PHILOSOPHICAL SHIFTS IN CONCEPTS OF TRUTH OVER TWENTY CENTURIES

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By

Arthur O. Coetzee

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PREFACE

The search for the "fit" of truth is humankind's common quest on all matters such as the larger questions of life, the smaller, everyday specific items of information, knowledge of nature, life events, and one's religious belief system. For a clearer view of the topic, one is inevitably lead into the historical developments in philosophy and science or to what is commonly understood to be the discipline of "philosophy of science".

An historical overview of this search for truth, certainty, and reliability from ancient times to the present reveals certain shifts in the thinking of philosophers and scientists. It also reveals a progressive focus on the nature of truth as well as on the methods of determining truth such as rationality, objectivity, empiricism, and revelation.

Contrary to the pretentious title of this paper and the inherent mammoth task of examining twenty centuries of history, its purpose has been delimited to that of:

(a) noting the contrasting and changing roles of philosophy, science, and religion during the period from the Greeks to the twentieth century as the debate about and the search for the best ways to determine truth continued.

(b) cursorily highlighting the major events, trends, and personalities involved in the role changes referred to in (a).

(c) drawing attention to the implications of the findings for the future as these relate to Christian educators, unsophisticated theologians, and lay Christians who are seeking to give a better reason for their faith.

The paper is divided into three sections. Section I begins with the original Greek understandings of philosophy, science, and wisdom, opinion, theory, knowledge, and truth. This is followed by a record of role and conceptual shifts in philosophy, science, and religion up to the end of the nineteenth century. The dramatic and fundamental twentieth century philosophical and scientific conceptual changes and their implications are highlighted in Section II. The final summary and conclusions are recorded in Section III.

TABLE OF CONTENTS

I. ROLE AND CONCEPTUAL CHANGES IN PHILOSOPHY, SCIENCE, AND THEOLOGY OVER NINETEEN CENTURIES[1]

A. INTRODUCTION

The concepts of philosophy, theology, and science underwent some changes over more than twenty centuries as new developments took place. Since these changes culminate in a crisis of status and role confusion in the twentieth century, a review of the Greek understandings of these concepts is presented here.

B. THE PERIOD OF THE GREEKS

1. Philosophy (Greek Philosophia)

Seen as a spiritual discipline required as a formative process on the way to wisdom, philosophy has as its basic meaning "a love of or striving for wisdom." Philosophy was seen as the "dialogue" of wisdom. The exercise of wisdom was seen as the basic function of wisdom.

Wisdom was seen as an attitude of mind, ability (skill), and being at peace with one's limitations--the ability to find peace with that which cannot be controlled by humans. The wise person responds with fitting attitudes and appropriate actions (the right ethos -ethics) to the demands of life that the person may face. Instead of skill to control circumstances, wisdom was the skill to accept the boundaries of human power--the sphere of the powerless.

The wise person is anchored peacefully in reality and is not dumbfounded by the surrounding powers. The compass of wisdom is truth. To have access to truth was an irreplaceable, precondition for the skill of wisdom. To differentiate between the skill of

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[1]This section of the paper closely follows the outlines given by: Del Ratzsch, "Changing Conceptions of Science: Plato to the Present" (Paper presented in 1988 to the Institute for Christian College Teaching, in Lincoln Nebraska) mimeographed; Norman L. Geisler, ed., Biblical errancy (Grand Rapids: Zondervan Publishing House, 1981); H. W. Rossouw, Wetenskap, Interpretasie, Wysheid (Port Elizabeth: Universiteit van Port Elizabeth, 1981); see also Frank Byron Jevons, A History of Greek Literature (New York: Charles Scribner's Sons, 1897), pp. 469-485, dealing specifically with the early Greek views of philosophy, science, etc.

wisdom and other skills, the word techne is used. Techne in the widest sense indicates the ability to shape or to bring forth something different from given material, such as creating "artwork," "choosing" in a logical thought process, or "persuading" someone. The difference between "techne"-skill and "wisdom"-skill is best contrasted by "cunning craftsman" as opposed to "wise judge." Skill at crafts is a power because it entails the concept of imposing a person's will on something. What one can control by power, one can also use to fulfill one's own desires. Technical skill, therefore, forms the basis for a controlling, appropriating relationship with reality. The skill of wisdom, in a sense, is the opposite of technical skill.

2. Truth (Greek = Aletheia)

The root meaning of truth is "unhidden" and refers to the unhiddenness of the cosmos with its fixed order by which all things exist and are kept in a coherent totality. In order to have truth, one needed to have real knowledge or science. Truth involved more than having isolated facts or knowledge. To have truth required the ability to see the underlying order of relationships. Truth was also the encompassing relationship to which one must adjust one's self in terms of life's orientation.

3. Opinion (Greek = Doksa)

Opinion was the superficial conclusion based on one quick glance of a happenstance without ever getting in view the contextual order of things.

4. Theory (Greek = Theoria)

Theorizing was the daily practice of opening the human's spirit in a stance of neutral but creative receptivity where the totality of the picture can impress itself on one and, therefore, give one true knowledge or science. The theorizing attitude and way of thinking were synonymous with those of philosophizing.

5. Knowledge

Knowledge involved more than knowing facts. It meant understanding--understanding towards wisdom. Aristotle, Plato, Pythagoras, and others believed that knowledge had a

deductive structure. Using basic principles of deductive logic, one could use general axioms and arrive at theorems. They saw absolute certainty as a characteristic of knowledge. Real knowledge stands in the service of wisdom as human orientation to life and not in the service of human technical skill.

6. Science

The sense of science was found in the contribution that it makes towards wisdom, thus to shaping humans inwardly and arming them spiritually for successful ethical living in harmony with the total order of the universe. The words of Socrates, "Knowledge is virtue," remained an abiding motif of Greek philosophy.

C. PLATO AND ARISTOTLE: THE IDEA VERSUS THE OBSERVABLE

For both Plato (428-346 B.C.) and Aristotle (384-322 B.C.), the axioms were obtained from the "Forms" or the ultimate underlying principles of reality. They disagreed, however, as to the "what and where of the Forms" and "ended up originating what were to be for the next two millennia the two dominant, competing ... epistomological views, which were in turn connected with two different traditional conceptions of science." (Ratzsch 1988, 2). For Plato, the Forms were located in the "idea" arrived at by rational deduction (idealism). For Aristotle, the Forms were observable, arrived at via the senses (realism). Aristotle evidenced the beginning of the empirical scientific method to blossom during the sixteenth century.

When the Greeks were conquered by the Romans and the Romans, in turn, were conquered by the barbarians, Greek learning was partially eclipsed.

D. THOMAS AQUINAS: ARISTOTELIAN CERTAINTY AND SPECIAL REVELATION

While the church via St. Augustine (d. 431) kept Platonistic philosophy alive, Aristotelianism never really completely died out. During the twelfth century and the revival of learning via the Arabic conquerors, Aristotelianism revived. At the University of Paris, Thomas Aquinas (1225-

1274) developed a masterful and rational synthesis of Aristotelianism and Christianity that would accommodate broad, cosmic consideration of purposes and ultimate causes. For knowledge other than scientific knowledge of natural things (essentials for salvation), Aquinas proposed the "special revelation" from God in Scripture and through the church to enable humans to achieve a full knowledge of reality. Aristotelianism was now fully in partnership with theology, theorizing within Scripture.

In the realm of theology, opposition in the form of anti-realism arose against the deterministic tendencies in Aristotelianism. This resulted in the condemnation of Aristotelianism in 1277 by the Bishop of Paris. He believed that Aristotelian determinism robbed God of His sovereignty to act in nature as He pleased. To say that God could only have acted in one particular way to achieve the observed results restricted God's activity. God could have achieved the same results a thousand different ways. Multiple theories could be consistent with the same data. Del Ratzsch refers to this as "the underdetermination of theory by data," (Ratzsch 1988, 8). The data cannot tell which theory is right; neither can we, therefore, come to know, even in principle, what the true structure of nature is.

E. PREDICTIVE SCIENCE: HYPOTHESIZING AND TESTING

Besides the fact that Aristotle could now be successfully questioned, the thirteenth century also produced a new view of the scientific method that was quite different from that of Plato and Aristotle, (Ratzsch 1988, 9). In giving up the scientific goal of obtaining theoretical knowledge that described the hidden truths of nature, it opted for scientific theorizing that would allow one to accurately predict observable matters. One was allowed to invent hypotheses. Finding out whether accurate predictions resulted was the way of scientific "testing." Here was no conflict between science and Scripture since no scientific truths were propagated. The Bible, and not science, presented truth.

F. THE RENAISSANCE: MATCHING THEORY AND REALITY

The Renaissance (ca. 1300-1600) brought a revival of Greek learning and an elevated view of human capacities to achieve in science and bring complete knowledge to humans. In a search for the "absolute certainty" of things two influential approaches marked the sixteenth and seventeenth centuries. One was led by Francis Bacon (1561-1626) and the other by Rene Descartes (1596-1650).

1. Inductive Experimentation

Francis Bacon (1561-1626) believed in a method of inductive logic also known as "empiricism." He rejected Aristotle's deductive logic--the "Aristotelian faculty which carried us lightly and easily from a few bits of data to theoretical truths," (Ratzsch 1988, 11; see also Geisler 1981, 28 and Baumer 1977, 26-78). His method of observation, experimentation, inductive data analysis, isolation of principles, and discovery of underlying relationships were to exclude all philosophical (hypothesizing), metaphysical (supernatural), and theological considerations. They attempted the exclusion of presuppositions and the presence of objectivity, empiricality, and rationality. Religion was deemed irrelevant to scientific endeavor. All that one needed to do was to verify sense experience. He attempted to separate science from faith.

2. Revised Idealism

Rene Descartes (1596-1650), by a dualistic method of reasoning, allowed science and theology to each have its own sovereign realm. The senses could account for knowledge of natural things but had to be supplemented for ultimate truth by the innate ideas of the mind. Here, as with Plato, science was done "from the top down--from the transcendent realm into the realm of nature," (Ratzsch 1988, 12). Now both science and religion were supreme but within their own spheres only!

3. Empiricism Without Hypotheses

Sir Isaac Newton (1642-1727) was next to step into history. According to Del Ratzsch, Newton as scientist (not as the Christian that he was, was thoroughly Baconian, insisting on

a purely empirical inductivist and deductivist methodology. "His philosophical preferences became more or less law," (Ratzsch 1988, 15; Andrade 1958; Baumer 1977, 48-53, 76, 271). He also excluded all theological influences within scientific theories themselves.

The seventeenth-century science of Bacon, Descartes, and Newton in general was marked by an attempt to get at absolute truth and certainty via empiricism and elimination of the supernatural from science. The earlier tentativeness and progressive insight brought to science by the brief period of "predictive hypothesizing and testing" appeared to be partially eliminated. The seventeenth/eighteenth century was also known as the period of Enlightenment (Age of Reason), generally pictured as being philosophically marked by Empiricism, Rationalism, and Deism. There was also the Materialism of Thomas Hobbes (1588-1679), the Skepticism of David Hume (1711-1776), and the Agnosticism of Immanuel Kant (1724-1804). Each played a significant role in altering the role and importance of science and theology in the search for truth (see also section H of this paper).

The chemical revolution in the eighteenth and nineteenth centuries highlighted the indispensability to science of the theoretical and the unobservable in the structure of matter. The Newtonian/Baconian inductivism simply could not suffice as an accurate reflection of what scientists were discovering about how to do science. "Some sort of role for hypotheses began to re-emerge after the Newtonian prohibition, and some of the old problems surrounding underdetermination of theory by data would re-emerge as well" (Ratzsch 1988, 14).

G. NINETEENTH-CENTURY CONFLICT BETWEEN SCIENCE AND RELIGION

While for some time there had not been any internal role for religion in science, there developed in England an "amicable partnership" between science (particularly biology and geology) and religion. While the Bible provided Christianity with marvelous evidences of God's wisdom and benevolence (Ratzsch 1988, 14), it also provided a context for scientific theorizing.

As these disciples developed, they could not be kept to reason and theorize within the bounds of the Bible as understood. According to Del Ratzsch, this period saw a real explosion

in alternative but positive schemes for harmonizing Scripture and science. While alternative ways of reading Genesis had been around for many years (Geisler 1981),[2] a new urgency now arose to do so, generated in part by a deepening faith in the reliability of science. On the other hand, discontent over reconciling science with Scripture developed and with it, general doubt that religion should be a consideration in science at all!

H. SUMMARY AND EVALUATION

During the Greek period (400-200 B.C.), philosophy supplied the meaningful framework for scientific theorizing and putting knowledge into the perspective that was wisdom. While Plato believed that one gathers knowledge with one's senses, true meaning was lodged in the concept (idea) of the mind. Aristotle concurred that one gathers knowledge via the senses, but he added that the ultimate meaning and truth could be obtained by logically deducing these from the very reality (object) being studied. Science was practiced for purposes of arriving at knowledge, truth, and wisdom, without utilitarian intent. Both these contending theories continued to exist in some form up to the nineteenth century. It was, however, during the thirteenth century that Thomas Aquinas amended Aristotelianism to include the "special revelation" of Scripture and the church for revealing the truth about spiritual things, while the senses, coupled to logical deduction, could bring the full truth about natural things. Instead of theorizing within the framework of philosophy alone, Aristotelianism now theorized within the framework of both philosophy and theology, with theology providing the controlling framework.

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[2]Note the following examples of questioning the scriptural record as such:

1678 - Richard Simon in France: Called the "father of biblical criticism," he denied the Mosaic authorship of the Bible.
1711 - H. B. Witter: Denied the inerrancy of Scripture and believed in <u>two</u> accounts of Scripture.
1753 - Jean Astruc: Used divine names to identify some dozen different writers of Genesis.
1804 - Johan Eichorn: Issued a critical introduction to the New Testament.
1830 - F. C. Bauer: Applied a dialectic to the writings of Peter and Paul that resulted in dating several of their books in the second century.
1866 - K. H. Graf: Laid down the basis of the JEPD theory.
ca 1876 - Julius Wellhausen: Popularized the documentary hypothesis of the Pentateuch.

By the end of the nineteenth century, the presuppositions of scientific thinking had taken on a dominant role over theological thinking in the sense that theology had been excluded as a consideration for truth in science, and supernaturalism had been outlawed as a way of really knowing.

There was further a wholesale substantive and philosophical attack on the Bible as a reliable source of truth of all knowledge. This was motivated by philosophical presuppositions but done in the name of objectivity and rationality in science. In this vein, Thomas Hobbes, an avowed believer, denied the cognitivity of revelational language and questioned the possibility of miracles, seeing them rather as spiritual or parabolic messages. Spinoza questioned the authorship of the Pentateuch and Daniel, as well as the inspiration of the Gospels. David Hume questioned the inspiration and authority of the Bible and mounted what is generally recognized as the strongest arguments ever against the probability of miracles. The emphasis had shifted to focus on the Bible and supernaturalism. Meanwhile, Immanuel Kant introduced ethical religion (so as not to gainsay the principles of empirical science) that paved the way for the "Higher Criticisms" which followed later. However, his arguments did highlight the role of the mind in giving meaning and framework to the observed facts, as well as identifying the inadequacy of the natural scientific method for all kinds of knowledge.

A new "philosophical hermeneutic" for interpreting the Bible arose in which Friedrich Schleiermacher (1784-1834), Willhelm Dilthey (1844-1911), and Martin Heidegger (1889-1976) played important roles (Rossouw 1981, 22). Wilhelm Dilthey questioned the monopoly and adequacy of the natural scientific method and pled for a different method for the behavioral sciences next to that of scientific method (Rossouw, 1981, 32).

In this new age of faith in science, the Greek techne had overtaken the desire for wisdom. The mechanical interpretation of nature led to the optimistic utilitarian application of knowledge for the benefit and happiness of all humans. Natural law was applied to life, business, and government. There arose a "hopeful belief in the steady improvement and ultimate perfection of mankind through the use of reason and more knowledge of natural law." The "orderliness of the universe" was the "supreme discovery of science" (Snyder 1979, 7-31). Sire puts it this way.

"In Bacon's words, knowledge became power, power to manipulate and bring creation more fully under human domination" (Sire 1988, 49).

Finally, contrary to the Greek tradition, philosophy had become the servant of science and knowledge instead of vice versa, and the Greek wisdom of hiding in the inscrutability of God had been replaced by scientific "certainty" (laws) and technical manipulation. Also contrary to the Greek tradition, Science was no more the contemplative vision of the cosmic totality; it had become the rational control of experiential phenomena with an eye to deriving the practical benefit that such control can have for humans when it is aimed at the techne, the manipulable aspects of reality. But all was not loss! What began during the last few centuries will climax with some meaning and greater balance in the seventeenth century.

II. TWENTIETH CENTURY PHILOSOPHY OF SCIENCE

A. HYPOTHETICO-DEDUCTIVISM

On march towards a greater certainty on the certainties and laws of nature, the twentieth century found itself in a neo-Baconian attempt to restore rigor and certainty to science despite the "now-forced" admission of "some" theoretical hypotheses into science such as was highlighted by Kant and Dilthey. That attempt was the hypothetico-deductivism of the first half of this century, of which logical positivism was simply a subspecie" (Ratzsch 1988, 16; van Huyssteen 1989, xix). The ideal of logical positivism was to discover universal laws and, thus, to base rational knowledge on final certainties through the criterion of verifiability. It purported to be so logical, factual, and value-free in its research process that it deliberately sought to eliminate (in science as well as in any context) all subjective and metaphysical elements.[3] Apparently the fact that it hypothesized from a philosophical base did not serve as a constraint to the scientists!

B. LOGICAL POSITIVISM

According to van Huyssteen (1989, 3-4), what is known today as "Philosophy of Science" owes its founding to a group of philosophers who for a number of years from 1922 onward met weekly in Vienna to discuss scientific and philosophical issues. They were known as the Vienna Circle with Moritz Schlick (1882-1936) as the founder and with persons like Carnap, Neurath, and Reichenbach as members. Philosophers such as Nagel, Hempel, and A. J. Ayer (1910 -) in Britain were a kind of second generation of this school and became known as "logical positivists." From the outset, the Circle was heavily influenced by the philosopher Ludwig Wittgenstein whose Tractatus Logico-Philosophicus in 1922 heralded a revolution in philosophic thought. The group focused heavily on the analysis of language and the accuracy of philosophic language. According to Ayer's "Language, Truth and Logic," a sentence can either be verified or falsified according to empirical ideas applied to it. From this arose the "verification principle."

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[3]Ibid., p. 16., See also Wentzel van Huyssteen, Theology and the Justification of Faith (Grand Rapids: William B. Eerdmans Publishing Company, 1989), p. xix.

Logical Positivism confronted theology with an unenviable dilemma.

Although enormously popular during the first part of this century, logical positivism--due to World War II, the assassination of Moritz Schlick by a student in 1936, and the influence shift of Wittgenstein--languished and collapsed by 1960. Ratzsch's reference (1988, 17) to positivism as being " . . . now largely a historically curious case of academic mass astigmatism, except in some isolated intellectual backwaters, such as high-school science texts," is exaggerated. It remains a fact that its mindset has not yet fully left modern science and theology!

Theology's standard reaction to the demands of positivism was well exemplified by Karl Barth, who ignored them totally by setting up his own "esoteric ecclesiastical theology," thus lapsing both epistemologically and methodologically into a model of rationality analogous to the standard positivistic concept from which it had sought to escape (van Huyssteen 1989, 11). No wonder McFague (1983, 89) could say:

> Scientific positivists have their colleagues in theology, for the assumption that it is possible to go directly from observation to theory without the critical use of models has its counterpart in those who assume it is possible to move from the story of Jesus to doctrine without the critical aid of metaphors and models.

For Barth, the prime consideration for scientific validity was whether or not theology was interpreting the Word of God in obedient faith. Methodological and cognitive issues were not important to him. Van Huyssteen (1978, 43:4) is of the opinion that Barth founded his theology "on an impressive choice for revelation rather than experience, theology rather than non-theological sciences, kerygmatic authority rather than rational argument." For this, Heinrich Scholz, as a positivist, confronted Barth in 1931 with his three minimum criteria for scientific thought, namely, the demand for (1) assertiveness (irrefutability), (2) coherence, and (3) testability. Barth consciously rejected these as he did any attempt to integrate that theology with the broader spectrum of nontheological sciences. Theologians who view theology as a science found this disappointing, for they would tend to believe that "theology's mode of thought and labor cannot be deduced solely from the structure and demands of the revelatory truth, but that it is essentially also directed by the structure and demands of a larger entity of culture . . . namely, science, and specifically a general theory of science" (Heyns and Jonker 1971, 14). They

pointed out (p.16) that when theological thought is isolated from science, "It must ultimately be transformed from science into a doctrine of faith."

C. THE CRITICAL RATIONALISM OF SIR KARL POPPER

The collapse of positivism was paralleled by the emergence of a new direction in conceptions of science. Extensive shifts in the philosophical science image have altered the traditional scientific processes for knowing and have highlighted objectivity and rationality. These changes have been so drastic that scholars have commented on the change from the "neat image of science to the gaudy image of science" (Rossouw 1981, 2).

Sir Karl Popper was the first to "adjust" the standard philosophical or positivist view of the scientific method. He detected "subjectivity" in the very areas considered to be objective, neutral, and exclusionary of the subjective. According to Popper, the scientific-knowing process begins with a problem when disjunctions to expectations are noticed. The search for a solution involves a review of the expectation pattern or the conceptual apparatus in the light of a new theoretical design. A scientific theory must be so formulated as to lend itself to being proved false by experience. For a theory to be scientifically credible, it must be testable or falsifiable, and whether it rests on truth is immaterial. Such a theory is the product of a creative imagination and not the conclusion of a logical process (Popper 1980, 86). Popper also rejects the positivistic claim that metaphysical assertions are meaningless. "Metaphysical ideas are often the forerunners of scientific ones" (Popper 1980, 80).

While Popper's view of science was already an amended one, two further changes touching objectivity and rationality in the knowing process were made by succeeding scientists. The first was brought about by Michael Polanyi (1962) by his observations that theoretical presuppositions not only make observation possible but actually determine what is observed. These observations had two implications. First, scientists with different reference frameworks get different phenomena in sight and thus examine different phenomena. Second, Popper's so-called falsifiability theory became suspect as all scientific observations are to be seen as "theory-laden."

For a while it seemed as though Popper had provided theology an excellent opportunity to operate as a science, given its many presuppositions; but, according to van Huyssteen (1989, 35), only Wolfhart Pannenberg, Gerhard Sauter, and Heinz Peter Humpelman took up the challenge of a broader rationality as offered by critical-rationalism. William W. Bartley's The Retreat to Commitment in 1962 did not bring comfort to Protestant theology, particularly since he was also a student of Popper. He clearly demonstrated the futility of ideologizing any theological stand in an attempt to immunize it against criticism (van Huyssteen 1989, 48).

D. THE PARADIGM THEORY OF THOMAS KUHN

The second element in Popper's view of science that was changed was the historical perspective. He saw science as a repetitive cycle of problem formulation, new theory formation, critical testing, elimination of mistakes, etc. This historical view of science was amended by Thomas S. Kuhn.

Kuhn has emerged as the most prominent and notable theorist of his time. His well-known and widely discussed work, The Structure of Scientific Revolutions (1962, 2nd ed., 1970), must rate as one of the most original and influential alternatives yet to the positivist scientific tradition of the time (van Huyssteen 1989, 48).

He maintained that not only the choice of one's scientific theories but also the very nature of the scientific pursuit should be explained in sociohistorical terms. He saw science as being thoroughly subjective in that sense. In contrast to Popper, Kuhn rejected the idea of a growth of knowledge toward truth. He saw scientific thought as a socially and historically determined activity dominated by the role played in it by paradigms (or worldviews). In that activity, scientific knowledge no longer grows accumulatively through the gradual addition of new elements to the existing corpus, but through radical shifts in which one vision gives way to another (van Huyssteen 1989, 48).

Where Popper saw the growth of knowledge toward truth in the creatively rational construction of theories that must ultimately be subjected to critical testing, Kuhn sees no role

for ultimate testing by definitive theological criteria. It is the accounting for the determinant role of pre-theoretic commitments in responsible choices that gives Kuhn's views of science a much broader grasp of rationality. For Kuhn, truth has a local and definitely provisional character (van Huyssteen 1989, 60-61).

It is van Huyssteen's view that Kuhn's conception of science has relativized the standard image of logical positivism even more than Karl Popper's had done. The essence of that change is supposed to lie in the new bearing given to crucial concepts such as rationality and objectivity, precisely because of the conscious methodological recognition of the indissoluble bond between the scientist's basic commitments and the theorizing that eventually occurs in scientific reflection (van Huyssteen 1989, 61). Kuhn thoroughly destroyed the old dream of an empirically autonomous, progressing, and rigidly objective science that was not influenced by value decisions, metaphysical preferences, philosophical predispositions, and even "worldviewish" flavors.

While there has been some amelioration of Thomas Kuhn's views, no substantive reversals have been suggested by philosophers of science (Ratzsch 1986, 59-73).

E. MODERN THEOLOGY AND THEORY FORMATION

Theologians like Pannenberg and Sauter and now van Huyssteen (1989, 143-197)[4] have attempted to theologize in full cognizance of the far-reaching breaks that Karl Popper, Michael Polanyi, and Thomas Kuhn have made with the traditional positivistic view of science. In each case, they have tried to identify the standards that are required to meet the demands of the new-science model. Rather than content, methodology is stressed.

Van Huyssteen (1986, 25) suggested three minimum requirements for a credible theological model of rationality and acceptable scientific standards. The requirements for each is as follows:

a. Theological judgments and theories refer to reality when they are able to identify problems and reveal the origin of such problems.

b. Theological judgments and theories refer to reality and have a critical and problem-solving quality when the solutions of problems are sought in direct relation to:

[4]van Huyssteen gives his own "Critical-Realist Model of Rationality in Systematic Theology" while also reviewing Wolfhart Pannenberg's "Theology as Science of God," see both pp. 71-100, and Gerhard Sauter's "Theology as Critical Argumentive Science," see pp. 101-121.

1. The original text of Christianity, in other words, the Bible
2. The tradition of theological thinking on the "fundamental truths" of the Christian faith
3. The present experience of the Christian faith within the context of awareness of contemporary problems.

c. Theological statements and theories have a designing and progressive character when they progress by solving problems.

IV. CONCLUDING REMARKS

Refinement in the dialogue over time culminated in two major thrusts during the twentieth century. First was the proposition that "...all real human knowledge was scientific knowledge" and "what science didn't know or couldn't know was beyond the range of real knowing," thus classing religion and metaphysics as subjects concerning which no verifiable knowledge could be gained. Second was the thrust that can be described as a reaction against the first and consists of a systematic downsizing of the supremacist notion of science on the basis of the very premises that brought it to power, namely, objectivity and rationality. The Christian religious paradigm was no more alone in experiencing a crisis involving its cognitive claims! Science was now found to be in the same boat.

These twentieth century developments brought about a two-fold blessing. For colleges and universities, it created a resurgence of interest in philosophy as a discipline. For theology as a discipline, it presented a fresh opportunity for acceptance and credibility. Some theologians have seen in this a chance to posture a new context with awareness and sensitivity to the extremely significant questions surrounding method- and theory-formation without discarding the inalienable, essential elements of its tradition of faith (Tracy 1978, 3). This latter observation again has brought a fresh task to the universities, colleges, and seminaries where the training of ministry is undertaken.

In contemplating the philosophic and scientific trends over more than twenty centuries and the implications that they hold for our time, I wish to highlight what have become important to me as educator and Christian believer.

As educator. The role and importance of philosophy has been highlighted as a motivating and shaping force. In the Christian school, there needs to be a place where students can see and experience the function of philosophy in a higher role than as mere servant of science. It needs to regain its former function as critical examiner and organizer of holistic meaning and shaper of worldviews. In a Christian university I know, a course in philosophic orientation with worldviews and methodological orientation to the major disciplines in the university is a requirement for all undergraduate students. With all the contending ideologies continuously confronting young people, the role of philosophy as a study course can be crucial. Perhaps the ancient "studium generale" could be revived (de Vleeschauwer 1981, 37-54).

As Christian believer. The rational mindset of the world requires from me a credible articulation of my faith and theology. Since theology claims to be dealing with truth, and since theology has to speak to the world about the Truth, it seems imperative that we theologize in such a way as to bring to Christianity an integrity and an intellectual uniqueness that integrates and gives sense to the varied and diverse dimensions of the modern experience while yet remaining true to the tradition of our faith. Critical thinking does not mean that one has to loosen oneself in misplaced objectivity from one's fundamental persuasions and ties of faith. In order for one to practice one's faith responsibly, he/she needs an understanding of philosophical foundations, and, even more, an understanding of the impact of those foundations on the mindset of modern society. Here, the Christian university can play a vital role, not only in shaping the thinking of the prospective layperson but also in training the minister for creative dialogue and theologizing. Theology cannot be the uncritical preservation and repetition of tradition.

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