abner Shimony, "Quantum Physics and the Philosophy of Whitehead," in *Philosophy in America*, ed. Max Black (Ithaca, N.Y.: Cornell University Press, 1965), pp. 240–261; and J.M. Burgers, *Experience and Conceptual Activity: A Philosophical Essay based upon the Writings of A.N. Whitehead* (Cambridge, Mass.: The M.I.T. Press, 1965), esp. pp. 65–76.
206. Lowe, p. 90.
207. Robert M. Palter, *Whitehead's Philosophy of Science* (Chicago: The University of Chicago Press, 1960), p. 155.
208. Leclerc, *Nature of Physical Existence.*
209. F.S.C. Northrop, "Whitehead's Philosophy of Science," in *The Philosophy of Alfred North Whitehead*, The Library of Living Philosophers, vol. 3, ed. Paul Arthur Schilpp (2nd ed.; LaSalle, Ill.: Open Court Publishing Co., 1951), p. 198.
210. Whitehead, *Principles of Natural Knowledge*, p. 53; cited from E.B. McGilvary, "Space–Time, Simple Location, and Prehension," in *The Philosophy of Alfred North Whitehead*, The Library of Living Philosophers, vol. 3, ed. Paul Arthur Schilpp (2nd ed.; LaSalle, Ill.: Open Court Publishing Co., 1951), p. 215.
211. McGilvary, p. 216.
212. Ibid., p. 217.
213. Northrop, p. 204.
214. Ibid.
215. Whitehead, *Principle of Relativity*, p. vf.
216. Palter, pp. 125ff.
217. Ibid., p. 128.
218. Ibid., p. 129.
219. Whitehead, *Science and the Modern World*, p. 122.
220. I.e., Whitehead's field equations; cf. *Principle of Relativity*, p. 83.
221. Ibid., p. 84.
222. Northrop, p. 188.
223. Ibid.
224. Ibid., p. 189.
225. The principal representatives are: J.L. Synge, *Relativity: The Special Theory* (Amsterdam: North-Holland Publishing Company, 1965), and his *Relativity: The General Theory* (Amsterdam: North-Holland Publishing Company, 1960); also C.B. Rayner, "Foundations and Applications of Whitehead's Theory of Relativity" (unpublished doctoral dissertation, University of London, 1953). Cf. also A. Schild, "Gravitational Theories of the Whitehead Type and the Principle of Equivalence," in *Evidence for Gravitational Theories*, Proceedings of the International School of Physics "Enrico Fermi," Course 20, ed. C. Møller (London: Academic Press, 1962), pp. 69–115. Cf. bibliographies in these entries.

226. Whitehead, *Process and Reality*, p. vi [cor. ed., p. 12].
227. Ibid., p. vii [cor. ed., p. xii].
228. Ibid., p. ix [cor. ed., p. xiii].
229. Cf. infra, pp. 151ff.
230. For an extensive discussion of Leibniz's position cf. Leclerc, pp. 251ff.
231. For this term and its amplification, cf. his *Principle of Relativity*, pp. 61ff.
232. Cf. Whitehead, *Process and Reality*, p. 113 [cor. ed., p. 73].
233. Ibid., p. 93; italics mine. Cf. p. 94: "the real essence indicates 'where' the entity is, that is to say, its status in the real world" [cor. ed., pp. 59f].
234. Ibid., p. 27 [cor. ed., p. 18].
235. Ibid., p. 27f. [cor. ed., p. 18].
236. Whitehead, *Concept of Nature*, p. 189.
237. Whitehead, *Process and Reality*, p. 113 [cor. ed., p. 73].
238. Ibid. [cor. ed., p. 73].
239. Ibid., p. 81 [cor. ed., p. 52].
240. Ibid., p. 73 [cor. ed., p. 46].
241. Ibid., p. 32f. [cor. ed., p. 22].
242. Whitehead, *Science and the Modern World*, p. 174.
243. Whitehead, *Process and Reality*, p. 46 [cor. ed., p. 31].
244. Ibid., p. 95 [cor. ed., p. 60].
245. Ibid. [cor. ed., p. 61].
246. Ibid. [cor. ed., p. 61].
247. Ibid., p. 113 [cor. ed., p. 73].
248. Ibid. [cor. ed. p. 73].
249. Leclerc, p. 289f.
250. Whitehead, *Process and Reality*, p. 124 [cor. ed., p. 80].
251. Ibid., p. 122 [cor. ed., p. 79].
252. Cf. Whitehead, *Science and the Modern World*, p. 101f.; also Leclerc, esp. pp. 242ff., where special attention is given to Leibniz. Cf. also the Introduction by Stephen Toulmin to his *Physical Reality: Philosophical Essays on Twentieth Century Physics* (Harper Torchbook ed.; New York: Harper and Row, 1970), pp. ix–xx, for an updating of the discussion.
253. Leclerc, p. 242.
254. Ervin Laszlo, *Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought* (Harper Torchbook ed.; Harper and Row, Publishers, 1972), p. vii.
255. Ludwig von Bertalanffy, *General System Theory: Foundations, Development, Applications* (rev. ed.; New York: George Braziller, 1968).
256. Originally published in 1955.
257. von Bertalanffy, p. 18f.
258. Ibid., p. 37.
259. Ibid., p. 39.
260. Ibid., pp. 20ff.
261. Ibid., p. 37.
262. Ibid.

263. Ibid.
264. Ibid., p. 45.
265. Ibid., p. 14.
266. Laszlo, p. xxi.
267. Ibid., p. ix.
268. Henryk Skolimowski, "The Twilight of Physical Description and the Ascent of Normative Models," in *The World System: Models, Norms, Applications*, ed. Ervin Laszlo (New York: George Braziller, 1973), pp. 97–118.
269. Laszlo, *Introduction to Systems Philosophy*, p. 3.
270. Ibid., p. 7.
271. Ibid., p. 10.
272. Ibid., p. 11.
273. Ibid., p. 12.
274. Ibid.
275. Ibid.
276. von Bertalanffy, p. 11: "As with every new idea in science and elsewhere, the systems concept has a long history. Although the term 'system' itself was not emphasized, the history of this concept includes many illustrious names. As 'natural philosophy,' we may trace it back to Leibniz; to Nicholas of Cusa with his coincidence of opposites; to the mystic medicine of Paracelsus; to Vico's and ibn-Kaldun's vision of history as a sequence of cultural entities or 'systems'; to the dialectic of Marx and Hegel, to mention but a few names from a rich panoply of thinkers."
277. Laszlo, *Introduction to Systems Philosophy*, p. 13.
278. von Bertalanffy, p. 49.
279. Laszlo, *Introduction to Systems Philosophy*, p. 15.
280. Ibid., p. 23.
281. Ibid.
282. Albert Einstein, *The World As I See It* (1934); cited from Laszlo, *Introduction to Systems Philosophy*, p. 23.
283. Ibid., p. 24f.
284. E.R Harrison, "The Mystery of Structure in the Universe," in *Hierarchical Structures*, ed. T. Whyte, Wilson, and Wilson (New York: American Elsevier Publishing Company, Inc., 1969), p. 88; cited from Laszlo, *Introduction to Systems Philosophy*, p. 26.
285. James G. Miller, *Living Systems: Basic Concepts in General Systems and Psychiatry*, ed. William Gray, D.F. Duhl, and N. Rizzo (Boston: Little, Brown and Company, 1969).
286. Laszlo, *Introduction to Systems Philosophy*, p. 30.
287. Ibid., p. 31.
288. Ibid.
289. Ibid., p. 49.
290. Ibid., p. 57; italics mine.
291. Ibid., p. 86.
292. Ibid., p. 91.

293. Ibid., p. 92.
294. Ibid., p. 99.
295. Ibid., p. 100.
296. Cf. infra, p. 88.
297. Laszlo, *Introduction to Systems Philosophy*, p. 116.
298. Ibid., p. 120.
299. Ibid., p. 123.
300. Ibid., p. 133.
301. Ibid., p. 147.
302. Ibid., p. 154.
303. Ibid.
304. Ibid., p. 170.
305. Ibid.
306. Ibid., p. 171.
307. Ibid., p. 173.
308. Ibid., p. 174.
309. Ibid.
310. Ibid.
311. Ibid., p. 175.
312. Ibid., p. 176.
313. Ibid., p. 179.
314. Ibid., p. 197.
315. Ibid., p. 197f.
316. Ibid., p. 203.
317. Ibid., p. 206.
318. Ibid., p. 232.
319. Ibid., p. 292; italics mine.
320. Ibid., p. 292f.
321. Ibid., p. 293.
322. Ibid.
323. Ibid.
324. Ibid., p. 294.
325. Ibid., p. 295.
326. Ibid., p. 282.
327. Ibid., p. 284.
328. Ibid.
329. Ibid., p. 285.
330. Ibid., p. 287f.
331. Ibid., p. 289.
332. Ibid.
333. Cf. the major articles on quantum physics and philosophy by Henry Peirce Stapp and Charles Hartshorne in *Process Studies* 7 (1977) and 8 (1978).
334. Cf. note 202, Part II.

PART TWO

1. I have adopted the term "universal internality" from Charles Hartshorne, *Creative Synthesis and Philosophic Method*, The Library of Philosophy and Theology (London: SCM Press, Ltd., 1970), p. 83.
2. F.H. Bradley, *Appearance and Reality: A Metaphysical Essay* (Oxford: Clarendon Press, 1893). Bradley amplified his position on internal relations in the Appendix to the 2nd ed. issued in 1897. It is this revised edition in its ninth (corrected) impression which will be cited here.
3. Ibid., p. 26.
4. Ibid., p. 27.
5. Ibid., p. 28.
6. Ibid., p. 512.
7. Ibid., p. 516.
8. Ibid., p. 517.
9. Ibid., p. 519.
10. Ibid., p. 520.
11. Ibid., p. 521.
12. Ibid., p. 522; italics mine.
13. Bertrand Russell, *Principles of Mathematics* (1903) (cited from 2nd ed., reprinted by W.W. Norton and Co., N.d.), p. 100.
14. Part I of this essay was republished as "The Monistic Theory of Truth," in Russell's *Philosophical Essays* (New York: Simon and Schuster, 1966; reprint of the 1910 ed.), pp. 131–146.
15. Ibid., p. 139.
16. Ibid.
17. Ibid., p. 140.
18. Ibid., p. 142.
19. Ibid.
20. Ibid., p. 143.
21. Ibid., p. 144.
22. Harold H. Joachim, *The Nature of Truth* (Oxford: Clarendon Press, 1906), p. 48f.
23. Ibid., p. 49.
24. William James, *Essays in Radical Empiricism* and *A Pluralistic Universe*, ed. Ralph Barton Perry (Gloucester, Mass.: Peter Smith, 1967).
25. Ibid., p. 49.
26. Ibid., p. 46.
27. Ibid., p. 72f.
28. Ibid., p. 76.
29. Ibid.
30. Ibid., p. 79.
31. Ibid., p. 81.
32. Ibid., p. 348.
33. G.E. Moore, Philosophical Studies (Totowa, N.J.: Littlefield, Adams and Co., 1968; reprint, 1st ed., 1922), p. 276.

34. Ibid., p. 276f.
35. Ibid., p. 284.
36. Ibid.
37. Ibid., p. 285.
38. Ibid., p. 288.
39. Ibid., p. 289.
40. Ibid.
41. Ibid., p. 306.
42. Ibid., p. 307.
43. Ibid., p. 307f.
44. A.C. Ewing, *Idealism: A Critical Survey* (New York: The Humanities Press, 1934).
45. Ibid., p. 137.
46. Ibid., p. 131.
47. Cf. ibid., pp. 141, 134, 136.
48. Ibid., p. 136.
49. Ibid., p. 187.
50. Ibid.
51. Ibid., p. 194.
52. Charles Hartshorne, *Man's Vision of God and the Logic of Theism* (Hamden Co., Archon Books, 1941; reprinted by Harper and Row, Inc., 1964), p. 236.
53. Ibid.
54. Ibid., p. 238.
55. Charles Hartshorne, *The Divine Relativity: A Social Conception of God* (New Haven: Yale University Press, 1948).
56. Ibid., p. 62.
57. Ibid., p. 64f.
58. Ibid., p. 65.
59. Ibid., p. 67.
60. Hartshorne, *Creative Synthesis*, p. 84.
61. Hartshorne, *Divine Relativity*, p. 76.
62. Ibid., p. 103.
63. Ibid., p. 110.
64. Hartshorne, *Creative Synthesis*, p. 52.
65. Ibid., p. 53.
66. Ibid., p. 99.
67. Ibid.
68. Ibid., p. 100.
69. Ibid., p. 104.
70. Ibid., p. 119.
71. Ibid., p. 210.
72. Ibid., p. 217.
73. It is not surprising that Hartshorne claims that "the paradigm of realistic experiencing" is memory rather than perception; ibid., p. 218.
74. Ibid., p. 220.

75. Ibid., p. 223.
76. Ibid., p. 226.
77. Ibid., p. 205.
78. Hartshorne, *Divine Relativity*, p. 114.
79. For his personal impressions of philosophy in those earlier days, cf. Brand Blanshard, "The Philosophy of Analysis," in *Clarity Is Not Enough, Essays in Criticism of Linguistic Philosophy*, ed. H.D. Lewis (London: George Allen and Unwin, 1963), pp. 76–109. See also his recent remarks in the essay, "Rationalism in Ethics and Religion," in *Mid-Twentieth Century American Philosophy: Personal Statements*, ed. Peter A. Bertocci (New York: Humanities Press, 1974), pp. 20–46. I am indebted to my colleague, Professor Bertocci, for the gift of a personal copy of this significant volume.
80. Brand Blanshard, *The Nature of Thought*, The Muirhead Library of Philosophy, vol. 2 (New York: The Macmillan Company, 1940), p. 449.
81. Ibid., p. 474.
82. Ibid., p. 451.
83. Ibid., p. 431.
84. Ibid., p. 452.
85. Ibid., p. 454.
86. Ibid., p. 458.
87. Ibid., p. 459.
88. Ibid., p. 468.
89. Ibid., p. 469.
90. Ibid., p. 470.
91. Ibid.
92. Ibid., p. 470f.
93. Ibid., p. 475.
94. Ibid., p. 478.
95. Ibid., p. 481.
96. Ibid., p. 491.
97. Ibid., p. 132.
98. Ibid., p. 150.
99. Ibid., p. 154; italics mine.
100. Brand Blanshard, "Internal Relations and Their Importance to Philosophy," *The Review of Metaphysics* 21 (December 1967): 227–236.
101. Ibid., pp. 262–272.
102. Brand Blanshard, *Reason and Analysis*, Paul Carus Lectures of 1959 (LaSalle, Ill.: Open Court Publishing Company, 1962).
103. Ernest Nagel, "Sovereign Reason," in *Freedom and Experience: Essays Presented to Horace M. Kallen*, ed. Sidney Hook and Milton R. Konvitz (Ithaca, N.Y.: Cornell University Press, 1947; reprinted in Nagel, *Sovereign Reason* [Glencoe, Ill.: Free Press, 1954]), pp. 266–295.
104. Robert E. Wood, *Martin Buber's Ontology: An Analysis of I and Thou*, Northwestern University Studies in Phenomenology and Existential Philosophy (Evanston: Northwestern University Press, 1969).

105. Syed A.R. Zaidi, "Toward A Relational Metaphysics," *The Review of Metaphysics* 26, no. 3 (March 1973); 412–437.
106. Ludwig Feuerbach, "Ueber Spiritualismus und Materialismus, besonders in Beziehung auf die Willensfreiheit," *Gesammelte Werke*, ed. Werner Schuffenhauer (Berlin: Akademische Verlag, 1972; originally published in 1866), vol. 11, Kleinere Schriften IV (1851–1866), § 15.
107. Ludwig Feuerbach, *Lectures on the Essence of Religion*, trans. Ralph Manheim (New York: Harper and Row, Publishers, 1967; originally published in 1851), p. 20.
108. Ludwig Feuerbach, *Das Wesen der Religion* (originally published in 1845).
109. Marx, "Es gibt keinen andern Weg . . . zur *Wahrheit* und *Freiheit*, als *durch* den *Feuer-bach.* Der Feuerbach ist das *Purgatorium* der Gegenwart"; Engels: "Wer hat . . . das Geheimnis des 'Systems' aufgedeckt? Feuerbach. Wer hat die Dialektik der Begriffe, den Götterkrieg, den die Philosophen allein kannten, vernichtet? Feuerbach. Wer hat . . . 'den Menschen' an die Stelle des alten Plunders, auch des 'unendlichen Selbstbewusstseins' gesetzt? Feuerbach und nur Feuerbach"; cited from Ludwig Feuerbach, *Anthropologischer Materialismus: Ausgewählte Schriften.* Herausgegeben und eingeleitet von Alfred Schmidt (Frankfurt: Europäische Verlagsanstalt, 1967), vol. 1, p. 6f.
110. Marx/Engels: Feuerbach "geht so weit, wie ein Theoretiker überhaupt gehen kann, ohne aufzuhören, Theoretiker und Philosoph zu sein," *Die deutsche Ideologie*: cited from Schmidt, vol. 1, p. 10.
111. Feuerbach, *The Essence of Christianity*, Preface to 2nd ed., p. xxxiv.
112. Cf. infra, p. 140f.
113. Feuerbach, *Lectures*, p. 21.
114. Ibid., p. 79; italics mine.
115. Ibid., p. 93.
116. Ibid., p. 91.
117. Feuerbach, *Essence of Christianity*, p. xxxiv.
118. Ibid., p. 12.
119. Feuerbach, "Ueber Spiritualismus und Materialismus," pp. 170–182.
120. Karl Löwith, *Das Individuum in der Rolle des Mitmenschen* (Darmstadt: Wissenschaftliche Buchgesellschaft, 1969; originally published in 1928), p. 10.
121. Cf. e.g. Hayden V. White's article on Feuerbach in *The Encyclopedia of Philosophy*, vol. 3, Paul Edwards, editor in chief (New York: Macmillan Publishing Co., Inc., and The Free Press, 1967), pp. 190–192. Even the recent excellent book by my colleague, Marx Wartofsky, manifests ambivalence precisely at the point of assigning a "label" to Feuerbach's philosophy: *Feuerbach* (Cambridge: Cambridge University Press, 1977), pp. 347ff.
122. Feuerbach, *Essence of Christianity*, p. 83.
123. Ibid., p. 82.
124. Ibid., p. 158.

125. Ibid., p. 92.
126. Ibid., p. 4
127. Ibid., p. 12.
128. Ibid.
129. Ludwig Feuerbach, *Saemtliche Werke*, Herausgegeben von W. Bolin und F. Jodl (Stuttgart: Fr. Frommanns Verlag, Bd. II, 1904), p. 313.
130. Ibid., p. 318.
131. Ibid., p. 318f.
132. Ibid., p. 340.
133. Ibid., p. 388f.
134. White, p. 192.
135. Feuerbach, *Lectures*, p. 312.
136. Feuerbach, "Ueber Spiritualismus und Materialismus," p. 171.
137. Ibid., p. 172.
138. Ibid.
139. Ibid., p. 174f.
140. Ibid., p. 175.
141. Ibid., p. 181.
142. Martin Buber, *I and Thou*, a new translation with a Prologue "I and You" and Notes by Walter Kaufmann (New York: Charles Scribner's Sons, 1970), p. 115.
143. Martin Buber, *Between Man and Man, with an Afterword by the Author on "The History of the Dialogical Principle,"* Introduction by Maurice Friedman (New York: The Macmillan Company, 1965; 1st English ed., 1947), pp. 209–224.
144. Ibid., p. 210.
145. Cf. ibid., p. 145–148.
146. Ibid., p. 148.
147. Wood, p. 120.
148. On this point, cf. Wood, p. 110; also p. xii, n. 7.
149. Ibid.
150. Buber, *I and Thou*, p. 53.
151. Martin Buber, *Daniel: Dialogues of Realization*, translation with an Introductory Essay by Maurice Friedman (New York: Holt, Rinehart and Winston, 1964), pp. 140–141.
152. Wood, p. 55.
153. Ibid., p. 28.
154. Ibid., p. 70.
155. Buber, *I and Thou*, p. 123.
156. Ibid.
157. Ibid., p. 124.
158. Ibid., p. 127.
159. Ibid., p. 100.
160. Ibid., pp. 102ff.
161. Wood, p. xii; the reference to Heim is from his "Ontologie und Theologie," *Zeitschrift für Theologie und Kirche* 38 (1930): 333.

162. Zaidi, p. 412.
163. Ibid.
164. Whitehead argued more modestly that in these earlier metaphysics there was a *priority* of quality over relation; cf. supra, p. 69.
165. Zaidi, p. 419.
166. Ibid.
167. Ibid., p. 422.
168. Ibid.
169. Ibid., pp. 422f.
170. Ibid., p. 422.
171. Ibid., p. 423.
172. Ibid.
173. Ibid., p. 424.
174. Ibid., p. 425.
175. *Collected Papers of Charles Sanders Peirce*, ed. Charles Hartshorne and Paul Weiss (Cambridge, Mass.: The Belknap Press of the Harvard University Press, 1974 reprint), vol. 1, p. 304.
176. Zaidi, p. 426.
177. Ibid., p. 427.
178. Ibid., p. 428.
179. Ibid., p. 429.
180. Ibid.
181. Ibid., p. 432.
182. Fr. Nietzsche, *The Will to Power*, trans. Walter Kaufmann and R.J. Hollingdale (New York: Vintage Books, 1968), cited from Zaidi, p. 432f.
183. Zaidi, p. 434.
184. Ibid., p. 437.
185. Cf. supra, p. 46.
186. Richard Schlegel. "Quantum Physics and Human Purpose," *Zygon: Journal of Religion and Science* 8 (1973): 200; italics mine.
187. Cf. supra, p. 49; italics mine.
188. As did Bradley of "reals," cf. p. 442.
189. Leclerc, p. 308.
190. Ibid.
191. Ibid., p. 296.
192. Whitehead, *Process and Reality*, p. 124 [cor. ed., p. 80].
193. Whitehead, *Concept of Nature*, p. 189.
194. Leclerc, p. 296.
195. Ibid., p. 304.
196. Ibid., p. 313.
197. Blanshard, *Nature of Thought*, vol. 2. p. 475.
198. I gave advanced notice of this relational theory of complementarity in an article, "The Complementarity of Theology and Cosmology," *Zygon: Journal of Religion and Science* 13 (1978): 19–33.
199. Cf. North.
200. Milton K. Munitz, "The Logic of Cosmology," *British Journal for the Philosophy of Science* 13 (1962): 39; cited from North, p. 272f.

201. Cf. supra, p. 19.
202. Cf. my article, "Theses on the Relational Self and the Genesis of the Western Ego," *Theologische Zeitschrift* 33 (1977): 326–335.
203. Peter Bertocci, *The Person God Is*, The Muirhead Library of Philosophy (New York: The Humanities Press, Inc., 1970).
204. Ibid., p. 55.
205. Ibid., p. 54.
206. Ibid., p. 58f.
207. Ibid.
208. Ibid., p. 52.
209. My attempt at a "phenomenology of temporality" can be found in my essay, "Relational Metaphysics and the Human Future," in *The Sources of Hope*, ed. Ross Fitzgerald (Sydney; Pergamon Press, 1979), pp. 19–33.
210. Mendel Sachs, *Ideas of the Theory of Relativity: General Implications from Physics to Problems of Society* (A Halsted Press Book; New York: John Wiley and Sons, 1974), p. 55.
211. *Collected Papers . . . Peirce*, 5:421 and 6:270.
212. William Ernest Hocking, "Theses Establishing an Idealistic Metaphysics by a New Route," *Journal of Philosophy* 38, no. 25 (1941): 688–690; and "Fact, Field and Destiny: Deductive Elements of Metaphysics," *Review of Metaphysics* 11 (1958): 525–549. I am indebted to my colleague, Dr. Leroy S. Rouner, for calling my attention to these two articles.
213. Maurice Merleau-Ponty, *Phenomenology of Perception.* International Library of Philosophy and Scientific Method. Translation from the French by Colin Smith (London: Routledge and Kegan Paul, 1962), esp. ch. 4.
214. The hermeneutic of myth which follows from a relational metaphysical perspective I have set forth in two recent articles: "A Relational Reassessment of Myth," *Nexus* (Boston University School of Theology Publication) 54 (1977): 11–16; and "Relational Ontology and Hermeneutics," in *Myth, Symbol and Reality*, ed. Alan Olson (Notre Dame Press, 1980).
215. Walther Schulz, *Der Gott der neuzeitlichen Metaphysik* (3rd ed., Pfullingen: Verlag Günther Neske, 1957), p. 13f.
216. I am deeply indebted to my former student, now Professor Richard A. Hughes of Lycoming College, for this insight. In our work together on the conceptual problems of vision he suggested the phrase, "the visual bias." His temporary blindness several years ago led him to reflect deeply on the prejudice of vision; these reflections were published in an article, "Love and the Visual Bias," *The Christian Century* 91, no. 21 (May 1974): 590f. An excerpt from Hughes' brief article is in order: "I believe now that modern Western civilization is the manifestation of a latent but total visual configuration, heading a hierarchy in which the nonvisual receptors lie dormant in the background. . . . Language, mythology, and kinship systems grow out of cumulative perceptual preferences. Although all persons have sight, Western man makes the visual a paradigm" (p. 590).
217. Cf. Supra, p. 142f.

218. Buber, *I and Thou*, p. 58.
219. *Collected Papers . . . Peirce*, 5:265 and 5:416. His own words bear repeating: "Let us not pretend to doubt in philosophy what we do not doubt in our hearts" (p. 257).

BIBLIOGRAPHY

BOOKS

d'Abro, A. *The Rise of the New Physics: Its Mathematical and Physical Theories.* 2 vols. New York: Dover Publications, Inc., 1951.

Alexander, H.G., ed. *The Leibniz–Clarke Correspondence.* Manchester: University Press, 1956.

Bastin, Ted, ed. *Quantum Theory and Beyond: Essays and Discussions arising from a Colloquium.* Cambridge: Cambridge University Press, 1971.

Beck, Lewis White. *Early German Philosophy: Kant and His Predecessors.* Cambridge, Mass.: The Belknap Press of Harvard University Press, 1969.

Bertalanffy, Ludwig von. *General System Theory: Foundations, Development, Applications.* Rev. ed. New York: George Braziller, 1968.

Bertocci, Peter A. *The Person God Is.* The Muirhead Library of Philosophy. New York: The Humanities Press, Inc., 1970.

Blanshard, Brand. *The Nature of Thought.* The Muirhead Library of Philosophy. 2 vols. New York: The Macmillan Company, 1940.

—. *Reason and Analysis.* Paul Carus Lectures of 1959. LaSalle, Ill.: Open Court Publishing Company, 1962.

Bohm, David. *Causality and Chance in Modern Physics.* London: Routledge and Kegan Paul, Ltd., 1957.

—. *Quantum Theory.* London: Constable and Company, Ltd., 1954 reprint.

Born, Max, ed. *The Born–Einstein Letters: Correspondence between Albert Einstein and Max and Hedwig Born from 1916 to 1955*, with commentaries by Max Born. Translated by Irene Born. New York: The Macmillan Company, 1971.

Bradley, F.H. *Appearance and Reality: A Metaphysical Essay.* 2nd ed., 9th cor. impression. Oxford: Clarendon Press, 1897.

Buber, Martin. *Between Man and Man, with an Afterword by the Author on "The History of the Dialogical Principle."* Introduction by Maurice Friedman. New York: The Macmillan Company, 1965.

—. *Daniel: Dialogues of Realization.* Translation with an Introductory Essay by Maurice Friedman. New York: Holt, Rinehart and Winston, 1964.

—. *I and Thou*, a new translation with a Prologue "I and You" and Notes by Walter Kaufmann. New York: Charles Scribner's Sons, 1970.

Buchdahl, Gerd. *The Image of Newton and Locke in the Age of Reason.* London: Sheed and Ward, 1961.

Burgers, J.M. *Experience and Conceptual Activity: A Philosophical Essay based upon the Writings of A.N. Whitehead.* Cambridge, Mass.: The M.I.T. Press, 1965.

Cassirer, Ernst. *Substance and Function* and *Einstein's Theory of Relativity.* New York: Dover Publications, Inc., 1953.

Cohen, I. Bernard, ed. *Sir Isaac Newton's Opticks.* New York: Dover Publications, Inc., 1952.

Cummings, E.E. *Selected Poems 1923–1958.* London: Faber and Faber, 1960.

Dampier, W.C. *A History of Science and Its Relations with Philosophy and Religion.* Postscript by I. Bernard Cohen. 1st paperback ed. Cambridge: Cambridge University Press, 1966.

Ewing, A.C. *Idealism: A Critical Survey.* New York: The Humanities Press, 1934.

Feibleman, James K. *An Introduction to the Philosophy of Charles S. Peirce.* Foreword by Bertrand Russell. 1st paperback ed. Cambridge, Mass.: The M.I.T. Press, 1970.

Feuerbach, Ludwig. *Saemmtliche Werke.* Edited by W. Bolin and F. Jodl. Vol. 2. Stuttgart: Fr. Frommanns Verlag, 1904.
"Grundsätze der Philosophie der Zukunft," pp. 245–320.
"Wider den Dualismus von Leib und Seele, Fleisch und Geist," pp. 326–357.
"Fragmente zur Charakteristik meines philosophischen Entwicklungsgangs," pp. 358–391.

—. *Gesammelte Werke.* Edited by Werner Schuffenhauer. Berlin: Akademie Verlag, 1972.
"Ueber Spiritualismus und Materialismus, besonders in Beziehung auf die Willensfreiheit," vol. 11, Kleinere Schriften IV (1851–1866).

—. *The Essence of Christianity.* Translated by George Eliot. Torchbook ed. New York: Harper and Brothers, Publishers, 1957.

—. *Lectures on the Essence of Religion.* Translated by Ralph Manheim. New York: Harper and Row, Publishers, 1967.

—. *Anthropologischer Materialismus: Ausgewählte Schriften.* Edited with an Introduction by Alfred Schmidt. 2 vols. Frankfurt: Europäische Verlagsanstalt, 1967.

Hartshorne, Charles. *Creative Synthesis and Philosophic Method.* The Library of Philosophy and Theology. London: S.C.M. Press, Ltd., 1970.

—. *The Divine Relativity: A Social Conception of God.* New Haven: Yale University Press, 1948.

—. *Man's Vision of God and the Logic of Theism.* New York: Harper and Row, 1964 reprint.

Heidegger, Martin. *What Is a Thing?* Translated by W.B. Barton, Jr., and Vera Deutsch, with an analysis by Eugene T. Gendlin. Gateway ed. Chicago: Henry Regnery Co., 1967.

Heisenberg, Werner. *Physics and Philosophy: The Revolution in Modern Science.* London: George Allen and Unwin, Ltd., 1959.

Hoffmann, Banesh. *Albert Einstein: Creator and Rebel.* New York: The Viking Press, 1972.

Hoyle, Sir Fred. *Astronomy: A History of Man's Investigation of the Universe.* Crescent Books, Inc., 1962.

James, William. *Essays in Radical Empiricism* and *A Pluralistic Universe.* Edited by Ralph Barton Perry. Gloucester, Mass.: Peter Smith, 1967.

Jammer, Max. *Concepts of Space: The History of the Theories of Space in Physics.* Harper Torchbook ed. New York: Harper and Brothers, 1960.

—. *The Philosophy of Quantum Mechanics: The Interpretations of Quantum Mechanics in Historical Perspective.* New York: John Wiley and Sons, 1974.

Joachim, Harold H. *The Nature of Truth.* Oxford: Clarendon Press, 1906.

Jonas, Hans. *The Gnostic Religion.* 2nd ed. Boston: Beacon Press, 1963.

Koyré, Alexandre. *From the Closed World to the Infinite Universe.* Baltimore: The Johns Hopkins Press, 1957.

Kuhn, Thomas S. *The Copernican Revolution: Planetary Astronomy in the Development of Western Thought.* Foreword by James M. Conant. Vintage Books. New York: Random House, 1959.

—. *The Structure of Scientific Revolutions.* International Encyclopedia of Unified Science. 2nd ed., enlarged. Chicago: The University of Chicago Press, 1970.

Lakatos, Imre, and Musgrave, Alan, eds. *Criticism and the Growth of Knowledge.* Proceedings of the International Colloquium in the Philosophy of Science, London, 1965, vol. 4. Cambridge: Cambridge University Press, 1970.

Lanczos, Cornelius. *Space through the Ages: The Evolution of Geometrical Ideas from Pythagoras to Hilbert to Einstein.* New York: Academic Press, 1970.

Laszlo, Ervin. *Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought.* Harper Torchbook ed. Harper and Row, Publishers, 1970.

Leclerc, Ivor. *The Nature of Physical Existence.* The Muirhead Library of Philosophy. New York: The Humanities Press, Inc., 1972.

Loemker, Leroy E. *Gottfried Wilhelm Leibniz: Philosophical Papers and Letters.* 2 vols. Chicago: The University of Chicago Press, 1956.

Lorentz, H.A.; Einstein, A.; Minkowski, H.; and Weyl, H. *The Principle of Relativity: A Collection of Original Memoirs on the Special and General Theory of Relativity.* New York: Dover Publications, Inc., 1952.

Löwith, Karl. *Das Individuum in der Rolle des Mitmenschen.* Darmstadt: Wissenschaftliche Buchgesellschaft, 1969 reprint.

Martin, Gottfried. *Kant's Metaphysics and Theory of Science.* Translated by P.G. Lucas. Manchester: University Press, 1953.

Merleau-Ponty, M. *Phenomenology of Perception.* International Library of Philosophy and Scientific Method. Translation from the French by Colin Smith. London: Routledge and Kegan Paul, 1962.

Miller, James G. *Living Systems: Basic Concepts in General Systems and Psychiatry.* Edited by William Gray, D.F. Duhl, and N. Rizzo. Boston: Little, Brown and Company, 1969.

Moore, G.E. *Philosophical Studies.* Totowa, N.J.: Littlefield, Adams and Co., 1968 reprint.

Nagel, Ernst. *Sovereign Reason.* Glencoe, Ill.: The Free Press, 1954.

Newton, Sir Isaac. *Mathematical Principles of Natural Philosophy.* Great Books of the Western World, vol. 34. Chicago: Encyclopaedia Britannica, Inc., 1952.

North, J.D. *The Measure of the Universe: A History of Modern Cosmology.* Oxford: Clarendon Press, 1965.

Palter, Robert M. *Whitehead's Philosophy of Science.* Chicago: The University of Chicago Press, 1960.

Peirce, Charles S. *Collected Papers of Charles Sanders Peirce.* Vols. 1–6, edited by Charles Hartshorne and Paul Weiss; vols. 7–8, edited by Arthur Burks. Cambridge: Harvard University Press, 1974 reprint.

Popper, Karl. *Conjectures and Refutations: The Growth of Scientific Knowledge.* 3rd ed. London: Routledge and Kegan Paul, 1969.

—. *Logic of Scientific Discovery.* Rev. ed. London: Hutchinson, 1968.

Russell, Bertrand. *Principles of Mathematics.* 2nd ed. Reprinted by W.W. Norton and Co., n.d.

Sachs, Mendel. *Ideas of the Theory of Relativity: General Implications from Physics to Problems of Society.* A Halsted Press Book. New York: John Wiley and Sons, 1974.

Schulz, Walther. *Der Gott der neuzeitlichen Metaphysik.* 3rd ed. Pfullingen: Verlag Günther Neske, 1957.

Smith, Norman Kemp, ed. *Immanuel Kant's Critique of Pure Reason.* 2nd impression with corrections. London: Macmillan and Co., Ltd., 1963 reprint.

Synge, J.L. *Relativity: The General Theory.* Amsterdam: North-Holland Publishing Company, 1960.

—. *Relativity: The Special Theory.* Amsterdam: North-Holland Publishing Company, 1965.

Torrance, Thomas F. *Space, Time and Incarnation.* London: Oxford University Press, 1969.

Toulmin, Stephen, ed. *Physical Reality: Philosophical Essays on Twentieth Century Physics.* Harper Torchbook ed. New York: Harper and Row, Publishers, 1970.

Wartofsky, Marx. *Feuerbach.* Cambridge: Cambridge University Press, 1977.

Westfall, R.S. *Force in Newton's Physics: The Science of Dynamics in the Seventeenth Century.* New York: American Elsevier, 1971.

Whitehead, Alfred North. *The Concept of Nature.* The Tarner Lectures delivered in Trinity College, November 1919. Cambridge: Cambridge University Press, 1971 reprint.

—. *An Enquiry concerning the Principles of Natural Knowledge.* Cambridge: Cambridge University Press, 1919.

—. *The Principle of Relativity with Applications to Physical Science.* Cambridge: Cambridge University Press, 1922.

—. *Process and Reality: An Essay in Cosmology.* Harper Torchbook ed. New York: Harper and Brothers, 1960.

—. *Process and Reality: An Essay in Cosmology.* Corr. ed. Edited by David Ray Griffin and Donald W. Sherburne. New York: The Free Press, 1978.

—. *Science and the Modern World. Lowell Lectures 1925.* New York: The Free Press, 1967 reprint.

Wood, Robert E. *Martin Buber's Ontology: An Analysis of I and Thou.* Northwestern University Studies in Phenomenology and Existential Philosophy. Evanston: Northwestern University Press, 1969.

ARTICLES

Blanshard, Brand. "Internal Relations and Their Importance to Philosophy." *The Review of Metaphysics* 21 (December 1967):227–236.

—. "The Philosophy of Analysis." In *Clarity Is Not Enough, Essays in Criticism of Linguistic Philosophy,* edited by H.D. Lewis, pp. 76–109. London: George Allen and Unwin, 1963.

—. "Rationalism in Ethics and Religion." In *Mid-Twentieth Century American Philosophy: Personal Statements,* edited by Peter A. Bertocci, pp. 20–46. New York: Humanities Press, 1974.

Bohm, David, and Bub, J. "A Proposed Solution of the Measurement Problem in Quantum Mechanics by a Hidden Variable Theory." *Reviews of Modern Physics* 38 (1966):453–469.

Bunge, Mario. "A Ghost-free Axiomatization of Quantum Mechanics." In *Quantum Theory and Reality,* edited by Mario Bunge. Studies in the Foundations, Methodology and Philosophy of Science, vol. 2. Heidelberg: Springer-Verlag, 1967.

—. "The Turn of the Tide." In *Quantum Theory and Reality,* edited by Mario Bunge. Studies in the Foundations, Methodology and Philosophy of Science, vol. 2. Heidelberg: Springer-Verlag, 1967.

DeWitt, Bryce S. "Quantum-Mechanics Debate." *Physics Today* 24 (1971): 26–44.

—. "Quantum Mechanics and Reality." *Physics Today* 23 (1970):30–35.

DeWitt, Bryce S., and Graham, B. Neill. "Resource Letter IQM-1 on the Interpretation of Quantum Mechanics." *American Journal of Physics* 39 (1970):724–738.

DeWitt, Bryce S.; Matzner, Richard A.; and Mikesell, A.H. "A Relativity Eclipse Experiment Refurbished." *Sky and Telescope* 47, no. 5 (May 1974):301–306.

Dingle, Hermann. "The Case against Special Relativity." *Nature* 216 (1967): 119–122.

Einstein, Albert. "Autobiographical Notes." In *Albert Einstein: Philosopher-Scientist.* The Library of Living Philosophers, vol. 7, edited by Paul

Arthur Schilpp, pp. 1–95. LaSalle, Ill.: Open Court Publishing Company, 1970.

Everett, Hugh, III. "'Relative State' Formulation of Quantum Mechanics." *Reviews of Modern Physics* 29 (1957):454–462.

Gingerich, Owen. "'Crisis' versus Aesthetic in Copernican Revolution." In *Vistas in Astronomy,* vol. 17, edited by Arthur Beer and K.Aa. Strand, pp. 85–95. New York: Pergamon Press, 1975.

Hacking, Ian. "Individual Substance." In *Leibniz: A Collection of Critical Essays,* edited by Harry G. Frankfurt, pp. 127–153. Anchor Book. New York: Doubleday and Company, 1972.

Hartshorne, Charles. "Bell's Theorem and Stapp's Revised View of Space–Time." *Process Studies* 7 (1977):183–191.

Hocking, William Ernest. "Fact, Field and Destiny: Deductive Elements of Metaphysics." *The Review of Metaphysics* 11 (1958):525–549.

—. "Theses Establishing an Idealistic Metaphysics by a New Route." *Journal of Philosophy* 38 (1941):688–690.

Hughes, Richard A. "Love and the Visual Bias." *The Christian Century* 91, no. 21 (May 1974):590ff.

Lowe, Victor. "The Development of Whitehead's Philosophy." In *The Philosophy of Alfred North Whitehead.* The Library of Living Philosophers, vol. 3, edited by Paul Arthur Schilpp, pp. 15–124. 2nd ed. LaSalle, Ill.: Open Court Publishing Company, 1951.

McGilvary, E.B. "Space–Time, Simple Location and Prehension." In *The Philosophy of Alfred North Whitehead.* The Library of Living Philosophers, vol. 3, edited by Paul Arthur Schilpp, pp. 209–239. 2nd ed. LaSalle, Ill.: Open Court Publishing Company, 1951.

Northrop, F.S.C. "Whitehead's Philosophy of Science." In *The Philosophy of Alfred North Whitehead.* The Library of Living Philosophers, vol. 3, edited by Paul Arthur Schilpp, pp. 165–207. 2nd ed. LaSalle, Ill.: Open Court Publishing Company, 1951.

Oliver, Harold H. "The Complementarity of Theology and Cosmology." *Zygon: Journal of Religion and Science* 13 (1978):19–33.

—. "Relational Metaphysics and the Human Future." In *The Sources of Hope,* edited by Ross Fitzgerald, pp. 19–33. Sydney: Pergamon Press, 1979.

—. "Relational Ontology and Hermeneutics." In *Myth, Symbol and Reality,* edited by Alan M. Olson, pp. 69–85. Notre Dame: University of Notre Dame Press, 1980.

—. "A Relational Reassessment of Myth." *Nexus* (Boston University of Theology Publication) 54 (1977):11–16.

—. "Theses on the Relational Self and the Genesis of the Western Ego." *Theologische Zeitschrift* 33 (1977):326–335.

Popper, Karl. "Quantum Mechanics without 'the Observer'." In *Quantum Theory and Reality,* edited by Mario Bunge, pp. 101ff. Studies in the Foundations, Methodology and Philosophy of Science, vol. 2. Heidelberg: Springer-Verlag, 1967.

Russell, Bertrand. "The Monistic Theory of Truth." In his *Philosophical Essays,* pp. 131–146. New York: Simon and Schuster, 1966 reprint.

Schild, A. "Gravitational Theories of the Whitehead Type and the Principle of Equivalence." In *Evidence for Gravitational Theories.* Proceedings of the International School of Physics "Enrico Fermi," Course 20, edited by C. Møller, pp. 99–115. London: Academic Press, 1962.

Schlegel, Richard. "Quantum Physics and Human Purpose." *Zygon: Journal of Religion and Science* 8 (1973):200–220.

Shimony, Abner. "Quantum Mechanics and the Philosophy of Whitehead." In *Philosophy in America,* edited by Max Black, pp. 240–261. Ithaca, N.Y.: Cornell University Press, 1965.

Skolimowski, Hendryk. "The Twilight of Physical Description and the Ascent of Normative Models." In *The World System: Models, Norms, Applications,* edited by Ervin Laszlo, pp. 97–118. New York: George Braziller, 1973.

Stapp, Henry Pierce. "Quantum Mechanics, Local Causality, and Process Philosophy." *Process Studies* 7 (1977):161–182.

Wheeler, John. "Assessment of Everett's 'Relative State' Formulation of Quantum Theory." *Reviews of Modern Physics* 29 (1957):463–465.

White, Hayden V. "Feuerbach, Ludwig Andreas." In *The Encyclopedia of Philosophy,* vol. 3, Paul Edwards, editor in chief, pp. 190–192. New York: Macmillan Publishing Company, Inc., and the Free Press, 1967.

Whitehead, Alfred North. "Autobiographical Notes." In *The Philosophy of Alfred North Whitehead.* The Library of Living Philosophers, vol. 3, edited by Paul Arthur Schilpp, pp. 1–14. 2nd ed. LaSalle, Ill.: Open Court Publishing Company, 1951.

Zaidi, Syed A.R. "Toward a Relational Metaphysics." *The Review of Metaphysics* 26 (March 1973):412–437.

UNPUBLISHED MATERIAL

Rayner, C.B. "Foundations and Applications of Whitehead's Theory of Relativity." Unpublished doctoral dissertation. University of London, 1953.

NAME INDEX

SUBJECT INDEX