Resurrecting Popper

An Exercise in Developing a Popperian/Lakatosian Epistemology as an Aid to Understanding the Possible Epistemic Structure of Vatican Magisterial Theology

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Abstract

RESURRECTING POPPER: AN EXERCISE IN DEVELOPING A POPPERIAN/LAKATOSIAN EPISTEMOLOGY AS AN AID TO UNDERSTANDING THE POSSIBLE EPISTEMIC STRUCTURE OF VATICAN MAGISTERIAL THEOLOGY.

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In this thesis, the author presents the philosophy of science and epistemology of Sir Karl Popper. The limitations of applying either to understanding theology are developed. This is followed by the presentation of the philosophy of scientific research programs of Imre Lakatos, who developed his sophisticated falsificationism to build on certain elements of Popper's work. From this work, the author modifies Popper's epistemology along Lakatosian lines and presents a Popperian/Lakatosian (P/L) epistemology. He then argues that such a P/L epistemology is useful for analyzing the theology presented in recent documents from John Paul II and the Congregation for the Doctrine of the Faith.

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Preface

My interest in the philosophy of Karl Popper derives from my undergraduate days at Utah State University. While taking a Philosophy of Science course I was volunteering for a local telephone helpline/crisis hotline. As a volunteer, aside from providing information on community resources for those requesting it, I was expected to help callers cope with their crises. A crisis occurs when some event (the precipitating event) surpasses a person's coping mechanisms. Crisis resolution generally comes about by means of a person's broadening their means of coping. Sometimes the caller, simply through talking, could regain control of their situation. More often, however, talking helped the caller to appreciate that they needed a referral to a professional who could help them to deal with deeper issues.

In training for dealing with crisis situations, I was impressed by the amount of the training that could be seen as Popperian. Not only was the training itself comprised of much trial and error (which came in the form of role-playing under the supervision of a supervisor, who would point out things that could be done better), but the nature of a crisis and crisis-resolution fits a Popperian conception. A precipitating event for a crisis is akin to an observation that clashes with the expectation of a theory. The need for a better coping mechanism (or theory) is presented by the inapplicability (falsification) of the previous one to the given situation.

Beyond crisis theory, I began to see parallels for Popper's ideas everywhere. One could say that I fell into a trap that Popper warns against: I began to find

verifications of Popperian philosophy everywhere; I was not critical of the pattern that I was developing. It was perhaps with the Catholicism that I was practicing that I began to wonder to what extent Popper's philosophy might be useful. Catholicism, from my point of view at the time, is not about conjectures and refutations, and attempts to subject it to this process seemed somehow anti-Catholic. Certainly questions could be asked, but the need for bold conjectures and attempts at refuting them seemed contrary to the search for truth that was presented by the Church. Naturally, I wondered to what extent Popper's philosophy could assist my faith development. As I have deepened my studies of theology, the question has become to what extent Popper's ideas can aid the field of theology and in understanding the nature of theology. My phase of dogmatic Popperism passed as I realized that Popperism entails self-criticism. The true Popperian must criticize his own theories.

It is only recently that I have discovered that Popper extended the kernels of ideas in his philosophy of science to embrace epistemology and metaphysics, as well as the mind-body problem. It was this discovery that led to the question that served as the impetus of this thesis; namely, to what degree can Popper's broader philosophy be applied to theology?

I have also only recently been made aware of the work of Imre Lakatos, who sought to expand Popper's falsificationism to account for the history of science. At first I considered Lakatos to be a rival of Popper. In coming to understand Lakatos' work, however, I have come to appreciate that his is an attempt to extend Popper's basic ideas to make them more cohesive and more answerable to the history of science. Popper's philosophy can be seen as the initial trajectory which Lakatos sought to boost.

Lakatos died in 1974 and at that time he had not responded to Popper's later ideas, particularly Popper's evolutionary epistemology. It occurred to me that just as Lakatos sought to extend Popper's ideas in the philosophy of science, I could create a Lakatosian extension of Popper's epistemology. The essential elements that are needed are already in Lakatos' work.

Initially I chose the title, "Resurrecting Popper," meaning only to revive Popper; that is, to apply his later ideas, which have been largely neglected by other scholars, to theology. I thought that Popper qua Popper could be revived, that it was a simple task to allow his later work speak for itself and to apply it to theology. However, further investigation showed that what is needed for Popper (or at least his ideas) is a resurrection in the proper sense, such that he and his ideas return in a transformed state.

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Introduction

> To carry out such a task [carrying forward the work of Christ under the lead of the befriending Spirit], the Church has always had the duty of scrutinizing the signs of the times and of interpreting them in the light of the Gospel. Thus, in language intelligible to each generation, she can respond to the perennial questions which men ask about this present life and the life to come, and about the relationship of the one to the other. We must therefore recognize and understand the world in which we live, its explanations, its longings, and its often dramatic characteristics. (*Gaudium et Spes*, §4)

This mandate from the Fathers of the Second Vatican Council carries with it a command to expand Christian understanding to new situations and areas of thought; that is, to produce new statements that effectively impart the Christian message to a previously unaddressed situation. Such statements can be seen as 'new theological knowledge.' *Theological* because they address the relationship between the divine and the situation to which they are directed. *New* in that they are previously unformulated propositions, or, if previously formulated, they are brought to address a new situation. That they can be properly considered *knowledge* is hinted at by the fact that they answer questions (those that are perennially asked) and show relationships (between this life and the next life).

In this thesis I propose to develop an understanding of knowledge that can include such statements of new theological knowledge within the body of knowledge in general. To do this I will engage the work of Sir Karl Raimund Popper (1902-1994) and Imre Lakatos (1922-1974).

0.1. Thesis statement

In the pages that follow I will defend the claim that Popper's philosophy of knowledge modified by a Lakatosian interpretation can enrich our understanding of theological knowledge and how it grows. Specifically, I will describe a Popperian/Lakatosian epistemology and argue that such an epistemology is useful for analyzing the epistemic structure behind recent documents promulgated by John Paul II and the Congregation for the Doctrine of the Faith.

0.2. The scope of this thesis

To support this thesis, I will begin by presenting a systematic development of Popper's ideas in chapter one. His philosophy of science will be presented as a precursor to his epistemology, and this will be followed by a discussion of the relevance of Popper's thought to theology. This will be followed in the second chapter by a presentation of Lakatos' philosophy of science (with a focus on certain aspects that signal advances of Popper's philosophy), the development of a Popperian/Lakatosian epistemology from Popper's alone, and an explanation for how such an epistemology is better able than Popper's to embrace theological knowledge. In chapter three, specific examples and cases will be given for the purpose of demonstrating how a Popperian/Lakatosian view can provide a framework for helping us to comprehend the epistemic underpinnings of the theological understanding of John Paul II and the CDF.

0.3. Justification of this thesis

Beginning with the rejection of Gnosticism in the early church, there has been a continued affirmation by Christians that theological knowledge is not the privileged possession of an elite class of believers. This implies that the content of Christian belief

has a source that is approachable by all Christians. While Christians have acknowledged that mystical experiences of God are had by certain believers, they have affirmed that theological knowledge is communal and capable of being shared by all. If theological knowledge is capable of being shared as other types of knowledge are, then it is not unreasonable to investigate it in the context of how we gain knowledge in general.

What is knowledge? How do we get it? How do we justify it? How does it grow? How can we help the growth of knowledge? These are the questions dealt with in the branch of philosophy called epistemology. In the twentieth century, some promising developments in epistemology came from philosophers who investigated what scientific knowledge is and how it grows. From this starting point, some philosophers have expanded the applicability of their ideas far beyond scientific knowledge. Their work, as I will show in this thesis, is fruitful for relating theological knowledge with knowledge in general.

One of these philosophers was Karl Popper.[1] His first major work, entitled *Logik der Forschung*, was published in 1934. The English translation, *The Logic of Scientific Discovery*, was not published until 1959, but his ideas were already being widely

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[1] Popper considered the designation 'philosophy of science' more of a curse than a blessing. He considered the questions dealt with in the philosophy of science to be questions of philosophy in general, with no need for a different name. Moreover, he thought that separating philosophy of science as a distinct area of philosophical inquiry could do it harm, if it was separated from the central problems that philosophy deals with.

Popper saw philosophy of science as merely a branch of epistemology, and the most important for describing how knowledge grows. As he states in the Preface to the 1959 English Edition of *The Logic of Scientific Discovery* (New York: Basic Books, 1959; paperback edition, New York: Harper Torchbooks, 1968), 15: "The central problem of epistemology has always been and still is the problem of the growth of knowledge. *And the growth of knowledge can be studied best by studying the growth of scientific knowledge*" [italics are in the original].

discussed before then; he had already been teaching at the London School of Economics for many years before it was published.

With his philosophy of science at the center of his thought, Sir Karl applied his ideas to a variety of other areas of inquiry. When he died in 1994 at the age of 92, he had written on political philosophy, the body-mind problem[2], and metaphysics, not to mention epistemology and other topics related to science, such as probability and quantum theory. Popper's *The Open Society and Its Enemies*,[3] a work on political philosophy, continues to influence political philosophers.

Popper, drawing from his philosophy of science, presents a picture of how we gain knowledge in general. Later in his life, Popper adapted the theory of evolution to a number of his ideas, especially his epistemology. The result was a move toward an understanding of the growth of knowledge as a historical process, yet not a deterministic one. This led to a change in his presentation, and he came to see attempts to solve problems, whether they be problems of an organism's survival or problems conceived by the mind, as the quintessential ingredient in the growth of knowledge. In his later life, Popper often expressed the view that "all life is problem solving."[4] For Popper, science and philosophy are refined forms of problem solving; hence, they stand in a privileged position for giving us epistemological insights, particularly in explaining how our knowledge grows.

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[2] Although generally called the mind-body problem, Popper was adamant in calling it the body-mind problem, placing the body first. This was because the body came first, as Popper saw it, and the mind came from an evolutionary development of the body. When making reference to Popper's treatment of it, I will utilize his terminology and refer to it as the body-mind problem.

[3] Fifth edition, revised, 2 vols. (Princeton, NJ: Princeton University Press, 1966) [First edition, 1943].

[4] This is in fact the title of one of his last books of essays, *All Life is Problem Solving* (London, New York: Routledge, 1999); the statement appears in a number of Popper's later essays and books.

Popper's epistemology, which he developed from his philosophy of science, is too rarely discussed in relation to theology. Generally, it is only Popper's philosophy of science that gets attention from theologians, and discussion of it is generally limited to a discussion of the scientific status of theology. Yet Popper's epistemology can provide a starting point for a description of theological knowledge.

Imre Lakatos, who survived in Hungary through World War II and Soviet domination before leaving in 1956 and making his way to England, saw his work in the philosophy of science as an improvement on the work of Popper. Before he died an early death in 1974, Lakatos had written little on the subject of epistemology. Given that Lakatos viewed his philosophy of science as an improvement of Popper's, it is not unreasonable to attempt to expand Popper's epistemology along lines laid down by Lakatos in his philosophy of science to produce a Popperian/Lakatosian epistemology. In this thesis I present an outline of such an epistemology, which, I will argue, not only overcomes certain deficiencies of Popper's epistemology, but has fruitful application in describing theological knowledge and how it grows.

One of the theological areas which the Popperian/Lakatosian epistemology I describe can find application is various recent papal encyclicals and communications from the Congregation for the Doctrine of the Faith (CDF). These are representatives of the Magisterium of the Catholic Church, which has among its teaching roles that of maintaining the soundness of Catholic doctrine.[5] The Magisterium is faced with

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[5] It is important to note from the outset that the understanding of the magisterium of the Church has changed over time. The present-day understanding, in which the Vatican plays a principal role in exercising magisterial functions in the Church, is a development in Catholicism that can be traced to the middle of the nineteenth century. The reference in the subtitle of this thesis to 'Vatican Magisterial Theology' is to the theology expressed by the Pope and CDF in the documents they have recently promulgated.

questions concerning which knowledge claims made by theologians are in keeping with the Catholic faith and which are potentially harmful to it. (The claims that theologians make can be seen as attempts to fulfill the mandate given in the opening passage from *Gaudium et Spes*, that of scrutinizing the signs of the times and interpreting them in the light of the Gospel.) If we consider such claims as potential knowledge, we can interpret the role of the Magisterium as that of maintaining the soundness of the body of Catholic knowledge. In this sense, I will argue, the theology behind the Pope's and the CDF's statements can be analyzed through the lens of Popperian/Lakatosian epistemology. An analysis of recent documents can yield insight into certain issues that face the Catholic Church today. Further, we can examine their statements in a P/L framework to assess the direction that the Vatican seems to be taking to foster the growth of theological knowledge.

Aside from providing insight into theological knowledge, a Popperian/Lakatosian epistemology can help to clarify the relationship between science and theology. Any relationship between science and theology will be forged, at least in part, on the anvil of epistemology. The relationship between science and theology will be a subtext that will be developed throughout this thesis as an aid for understanding how Popper's epistemology and the Popperian/Lakatosian hybrid that I propose can be applied to theology.

Chapter I: Popper and Theology

The goal of this first chapter is to show that Popper's epistemology has application to theological knowledge, but there are certain difficulties in making such an application. The organization of this chapter will follow a somewhat chronological development of Popper's ideas, although there will be places in which it will be necessary to step outside of this chronological arrangement in order to make certain points clear.

In order to present Popper's epistemology, it will be first necessary to explain his philosophy of science, since this is at the heart of his ideas. Aside from helping the reader to understand Popper's epistemology, an understanding of Popper's philosophy of science will allow the reader to appreciate how theology relates to science as conceived by Popper. This will enhance the reader's appreciation for the relation of Popper's epistemology to the growth of theological knowledge.

Certain key elements define Popper's philosophy of science, and I present these here so that the reader can get a taste of what comes in the first section of this chapter. The first is that the progress of science is measured by the production of theories that get "closer to the truth" than their competitors; how Popper makes such an evaluation is given below. While no method can infallibly decide if a theory is closer to the truth than another is, Popper argues that the best method for achieving that goal is methodological falsificationism, which entails the process of conjecture and refutation. Just as there is

no guaranteed method for getting closer to the truth, there is no knowledge which can be guaranteed to be true. Knowledge is conjectural.

From his premise that knowledge is conjectural, Popper will develop his epistemology, a discussion of which comprises the second section of this chapter. The highlight of his epistemology is its evolutionary aspect: our conjectures vie for survival, and those that are most fit for survival will live. In developing his evolutionary epistemology, Popper adopts an historical view of the growth of knowledge. This historical picture leads Popper to generalize his approach as one of problem solving. The central focus for Popper then becomes 'problem situations' in general, and he generalizes his scientific methodological falsificationism to become 'critical rationalism,' which has a more general application to more general problem situations.

Popper's focus on problem situations is helpful for applying his epistemology to theology. Therefore, the applications of Popper's epistemology to theology that are made in the fourth section of this chapter will rely on an analysis of how theology addresses its problem situations. There are some aspects of Popper's epistemology that conflict with a Christian understanding of knowledge; in other respects, Popper's epistemology is not ample enough to deal adequately with theological knowledge. These difficulties will be brought to light in the fifth section of this chapter.

Many of the difficulties presented lead some to the conclusion that theological knowledge is of a different type from the type of knowledge that Popper is dealing with. This state of affairs leaves room for the advances that can be made by a Lakatosian extension of Popper's ideas, which is the topic of the following chapter.

1.1. Popper's philosophy of science

Presenting Popper's philosophy of science will serve two purposes in this chapter. First, it will allow the reader to appreciate the basis upon which Popper developed his epistemology. His earliest work, *The Logic of Scientific Discovery*, served as the platform on which he constructed his other ideas. Second, an understanding of Popper's philosophy of science will provide insight for the reader into how theology relates to Popper's picture of science. This insight will help the reader to better understand how Popper's epistemology, described in later sections, relates to theological knowledge.

1.1.1. Popper's start: induction and demarcation

What sets science apart from other endeavors? What makes a statement scientific or non-scientific? The answers to these questions define the criteria for demarcation of science. An answer to these questions came in the 1920's from a group of philosophers, called logical positivists, who were working in Vienna, Austria. They came to be called the Vienna Circle, and their criterion of demarcation was that a statement is scientific if it can be reduced to basic observation statements.

The aim of the logical positivists was noble enough. Seeing the world immersed in a sea of competing metaphysical systems and swimming with pseudo-scientific theories, with no apparent means of deciding which should be kept and which tossed aside, the Vienna Circle wanted to cut through any metaphysical claims, kill pseudo-science, and provide our knowledge with as sure a foundation as possible. The surest foundation for knowledge, as they conceived it, was intersubjective observation statements. These are statements of the contents of an observation that can be made,

and the contents agreed upon, by anyone (hence, everyone). An example might be "This is a piece of paper," stated while pointing to a piece of paper. Such a statement would contrast with "The Spirit is present here" which expresses an observation that another person might not observe. The Positivists proposed their criterion of demarcation for science: a statement is scientific if it is reducible to basic observation statements. Those statements that were not able to be reduced to observation statements were not only non-scientific for the logical positivists, but meaningless. Such statements could be safely discarded from discussion.

A young Karl Popper, an acquaintance of a few members of the Vienna Circle, was dissatisfied with the criterion of demarcation set forth by the Vienna circle, for a number of reasons. The first reason was that a general scientific statement had to be reducible to a finite number of observation statements. There is no basis in deductive logic for deriving a generalization from a finite number of observations, as David Hume, writing around the middle of the 18th century, had shown.

Hume had accepted that induction lacks a logical basis, but he had remained an empiricist nonetheless. His view, what Popper calls 'psychologism,' is that nature provides us at birth with an innate ability to make connections in our minds based on our observation of the repeated conjunction of two occurrences. (The fact that this ability is demonstrated by infants even before they can reason was one of Hume's argument for defending empiricism, despite the lack of a logical basis for induction.) It is by habit, or custom, that we make such connections in our minds, according to Hume. All we must

do is to allow our minds to make these connections, unencumbered by superstitions.[6] In the event of any conflict of explanation based upon sense data, one could only proportion one's belief according to the evidence. The positivists, in appealing to basic observation statements, accept Hume's 'solution' to the problem of induction.

A second point of contention that separated Popper and the Vienna Circle involved the appeal in theories to unobservable entities or forces. Some highly successful scientific theories are not derivable from observation statements, because they appeal to principles that are not observable in those facts.[7] Such principles would have to be classified as metaphysical, and would have to therefore be eschewed, by the Vienna Circle's standards. As Popper stated, "positivists, in their anxiety to annihilate metaphysics, annihilate natural science along with it. For scientific laws . . . cannot be logically reduced to elementary statements of experience."[8] According to Popper, appeal to explanatory principles has to come from somewhere other than the facts themselves.

Popper's solution to the problem of induction and the problem of demarcation was built on two assertions: (1) Our hypotheses do not come from an inductive process

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[6] Of course, religion was one such superstition. Hume's ideas and his argument against religion are summarized by Nancey Murphy, *Theology in the Age of Scientific Reasoning*, 7, 11-12, 34-39. For Hume's appeal to custom in solving the problem of induction see David Hume, *An Inquiry Concerning Human Understanding*, section V, part 1.

[7] The idea of gravity is just such a concept. Newton initially felt very uncomfortable with the idea of 'action at a distance' that was a pulling action. Cartesian physics allowed only for transfer of energy by 'push' ('pull' was explainable by 'push,' e.g. the links on a chain push against one another) or by 'vortex.' Furthermore, there was no way to observe gravity apart from its action. However, gravity was a metaphysical concept that was remarkably useful as an explanatory device.

[8] *Logic of Scientific Discovery*, 36 (sec. 4). For Popper, it should be pointed out, there was much value in 'metaphysical' concepts beyond their explanatory role in scientific theories. For example, Popper saw the utility in metaphysical statements that helped to resolve philosophical problems. This idea will be developed in section 1.3.1 below.

Note: Many of Popper's essays appear reproduced in other works and his books appear in various editions and printings; therefore, the section of the essay or book in which the quote is found will be given in the footnote text in parenthesis following the page reference.

of repeated observation, but rather they come from our attempts to impose our ideas on the world. (2) We can not justify our hypotheses as true; we can only show them to be false. I will deal with each of these statements individually.

Regarding the first of Popper's assertions, Popper conjectures that it is not a psychological habit of reception, but an active inborn inclination to impose our ideas on the world, that leads us to hypotheses. We invent concepts and hypotheses and try to make the world fit them. Popper would later summarize his development as follows:

> Thus I was led by purely logical considerations to replace the psychological theory of induction by the following view. Without waiting, passively, for repetitions to impress or impose regularities upon us, we actively try to impose regularities upon the world. We try to discover similarities in it, and to interpret it in terms of laws invented by us. Without waiting for premises we jump to conclusions.[9]

The idea that we impose order on the observed world was not original to Popper. Immanuel Kant, responding to Hume's empiricism, had conjectured the same. Kant believed that our minds impose an order on the universe that is derived *a priori* from reason. Unlike Kant, Popper accepted that our conjectures have a source that is not necessarily rational. This move allowed Popper to circumvent the problem of 'metaphysical' principles that are used for explanation from the data themselves. The 'jumping to conclusions' involves our addition of explanatory concepts, which need not be reducible to observation.

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[9] Karl Popper, "Science: Conjectures and Refutations," in *Conjectures and Refutations*, fifth edition (London: Routledge, 1989), 46 (sec. iv).

Recently, scientists have identified an area of the brain which seems to be involved with this inclination to impose patterns on the world. Scientists presented subjects with random sequences of circles and squares. Although the subjects were told beforehand that the sequences were random, blood vessels in certain areas of the brain were dilated during the experiment, indicating to researchers that the brains of the subjects were attempting to find patterns in the sequences. See Charles Choi, "Double or Nothing," *Scientific American* 286, no. 6 (June 2002): 29. Choi is summarizing work that appears in the April 8 *Nature Neuroscience*. It is worth noting that this could serve as empirical support for Popper's theory.

Our invention of explanatory concepts and hypotheses does not occur by means of a rational process. As Popper sees it, neither does justifying hypotheses by using induction. So it seems that Popper has reduced the rationality of science further. Popper points out, however, that the lack of rationality is limited to the production of these ideas. It need not affect their justification, as induction does.

This brings us to the second of Popper's responses to the positivists: we can use logic on a hypothesis, not to justify it as true, but to show that it is false. We can take a hypothesis, deduce observable conclusions from it, and test to see if those conclusions hold up to observation. If the conclusions do not hold, then we can deem the hypothesis false.

This led Popper to propose the following criterion of demarcation for scientific statements: A statement belongs to the empirical sciences if it is falsifiable, that is, if it can be contradicted by experience. Popper indicates that when a scientific hypothesis is proposed, it comes with a set of falsifiers, or observations that the theory rules out from possibility. A theory which is proposed but which does not exclude possible

observations is pseudo-scientific.[10] Observing one of these falsifiers would serve to show the statement is false, by the logical rule *modus tollens*.[11]

We can now see the relationship between Popper's solution to the problem of induction and his line of demarcation for science. Since our hypotheses come from our trying to impose our ideas on the world and not through the process of induction, and attempts to justify our hypotheses by finding supporting evidence only lead us back into the difficulties of induction, we should reject attempts to justify them. We should rather try to show that they are false and come up with other hypotheses to replace them. In other words, since our hypotheses can have no sure foundation, we cannot know if they are true; we can only discover if they are false. And we can only do this if they are falsifiable.

1.1.2. The method of science

The Popperian picture of science described to this point implies a methodology that revolves around obtaining falsifications for hypotheses. Later Popper would generalize this method as the method of conjectures and refutations, or the method of

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[10] An example of a pseudo-science that Popper often proposes is Freudianism, which, like Marxism, was highly popular and highly influential in early-twentieth-century Austria. Popper saw a contrast between Einstein's theories, which could be shown false if certain predicted celestial observations were not borne out, and Freudianism and the theories it spawned, like those of Alfred Adler, which seemed able to explain any psychological phenomenon. To illustrate their lack of falsifiability, Popper gives the example of two men, one who tries to drown a child by pushing the child into water and another that jumps into the water to save it. The very different actions of both men are explainable in Freudian terms and Adlerian terms. Freud can appeal to some repressed desire in each man. Adler can appeal to the will to power to explain both men's behavior. See *Realism and the Aim of Science*, 168-9 (sec. 18).

[11] The rule of *modus tollens* is as follows: If p, then q; not q; therefore, not p. In order to be a valid argument, q must follow logically from p. In the case of science, this means that the predictions must be logically derivable from the hypothesis. The derivation of such predictions is somewhat problematic because there might be background assumptions that are used in making the prediction. Failing to observe a predicted outcome could be due to the effect of these assumptions, not an incorrect hypothesis; this could lead to falsification of a correct hypothesis. Of this there is more in section 1.1.2.1 below.

trial and error; but it is generally called *falsificationism*. This will be the terminology that I use in the main to refer to the methodology.

Who makes the decisions? What is science aiming toward? How does a methodology work toward that aim? These are the questions surrounding a choice of method. Popper's answers to these questions will not only open a window into Popper's epistemology, but will open a door for the reconsideration of the scientific status of theology. In this section, I will present the essentials of Popper's scientific methodology. The focus will be on Popper's advocacy of convention for making basic decisions in science, his rejection of conventional approaches on a broader scale, and his later view that the goal of science is to produce theories that get closer to the truth than their predecessors.

1.1.2.1. Who makes the decisions?

With Popper's falsificationism, just as there is no certain basis for justifying our hypotheses, there is likewise no certain basis for justifying a method for science. Science is like a game, according to Popper, and needs rules to guide it that are based on the goal of the game.[12] One of the most important advances that Popper made with his methodology was his acceptance that methodology needs to be based on actual practice. Gustavo Ortiz sees Popper as the first philosopher in the modern age to appreciate this; he states, "within the empirical-analytical tradition, it is with Popper that

[12] See Popper, *Logic of Scientific Discovery*, 49-56, esp. 53-4 (secs. 9-11, esp. 11).

rationality, as far as it is critical, begins to be based on human activity."[13] The practitioners of science must decide how to apply the rules of science, specifically the rules of logic. Thus, as Ortíz notes, with Popper the idea of proceeding rationally in science changes from conforming to the rules of logic to acting in accordance with procedural rules that are arrived at consensually.[14]

What are some of the methodological decisions that scientists must make with Popper's falsificationist approach? One of the first involves what to count as a falsification. Popper recognized that obtaining an observation that contradicts the prediction of a hypothesis does not automatically spell a falsification. "In point of fact," he writes,

> no conclusive disproof of a theory can ever be produced; for it is always possible to say that the experimental results are not reliable, or that the discrepancies which are asserted to exist between the experimental results and the theory are only apparent and that they will disappear with the advance of our understanding.[15]

For Popper, the point at which such defenses of a theory are no longer to be accepted is a matter of convention. This relates to another methodological decision that Popper foresees: when to reject a theory.

For Popper, regarding a theory as falsified is a separate decision from deciding to reject a theory. A falsified theory can still be useful, and there is no guarantee that there will always be an alternative. An example for Popper would be Newtonian physics, which was falsified by the deviant perihelion of Mercury, before the advent of Einsteinian

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[13] This is my loose translation of Gustavo Ortíz, "Lenguage religioso y racionalidad argumentativa," in *La Nueva Evangelización del Mundo de la Ciencia en América Latina* (Madrid: Iberoamericana, 1995), 293: "Así pues, dentro de la tradición empírico-analítica, es con Popper con quien la racionalidad en cuanto crítica empieza a ser predicada, básicamente, de la acción humana."

[14] Ortíz, "Lenguage religioso y racionalidad argumentativa," 293.

[15] Popper, *Logic of Scientific Discovery*, 50 (sec. 9).

physics. The decision to reject a theory will be made on the basis of deciding the relative merits of two or more competing theories.

1.1.2.2. Popper's justification of his methodology

To justify his methodology, Popper realized that he could not appeal to any certain basis of justification. Such a certain basis he had rejected in his assertion that our conjectures are born of our attempt to assert control over the world. "There is only *one* way, as far as I can see, of arguing rationally in support of my proposals. This is to analyse their logical consequences: to point out their fertility--their power to elucidate the problems of the theory of knowledge."[16] For such an evaluation of fertility, Popper in places appeals to the opinions of elite scientists as demonstrations of the fertility of his ideas.

Part of the fruitfulness that Popper saw in his methodology was the effectiveness of the strategy that it proposes for gaining knowledge. By means of falsificationism, we can more efficiently identify the limitations of theories and come up with replacements that overcome those limitations. It is to the subject of theories that we should now turn.

1.1.2.3. Progress in science: Better theories

"Theories are nets," Popper says in *The Logic of Scientific Discovery*, "cast to catch what we call 'the world': to rationalize, to explain, and to master it. We endeavour to make the mesh ever finer."[17] Initially, the goal of science for Popper was to produce theories that could explain as much as possible, while being as easily testable as

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[16] Popper, *Logic of Scientific Discovery*, 38 (sec. 4).
[17] *The Logic of Scientific Discovery*, 59 (ch. 3 intro.).

possible. Utilizing an evolutionary metaphor, Popper describes how his method leads to a choice in theories:

> We choose the theory which best holds its own in competition with other theories; the one which, by natural selection, proves itself the fittest to survive. This will be the one which not only has hitherto stood up to the severest tests, but the one which is also testable in the most rigorous way.[18]

The methodology of falsification leads to progress in science because it spurs scientists toward producing new, powerful theories, rather than trying to bolster an already existing theory. That is, it aims for making a better net, one with a finer mesh, rather than mending an old net. What are some of the marks of a theory that help us see that it is an improvement on other theories? In a text that he prepared in 1960, Popper identifies three requirements for a new theory. They are (1) The new theory should be engendered by a simple, new and powerful idea that unifies previously unconnected things, (2) the theory should be independently testable, meaning that it should not only explain everything that it is designed to explain but have new (previously untested) consequences that can be tested, and (3) it should pass some new, and severe, tests.[19]

This third criterion is essential for scientists to have a sense of progress in science, according to Popper. This is because the continued production of theories that meet only the first two criteria can eventually come to seem *ad hoc* or merely as instruments for achieving observational or practical goals, without seeming to take a step forward, much like mending an old net. Passing a severe test gives scientists a sense

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[18] *Logic of Scientific Discovery*, 108 (sec. 30).

[19] "Truth, Rationality, and the Growth of Knowledge," in *Conjectures and Refutations*, 240-2 (sec xviii). Elsewhere, in relation to the second requirement, Popper noted that there is a preference for a theory which is more easily testable than for one that is less easily testable.

that the theory marks scientific progress; it gives them the sense that there is a new net with a finer mesh.

1.1.2.4. Unnecessary evils: Conventionalist strategies

It should be stressed here that Popper was not so naïve as to think that falsification is easily applied to a theory. He did not assume that the decision between a basic observation statement and a theoretical one that it contradicts is a simple one. For Popper, falsification does, however, boil down to the decision to accept a basic statement that falsifies a hypothesis.[20]

Popper also realized that the data from an experiment cannot be accepted uncritically. They could also be affected by unnoticed factors. Further, he understood that there is a place for auxiliary hypotheses that harmonize a theory and data that seems to contradict it. Thus, there is a need for some methodological rules for deciding these cases. These rules are necessarily conventional, decided upon by scientists; but for Popper, the goal is always a falsification of an individual hypothesis.

This stands in contrast to the view of W. V. O. Quine.[21] Quine, drawing from the earlier work of Pierre Duhem, argues that hypotheses, like our beliefs, are interrelated; they are like the nodes of a web, with strands connecting to other hypotheses or beliefs. When we test a hypothesis, we are testing an entire body of hypotheses that are interrelated. The predictions derived from a hypothesis rely on other hypotheses, some of which are basic assumptions. In the case of a contradiction between an observation

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[20] See *The Logic of Scientific Discovery*, 104 (sec. 29).

[21] See W. V. O. Quine and J. S. Ullian, *The Web of Belief*, 2nd ed. (New York: Random House, 1978) [1st edition, 1970], and W. V. O. Quine, "Two Dogmas of Empiricism," *Philosophical Review* 60 (1951): 20-43, esp. 38-43.

statement and a prediction from a hypothesis, we cannot be sure which hypotheses are responsible.

Further, Quine argues that when an experiment yields results that go against the expectations engendered by a body of hypotheses, the course of action is not clear. A variety of what Popper calls 'conventionalist stratagems' can be employed. Conventionalism, broadly conceived, is the view that decisions about how to organize our system(s) of knowledge are made by agreement; the conventions that are established are generally designed to maintain the simplicity of a system. Among the conventionalist stratagems that Popper addresses are: adding *ad hoc* hypotheses to account for problematic data, proposing auxiliary hypotheses that harmonize the theory and the apparently contradictory data, modifying definitions of terms so that the data fit the theory, or rejecting the data as unreliable;[22] but this is by no means an exhaustive list. The goal of conventionalists, in utilizing their strategies, is to keep the system of hypotheses and data as simple as possible.

Popper recognized that he could not offer a conclusive refutation of the value of conventionalism, because it is not illogical. His argument against it mirrors his justification of falsificationism: utilizing conventionalist strategies stands in the way of progress in science. The only conventionalist decisions that Popper found useful were agreement on the content of a basic observation statement and the application of auxiliary hypotheses. In the case of a basic observation statement, if there is a disagreement over what the statement really reports, experiments can be devised to help scientists decide on the actual content of the statement. In the case of the addition of auxiliary hypotheses, this is only allowed if the addition of the auxiliary hypotheses

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[22] *The Logic of Scientific Discovery*, (secs. 19 and 20)

adds to the testability of a system of hypotheses; it can not be just a "quick fix" that waters down the content of a system of hypotheses.

1.1.2.5. The ultimate goal of science: getting closer to the truth

In *The Logic of Scientific Discovery*, Popper views the goal of science more in terms described above, making the mesh of our theories finer and being able to catch more of the world. He does make a few comments to the effect that in so doing we are producing theories that are closer to the truth than their predecessors. As a result of Popper's appropriation of Tarski's theory of truth in the 1950's, Popper more overtly claimed getting closer to the truth as the goal of science.[23]

Simply put, Tarski's theory says that a statement is true if the state of affairs it describes holds in the world. "I am sitting in a chair as I type these words" is true if and only if I am sitting in a chair as I type these words. Tarski notes, however, that there is no general criterion for truth, no sure method for deciding if any statement is true. It is on this basis that Popper justifies his falsificationism: we may have no general criterion for the truth, but we have one for falsehood: we can test statements against our observations. We can show a statement is false by making an observation that contradicts it. This is what Popper refers to as the asymmetry between truth and falsity.

Popper describes the 'truth content' of a theory as the size of the set of its consequences which are true, and the 'falsity content' is the size of the set of its consequences which are false. The verisimilitude of a theory is the difference between

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[23] See especially "Truth, Rationality, and the Growth of Scientific Knowledge," in *Conjectures and Refutations*, 215-50, in which Popper makes repeated use of the phrase "closer to the truth." The information in this section, while prevalent in Popper's writings, can also be found in this article.

its truth content and its falsity content. A theory is closer to the truth than another is if its verisimilitude is higher.

As Popper points out, we can not know the magnitude of the truth content or the falsity content of a theory. So how can we judge one theory against another on the basis of verisimilitude? According to Popper, we can only guess; but we can make a good guess based on certain considerations. The first is to look at attempts at falsification of a theory. The more tests that a theory has passed gives us an idea that its truth content is larger and its falsity content smaller than a rival theory that has not passed the same tests. Another consideration is how well one theory explains the content of another. The theory that is closer to the truth will be more likely to explain all of the observations of a rival plus predict some new observations.

Because it is a guess, Popper does not see this method as a foolproof means for guaranteed progress in science. In his later writings, especially, he commented that mistakes can be made. It is possible that a theory with greater verisimilitude could be rejected and replaced by another theory with less verisimilitude.[24] In keeping with his rejection of a certain basis for establishing a methodology, Popper acknowledges that the best we can do is to use the method that leads to the best guesses. Popper sees his falsificationism as that method.

1.1.3. The Proper (scientific) attitude: criticism

Perhaps the most important aspect of Popper's falsificationism is the attitude that it entails. For Popper, we advance in our knowledge "by *criticizing* the theories and

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[24] This could happen for a variety of reasons. An example could be if by chance one of the falsifiers of the more verisimilar theory is observed and none of the falsifiers of the less verisimilar theory are observed.

guesses of others and--if we can train ourselves to do so--by *criticizing* our own theories or guesses."[25] The critical attitude fuels the Popperian epistemological engine.

The early Popper seems to indicate that criticism can come simply as a result of drawing out the conclusions of a hypothesis and testing them. Later, he seems to have shifted to a view in which criticism originates from an alternative hypothesis, as indicated by text he added to a footnote in the English edition of *The Logic of Scientific Discovery* (1959):

> In most cases we have, before falsifying a hypothesis, another one up our sleeves; for the falsifying experiment is usually a *crucial experiment* designed to decide between the two. That is to say, it is suggested by the fact that the two hypotheses differ in some respect; and it makes use of this difference to refute (at least) one of them.[26]

This is an important shift for Popper, because it marks the beginning of his appreciation that criticism derives from the platform of an alternative theory. This will be of importance in dealing with Popper's epistemology, in which criticism likewise plays a significant role. Additionally, it is of importance for the presentation of Lakatos' philosophy of science, because Lakatos appropriates and expands this aspect.

1.1.3.1. A necessary evil: The Dogmatic Attitude

Running counter to the critical attitude is the dogmatic attitude. This is the attitude which leads us to stick to the generalizations that we impose upon the world. It is a natural outgrowth of what leads us to make conjectures in the first place. It therefore

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[25] Popper, "Sources of Knowledge and Ignorance," in *Conjectures and Refutations*, 26. [italics are his]. An earlier, and less well-executed attempt of Popper's to explain this point can be found in *The Logic of Scientific Discovery*, 97-100 (sec. 27).

[26] *Logic of Scientific Discovery*, 87, n. 1 (sec. 22).

has its place in science: "This dogmatism is to some extent necessary. It is demanded by a situation which can only be dealt with by forcing our conjectures upon the world."[27] But unchecked by the critical attitude, the dogmatic attitude can stand in the way of the growth of knowledge. It can lead to a situation in which "we expect regularities everywhere and attempt to find them even where there are none . . . and we stick to our expectations even when they are inadequate and we ought to accept defeat."

Popper borrows from the world of psychology to point out that the dogmatic attitude is akin to a neurosis. However, it can lead to the growth of knowledge because it "allows us to approach a good theory in stages, by way of approximations: if we accept defeat too easily, we may prevent ourselves from finding that we were very nearly right."

Popper does not give an indication how to resolve methodologically when we ought to accept defeat and when doing so is premature and prevents us from finding a good theory. This will be important when we discuss Lakatos, who does incorporate this into his methodology.

1.1.3.2. In Failure is Success

Despite the seemingly dismal prospect of refutation that every theory must suffer, Popper, in his ever-optimistic manner, emphasized the positive role of refutation in his philosophy: Even though a refutation seems to be a mark of failure for a scientist or that scientist's theory, Popper says,

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[27] This and the following two quotations, "Science: Conjectures and Refutations," in *Conjectures and Refutations*, 49 (sec vi).

> Every refutation should be regarded as a great success . . .
>
> Even if a new theory . . . should meet an early death, it should not be forgotten; rather its beauty should be remembered, and history should record our gratitude to it--for bequeathing to us new and perhaps still unexplained experimental facts and, with them, new problems; and for the services it has thus rendered to the progress of science during its successful but short life.[28]

1.2. Popper's Epistemology

The reader will recall that, for Popper, we do not come upon scientific hypotheses except by jumping to conclusions and attempting to impose our ideas on the world. It is our attempts to mold the world to our expectations that warrant the application of methodological falsificationism. In developing his epistemology, Popper begins with these attempts to impose our ideas on the world, which he generally refers to as conjectures. These conjectures, even those which are so fundamental that they are seldom if ever spoken, lead to expectations of what we experience. Popper equates our knowledge with our expectations and our conjectures about how the world around us works. Thus, knowledge is conjectural, according to Popper.

In this section, I will describe Popper's epistemology, beginning with his claim that knowledge is conjectural, and leading up to his view of how knowledge grows over time. A brief outline of important ideas is given here to orient the reader: If knowledge is conjectural, then it can be mistaken;[29] acceptance of this signals an advance of Popper's epistemology. Further, since knowledge is conjectural, it should be subject to criticism, just as hypotheses in science are. In this way, our mistaken conjectures are more likely

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[28] 'Truth, Rationality, and the Growth of Scientific Knowledge", in *Conjectures and Refutations*, 243 (sec. xix).

[29] The statement that knowledge can be mistaken might sound wrong, but in the following subsection (1.2.1), I will explain how Popper uses this language. The reader is invited here to keep in mind that part of what Popper is doing in his epistemology is to redefine what knowledge means.

to be rejected, and what remains will be closer to representing reality than what came before.

The reader has no doubt already detected that Popper's epistemology differs little from his philosophy of science, so much of what is presented in the first parts of this section will be a review of Popper's thoughts on science, except that here they will be applied to knowledge in general. One area of development came in the 1950's, when Popper began to adapt evolutionary theory to his ideas. One result of this is his evolutionary epistemology. Briefly put, this is the view that knowledge grows by means of a competition between conjectures in which the fittest survive. His development of an evolutionary epistemology occasioned an increase of historical sensibility in Popper that came to overshadow his work.

1.2.1. The Bucket and the Searchlight

Popper's claim that knowledge is conjectural stands in contrast to the inductivist view of knowledge, which was briefly introduced in the discussion of Hume in section 1.1.1. The inductivist picture portrays humans as passive receivers who receive sensory input and, by habit or custom, make connections among the elements of this sensory input. A person's mind is filled by sense-data and the connections it has made from that sense data, and this is what constitutes that person's knowledge. In order to illustrate the difference between his view of conjectural knowledge and the inductivist view, Popper used the metaphor of the 'bucket and the searchlight.'

Popper began calling the inductivist view the 'bucket theory' of knowledge in the late 1940's.[30] In a number of later lectures and essays, he would illustrate it using a sketch of a bucket with eyes, a nose, a mouth, and ears on it to symbolize the senses. (He often noted that the sense of touch was missing from the diagram, but didn't feel that this took too much away from the analogy). By opening our senses, data flows into our bucket and this is how we gain knowledge.

Popper has a number of criticisms of this view. The first involves the depiction of humans as passive receivers. Speaking to what happens in scientific investigation, Popper notes that "it is *observation* rather than perception which plays the decisive part. But observation is a process in which we play an intensely *active* part. An observation is a perception, but one which is planned and prepared."[31] Popper notes often that we *make* observations. To put his point across more forcefully, Popper sometimes asks his audience to take a moment to observe and record what they observe. He then points out that this request is absurd, since the natural question is *what* to observe.[32] As Popper puts it: "Observation is always selective. It needs a chosen object, a definite task, an interest, a point of view, a problem."[33]

A second criticism that Popper has of the bucket theory of knowledge is that our knowledge is *anticipatory* in nature. It is such that we *expect* things to be a certain way. We seek to assert our knowledge in the world. This active aspect of knowledge goes against the view that our knowledge consists merely of what we have experienced in the

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[30] One of his earliest expositions on this topic was in a 1948 lecture entitled "Naturgesetze und theoretische Systeme", which appears in English as 'The Bucket and the Searchlight: Two Theories of Knowledge," in *Objective Knowledge: An Evolutionary Approach* (Oxford: The Clarendon Press, 1972), 341-61.

[31] "The Bucket and the Searchlight," 342 (sec. ii).

[32] This first appears in *The Logic of Scientific Discovery*, 106 (sec. 30).

[33] "Science: Conjectures and Refutations," 46 (sec. v).

past. This anticipatory aspect of knowledge leads Popper to consider knowledge as our conjectures, our hypotheses, or our expectations. He uses these terms interchangeably.

In contrast to the bucket theory, Popper developed the 'searchlight theory' of knowledge. According to the searchlight theory, our conjectures direct our attention, like a searchlight, to certain expectations and lead us to make specific observations. This occurs amidst a 'horizon of expectations,' the set of all the things we might expect from the conjectures that we use to interact with the world.

When doing science, we are directing our attention toward one section of that horizon, and consciously observing to see if our expectation is met. This method can be extended beyond science. In general, we can test our expectations (our knowledge) against experience.

Popper illustrates the growth of knowledge using the horizon of expectations as a metaphor. If an observation goes against our expectation, Popper describes this as a bombshell being dropped on that section of the horizon. There is then a need to rebuild the horizon of expectations. This comes in the form of a new conjecture, one that accounts for the expectations of the previous one (the one destroyed by the metaphorical bombshell) while extending the horizon of expectation with more predictions (expectations). The result is a more evolved stage in the horizon of expectation, "a stage in which those expectations which have not been hit by the bomb are somehow incorporated into the horizon, while those parts of the horizon which have suffered damage are repaired and rebuilt."[34]

According to the searchlight theory of knowledge, knowledge begins not with the outside world, but with expectations. In this respect it is 'genetically a priori in its content'

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[34] "The Bucket and the Searchlight," 345 (sec. iv).

according to Popper. However, the growth of knowledge depends on an a posteriori clash with reality. Popper explains it thus:

> All knowledge is hypothetical or conjectural: it is *our* hypothesis. Only the *elimination* of hypotheses is a posteriori, the clash between hypotheses and reality. In this alone consists the empirical component of our knowledge. And it is enough to enable us to learn from experience; enough for us to be empiricists.[35]

He continues, demonstrating how we can gain new knowledge:

> We learn *only* through trial and error. Our trials, however, are *always* our hypotheses. They stem from us, not from the external world. *All* we learn from the external world is that some of our efforts are mistaken.

It can be mentioned here that Popper includes behaviors in what constitutes knowledge; behaviors are trials that can be 'falsified' empirically by not succeeding in bringing about an advantageous outcome. It should also be pointed out that Popper recognizes that most of human knowledge (again, one can include behaviors) is not derived from people developing novel conjectures and testing them. Below, in section 1.2.4, I will explain Popper's view that many of our hypotheses we appropriate from tradition.

An important point, one alluded to in the introduction to this section, should be emphasized here. If our knowledge is conjectural, then it can be mistaken. From Popper's perspective, this state of affairs cannot be helped, except by our trying to refute our conjectures and replace them with ones that better capture the world. Conjectures and refutations, trial and error--this is how our knowledge grows.

Popper compares his approach to knowledge to the foundationalist approach, which is the idea that we can have a certain basis for our knowledge. He describes our knowledge as an edifice above a swamp, supported by pylons which we ourselves have

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[35] Popper, *All Life is Problem Solving*, 47 [italics are in the original].

driven. Some may hold for a while, but they are susceptible to shifting or sinking. We must then drive a longer pylon into the swamp.[36] We never, though, reach bedrock beneath the swamp. Popper's willingness to dispense with a foundationalist basis for knowledge signified a significant step forward in philosophy.[37]

1.2.2. Objective Knowledge: Knowledge without a knowing subject

The depiction of knowledge given so far has focused on the knowledge of an individual person. Such knowledge is subjective knowledge, the type of knowledge that corresponds to mental states, to what someone is thinking. This, however, is not the type of knowledge that is most important in an epistemology, according to Popper. It is a mistake of many epistemologies, says Popper, that they concentrate on subjective knowledge. Rather, it is the product of subjective knowledge, objective knowledge, that is of greatest consequence for an epistemology. Objective knowledge is what Popper calls "knowledge without a knowing subject."[38] It is knowledge that has been somehow made public and shared; examples of objective knowledge that Popper gives are the statement of a theory or an argument over a theory in a journal, or the publication of data

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[36] Cf. *The Logic of Scientific Discovery*, 111 (sec 30, last paragraph). Elsewhere, Popper points out that the idea of asking for a certain basis for our knowledge is asking the wrong question. Just as the question which motivated political philosophy for centuries--who should rule?--is the wrong question because it presupposes an authoritarian framework, so the question 'How can we achieve a certain basis for our knowledge?' is the wrong question because it presupposes just such a basis. Just as the political question should be changed to "How can we organize our political institutions so that bad or incompetent rulers cannot do too much damage?" so the question about the sources of our knowledge should be replaced by the question of how to proceed rationally without a certain basis for our knowledge: "How can we hope to detect and eliminate error?" See "Sources of Knowledge and Ignorance," in *Conjectures and Refutations*, 25 (sec. xiv).

[37] In this respect, Popper is a postmodernist. However, he is very much a rationalist. He was not enamored of the 'post-critical' or 'post-rational' movements that were coming to the fore in philosophy and other fields during the middle of the twentieth century and after. He most deplored the appeal to authority that was coming back into philosophy.

[38] The material for this section is drawn from "Epistemology Without a Knowing Subject," in *Objective Knowledge*, 106-152, esp. 106-122.

in a book in a library. The important point to be understood, Popper explains, is that such knowledge remains knowledge, even if there is no one thinking it at a given time.

In order to explain himself, Popper offers one of his bolder conjectures (and one which provoked a significant amount of criticism): his model of three worlds. World One consists of the actual physical world; World Two consists of subjective knowledge; and World Three consists of objective knowledge. The key inhabitants of this third world of objective knowledge are problems, conjectures, arguments, aims and standards. As Popper sees it, World Three is partly autonomous from World Two. Popper argues for the autonomy of World Three by noting that some objective knowledge exists as a consequence of other objective knowledge, it is just waiting to be discovered. Popper gives the example of the infinitude of the prime numbers. Once the concept of prime numbers was introduced into World Three, with it came the fact that there are infinitely many prime numbers. It was some time after the discovery of prime numbers, however, that Euclid discovered and demonstrated the infinitude of primes. Popper thus likens discovery in World Three to geographical discoveries of the Earth (in World One). A mountain may exist, but until someone discovers it, it is unknown. Likewise, in World Three there are the consequences of our conjectures, just waiting to be discovered.

Part of the reason that World Three, the world of objective knowledge, is of great importance to Popper is his view that we can learn more about subjective knowledge in World Two by analyzing its products (objective knowledge) than we can by trying to analyze the thought processes that go along with knowing. Examining the elements and processes involved in an argument surrounding a theory, Popper argues, can tell us more about World Two than attempting to examine the psychological states of those involved in the argument. For example, merely analyzing the psychology that coincides

with development of a theory can tell us very little about how that theory is justified; further, it is by studying how a theory is justified that we can best understand what the growth of knowledge consists of.

In the previous section, I pointed out that behavior is included in knowledge for Popper. Given this view of behavior, Popper proposed that human behavior and objective knowledge regulate each other through a system of 'plastic controls.'[39] A behavior can be rejected if it conflicts with accepted objective knowledge. An example might be abandoning rain-dance behavior in light of objective knowledge about the cause of rain. Likewise, the introduction of a new behavior as a trial solution to a problem can affect the content of our objective knowledge. An example might be the recent discovery that putting duct tape on warts is as effective for killing them as, if not more effective than, putting liquid nitrogen on them. This knowledge would not have been gained had not people tried it, claimed that it worked, and prompted researchers to investigate further. Such a system of plastic controls, as Popper presents it, is based on criticism and error-elimination.

Above I explained that knowledge can be mistaken, as Popper speaks of knowledge. Objective knowledge is no exception for him. World Three, as Popper conceives of it, contains some false hypotheses and incorrect data. Here Popper sees the value of testing our conjectures as thoroughly as possible, in the hopes of adding to World Three knowledge that a certain hypothesis or set of data is mistaken.

Objective knowledge can influence our subjective knowledge. This is one of the major points that Popper addresses in his later essays and lectures. We choose to accept a large number of conjectures as our subjective knowledge which have their

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[39] This idea is at the center of "Of Clouds and Clocks," in *Objective Knowledge*, 206-255.

origins as objective knowledge. It is for this reason that Popper exhorts us to adopt the critical attitude, to 'clean up' the objective knowledge that might have an impact upon us and others.[40]

1.2.3. The primary source of knowledge: tradition

"There are all kinds of sources of our knowledge; *but none has authority*."[41] This sums up Popper's view of the sources of human knowledge. Of these many non-authoritative sources of knowledge, though, tradition is the most important. Traditional knowledge can be viewed simply as the set of conjectures or expectations which are passed from generation to generation. (Recall that our knowledge is conjectural and based on expectations.) The majority of these expectations are likely to not have been examined critically, as Popper sees it, because they form such a basic part of our way of viewing things.

Popper delivered a lecture in 1949 entitled "Towards a Rational Theory of Tradition"[42] to the Rationalist Press Association. In this lecture, he discusses the proper attitude one should have towards tradition. Popper rejects the extreme rationalist concept of rejecting tradition wholesale (noting that such an attitude itself constitutes a tradition). He also advocates a critical attitude towards tradition. This critical attitude does not entail a complete freedom from tradition--"I do not think that we could ever free ourselves entirely from the bonds of tradition. The so-called freeing is really only a

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[40] It is worth noting that Popper argues against determinism and for human freedom using this picture of plastic controls that humans and their objective knowledge exert on each other. As Popper sees it, these plastic controls leave space in which human freedom can exert itself. It can also be mentioned here that, as Popper sees it, the most basic ingredient for the progress of knowledge is the critical (rationalist) attitude. It is in this sense that one can understand Popper's basic message as an exhortation to adopt this critical attitude. To this end, he exerted his human freedom to make sure that it is part of the objective knowledge that influences us.

[41] "Sources of Knowledge and of Ignorance," in *CJ*, 24 (sec. xiv).

[42] In *Conjectures and Refutations*, 120-135; first published in *The Rationalist Annual* (1949).

change from one tradition to another."[43]--but a freeing from the taboos of a tradition in order to consider it critically. This freeing from taboo comes from stepping back as far as possible from the tradition, identifying those conjectures of the tradition which can be identified, and asking if these conjectures should be kept or rejected.

Science is a tradition like any other except that it maintains a second-order tradition which asks for criticism of the first-order tradition. Popper explains that this first started in Ancient Greece, where the philosophers began to critically discuss their religious myths. They then proposed a new tradition. This new tradition included not only their new myths but also the attitude of criticism toward the myths themselves. This is what makes all the difference for science:

> We shall understand that, in a certain sense, science is myth-making just as religion is. You will say: 'But the scientific myths are so very different from the religious myths.' Certainly they are different. But why are they different? Because if one adopts this critical attitude then one's myths do become different. They change; and they change in the direction of giving a better and better account of the world--of the various things which we can observe. And they also challenge us to observe things which we would never have observed without these theories or myths.[44]

But beyond the tradition of science, Popper is directing his words to any tradition. If that tradition wants to adapt its conjectures and expectations to better match what really goes on in the world, then it must adopt the critical attitude. Popper does not delve too much into the question of where the limitations of criticism lie which are given by the tradition itself.

Popper further discusses the reasons behind an uncritical adoption of tradition, seeing it as an attempt to establish order in one's world, akin to the dogmatic attitude.[45]

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[43] Popper, "Towards a Rational Theory of Tradition," 122.
[44] "Towards a Rational Theory of Tradition," 127.
[45] "Towards a Rational Theory of Tradition," 132.

Elsewhere in this article, in defense of the value of the critical attitude, Popper argues that more knowledge is gained from a scientific revolution than from that which is accumulated in the absence of a revolution. This is because the revolution entails critical discussion about fundamental questions. The accumulation of data in the absence of a revolution is simply the addition of what is deduced from a theory.

1.2.4. Evolutionary Epistemology

As was mentioned in the introduction, Popper came to see in evolutionary theory a useful means for explaining many of the elements of his thought, primarily his epistemology. The evolutionary epistemology that Popper developed signifies a turn for Popper towards a historical view of the growth of knowledge. Further, it gives him a model with which to connect various elements of his philosophy. More of the relevance of this historical turn will be dealt with in the following sections. In this section, I will merely describe Popper's evolutionary epistemology.

The seeds of an evolutionary epistemology can be found in *The Logic of Scientific Discovery*. In various passages Popper utilizes the evolutionary language of survival of the fittest theory to describe how falsification leads to progress in science (see section 1.1.2.3. above). Over time, he adapted the theory of evolution to his ideas and unified them in his epistemology:

> The growth of our knowledge is the result of a process closely resembling what Darwin called 'natural selection'; that is, *the natural selection of hypotheses:* our knowledge consists, at every moment, of those hypotheses which have shown their (comparative) fitness by surviving so far in their struggle for existence; a competitive struggle which eliminates those hypotheses which are unfit.[46]

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[46] Popper, "Evolution and the Tree of Knowledge," in *Objective Knowledge*, 261 (sec. 1).

Peter Munz gives a concise summary of the central points of evolutionary epistemology:

> [It] seeks to explain that the knowledge we have is, even when it is highly abstract knowledge, part of or an extension of the adaptive evolutionary process which began many million years ago when living cells first emerged. This process began and has continued through random mutations and selective retentions of some mutations. These adaptations never 'represent' the environment; and selections are not justified but only tolerated by the environment.[47]

Munz depicts conjectures as akin to mutations, which helps us to appreciate that their genesis is not rational; they can just appear. The selective retention of mutations corresponds to the retention of knowledge that is passed through tradition. Popper more often than not seems to view conjectures as akin to organisms, or species. This gives a slightly different view of evolutionary epistemology. Munz's focus on mutations helps to distinguish between the organism and the mutation. His focus on conjectures as mutations, in fact, is more in accord with the Lakatosian version of Popper's epistemology that I will construct in the following chapter, in which the view of a mutation as a conjecture and an organism as a body of conjectures helps to overcome a number of difficulties of Popper's epistemology.

1.3. Problem solving in general

As was noted in the introduction, for Popper all life is problem solving. Taking an evolutionary outlook of life in general, and not just that of hypotheses, Popper depicts the engine for the growth of knowledge to be a confrontation with problems:

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[47] *Our Knowledge of the Growth of Knowledge: Popper or Wittgenstein?* (London: Routledge and Kegan Paul, 1985), 6.

> From the amoeba to Einstein, the growth of knowledge is always the same: we try to solve our problems, and to obtain, by a process of elimination, something approaching adequacy in our tentative solutions.[48]

The process of elimination is largely under our control. Popper points out that in some cases a trial solution can lead to the death of the organism that follows it. This can apply to humans. Popper gives the example of a tribe that, when confronted with the problem of what forms of life are sacred and should be protected, deemed all animal life to be sacred, including tigers. Such a solution was corrected by the elimination of the tribe (by being eaten by tigers).

Behavior, as it is an attempt to solve an actual problem in World One, can be seen as a conjecture. Further, the justification of such knowledge is rooted in its ability to solve the problem.[49] Popper can highlight a distinction between human conceptual forms of knowledge and behavioral knowledge, and he uses the amoeba and Einstein to illustrate the difference. The difference between the amoeba and Einstein (between behavioral knowledge and conceptual knowledge), is that the amoeba cannot consider its conjectures and take a critical stance toward them before acting on them. The amoeba's conjectures are its behaviors, and natural selection operates directly to eliminate an amoeba that follows a mistaken hypothesis. Einstein, on the other hand, can consider his conjectures and criticize them; he can discard conjectures that are immediately harmful without coming to harm himself.[50] This is the advantage of rationality for Popper: our theories can die in our stead.

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[48] Popper, "Evolution and the Tree of Knowledge," in *Objective Knowledge*, 261 (sec. 1).

[49] See "Of Clouds and Clocks," in *Objective Knowledge*, 242-5 (secs. xviii and xix), in which Popper outlines his evolutionary theory of knowledge in twelve points. The concept that behavior (animal or human) is a trial solution to a problem situation appears in the earlier points.

[50] "Of Clouds and Clocks," 246-8.

Critical discussion, or simply criticism, is the heart of the elimination process in Popper's epistemology. This leads him to redefine the problem solving process, yielding a circular process which he would sum up in three words: problems--theories--criticism. This means:

> (1) We stumble over some problem.
> (2) We try to solve it, for example by proposing some theory.
> (3) We learn from our mistakes, especially from those brought home to us by the critical discussion of our tentative solutions--a discussion which tends to lead to *new problems*.[51]

Of importance in this formulation is the introduction of a new problem as a result of an attempted solution, whether it succeeds in solving the problem or not. Of course, there can be a variety of tentative solutions. In such a case, it is through critical discussion that a decision can be made regarding which trial solutions are the best; this in turn determines which new problems should be addressed.

Popper's focus on problem situations and problem solving is a means of expanding his philosophy of science to more general applications. Science is a special case of problem solving in which empirical tests can be made to test the value of a trial solution to a problem (a hypothesis). Other situations, in which a trial solution is not an empirically testable theory, are tested by critical evaluation.

1.3.1. Problem solving as a key to understanding

A focus on problem solving is not only beneficial as an explanation of the growth of knowledge; it also has value for Popper in providing explanations in non-scientific endeavors, especially history. Popper demonstrates the usefulness of examining the history of philosophy using an approach that looks at the problem situation that

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[51] "Science: Problems, Aims, Responsibilities," in *The Myth of the Framework* (London and New York: Routledge, 1994), 101 (sec. x).

confronted a philosopher. In "The Nature of Philosophical Problems and their Roots in Science,"[52] Popper uses this approach to explain aspects of Plato's and Kant's philosophy.[53] In the study of the history of science, not knowing the problem situations surrounding a development leads to misunderstanding that development, says Popper. Likewise, approaching a problem situation without understanding something of the history of the problem (or the history of problem situations in general), can lead to wasted effort.[54]

This leads to a reconsideration of 'metaphysical,' or philosophical speculation, which means for Popper speculation on topics that are not empirically testable. This lack of testable predictions does not render such theories valueless, something that Popper came to appreciate more and more as he expanded the applicability of his philosophy. Insofar as they are philosophical and help to solve a problem, metaphysical ideas have value, but they may also achieve a form that makes them empirically testable at some point. Democritus' atomic theory is one example that Popper gives. This theory was presented to respond to Parmenides, and it was not empirically testable when it was proposed. Later, however, it was expressed in a manner which made it testable.[55]

In his view, philosophical problems are not just a matter of linguistic confusion. Where he sees validity in the criticisms of philosophy by linguistic philosophers is with respect to 'pure' philosophical problems. For Popper, these are merely discussions on topics that have been detached from their original problem situation. Debate on them is

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[52] In *Conjectures and Refutations*, 66-96.

[53] For example, Popper sees Plato confronting the proof that the square root of 2 is irrational, which leads him to abandon the natural numbers for geometry as the more basic science.

[54] See "On the Theory of the Objective Mind" in *Objective Knowledge*, 153-90.

[55] See "The Nature of Philosophical Problems and their Roots in Science," in *Conjectures and Refutations*, 79-83 (sec. vi).

indeed, agrees Popper, of little or no value. The value of philosophy is to deal with problems that arise in specific situations.[56]

Related to this is Popper's attitude toward unfalsifiable theories. Although a theory may be unfalsifiable, it is not valueless. Indeed, Popper points out that some unfalsifiable hypotheses are more useful than others. The unfalsifiability of Berkeleyan idealism or physical realism are examples. While both are unfalsifiable, Popper points out that physical realism does much more to help us resolve our problems than does idealism. It is by means of critical discussion that such conclusions can be drawn.

As was noted above, while Popper might have generalized his conception of the method, he maintained his criterion of demarcation for the sciences, that of being falsifiable by experience. Of course, some statements lend themselves more easily to testing than others. Thus, we can understand that some trial solutions to our problems have consequences that are testable by observation; such trial solutions belong to the empirical sciences. Other trial solutions are for problems that involve our entire set of beliefs (expectations, in Popperian terms) and which can be judged by how well they solve our problems; such trial solutions belong to metaphysics or philosophy. Yet other trial solutions have consequences that can be checked against historical records, or judged by how well they account for our understanding of ourselves; such trial solutions belong to the softer, human sciences.

1.3.2. Theology as a problem-solving endeavor

Although Popper reframed certain aspects of his philosophy of science later, he maintained his criterion of demarcation for the sciences throughout his life.[57] His strict

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[56] "The Nature of Philosophical Problems and their Roots in Science," 71-75 (sec. iii).

line of demarcation bears on the classification of theology as an empirical science. The body of theological statements contains many for which it would be difficult to devise a set of predictions that can be empirically tested. Such a statements as "Jesus died for our sins" or "God is love" are such statements. Theological claims that lend themselves to testing tend to be specific, such as miracle claims, but such statements do not address phenomena that are repeatable. Further, the logical relationships between specific theological statements and general ones like "God is love" are not easy to delineate. These traits of the body of theological conjectures, seen from a Popperian viewpoint, militate against its being treated as an empirical science.[58]

It has already been explained that Popper used the process of problem solving as a generalization of his falsificationism. Given some of the difficulties that might be derived from treating theology as an empirical science, it makes sense to utilize Popper's general philosophy of problem solving in order to approach theology. Thus, from a Popperian viewpoint, it would make more sense to treat theology more like philosophy, which Popper evaluates according to how it helps to address problem situations. This does not mean that theology cannot add objective knowledge; it only means that the knowledge that it adds is judged on how it helps to approach a problem situation.

Such a conception of theology seems plausible if we consider the actual practice of criticism in theology. A glance through theological journals will demonstrate that the

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[57] For example, writing in 1972, Popper says flatly: "A theory is part of empirical science if and only if it conflicts with possible experiences and is therefore in principle falsifiable by experience." See Popper, *All Life is Problem Solving*, 16.

[58] There is the possibility, emphasized in the work of John Hick, that certain theological propositions are empirical because they are verifiable (or falsifiable) after death. Dealing with such a conception of the falsifiability of theological statements, while noteworthy here, does not fall within the scope of this thesis. Aside from the observation that an epistemology of the afterlife might be radically different from those of this life, this author notes that the falsifiability in question is not one that can be tested and the results reproduced and shared (easily, anyway) among disinterested observers.

criticism that is generally leveled against theological conjectures is predicated on how that conjecture helps to solve, or not solve, a given set of problems. Thus, Popper's generalized problem-centered approach to epistemology promises to be more fruitful in understanding theology than his scientific falsificationism.

There are, however, some difficulties with Popper's epistemology by itself, and others that stand in the way of its application to theology. In the next section, I will detail some of the difficulties that plague Popper's epistemology in general. In section 1.5, I will demonstrate how certain elements of Popper's epistemology clash with a specific theological program, the theology expressed by the Vatican.

1.4. Problems with Popper's epistemology

One source of difficulties in Popper's epistemology is derived from his conjecture of the three worlds, especially his World Three of objective knowledge. A variety of criticisms have been directed towards this conjecture[59] and his philosophy in general,[60] but for the purposes of this thesis, I will present two of the more problematic aspects of Popper's philosophy. These aspects, as will be shown in the next chapter, are areas that Lakatos' philosophy overcomes.

The first difficulty with Popper's epistemology is what Jeremy Naydler calls "The Poverty of Popperism."[61] This poverty is predicated on Popper's neglect of the faculties of insight that might aid in the development of conjectures. Recall that in his

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[59] L. Jonathan Cohen, "Third World Epistemology," in *Popper and the Human Sciences*, ed. Gregory Currie and Alan Musgrave (Dordrecht, Boston, Lancaster: Martinus Nijhoff, 1985), 1-12, gives a brief summary of the main difficulties surrounding Popper's conjecture of World Three.

[60] The reader is directed to Paul A. Schilpp, ed. *The Philosophy of Karl Popper*, 2 vols., (La Salle, IL: Open Court, 1974), which contains essays on a number of aspects of Popper's philosophy from a wide spectrum of scholars.

[61] Jeremy Naydler, "The Poverty of Popperism," *The Thomist* 46, no. 1 (January 1982): 92-107.

evolutionary epistemology, Popper views new conjectures as mutations, without a rational source. What is relevant for Popper is the environment's response to the mutation. If it is 'selectively retained,' to use Munz's terminology (from section 1.2.4), then it signals progress, but it does not 'represent' the environment. Naydler uses terms drawn from medieval philosophy, *ratio* and *intellectus*, to illustrate the poverty of Popper's epistemology. Naydler's criticism is that Popper's entire concern is with *ratio*, the argument that occurs after a conjecture is introduced, and not at all with *intellectus*, the mechanism by which we come to those conjectures. Part of *intellectus* is the cultivation of insight, according to Naydler, and Popper's neglect of insight impoverishes his epistemology.

In order to illustrate this, I invoke the example of chess. A player whose turn it is to play is confronted with a formidable number of possible moves. The accounts given by master chess players indicate that they do not consider the many bad moves that are possible, because they do not even see them. They do not only employ their faculty of reason to find the best move among the many possible moves, they incorporate their acquired insight to filter out a good number of bad moves before using their reason.

The result of discarding the faculty of insight from consideration leads us straight back into the Platonic cave, according to Naydler. Here we know only that we do not know. In order to make his point, Naydler utilizes Popper's metaphor of our pursuit of the truth as trying to reach the summit of a mountain shrouded in mist. When we reach a high point, we do not know if it is the summit, or just a subsidiary peak. Naydler asks,

"For if we can never know that we know, then what is the use of our scurrying up the mountainside of knowledge?"[62]

This criticism can be overcome in part by recalling that Popper saw that attempts at addressing a problem situation are enhanced by an understanding of the history of the problem or of problem situations in general. Such an understanding could aid insight into what might be profitable routes to take. Such a view, however, implies that a person who studies the issues surrounding a problem situation might gain expertise in that problem situation. This, in turn, would imply that the opinions of certain people are to be valued more than others; that is, they might be considered authoritative. This leads to the second difficulty with Popper's epistemology: his rejection of authority.

Popper's critical rationalist epistemology is built around a rejection of the idea that the authority of experts constitutes a more valid source of knowledge than any other. This can be seen to be behind Popper's view of tradition, in which tradition should be questioned by anybody and everybody.

Popper's rejection of authority seems to rely on his view that critical rationalism is the best means for not only fostering the growth of our knowledge, but maintaining the order of our knowledge. This amounts to a faith in critical rationalism on the part of Popper. He states as much in *The Open Society:*

> We have to conclude . . . that no rational argument will have a rational effect on a man who does not want to adopt a rational attitude. Thus a comprehensive rationalism is untenable.
>
> But this means that whoever adopts the rationalist attitude does so because he has adopted, consciously or unconsciously, some proposal, or decision, or belief, or behaviour; an adoption which may be called 'irrational'. Whether this adoption is tentative or leads to a settled habit, we may describe it as an irrational *faith in reason*.[63]

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[62] "The Poverty of Popperism," 106.

[63] *The Open Society* 2:231 (ch. 24, sec. ii) [Italics are in the original].

Alan Ryan argues that Popper's faith in this sense is rooted in his liberalism. In other words, Popper's faith is in an 'Open Society', and his critical rationalism is rooted in his faith in such a society.[64] Such a view is partially borne out by Popper's analysis of the choice between rationality and irrationality, which he describes as, "in many senses, the most fundamental decision in the ethical field"[65]:

> For the question whether we adopt some more or less radical form of irrationalism, or whether we adopt that minimum concession to irrationalism which I have termed 'critical rationalism', will deeply affect our whole attitude towards other men, and towards the problems of social life. It has already been said that rationalism is closely connected with the belief in the unity of mankind. Irrationalism, which is not bound by any rules of consistency, may be combined with any kind of belief, including a belief in the brotherhood of man; but the fact that it may easily be combined with a very different belief, and especially the fact that it lends itself easily to the support of a romantic belief in the existence of an elect body, in the division of men into leaders and led, into natural masters and natural slaves, shows clearly that a moral decision is involved in the choice between it and a critical rationalism.[66]

Popper, while accepting that the choice for critical rationalism is not entirely rational, indicates here some of the reasons that he believes it to be a better moral choice.

1.5. Difficulties in Applying Popper's Epistemology to Vatican Theology

I now move to demonstrate some of the difficulties involved with applying Popper's epistemology to theology, as represented in the work of John Paul II. The major difference between the Pope and Popper is their contrasting understandings of what truth is. This difference is derived from the disembodiment of knowledge in Popper's epistemology.

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[64] Alan Ryan, "Popper and Liberalism," in *Popper and the Human Sciences*, ed. G. Currie and A. Musgrave (Dordrecht, Boston, Lancaster: Martinus Nijhoff Publishers, 1985), 89-104. Needless to say, Popper's faith in an open society means that expert opinion need not be appealed to.

[65] *Open Society*, 2:233 (ch. 24, sec. iii).

[66] *Open Society*, 2:232. (ch. 24, sec. iii).

1.5.1. Conflict between Popperian disembodiment of knowledge and John Paul's embodied truth

Popper's evolutionary epistemology, the reader will recall, is directed more at objective knowledge, which resides in Popper's World Three. This is 'knowledge without a knowing subject,' as has been explained; in other words, such knowledge is 'disembodied.' Such a classification is useful for Popper, because it allows him to defend the partial autonomy of World Three from World Two. In a partially autonomous World Three, knowledge grows in an evolutionary manner, according to the rules of rationality and not solely governed by the activities of World Two. Popper's World Three gives him leverage in describing that certain problem situations and their solutions are introduced into World Three by the introduction of other knowledge. And it is within this process that Popper is able to account for the rational growth of knowledge, without having to appeal to the actual thought processes that accompanied it in World Two.

Such a concept of disembodied knowledge, however, runs the risk of being too far separated from behavior and human experience to give an adequate explanation of religious belief. In particular, it runs counter to John Paul II's view of theological knowledge, in which theological conjectures or statements of belief necessarily have an experiential or relational dimension. Pope John Paul II hints at this in the following passage from *Fides et Ratio*:

> Belief is often humanly richer than mere evidence, because it involves an interpersonal relationship and brings into play not only a person's capacity to know but also the deeper capacity to entrust oneself to others, to enter into a relationship with them which is intimate and enduring.
>
> . . . Human perfection, then, consists not simply in acquiring an abstract knowledge of the truth, but in a dynamic relationship of faithful self-giving with others. (*FeR*, §32)

The implication here is that objective theological knowledge is intimately related to knowledge of an experiential sort. This can be interpreted, in turn, as an indication that there is a certain embodiedness in theological knowledge. This is to say that the content of a theological statement includes certain experiential and behavioral conjectures.

The reader might want to respond that Popper did account for the reciprocal relationship between objective knowledge and behavior using the concept of plastic controls. But embedded in the idea of plastic controls lies the implication that objective knowledge and behavior can be separated. To illustrate the difficulty, we can imagine a copy of the Bible being received by a community of aliens who are able to translate it into their language. The knowledge contained in the Bible is objective knowledge in Popper's scheme, capable of being discussed and criticized. From a Christian perspective, however, such a discussion among aliens would not address the knowledge of the Bible adequately. In order for the aliens to have a proper discussion, a Christian can argue, they would have to see how the knowledge in the Bible is lived, if not try to live it themselves. Then, and only then, would they be able to understand enough to have a profitable discussion.

All of the above points to the fact that Popper's conception of his World Three is not rich enough to embrace theological statements. This is because the content and meaning of theological statements is bound up with human living. An authentic understanding of a theological statement is derived from an experiential or behavioral understanding.

The contrast between Popper's views and John Paul's in this respect can be best seen in their understandings of what the truth consists of. In the quote from *Fides et Ratio* given above, we can already discern that the Pope is using the idea of truth in a

relational sense. This clearly conflicts with Popper's sense of truth, which sees truth in terms of propositional logic.

While for Popper the decision whether to adopt critical rationalism is a fundamental moral question, it is not arrived at in a purely rational manner. For John Paul II the fundamental question that faces humanity involves the meaning of life and death. Furthermore, John Paul detects a need for some central truth to be accepted on which to base our lives. This is a fundamental decision according to John Paul, much like the fundamental decision for critical rationalism was for Popper. Section 27 of *Fides et Ratio*, can be seen as a response to Popper by John Paul II:

> Every truth--if it really is truth--presents itself as universal, even if it is not the whole truth. If something is true, then it must be true for all people and at all times. Beyond this universality, however, people seek an absolute which might give to all their searching a meaning and an answer--something ultimate which might serve as the ground of all things. In other words, they seek a final explanation, a supreme value, which refers to nothing beyond itself and which puts an end to all questioning. Hypotheses may fascinate, but they do not satisfy. Whether we admit it or not, there comes for everyone the moment when personal existence must be anchored to a truth recognized as final, a truth which confers a certitude no longer open to doubt. (*FeR*, § 27)

Here again, we can see how the Pope's view of truth is inextricably tied to his relational sense of knowledge. It further points to the need, as the Pope sees it, of claiming certainty for some truths in order to live our lives meaningfully. This is in clear contrast to Popper's understanding that we can never have certainty in our propositions. Lakatos, it will be shown in the next chapter, provides an avenue by which this conflict can be overcome.

1.5.2. A difficulty involving conflict between two different traditions

How should conflict between traditions be handled? That is, if a conjecture from a tradition is to conflict with a conjecture in another, then what can be done? In Popper's epistemology, the relative merits of conjectures are discernible by making a comparison of a conjecture's verisimilitude or problem-solving ability. Such a comparison, because it is made using criteria which transcend any framework, is possible. Thus, inter-traditional criticism, like communication between worldviews, may be difficult, but is not impossible. Moreover, any inter-traditional conflict should be resolved according to an evolutionary principle of some kind, according to Popper's epistemology. Popper seems to have too simplistic of a view of this, much like his view of truth. Lakatos gives an indication for how such differences can be resolved, and this will constitute part of the advance of his thought over Popper's. More will be said of this topic in the following chapter.

1.6. A direction for epistemology

All of the difficulties described above lead to at least two conclusions. First, that Popper's epistemology, while a step forward from the inductivism that preceded it, still has difficulties to overcome. Second, that it falls short of being an epistemology that can adequately deal with theological knowledge, at least that of John Paul II.

In the following chapter, I will argue that the augmentation of Popper's epistemology, along the lines drawn by Lakatos in his augmentation of Popper's philosophy of science, can both overcome the difficulties of Popper's evolutionary epistemology that have been presented and yield an epistemology that incorporates an understanding of the growth of theological knowledge that can embrace the understanding of John Paul II.

Chapter II: Popperian/Lakatosian Epistemology and Theology

I noted in the introduction that Popper tried to extend the applicability of his ideas throughout his life. Numerous commentators on Popper have noted that he did not extend the same critical attitude to his own ideas as he exhorted others to extend to theirs. Popper justified this apparent incongruity on the grounds that what he was doing was not scientific, but philosophical. For Popper, philosophy does not have a fixed method. It applies any method in an effort to solve a problem. As a conjecture, however, Popper had to accept that his philosophy is not exempt from rational criticism.[67] Some of these criticisms have been presented in the previous chapter and serve to demonstrate some of the limitations of Popper's work.

Imre Lakatos endeavored to extend the basic ideas of Popper's philosophy of science in a manner that would incorporate the useful parts of alternative philosophies and overcome some of the problems of Popper's account of the growth of scientific knowledge. In so doing, Lakatos developed what he considered to be an advance on

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[67] In fairness, it can be pointed out that as his writings progressed, Popper expressed the understanding that people proposing a theory, be it scientific or philosophical, might find it difficult to criticize their own ideas. They will leave the criticism to others. Of course, if we leave the criticism to others, Popper indicates that we must be at least open to receiving this criticism. Being open to criticism is something that Popper struggled with, as well. For example, he often insisted on knowing the questions he would be asked by his graduate students after a lecture, which led one critic to comment that *The Open Society and Its Enemies* should have been entitled *The Open Society by One of Its Enemies*.

Popper more often responded to criticism of his ideas by arguing that the criticism was not of his ideas but of some caricature of his ideas. Having read a number of the criticisms of Popper's ideas, I believe that there is a good deal of validity to his assertion. Of course, even criticisms that misrepresent Popper's ideas are useful, because they motivated Popper to make a clarification that otherwise would have remained unmade.

Popper's system. The result was a picture of the growth of scientific knowledge that relies on scientists' trying to push a basic idea forward and extend it as far as possible.

What Popper did in sticking to his ideas (somewhat dogmatically, according to his own definition) is a demonstration of Lakatos' depiction for how knowledge grows. The irony that Lakatos was able to give an explanation for the growth of knowledge that includes Popper's own development of his philosophy should not be lost on the reader. It encapsulates a central idea of this thesis. Lakatos provides a picture of the growth of knowledge that advances Popper's ideas, and it includes an explanation of the development of Popper. The explanation for how Lakatos' philosophy of science progresses beyond Popper's is the first main section of this chapter.

I am arguing that Lakatos' advance on Popper's ideas on the development of knowledge in science can be extended into Popper's later ideas, particularly Popper's evolutionary epistemology. Before Lakatos died, he had not taken the opportunity to address Popper's later thoughts directly, nor to write extensively on epistemology. Therefore, I will propose in section 2.2 a Popperian/Lakatosian epistemology using the basics of Popper's epistemology, but extending these in line with Lakatos' philosophy of science.

Section 2.3 consists of a brief demonstration that Lakatos' philosophy of science is not broad enough to fully describe the endeavor of theology. This is done in order to rationalize the need for a Popperian/Lakatosian epistemology to deal with theology. Finally, in section 2.4, I will demonstrate how this epistemology overcomes some of the difficulties that were encountered with applying Popper's epistemology to the growth of theological knowledge.

2.1. Lakatos' philosophy of science

Lakatos sought to produce a philosophy of science that could have as its basis Popper's falsificationism, but which could address the criticisms of falsificationism and overcome some of its shortfalls. A central criticism of Popper's philosophy of science is that the history of science diverges from the picture that Popper paints for how science operates. Some elements of Popper's falsificationism, such as the irrational genesis of many hypotheses, can be readily found in the history of science. Other elements of Popper's falsificationism, such as scientists testing a hypothesis severely in an effort to falsify it, are not prevalent in the history of science. More often than not, the history of science is a record of scientists trying to push their ideas forward and defend them from criticism.[68]

Lakatos wrote his major piece, "Falsification and the Methodology of Scientific Research Programmes,"[69] in order to propose an updated version of falsificationism that could be defended against the objections of Thomas Kuhn.[70] In the process, he was able to develop a version of falsificationism that overcame many other difficulties of Popper's system.

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[68] Of course, Popper's rejoinder to such a critique would be that when all is said and done, regardless of how rationally or irrationally it may have been said and done, development in science is capable of a rational reconstruction which depicts logically how a theory was falsified. Such an argument fails to satisfy most philosophers of science, who feel that a philosophy of science should be able to describe the development of science as much as prescribe how it should develop. As I will show below, Lakatos produces a philosophy of science that allows for a rational reconstruction that fits with the history of science.

[69] in *The Methodology of Scientific Research Programmes*, ed. John Worrall and Gregory Currie (Cambridge: Cambridge University Press, 1978), 8-101. Originally published in *Criticism and the Growth of Knowledge*, ed. Imre Lakatos and Alan Musgrave (Cambridge: Cambridge University Press, 1970).

[70] *The Structure of Scientific Revolutions*, 2nd ed., enlarged (Chicago: The University of Chicago Press, 1970) [1962].

Kuhn, in *The Structure of Scientific Revolutions*, uses the Copernican revolution as a model in arguing that the history of science does not fit Popper's falsificationist picture. According to Kuhn, science does not proceed by the method of falsification, but by means of 'normal science' punctuated by scientific revolutions, or 'paradigm shifts' as Kuhn refers to them. A paradigm directs scientists' attention away from anomalies and toward areas in which profitable gains can be made within the paradigm. This work within the paradigm is normal science. Paradigm shifts occur when a rival paradigm comes to be accepted over another. The shift is an irrational process, according to Kuhn, much like a religious conversion. It is marked by conflict which is aggravated by the inability of those in one paradigm to comprehend the rival paradigm. Thus, according to Kuhn, a theory is protected *from* falsification, not made subject *to* it, by its proponents. Further, the acceptance of an anomaly as a falsifier of the theory (in which Popper sees the rationality of a falsification), is really just a retrospective view from the victorious paradigm given to justify its having replaced the prior paradigm.

Lakatos accepts Kuhn's arguments as valid refutations of the rationality of 'naive methodological falsificationism,' which is early Popperian falsificationism in the main. However, there are elements of Popper's falsificationism, many of which Popper developed in the 50's and 60's, that Lakatos identifies as seeds from which can grow a 'sophisticated methodological falsificationism' that can overcome Kuhn's arguments. The irrationality that Kuhn sees in scientific revolutions, Lakatos argues, can be interpreted as rational progress by this sophisticated falsificationism.

In order to understand how Lakatos sought to improve naive falsificationism, we can look at two claims of Popper's falsificationism that Lakatos took issue with. Naive falsificationism depicts a test of a theory as "a two-cornered fight" between theory and

experiment that is organized so that they face each other alone; further, in naive falsificationism, the only real discoveries are refutations of hypotheses. History of science, says Lakatos, tells us that tests of theories are fights with more than two corners; they involve not only experiments, but rival theories as well. Further, the history of science indicates that some real discoveries have been confirmations of theories--what Lakatos will call novel facts--rather than falsifications.[71]

There are three elements of Popper's falsificationism that Lakatos identifies as sophisticated. The first is the early Popper's understanding that certain conventionalist decisions are needed in science, but that these can be made in a manner that helps science to progress. The second is the later Popper's recognition that a rival theory is generally what suggests a test of a hypothesis (section 1.1.3 above). The third is the set of three criteria for a new theory that Popper proposes (section 1.1.2.3. above), which suggest that confirmation is indeed important for there to be progress in science. All of these sophisticated elements must be taken further than Popper did, and this Lakatos endeavors to do. A brief introduction to the ideas of Lakatos and some key terms will help the reader to understand the sections that follow.

Lakatos makes a distinction between *mature* and *immature* science.[72] A mature science is one that is organized into one or more *research programs*. A research program is based on a system of hypotheses.[73] At the heart of this system is a statement of theory that is protected from falsification. This theory is the *hard core*. The means of protecting this hard core is called the *negative heuristic*, it guides the

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[71] "Falsification and the Methodology of Scientific Research Programmes," 31 (sec. 2b)

[72] "Falsification and the Methodology of Scientific Research Programmes," 87-88 (sec. 3d4).

[73] The information in the remainder of this paragraph is drawn from "Falsification and the Methodology of Scientific Research Programmes," 47-9 (secs. 3 and 3a).

development of *auxiliary hypotheses* that deflect falsifications from the hard core; these are designed to interpret data in a manner that harmonizes them with the hard core while predicting new facts. Along with the hard core there is a direction of fruitful inquiry for the research program, called the *positive heuristic*, designed to extend the applicability of the hard core.[74]

An immature science, as Lakatos describes it, "has no unifying idea, no heuristic power, no continuity."[75] Heuristic power, as described above, is what directs the application of the hard core to production of data and the analysis of observations. In an immature science, there are no discernible research programs and the development of auxiliary hypotheses proceeds only by trial and error; there is a lack of direction in the creation of auxiliary hypotheses. Amidst this lack of a unifying idea, the 'novel facts' that are derived from immature science to be of little value because they are not explained within a framework that keeps its organization; therefore, "good scientists will not find such makeshift progress satisfactory."[76]

2.1.1. Criterion of demarcation

It is important to note that Lakatos' sophisticated falsificationism is explicitly concerned with series of theories and systems of hypotheses rather than individual conjectures. It deals with series of theories in that the addition of an auxiliary hypothesis

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[74] Lakatos gives examples of both the negative and positive heuristics from the development of Newtonian physics. The negative heuristic, for example, led to the development of hypotheses regarding the refraction of light entering the earth's atmosphere in order to deal with certain problematic observations; the positive heuristic was seen in Newton's gradual addition of considerations in making predictions. One of these was the addition of the perturbations of planets from their course due to the gravitational effect from other planets.

[75] "Falsification and the Methodology of Scientific Research Programmes," 88 (sec. 3d4).

[76] "Falsification and the Methodology of Scientific Research Programmes," 88 (sec. 3d4). Lakatos uses single quotes to distinguish facts that come from an immature science (i.e. 'novel facts') from genuine novel facts, those that are developed within a research program.

produces a new theory. The course of development of auxiliary hypotheses constitutes a series of theories; the progression of theories yields a research program.

Because its view of a theory is that of a hard core and many auxiliary hypotheses, Lakatos' philosophy likewise lends itself to analysis of systems of hypotheses, rather than individual hypotheses. This change in scope is significant, because it immediately obviates one of the problems which plagues Popperian falsification, namely, how to deal with tests of individual hypotheses that are supported by other hypotheses.

Competition between theories within research programs, and competition between research programs, is essential for science to grow. It is also necessary for Lakatos' criterion of demarcation between scientific and pseudoscientific theories. Although he uses it to describe theories, Lakatos notes the term 'scientific' is more properly applied to research programs.[77] A research program that continues to produce theories that lead to novel facts is scientific. In this context, novel facts are "facts which had been either undreamt of, or have indeed been contradicted by previous or rival programmes."[78] Later, Lakatos expands the concept of novel facts on the suggestion of Elie Zahar to include facts that do not play a part in the development of a theory, but are already known and can be explained by the theory.[79] A degenerating, or

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[77] At one point, he claims that to view a single theory as scientific is a "category mistake." See "Falsification and the Methodology of Scientific Research Programmes," 34 (sec. 2c). In the footnote accompanying this text, Lakatos notes that Popper was guilty of such category mistakes, which militated against his success: "Popper's conflation of 'theories' and 'series of theories' prevented him from getting the basic ideas of sophisticated falsificationism across more successfully."

[78] Lakatos, "Science and Pseudoscience," in *The Methodology of Scientific Research Programmes*, 5.

[79] See "Why did Copernicus's Research Programme Supercede Ptolemy's?" in *The Methodology of Scientific Research Programmes*, 184-5 (sec. 5).

pseudoscientific research program is one that is not producing novel facts and is only producing hypotheses in an *ad hoc* manner to account for known facts.

Falsification of a theory comes not from a clash between a theory and an observation, as it did for Popper, but from its replacement. "No experiment, experimental report, observation statement or well-corroborated low-level falsifying hypothesis alone can lead to falsification. There is no falsification before the emergence of a better theory,"[80] says Lakatos. A better theory is one that explains what another theory explains, predicts novel facts, and has some of these novel facts observationally verified.[81]

Here we can see another advance of Lakatos' ideas over Popper's. In Lakatos' criterion of demarcation (the production of novel facts) we can see aspects of Popper's second and third requirement for a new theory--being independently testable (that is, predicting something that hasn't already been observed) and passing some new, severe test. These, as was mentioned above, Lakatos sees as sophisticated aspects of Popper's falsificationism. However, as Lakatos points out, Popper never gave up his falsification rules (of conflict between a theory and a basic observation statement) and thus never made the step to seeing competition between theories as a *necessary* component of falsification.[82]

How might an entire research program be eliminated? As is the case with theories, competition is the key. For Lakatos, a research program can be eliminated

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[80] "Falsification and the Methodology of Scientific Research Programmes," 35 (sec. 2c)

[81] In Lakatos' words, "A scientific theory T is *falsified* if and only if another theory T' . . . (1) has excess empirical content over T: that is, it predicts novel facts, that is, facts improbable in the light of, or even forbidden, by T; (2) T' explains . . . all the unrefuted content of T . . . and (3) some of the excess content of T' is corroborated." See "Falsification and the Methodology of Scientific Research Programmes," 32 (sec. 2c).

[82] "Falsification and the Methodology of Scientific Research Programmes," 93-4 (appendix).

when a rival program can explain its previous success and demonstrate greater power to develop theories that lead to novel facts.[83]

But beyond this, the actual decision to reject a research program is based on pragmatic decisions of scientists. This is how Lakatos is able to reframe the irrationality that Kuhn saw in scientific revolutions with a rational explanation: "If we have two rival research programmes, and one is progressing while the other is degenerating, scientists tend to join the progressive programme."[84] Behind this, however, there can be no fully compelling rationale for a scientist to switch programs. A scientist can stick to a degenerating program if they want to test their genius for devising auxiliary hypotheses that will make it progressive. Ultimately, the rejection of a research program is accomplished when work on it has stopped.[85]

2.1.2. The Dogmatic Attitude

Lakatos' criterion of demarcation has two main advantages over Popper's. They involve the psychology of scientists and the history of science. Regarding the psychology of scientists, Lakatos says,

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[83] "Falsification and the Methodology of Scientific Research Programmes," 69 (sec 3d). Based on the examples that Lakatos gives, it seems that for a theory to explain the 'previous success' of a rival, it need only provide an explanation for the content (the corroborated 'facts') of its rival. In this passage, Lakatos does not insist on 'excess corroborated content.' This is likely an oversight on the part of Lakatos, since in some of his examples this is central to the comparison between two research programs. See ibid, 39 (sec. 2c), in which the excess corroborated content of Einstein's relativity theory is central to its primacy over the Newtonian research program.

The power to develop theories Lakatos calls 'heuristic power.' It derives from the ability of the positive and negative heuristics to keep the research program progressive. The heuristic power of research programs can be roughly measured by 'their capacity to explain their refutations in the course of their growth.' ibid., 52 (sec 3b). It should be clear to the reader that where Kuhn sees a paradigm, Lakatos' sees a hard core with its positive and negative heuristics.

[84] "Science and Pseudoscience," 6.

[85] See "Falsification and the Methodology of Scientific Research Programmes," 70, n.4 (sec. 3d).

> Scientists have thick skins. They do not abandon a theory merely because facts contradict it. They normally either invent some rescue hypothesis to explain what they then call a mere anomaly or, if they cannot explain the anomaly, they ignore it, and direct their attention to other problems. Note that scientists talk about anomalies, recalcitrant instances, not refutations.[86]

Such behavior on the part of scientists derives from what Popper identified as the dogmatic attitude (see section 1.1.3.1 above). Popper was ambivalent with regard to the dogmatic attitude. The dogmatic attitude is unavoidable because it is part of our desire to assert our conjectures on the world, and Popper recognized its value to science because it pushes scientists to develop conjectures. However, it runs counter to the critical attitude, which is central to the progress of science.

Lakatos baptizes certain aspects of dogmatic attitude described by Popper as the positive and negative heuristics in his philosophy. For Lakatos, it is essential for the growth of scientific knowledge that scientists work to develop auxiliary hypotheses to protect a hard core and extend its applicability. However, Lakatos understands that such work should not entail a curtailment of skepticism. Lakatos recognizes that "Blind commitment to a theory is not an intellectual virtue: it is an intellectual crime."[87] Continuing work on a degenerating program is allowable, for Lakatos, but a scientist must be honest about its shortcomings.

On the historical front, the second main advantage that Lakatos' sophisticated falsificationism has over Popper's is that many times it is difficult for a scientist to explain under what conditions they will give up their theory, except in hindsight. He says: "History of science . . . is full of accounts of how crucial experiments allegedly killed

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[86] "Science and Pseudoscience," 4.
[87] "Science and Pseudoscience," 1.

theories. But such accounts are fabricated long after the theory had been abandoned."[88] This is to say that what a naive falsificationist sees as a falsification of a theory was probably not considered one at the time. It is not accepted as a falsification until an alternative theory has been proposed that supercedes the former.

2.1.3. Method: Stay on the horse as long as you can ride it

Methodological decisions are an unavoidable part of science, and they play an important role. Popper recognized this, and developed his falsificationist methodological rules. Because he saw refutation of a theory by observation as the path to progress in science, Popper sought to limit conventionalist decisions to those that involved refutation of a theory. Lakatos', with his sophisticated methodology, seeks to continue Popper's work to further simplify falsificationist methodological rules that guide greater progress in science.

Metaphorically, we can consider a research program as a horse. The naive falsificationist sees the goal of science as intentionally guiding a horse toward difficult terrain, trying to find areas that it cannot pass, and when it is stymied, abandoning it to look for another horse. The sophisticated falsificationist sees greater value in getting mileage out of it. The sophisticated falsificationist guides his horse along simpler paths, avoids troublesome terrain, and looks for ways to get around obstacles and continue riding. Changing horses for the sophisticated falsificationist is not incumbent upon a horse having been stymied, but upon deciding that another horse has greater promise of going further.

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[88] "Science and Pseudoscience," 4. Lakatos gives the example of a Newtonian being as nonplussed as a Freudian if asked to give the conditions under which they would consider their theory falsified. The Newtonian does not see what it would take until after it has happened.

Methodologically, such a change of strategies leads to a simplification of methodolgical decisions. Lakatos is able to identify five types of decisions that a naive falsificationist must make, and he argues that a sophisticated falsificationist is able to simplify these.[89]

A significant improvement and simplification of falsificationist methodological decision making comes in the form of the negative and positive heuristics. The negative heuristic protects the hard core from falsification by directing investigation away from problematic areas, those which are riddled with anomalies or which will not seem to bring fruitful advances (novel facts). In terms of our metaphor, it is the heuristic which leads the horse away from difficult terrain and seeks a way around obstacles.

The positive heuristic is an inherent part of the hard core itself. Having a positive heuristic is part of what makes a mature science. It directs the application of the hard core in certain areas and gives a direction to the development of auxiliary hypotheses.

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[89] The five naive falsificationist decisions are: (1) the decision of the acceptability of 'basic' statements, (2) which statements count as 'basic' and which do not, (3) what statistical evidence counts as falsification for a probabilistic theory, (4) at what point a *ceteris paribus* clause is sufficiently corroborated so that certain data can be accepted as a refutation of a theory, and (5) the decision to eliminate 'syntactically metaphysical' theories on the basis of their direct clash with corroborated theories. (The decision of when to reject a falsified theory, made more explicit by the later Popper, would count as a sophisticated decision, because it includes the comparison of a theory with another.)

The first three types of decisions are made less conventional by sophisticated falsificationism, because the need for a final, conclusive decision is mitigated. With sophisticated falsificationism, one can appeal to a difficulty with an interpretative theory to explain a clash between a theory and an observation. One can then work to develop a new interpretive theory. Lakatos gives the example of Newton's 'correcting' certain lunar observations of the astronomer Flamsteed to fit his theory by appealing to the refraction of light by earth's atmosphere. See "Falsification and the Methodology of Scientific Research Programmes," 45, n. 5 (sec. 2c).

The fourth and fifth types of decisions are obviated with sophisticated falsificationism, because the development of content-increasing auxiliary hypotheses (even metaphysical ones) to account for anomalous data is encouraged. For the explanation of the five types of decisions, see "Falsification and the Methodology of Scientific Research Programmes," 22-28 (sec. 2b). For Lakatos explanation of how sophisticated falsificationism obviates or simplifies these decisions, see ibid., 40-7 (sec. 2c).

In terms of the horse metaphor, the positive heuristic leads the horse along what looks to be the simpler path and towards water.

A note of comparison should be made with Popper here. The goal for Lakatos is not to investigate all of the terrain of inquiry in a methodical manner. There are areas of investigation which will be avoided by a research program. Sometimes, after the research program has developed, it will be able to find a means of investigating previously uninviting areas, but there is no need to make such an attempt before then. That is, sometimes a much simpler 'back-way' can be found for entering an area of investigation that is exposed only by riding past it. The development of auxiliary hypotheses that turn previously anomalous data into supporting evidence Lakatos terms "devouring anomalies."

Above, I pointed out that Lakatos' focus on systems of theories helps sophisticated falsificationism deal much more effectively with some difficulties of naive falsificationism. This is best seen in light of the conventionalist decisions that each espouses. The conventionalists, the reader will recall, emphasize the interrelatedness of conjectures; they form a network, or web, of statements. Conventionalists argue that when two statements come into conflict, or seem to come into conflict, the decision about how to proceed is made by convention, with the aim of the decision being how to maintain the simplicity of the network. Even if the statements that come into conflict are an observation statement and a hypothesis, a decision must be made regarding how to proceed.

Conventionalists contend that there have been historically valid reasons for protecting a theory from problematic data or a hypothesis that is itself corroborated by

evidence but which apparently conflicts with the theory.[90] In such cases, such decisions did not stand in the way of the advance of science, and in some cases they averted what would have been an overhasty rejection of certain hypotheses.

Popper found a handful of conventionalist strategies to be acceptable. One of these is the development of auxiliary hypotheses, but for Popper developing auxiliary hypotheses is only acceptable if it does not decrease the testability of the central theory, i.e. if it does not decrease the size of the set of potential falsifiers. Just as Lakatos was able to include the positive aspects of the dogmatic attitude into sophisticated falsificationism, so he is able to more easily incorporate conventionalist strategies into it. However, the rationale that he uses for employing conventionalist strategies is different from the conventionalists' rationale. For the conventionalists the decision about how to modify a system of hypotheses in the presence of a problematic hypothesis is generally based on what will maintain the greatest simplicity, but for Lakatos any part of a research program can be modified, so long as the modification helps to predict and discover novel facts.[91] Said another way, with sophisticated falsificationism conventionalist decisions are made as guided by the negative and positive heuristics. If the hard core is in conflict with a basic conjecture, then an attempt to produce an auxiliary hypothesis to account for it is made. If this is not easily done, then the basic conjecture can be labeled as an as-yet-unexplained anomaly and investigation can proceed in directions that avoid such an anomaly.

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[90] The main strategies involved (those that Popper addressed and which were presented in Chapter I) include rejecting problematic data, redefining terms to account for difficulties, and inventing auxiliary hypotheses or *ad hoc* hypotheses to resolve any difficulties.

[91] "Falsification and the Methodology of Scientific Research Programmes," 99 (appendix).

2.1.4. Virtues of Sophisticated Falsificationism: Constructive Criticism, Pluralism, and Patience

Progress in naive falsificationism hinges on refutations of theories, which are achieved as quickly as possible. This, in turn, helps to maintain a certain agreement among scientists regarding which are the theories to be preferred. Lakatos' simplification of methodological rules allows for progress through the addition of novel facts by a theory that is able to explain all of the facts of a previous or rival theory. Lakatos' sophisticated falsificationism incorporates the three virtues given in the title of this section.

The first virtue, constructive criticism, is derived from the fact that falsification in a sophisticated viewpoint requires a rival program. This means that criticism of a theory is not negative, a pitting of a theory against observation, but constructive; it comes in the form of a rival program. A theory or research program is not considered falsified unless there is a better theory or program to replace it. In the absence of a replacement, work can continue in a research program despite the presence of anomalies.

Pluralism is the second virtue that is brought to light by Lakatos' philosophy of research programs. Because falsification is predicated on competition, pluralism of research programs is an asset to the growth of knowledge from the perspective of a sophisticated falsificationist because it leads to greater possibility of discovering novel facts. Further, a research program can foster a plurality of rival theories in attempting to expand its applicability. The production of multiple theories in a research program gives the research program greater opportunity for producing novel facts. Of course, the benefits of pluralism can become a barrier to the growth of knowledge if a proliferation of programs and theories leads to confusion, and this Lakatos concedes. However, should

such a proliferation seem to scientists to stand in the way of progress, a pragmatic decision on their part regarding which programs to focus their energy and attention on fits into Lakatos' framework, in which decisions regarding which programs to abandon is a pragmatic one.

The third virtue, patience, is fostered in a variety of ways in sophisticated falsificationism. The primary way involves the development of research programs. History of science, as seen by Lakatos, shows that it often takes time for a research program to solidify and to begin to be able to produce novel facts. During the formative years of a program, it may merely explain 'old facts' in a new way. Additionally, there are often many difficulties that have to be worked out. Such difficulties could be counted as refutations from a naive falsificationist perspective, and a program could be discarded prematurely.[92] This means for Lakatos that a research program that proposes a new hard core and begins seeking application to accepted data, a 'budding' research program, must be treated leniently. Furthermore, it should be judged on its own merits, not in comparison to other research programs:

> We must not discard a budding research programme simply because it has so far failed to overtake a powerful rival. We should not abandon it if, supposing its rival were not there, it would constitute a progressive problemshift. . . . it should be sheltered for a while from a powerful established rival.[93]

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[92] See "Falsification and the Methodology of Scientific Research Programmes," 65 (sec. 3c2), where he says: "to give a stern 'refutable interpretation' to a fledgling version of a programme is dangerous methodological cruelty. . . . it may take decades of theoretical work to arrive at the first novel facts and still more time to arrive at *interestingly testable* versions . . ." On page 70 he gives the example of the kinetic theory of heat, which "*seemed* to lag behind the results of the phenomenological theory for decades before it finally overtook it with the Einstein-Smoluchowski theory of Brownian motion in 1905."

[93] Lakatos, "Falsification and the Methodology of Scientific Research Programmes," 70-1 (sec. 3d).

Here we can also see the relationship between patience and pluralism. Pluralism among research programs is fostered by patience with budding programs.

Yet another reason for exercising patience with research programs has already been mentioned: falsification of a theory is generally understood in hindsight. An experiment that is regarded as 'crucial' is not necessarily seen as such at the time.[94] It is only by being patient and letting research programs develop that crucial experiments can be recognized as such. To try to identify crucial experiments at the time they are performed, as a naive falsificationist would, could lead to a hasty, unwarranted falsification of an otherwise viable theory.

2.1.5. Other philosophies of science as Lakatosian research programs

One of the most intriguing aspects of Lakatos' work is that he uses his own philosophy of science in order to interpret the situation of philosophy of science. In "History of Science and Its Rational Reconstructions,"[95] Lakatos investigates inductivism, conventionalism, naive falsificationism, and his own sophisticated falsificationism as research programs for describing the growth of science. In doing so, he utilizes their rational reconstructions of history (of science) as a meta-criterion for judging philosophies of science.[96]

The upshot of Lakatos' work in this article is that where inductivism and conventionalism are mired in accounting for incongruities between the history of science and their account of the growth of science, Lakatos is able to identify his sophisticated

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[94] Lakatos gives the changes in the interpretations of the Michaelson-Morley experiment and the results regarding beta-decay among factions supporting different theories as examples of how the "status of a 'crucial' experiment depends on the status of the theoretical competition in which it is embedded." See ibid, 68-86, esp. 85 (secs. 3d-3d3).

[95] in *The Methodology of Scientific Research Programmes*, 102-138.

[96] "History of Science and Its Rational Reconstructions," 122 (sec. 2).

falsificationism as a progressive problemshift of naive falsificationism by its ability to interpret greater content in the history of science than naive falsificationism.

This ability of Lakatos' system to self-referentially justify itself is what Nancey Murphy calls its 'fractal structure' of justification.[97] The advantage that a fractal structure of justification confers on a system is that it prevents it from being self-refuting. It is in this respect that we can see how Lakatos' sophisticated falsificationism improves on Popper's version of falsificationism: Popper's version is itself falsified by the history of science. This, recall from the introduction to this chapter, led Popper to justify his philosophy of science on the basis of its problem-solving ability.[98]

The question that now can be asked is how Lakatos' ideas affect the broader field of epistemology. Lakatos did not much address epistemology beyond science. The only non-empirical research programs that he dealt with were mathematical ones. Popper, of course, did have an epistemology, but I have demonstrated various problems with it, not least of which for this thesis is its lack of full application to theological knowledge. Given that Popper's epistemology was built around his falsificationism, it is reasonable to believe that it can be augmented in the same directions that Lakatos augmented Popper's falsificationism.

Thus, I propose to develop an epistemology that derives from Popper's evolutionary epistemology, but which includes advances along Lakatosian lines. The result, the reader should be aware, will look like an augmented version of Lakatos'

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[97] See *Anglo-American Postmodernism* (Boulder, CO: Westview Press, 1997), 54. Murphy uses Lakatos' addition of Zahar's re-definition of a novel fact (see section 2.1.1 above) as evidence of an auxiliary hypothesis that constituted a progressive problemshift for his research program.

[98] This, it can be noted, is a somewhat fractal justification in its own right. Recall that problem-solving ability is what justifies philosophical systems for Popper. We may interpret sophisticated falsificationism as the extension of this philosophical fractal nature to science, which can serve as a further demonstrates that Lakatos' work is an advancement of Popper's, not a break with it.

philosophy of research programs. Much of the terminology I will borrow from Lakatos. My aim is to justify that such an epistemology can be applied to knowledge that is not specifically rooted in empirical science and is more 'interpretive' in nature; that is, knowledge that helps us interpret our world.

2. 2. A proposed Popperian/Lakatosian epistemology

Sophisticated falsificationism blends a variety of philosophies, according to Lakatos. The importance of methodological decisions it derives from the conventionalists; the value of learning from experience it derives from the empiricists; and from the Kantians it adopts the activist approach to epistemology.[99] The first two of these have been explained above. The activist approach to epistemology Lakatos appropriated from Popper's epistemology. In expanding Popper's epistemology in a Lakatosian direction, then, this is a reasonable first element to include. In the following section, I will describe how an activist approach to epistemology should be understood in the epistemology I am presenting, and I will explain how other elements of Popper's epistemology are incorporated into it.

2.2.1. Elements drawn from Popper

The activist approach to epistemology that is at the heart of Lakatos' philosophy is essentially Popper's 'searchlight theory', except that in describing it, Lakatos modifies it in a sophisticated falsificationist manner. Regarding the source of our knowledge, Lakatos says, "we cannot read the book of Nature without mental activity, without

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[99] See "Falsification and the Methodology of Scientific Research Programmes," 38 (sec. 2c).

interpreting it in the light of our expectations or theories."[100] It is not unreasonable to assert that Lakatos' juxtaposition of expectations and theories means that he adopts Popper's conjectural view of knowledge; that is, our knowledge consists of our expectations and hypotheses.

Lakatos goes on to assert a position he calls 'revolutionary activism': "conceptual frameworks can be developed and also replaced by new, *better* ones; it is *we* who create our 'prisons' and we can also, critically, demolish them."[101] The similarity in sentiment in this quotation to Popper's view of rebuilding one's horizon of expectations after it is hit by a metaphorical bombshell (a falsification) can be noted. However, we can sense that Lakatos combines the destruction of conceptual frameworks with their replacement; this replacement is not a result of a Popperian falsification. Rather, in the manner of a Lakatosian falsification, it is based on judging another to be better and adopting that framework. In a scientific sense, 'better' means for Lakatos the more empirically progressive research program, but what 'better' might mean in a general epistemological sense Lakatos does not address. Below I will argue that it involves being able to overcome problem situations and/or to expand the range of applicability of a system of conjectures.

The Popperian/Lakatosian epistemology that I wish to propose is a general one, and I will paint it in broad strokes. The important aspect of it for this thesis is how it handles knowledge that has its justification not in a readily identifiable empirical source (that is, scientific knowledge), but more generally in human experience. Such

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[100] "Falsification and the Methodology of Scientific Research Programmes," 20 (sec. 2b).
[101] "Falsification and the Methodology of Scientific Research Programmes," 20 (sec. 2b).

knowledge is generally born of conjectures that can be considered interpretive, or hermeneutic; these types of conjectures help us to navigate in our worlds.

These conjectures also extend into human behavior, as has already been described in Popper's epistemology through his inclusion of behavior as a type of knowledge and his depiction of the plastic controls by which conceptual knowledge and behavioral knowledge correct each other (presented above in section 1.2.2). I propose that Popper's depiction of plastic controls for behavior and knowledge can be developed in a Lakatosian direction. The interaction between objective knowledge and behavior can be more properly viewed as constructive, in the sense that Lakatos describes it. This means that the interaction between objective knowledge and behavior is best viewed in the context of competition between rival programs. Development of an interpretation of a new behavior that succeeds in solving a problem, or adopting a behavior that is in line with our conceptual interpretation of the world, is criticized implicitly by the presence of a rival interpretation or behavior. Below, I will describe how such competition plays itself out.

The basis of the epistemology I am proposing is revolutionary activism, as indicated above. That is, according to this epistemology, our knowledge is conjectural, and it is born of our imposition of our concepts on the world. Beyond this and before continuing, there are four other points I want to set forth about the epistemology I will propose. First, knowledge gains its justification from its being part of a system of conjectures that finds application in the world. This is an improvement on Popper's claim that the only justification our knowledge might have is from its having been subject to criticism. Second, Popper's World Three of objective knowledge can be retained, but its autonomy will be diminished according to a Lakatosian understanding of the

dependence of knowledge on a system. Third, an epistemology based on Popper's work will accept that most of our knowledge comes from tradition, and the stance that one takes toward tradition will be critical, as Popper suggests, but the critical stance one takes will be shown to be more fruitful if one includes the constructive, competitive understanding of criticism suggested by Lakatos. Finally, and most importantly, this epistemology will remain evolutionary, but the evolutionary model that it will use will be expanded to incorporate the evolutionary advantages of expanding applicability (akin to colonization of a new environment by a species).

It should be noted that in speaking of interpretive knowledge, we are still assuming that there is a reality to be interpreted. The reader will recall from section 1.2.1 above, "The Bucket and the Searclight," that Popper conceives of reality as that with which our construction of our horizon of expectations can potentially clash. The reader will also recall that such a clash is devastating as Popper sees it; he likens it to a bombshell that destroys part of our horizon of expectations and requires reconstruction of part of this horizon. In my proposed epistemology, a clash with reality is more like a notice from the city planner that warns us that trying to build our horizon of expectations in a certain direction will meet with difficulty. Metaphorically, it tells us that the land that we planned to build on is not zoned for our type of structure, or the ground there is unstable, etc.; if we want to keep building, then another direction is most useful. Such a conception helps to allow for those strokes of insight, recognized by Lakatos in the development of scientific knowledge, that might help us to find a way around an obstacle so to build where we earlier could not.

The critical element of this epistemology remains in the Lakatosian sense that if a project seems to have found a way to faster growth than a rival, or if it finds application

in a problem area of a rival, then one is justified in building with this project and abandoning the rival. Conflict comes, then, not so much between a system and reality, as Popper envisioned it, but between rival systems that seek to describe reality. This idea will be more fully developed in section 2.2.4 below.

To this point, I have explained that the epistemology I am proposing incorporates Popper's revolutionary activist approach to knowledge and maintains a critical realism, although these are to be developed in a Lakatosian manner. Further, I have explained that with our Popperian approach of knowledge being derived from a problem situation, we can include a wide range of types of knowledge, including behavior. In developing some of the specifics of this epistemology, I turn first to describing how knowledge is justified by its inclusion into a system.

2.2.2. Knowledge is part of a system

The reader will recall from section 2.1 above that Lakatos considered 'novel facts' derived from an immature science to lack the value that facts embedded in a research program have. This is to say that our scientific knowledge gains justification from being incorporated into a research program. What Lakatos indicates about the need for a hard core for scientific systems is easily translatable to the epistemology I am proposing: Any knowledge is justified in relation to the system in which it is incorporated. Further, for a system to have justification, it must have a hard core that is expanding its applicability and/or overcoming problem situations.

Both points require some elaboration. The first point, that knowledge is justified in relation to the system to which it is tied, enriches Popper's basic epistemology in the same manner that Lakatos' philosophy of research programs enriched Popper's

philosophy of critical rationalism. An example from theology that can help to elucidate this point is the knowledge that saints intercede on our behalf, as generally expressed by Catholics.[102] Although Popper would view the knowledge that saints intercede for us to be justified insofar as it stands up to criticism, it is difficult to imagine criticizing or defending such a belief without drawing from other beliefs. Lakatos helps us to understand that criticism is not just of an isolated belief, but of the entire system in which God's grace is mediated by persons or symbols into which such a belief fits. Furthermore, Lakatos' work helps us to see that criticisms of such a belief are drawn from rival systems. (Among those that can be readily identified are Protestant systems of thought, which tend to see as idolatrous the attribution of godlike powers to things that aren't God, and Enlightenment rationalisms, which denigrate anything that might resemble superstition.)

Regarding the second point, that justification is derived from the ability of a proposition (or behavior) to solve its problem situation, we must first recall that Popper viewed the justification of a conjecture to be its ability to overcome a problem situation. We can add to this Lakatos' insight that a system's strength is drawn from its heuristic power, that is, from its positive and negative heuristics. Such strength is derived from a system's negative heuristic through its ability to shield its hard core from contradictory evidence or even find a way to reinterpret such evidence in a manner that supports the hard core (what Lakatos refers to as 'devouring anomalies'); the strength that a system derives from its positive heuristic is through its ability to see directions for expanding its applicability. Which of these might be more important for justifying a system, and how

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[102] I am well aware that Catholics are not in complete agreement with regard to *how* saints intercede on our behalf. I am presenting simply the belief *that* saints can intercede for us, which most Catholics would agree with.

this justification is measured, are topics that I will discuss further along. What is important to understand at this point is that knowledge gains justification, in the epistemology I am developing, by being part of a system that itself is justified according to its ability to overcome its difficulties and/or expand its applicability.[103]

I have introduced the concepts of a system's "overcoming problem situations (or difficulties)" and "expanding its applicability" without giving a clear indication of what these concepts might mean. At this point, it is essential that I give a clearer description of these ideas. Problem situations for a system can be equated with any experience or observation that challenges the applicability of a system where it should be applicable. An example that comes from Christian theology is the problem of evil. If one adopts a system which holds as a hard core belief that God is all-loving, all-knowing and all-powerful, then the presence of evil in the world constitutes a problem situation. The example of the problem of evil is especially good for describing how confronting problem situations can unfold. Some Christians find it too trying to develop auxiliary conjectures that explain how evil and an all-loving, all-knowing and all-powerful God are compatible; as a result they turn to a rival system that does not include in its hard core a belief in such a God. Others make an attempt to preserve the system by redefining evil to make it illusory or to deny its reality. The number of attempted solutions cannot be developed here; their abundance demonstrates the variability of strategies that can be used to

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[103] The case of racism as an epistemological 'hard core' is one in which the negative and positive heuristics are easy to see. A racist, as anyone who has dealt with one well knows, is able to easily interpret certain news stories or other 'facts' in a manner commensurate with their racism. They likewise tend to steer clear of certain other 'facts' or situations that would require more effort to interpret in a racist manner; alternatively, they produce 'ad hoc' conjectures to account for troublesome information.

overcome a problem situation.[104] A reminder regarding problem situations should be made: A system is never devoid of problem situations. As Popper pointed out, the solution to a problem situation generally engenders new problems. Systems are constantly confronted by difficulties.

Expansion of applicability is more difficult to define in this epistemology than it is in Lakatos' philosophy of scientific research programs, in which such applicability is seen in purely empirical terms. I propose that it be understood as the ability of a system's hard core to interpret an experience, observation, or behavior that was not previously recognized to be within the bounds of interpretation of the hard core. This, of course, is done by means of adding an auxiliary conjecture or augmenting an already existing conjecture.[105] In this respect, then, it is understood largely in the spirit of Zahar's addition to Lakatos' definition of novel facts. Then a system of conjectures that interprets human experience has justification if it can develop auxiliary conjectures to

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[104] There are some strategies of overcoming this problem situation that bear greater fruit than others; how rival interpretations compete is dealt with below.

Other examples include the following: The presence of women who feel called to the Catholic priesthood amounts to a problem situation for a system that holds an only-male priesthood in its hard core; love and respect demonstrated to someone who holds a hard core belief of their unworthiness; a group of intelligent, high-class Black neighbors for a racist; etc.

[105] In the realm of Christianity, an example might be a person's connecting a difficult trial with the crucifixion of Jesus, or a Catholic's connecting the symbol of the sacrifice of the Mass with a desire to pursue social justice.

interpret certain experiences in the light of a hard core and to find other experiences that are interpreted by the addition of the auxiliary conjectures.[106]

At the heart of a system is its hard core. I have been referring to hard cores (and operationally defining them as I go), but some additional comments are needed. The level of precision that is needed in a hard core will vary, according to the system. For the empirical sciences, it can be a simple set of sentences that employ clear, unambiguous language, such as those that define relativity theory. For a system of conjectures designed to interpret and express knowledge about human experience, however, they can be more elaborate. Hard cores that are used in such systems might include stories, manifestos, series of morality tales, contracts, pictures, or a mix of these things.[107] What is important is that in this epistemology our interpretation of the world around us is *more justified* if we proceed by attempting to connect our experiences with

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[106] There is a danger here that both Popper and Lakatos were wary of: trivial confirmations of any research program, including a degenerating one, can be had for the asking. What I am proposing here circumvents this difficulty in that it requires that certain experiences be brought under the interpretation of the hard core that were not previously there. This captures the spirit of the first of Popper's three requirements for a new theory for inspiration, the requirement that the theory bring together two previously unlinked things or facts (Popper says it should be simple, new, powerful, and unifying, but we can tone this down a bit.) So if an auxiliary interpretation brings together (in the light of the hard core) two previously unrelated items or experiences, then we count it as progress.

This does not mean that novel facts as originally defined by Lakatos, before Zahar's addition (i.e. facts that are ruled out or do not fit within a rival program) cannot serve to give support to a program. I am only indicating here that more often than not the novel facts that are generated by an interpretive program will be along the lines described above.

[107] The hard core need not be internally consistent. In the empirical sciences, Lakatos gives the example of Bohr's research program of light emission in the early years of quantum physics as an example of a research program that was built by spicing two inconsistent elements together. Later, ways of making it consistent were found. See "Falsification and the Methodology of Scientific Research Programmes," 55-68 (sec. 3c2). There is no reason to expect that a hard core should be clearly consistent, especially if it is new; however, it should be expected that ways of resolving inconsistencies will be found. Inconsistencies will eventually amount to a problem situation that must be resolved before progress can continue.

a hard core, rather than applying a hodgepodge of conjectures in order to interpret the world.[108]

Hard cores themselves need interpretation. Such interpretations can be understood within the same framework that Popper used to describe the reciprocal, plastic controls that relate behaviors with objective, conceptual knowledge. The interpretation of a hard core comes about by means of its application, which in turn can exert a reciprocal influence on the hard core. In the epistemology that I am proposing, however, such a process is not founded on criticism in the sense that Popper meant it, but in the sense that Lakatos introduces: Criticism of a system comes in the form of a rival system.[109] The basis of such criticism is the question: does it expand the applicability of the system and/or help to overcome a problem situation better than another?

2.2.3. An augmentation of evolutionary epistemology along Lakatosian lines

The purpose of this section is to describe how Lakatos' insights, as applied so far in the epistemology that I am proposing, can enhance Popper's evolutionary view of knowledge. In doing this, I will show how my proposed epistemology maintains the hard core claims of Popper's epistemology while increasing their applicability and their ability

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[108] This is a dangerous statement, because it says that, say, a militant racist's knowledge (at least regarding race), which is clearly organized around a discernible hard core, is more justified than a person who has no discernible opinion on race. Yet this is correct in this epistemology. Whether the racist's system is the 'most justified' can be in doubt, and more will be said about the justification of rival systems below.

[109] It can be added that criticism of a conjecture can occur within a system, as when rival auxiliary conjectures or interpretations are devised for the same hard core. In such a case, criticism can be made more specific and be related to how well each of the rival conjectures helps the hard core to overcome a problem situation or to expand its applicability. A case in point can be seen in the rival interpretations of certain passages in Vatican II documents that have appeared in the post-conciliar period ("subsists in" comes quickly to mind). Criticism of rival interpretations is generally focused on how each interpretation both help to maintain the coherence of accepted Catholic doctrine and to aid in the applicability of Catholic doctrine to human experience.

to overcome some of the difficulties that confronted Popper's epistemology; this will be done so that I may accurately describe the epistemology as a Popperian/Lakatosian epistemology.

To begin, let us first recall that Popper saw the growth of knowledge in evolutionary terms, as follows: A conjecture is pitted in competition against its environment (observations and/or experiences). If it is compatible with these, then it lives to see another day. The environment continually tries to produce observations or experiences that will kill (falsify) the conjecture. If a conjecture dies because a falsifier is produced by the environment, then another is sought to replace it. This new conjecture must, of course, be able to survive all of the observations or experiences that falsified earlier conjectures. Over time, conjectures that are able to stand up to a greater number of potential falsifiers in the environment are developed.

Using the same imagery, we can describe the advance that the epistemology I am proposing makes over Popper's. The Lakatosian elements should be clear to the reader. In my proposed epistemology, two or more systems are pitted against each other and against the environment. The environment poses difficulties for each of the rival systems, though not necessarily in the same places. In order to displace its rivals, each system tries to find a way to adapt so that it can enter a new area of the environment, especially an area that poses a problem for a rival. In order to not be displaced, each system tries to adapt to survive in parts of the environment that have posed difficulties for it, but which a rival version is already able to survive in. Over time, a system that is able to survive everywhere that a rival does and to survive in areas that remain inhospitable to a rival will displace that rival.

Before discussing how this new evolutionary conception of knowledge can be shown to be an improvement on Popper's, the last statement given above must be defended. Through mathematical modeling, it can be shown that if two organisms are coexisting in an environment and one is able to colonize a neighboring area that the other is unable to colonize, then the first will eventually crowd out its competitor in the environment that they originally shared.[110] Thus, the ability of a system to find application in an area that constitutes a problem situation for a rival system will lead to the falsification of the rival.

Returning now to demonstrating how this new evolutionary picture of knowledge constitutes an advance on Popper's, I will first show that the hard core claims of Popper's epistemology are maintained in this new version; then I will move to demonstrating how this new picture constitutes an improvement over Popper's. The hard core claims of Popper's are first, that knowledge grows by the evolutionary process of falsification, and second, that the impetus behind falsification is the desire for an increase in verisimilitude. The first of these claims I have shown in the paragraph

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[110] The argument goes as follows. Imagine an area A in which an organism of type X lives. Area B is adjacent to area A, and is uninhabitable by organisms of type X. Imagine that an organism of type X mutates in a manner that allows it to colonize area B without losing its ability to survive in area A. This new organism is of type Y, and is suited to life in area A and B. Assume that X and Y can still interbreed and the unique trait of Y can be expressed in the offspring.

Let x be the number of organisms of type X. (They are only in area A since they perish in area B.) Let y be the number of organisms of type Y (in areas A and B). Assuming that there is movement of species across the border between A and B, then eventually both areas A and B will be filled only with organisms of type Y.

The math is as follows. If we ignore perturbations, then let p be a lower bound (greater than zero) for the proportion of the organisms of type Y that cross from area B to A or that interbreed and leave offspring in area A. x_n = the number of organisms of type X in the nth generation. y_n = the number of organisms of type Y in the nth generation. Since all organisms of type X die in area B, there is movement only of organisms of type Y into area B from area A. The following equations result: $y_k > y_{k-1} + p * (x_{k-1})$; $x_k < x_{k-1} - p * (x_{k-1}) = (1-p) * x_{k-1}$. Thus $x_n < (1-p)^n * x_1$. As n increases, x_n approaches 0, leaving only organisms of type Y.

In the case in which there is no interbreeding, then the migration of organisms of type Y across the border leads to the same result: All type X organisms are crowded out of area A.

above. That an increase in verisimilitude results from my proposed epistemology can be easily shown: The system that falsifies a rival does so precisely by means of having greater applicability. This implies that it has greater corroboration than its rival and, hence, greater verisimilitude.[111]

At this point, enough has been shown to characterize the epistemology that I am proposing as a Lakatosian development of Popper's epistemology. From this point forward, I will refer to it as Popperian/Lakatosian (or P/L) epistemology. To show that P/L epistemology constitutes an improvement over Popper's, I will do so according to the criteria that I have proposed, namely, that evolutionary picture of the growth of knowledge provided by P/L epistemology overcomes problem situations that confront Popper's and expands its applicability.

A problem situation of Popper's epistemology and one that P/L epistemology overcomes is the criticism made by Jeremy Naydler that Popper is unable to provide a place for insight in the development of conjectures. Popper, recall from section 1.4 above, indicates that epistemological trial solutions (conjectures) derive from our attempts to impose our ideas on the world, but he considers their genesis somewhat arbitrary. This is part of the "poverty" that Naydler identified in Popper's epistemology. P/L epistemology is able to improve on Popper's by giving an indication of where a system's trial conjectures come from, namely, the positive and negative heuristics.

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[111] Of course, as Popper pointed out, we cannot know the verisimilitude of a conjecture; we can only guess at its verisimilitude relative to other conjectures. The same is true of systems of conjectures. The system that at present is able to find greater application is more likely the one with greater verisimilitude.

An additional point can be made here: if a degenerating system (one that is fighting a rearguard action to defend itself against rivals) is able to become progressive and find areas of application that elude a rival, it can become ascendant over its rivals. This underscores the value of heuristic power in a system for determining long-term success against rivals. I will develop this further in the section involving justification below.

That P/L epistemology is an advance beyond Popper's can be seen in its ability to resolve an incongruity in Popper's own work. Popper saw that the evolutionary success of humanity, its ability to survive, relied on its ability to develop tools, or 'exosomatic organs'.[112] This is in contrast to animal evolution, which proceeds by the 'blind' development of mutations. For example, rather than develop better eyes, humans develop microscopes, or telescopes. Among the tools that humans have developed is language, which engendered the development of theories, which are tools as well. Popper neglects to fully consider the difference between the situation of an organism that is 'waiting' for a mutation to make it better able to survive and the situation of a human who takes an active role in developing an exosomatic organ, that is, *causing* a mutation. He lumps them together as 'trial solutions' that are in need of error correction. Yet the ability to actively develop an exosomatic organ, rather than wait for evolutionary fate to supply it, is a necessary part of being human, according to revolutionary activist epistemology.

P/L epistemology incorporates this active, human spin. (The alert reader will have noticed my use of the active voice in describing a system's "adapting" in my presentation of P/L epistemology in the third paragraph of this section.) Following the lead of Lakatos, P/L epistemology separates knowledge that is genetically programmed from human conceptual knowledge on the basis of a very human trait: humans modify their environment to suit their needs. In evolutionary-epistemological terms, this means that human knowledge is not set in an environment that unilaterally challenges its survival; rather, human knowledge is set in an environment and is challenged to *change the environment* to suit its needs. This is at the heart of Lakatos' sophisticated

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[112] See "Of Clouds and Clocks," in *Objective Knowledge*, 238 (sec. xv).

falsificationism for science,[113] and it translates into P/L epistemology: if conjectures are mutations, then human knowledge is unique in that it causes its own mutations; further, these mutations are designed to aid the survival of the organism (be it a metaphorical system of conjectures or an actual human) by changing the environment, either actually or metaphorically. It can also be added that the role that the positive and negative heuristics play in the broader epistemology that I am presenting helps to resolve the ambivalence of the dogmatic attitude in Popper's epistemology, again following Lakatos (see section 2.1.2)

This does not mean, however, that reality is changed. Changing the environment is like our construction of our horizon of expectations in the simile presented above. There are still limits imposed by reality, like the city planner that tells us that our construction cannot go wherever it wants. Changing the environment means continuing to find directions in which to extend a developing system of conjectures, or finding a way to overcome anomalous experiences or observations.

As a demonstration of the expanded applicability of P/L epistemology, we can look at Popper's assertion that the origin of much of our knowledge is tradition, especially his assertion that we accept many systems of conjectures as they are handed to us from tradition. P/L epistemology adds to this that although we do not need to, we can invent new traditions as part of our ability to create new systems. Regardless of the origin of the systems we adopt, the task that confronts us is to expand their applicability,

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[113] In "Falsification and the Methodology of Scientific Research Programmes," 99-100 (Appendix), Lakatos says: "The direction of science is determined primarily by human creative imagination and not by the universe of facts which surrounds us. Creative imagination is likely to find corroborating novel evidence even for the most 'absurd' programme, if the search has sufficient drive. This look-out for *new confirming evidence* is perfectly permissible. Scientists dream up phantasies and then pursue a highly selective hunt for new facts which fit these phantasies. This process may be described as 'science creating its own universe.'" Lakatos adds a parenthetical comment to note that he is using 'creating' in a "provocative, idiosyncratic sense."

particularly in the area of overcoming new problem situations.[114] The improvement of P/L epistemology can be seen in how criticism of a tradition is undertaken; criticism of a conjecture given by tradition is done within a system, and it relies on the presence of an alternative system, even if such an alternative is imagined. This is in contrast to the means that Popper envisioned for criticizing traditions, which involves merely trying to step outside of the taboos of a tradition in order to examine a conjecture in isolation and decide if it should be retained. From the perspective of my proposed epistemology, a specific conjecture can be assessed in a system only in comparison to a rival within that system; On a broader scale, certain systems of conjectures are demonstrating a greater ability than others to address the problem situations of the system or expand its applicability. Decisions about systems, even those given to us by tradition, are motivated by an analysis of alternatives.

One final advance that P/L epistemology makes over Popper's must be spotlighted. It is that it satisfies its own criteria of justification, which is something that Popper's epistemology struggled to do. Recall that Lakatos was able to point to historical cases in which Popper's falsificationism fails to explain the growth of knowledge. In this sense, then, Popper's own theory is falsified according to its own definition. In the P/L epistemology I have presented, I have demonstrated that it is justified by taking core ideas from Popper's epistemology and developing them in a Lakatosian direction to improve their applicability and to help the Popperian hard core to overcome certain difficulties. To demonstrate that P/L epistemology is justified by being

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[114] Here examples can be drawn from American tradition: The amendments to the Constitutions are perfect examples of auxiliary conjectures that were designed to overcome problems of how to apply the principles of the Constitution to American life. The repeal of Prohibition in particular demonstrates that some attempts to overcome a problem situation sometimes are found to be counterproductive and are reversed.

able to interpret everything that rival epistemologies can describe and more, while necessary for demonstrating the justification of P/L epistemology, is beyond the scope of this paper and can be left for another time.

2.2.4. A few clarifications

At this point, there are two difficulties in applying any of this to interpretive situations that must be addressed before we can continue. They are expressed in the following questions: (1) If systems of conjectures are interpretive and the experiences that are explained by them are interpreted within a system, then how can another system claim to 'cover' those experiences with its explanations? (2) Along the same lines, if the identification of the problem situation of a system is itself an interpretation within a system, then how can a rival system claim to 'solve' it (or even more, solve it better than the system in question, or any other system for that matter)?

These two difficulties are overcome if we view systems as languages, as is suggested by Brad Kallenberg in "The Gospel Truth of Relativism."[115] Kallenberg, following Wittgenstein, takes the view that language is inextricably linked to actual social behaviors. Accepting that differing systems (Kallenberg focuses on MacIntyrean traditions) are different languages is a concession to relativism, but it is a concession that does not leave the problem of adjudicating rival systems insoluble. The solution is that for proponents of a system to claim supremacy over another system, they must first learn the language of the rival context. Such learning, given the link between language and social behavior that Kallenberg posits, must be 'inculturated' learning. This means one must enter the culture of a rival system in order to really learn its language.

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[115] *Scottish Journal of Theology* 53, no. 2 (2000): 177-211.

As Kallenberg presents it, only a 'bilingual' person can stand a chance of being able to determine if two systems explain the same experiential territory, and if not, then how one might be able to be modified (through the addition of auxiliary hypotheses) to apply to the area of applicability of the other. Such a bilingual person is likewise able to assess the problem situations of each system and to make decisions regarding the applicability of one system to another's problem situations. Implicit in this depiction is that such 'bilingual' persons are experts in the relationship between the two systems.

Kallenberg points out that becoming bilingual comes with some risk. In learning another language, one's own systems can be changed. But taking such a risk is necessary if a proponent of a system wishes to try to gain adherents among those who speak a different language, that is, those who have a different system. Going beyond what Kallenberg presents in his paper, I suggest that such a risk can be managed if we accept that learning another language is a matter of conjecture: we conjecture the meanings and syntax of the language, and go about trying to expand the applicability of our conjectures. From this viewpoint, learning another language is simply developing a set of conjectures that allows the learner to successfully navigate in the new language.

This is especially true for living systems that are deeply connected with behavior and perceptions of experience. A proponent of such a system can become 'bilingual' without losing their embodiment of the system they are proposing. A proponent of a system (the source system) who is attempting to gain adherents among those of another

system (the target system) can work to develop a system for 'translation,' but such a conjectural system of translation will maintain the source system intact.[116]

Developing such a system can help the source system to be strengthened as it finds means of relating the target system to itself (by means of the development of auxiliary conjectures). If there are incompatibilities between the two systems, then a person working within the source system clearly cannot fully enter the target system without compromising some aspect of the source system. Such points of incompatibility, however, can become platforms for a demonstration of the benefits of the source system over the target system. In other cases, apparent incompatibilities can be overcome through the same strokes of genius that allow a Lakatosian research program to devour its anomalies.

We can develop the idea of bilingualism to include analysis of inert systems, especially those of the past. As mentioned above, a difficulty is that there is no living representative of an inert system of knowledge with which to converse. Any 'conversation' discussion is with a hypothetical interlocutor; we have only what is recorded by history and must make a conjecture about what a given writer means without having recourse to discussion in order to refine our conjecture. Furthermore, our conjecture about the meaning of a recorded statement (or, more properly, a set of statements) can draw from a conjectured reconstruction of the problem situation that surrounded the recorded statement. Such a reconstruction can enhance our

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[116] On a personal note, I would classify both my experience in Mexico learning Spanish and my experience growing up in Utah as a Catholic among a great number of Mormons as this type of bilingualism. I found a way to navigate fairly well in both environments without losing many of my 'American' or Catholic prejudices.

I should add that the 'translation' I am describing is an individual's attempt to relate the two systems. It does not imply that a translation manual can be made that could be given to another; the argument against this latter possibility Kallenberg makes in his article.

understanding of the system to which a statement belonged and can thereby improve our translation of it.

To this point, I have not dealt with the relationship between an individual and a system of conjectures that that individual might adhere to. On one hand, the system is defined by the individuals that promote it. On the other hand, each individual will have their idiomatic version, or translation, of a system. An example can be seen in the varying interpretations of the 'American' system among citizens of the U.S.A. Differences in interpretations of the system can be so different that what one person considers 'un-American' can be deemed as highly patriotic by another.

It is important to understand that a system generally includes the criteria and method by which judgments are to be made in the system. For example, among evangelical Protestants there is an understanding that a conjecture in their system must have biblical warrant in order to be acceptable; further, the means of establishing that warrant are generally also understood within the system.

Often, the system itself includes conjectures that indicate what the final authority for interpretations will be. An example would be the Constitution of the United States, which includes provisions for creating a Supreme Court that serves as the final authority regarding interpretation of the Constitution itself. The Catholic Magisterium is another example: it is provided for in the system of Catholic belief. How the Catholic Magisterium serves as an earthly authority of the Catholic system of conjectures will be explored in the following chapter.

2.3. Why Theology Cannot Simply be Considered a Lakatosian Research Program

Nancey Murphy, in *Theology in the Age of Scientific Reasoning*,[117] makes a strong case for the inclusion of theology among the sciences. She does this by demonstrating that theology can have the form of a Lakatosian research program, and gives specific examples from history of theologies that can be described in Lakatosian terms.

In this section my aim is not to rebut Murphy's work--theology can and often does have the form of a research program--, but to show that it does not give us a complete picture, because it does not address how some theologies conceive of themselves and their goals. I will argue that such goals are defined more in terms of overcoming problem situations than the search for novel facts.

2.3.1. Novel Facts are not enough for Theology

To begin this argument, let us recall that in Lakatos' philosophy of science the production of novel facts is what justifies a program.

Growth in theological knowledge is not generally gauged only by its ability to derive new application, but applications that are somehow considered meaningful, or relevant. Such relevance, as I see it, is derived from the ability of theological knowledge to help its possessor to confront a difficulty; in P/L terms, this relevance is drawn from its ability to overcome a problem situation. The sentiment that more is required of a theological statement than its production of novel facts is expressed by the Congregation for the Doctrine of the Faith: "While the theologian might often feel the urge to be daring

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[117] (Ithaca, NY: Cornell University Press, 1990).

in his work, this will not bear fruit or 'edify' unless it is accompanied by that patience which permits maturation to occur" ("Instruction on the Ecclesial Vocation of the Theologian," §11). I contend that part of what the CDF indicates here is that edification which is derived from the maturation of a theologian's idea is not the production of a novel fact, *per se*, but the development of a conjecture that is relevant to the lives of believers. My point here is that while the creation of novel facts can be relevant to the lives of believers, it is not the sole criteria by which believers judge the relevance of a theological statement.

A conjecture that augments the applicability of a system of conjectures may be considered irrelevant if it fails to address a problem situation that confronts a system at the time. Murphy overlooks the issue of a conjecture's ability to overcome a problem situation in a system because of her focus on Lakatos' system alone. Lakatos' philosophy of research programs is unable to address questions of relevance, because the only concern for a scientific research program is producing novel facts, not addressing problem situations, as was explained above in section 2.2.3.

2.3.2. Theology as a tradition-based inquiry

How are the conjectures that are developed to help a theological system overcome its problem situations assessed? The quotation from the CDF given in the previous section provides an indication: it is done by a community over time. In this respect theology is a tradition-based inquiry as described by Alasdair MacIntyre. For MacIntyre, a tradition is "an argument extended through time in which certain fundamental agreements are defined and redefined in terms of two kinds of conflict: those with critics and enemies external to the tradition . . . and those internal, interpretive

debates through which the meaning and rationale of the fundamental agreements come to be expressed and by whose progress a tradition is constituted."[118]

I do not think that it is too much of a stretch to suggest that the debates that MacIntyre describes revolve, at least in part, around the problem situations that confront a system of conjectures. Theology is an endeavor that faces problem situations internal to itself, most recognizably in its need to address itself to the times and situations that it encounters while providing an interpretation that links it to its past, and problem situations from external sources, most recognizably in the challenges that are directed towards it by rival systems. It is in both senses that we can understand that theology is more of a MacIntyrean tradition-based inquiry, focused on addressing its problem situations, than it is a Lakatosian research program, in which the only problem situation is producing novel facts.

Viewing theology as a tradition-based inquiry is, in its turn, conducive to seeing it in terms of P/L epistemology. This can be seen in the task that the fathers of the Second Vatican Council laid out in the quotation in the introduction of this thesis. Their call for the Church to come up with language that can help the Church to respond to the needs of the times can be seen as not only a call to expand the applicability of the system of belief, but also a call to address the difficulties that each new age presents to the Church. In a P/L sense, this is simply a call to maintain the justification of the beliefs of the Church.

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[118] Alasdair MacIntyre, *Whose Justice? Which Rationality?* (Notre Dame: University of Notre Dame Press, 1988), 12.

2.4. Greater applicability of Popperian/Lakatosian Epistemology to Theology

Having so far in this chapter proposed an epistemology that expands Popper's fundamental ideas in a Lakatosian direction, and having claimed that theology cannot be dealt with solely as a Lakatosian research program, I turn to how Popperian/Lakatosian epistemology overcomes the difficulties derived from applying Popper's epistemology alone to theology (sections 1.5.1-1.5.2 in chapter one). The direction for how these difficulties can be dealt with has been implicit in the prior sections. Therefore, only a brief description of them need be given here. The key improvements of a P/L epistemology that apply in this section are the embodiment of knowledge in a system of conjectures, the methodological unfalsifiability of a hard core, and the enhanced evolutionary view of a P/L epistemology.

2.4.1. The embodiment of knowledge and understanding of truth in P/L epistemology

In section 1.5.1, I argued that theological knowledge is not the disembodied knowledge of Popper's World Three, that setting theological knowledge in an world that is autonomous from experience and behavior creates great a division between them. Systems of theological knowledge, in which behavior and conjectures that help to interpret experience are a major part, cannot be well considered if there is too great a chasm between more abstract conjectures, especially those in a hard core, and those that are more concrete, such as behavior and experience.

In the example I gave in section 1.5.1, involving aliens who receive the Bible, the Bible would be an inert system for the aliens, since it would come merely as a system of recorded statements. From this view, then, the aliens would be left to guess what its

meaning is, separated from the behavioral and experiential conjectures of the system as a proponent would present them. To treat a system of theological conjectures as merely a system of declarative statements would be to treat it as a dead system. In other words, it would neglect that these conjectures are embodied in a system and cannot be properly understood apart from the experiences and behaviors that are part of that system.

It should be clear that these difficulties are overcome in the P/L epistemology I have described in this chapter. A significant improvement is made by P/L epistemology in its ability to appreciate the interrelatedness between hard core beliefs and human experience and behavior. The plastic controls between objective knowledge and behavior that Popper conjectures are understood in P/L epistemology along the lines of the auxiliary conjectures that help to interpret hard core beliefs in the light of behaviors and experiences. There is thus a place in P/L epistemology for the relational aspect of knowledge described by John Paul II.

An additional point can be made here regarding the disagreement between Popper and John Paul II over the possibility of attaining certainty. This difficulty is overcome with the addition in P/L epistemology of a hard core, which is made methodologically unfalsifiable. In the case of theology, such a hard core is taken to be certain; it contains the set of doctrines that a theologian (as a believer) takes as irrefutable. How this plays out in recent Vatican theological statements will be explored in the following chapter.

2.4.2. Criteria for judging between conjectures in different systems

There are two scenarios to be dealt with in this section: (1) conflict between conjectures in rival systems, and (2) conflict between two rival conjectures within the same system. The first case is dealt with easily. The justification of a conjecture is predicated on the justification of the system to which it belongs. Therefore, conflict between conjectures from rival systems can be resolved through competition between the two systems. In theological terms, this means that individual beliefs need not be separated from others in order to assess their merits; more often than not, assessing the relative merits of individual claims will involve a number of other claims in a system.

Alternatively, however, if proponents of a system see in another system a set of conjectures that could benefit their system, there is nothing preventing them from trying to appropriate that set of conjectures and incorporate them into their system. If such an appropriation is possible, then it can serve to justify the system by demonstrating its increased applicability through being able to appropriate beneficial elements from other systems.

The second case, conflict between two conjectures in the same system, is dealt with by means of the standard assessments: which conjecture helps the system to expand its applicability or overcome a problem situation better than the other. As in the case of science, such evaluations may take some time to make.

Given what has been presented so far, we can move from generalities to seeing how P/L epistemology can be applied in a specific instance in order to interpret a specific theology, namely the theology expressed in recent Vatican documents.

Chapter III: A P/L assessment of Vatican Theology

In this chapter I will offer an overview of Vatican[119] theology as it appears from the standpoint of P/L epistemology. I will assess, albeit in broad terms, the extent to which the set of beliefs expressed in recent documents from John Paul II and the Congregation for the Doctrine of the Faith is a P/L system of conjectures.[120] In making this assessment, I will show that many of the beliefs expressed in these documents can fit a P/L epistemological understanding. Those cases in which their teaching runs counter to a P/L understanding I will use as opportunities to briefly discuss what this implies and what avenues a P/L epistemology suggests for development.

In making an assessment of these versions of Catholic beliefs, I will follow the order in which I presented elements of P/L epistemology in section 2.2 above. First, I will address how recent Vatican statements fit an activist epistemological understanding and why P/L epistemology is adequate for analyzing the set of beliefs behind them. Next, I will discuss how the Catholic system of belief fares from a P/L evolutionary perspective. Part of this discussion will include an assessment of the justification of the Catholic system of beliefs from a P/L perspective.

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[119] The word 'Vatican' is to be understood as including the Pope and the curial offices, particularly the CDF.

[120] There does not seem to be appreciable difference, epistemologically speaking, between the documents that have come from John Paul II and the Congregation for the Doctrine of the Faith, so I will consider them of a piece.

Another note should be made here. I understand that the Vatican's version of the Catholic system is not the only one, nor is it necessarily the best, from a P/L perspective. The fact that each Catholic has their interpretation of the system is likewise to be acknowledged. I am choosing to deal in this chapter with recent Vatican documents because these are documents that exert wide influence on Catholics.

3.1. Catholic Beliefs and P/L systems

The purpose of this section is to assess to what extent the beliefs expressed by John Paul II and the CDF fit the description of a P/L system of conjectures. Before delving into such an assessment, it behooves us to consider the extent to which the Catholic set of beliefs, as conceived by the Vatican, begins with an activist understanding of knowledge, since an activist epistemology is at the root of P/L epistemology. An activist epistemology, recall, is one in which our expectations and preconceptions determine the interpretation of our experience. In its "Instruction on Christian Freedom and Liberation," the Congregation for the Doctrine of the Faith, in addressing the tendency of some Liberation theologians to place experience as the starting point for theology, demonstrates how an activist understanding of epistemology under girds Church teaching:

> A theological reflection developed from a particular experience can constitute a very positive contribution, inasmuch as it makes possible a highlighting of aspects of the word of God, the richness of which had not yet been fully grasped. But in order that this reflection may be truly a reading of the Scripture and not a projection onto the word of God of a meaning which it does not contain, the theologian will be careful to interpret the experience from which he begins in the light of the experience of the church herself. (ICFL, §70)

Two elements of an activist epistemology are revealed by the CDF in this quotation. The first is that experience is not neutral; interpretation is required for its meaning to be understood. The second is that experience is the place for applying one's interpretation, in order to appreciate new aspects that had not been previously appreciated.

The body of recent Vatican documents seems to follow an activist understanding in which experience is to be interpreted in the light of faith. However, the epistemological activism of the Vatican is not the revolutionary type that is at the root of

P/L epistemology; rather, statements from the Vatican betray a conservative activist understanding, in which beliefs are to be maintained and new statements of beliefs fit into the structure provided by earlier ones. There is no replacement of beliefs as a revolutionary epistemology suggests there can be. I will return to a discussion of how the Vatican's conservative activism affects the set of Catholic beliefs after demonstrating that the set of Catholic beliefs can be suitably treated as a P/L system of conjectures.

In order to classify the set of Catholic beliefs as a P/L system of conjectures, I will demonstrate that Catholic beliefs have a hard core, a positive heuristic aimed at expanding its application and addressing problem situations, and a negative heuristic designed to guide discussion away from problem situations that are at present intractable. It is easy to characterize the hard core of the set of Catholic beliefs as that set of teachings to which full assent is required by the faithful. The assent that is required of these beliefs can be seen as a decision to not place them in doubt, just like a hard core is rendered methodologically irrefutable. Surrounding this hard core of Catholic beliefs are auxiliary beliefs; the level of assent that is expected for these depends on how closely they are tied to the central beliefs. It is easy to interpret the role of auxiliary beliefs in the set of Catholic beliefs along the lines indicated by a P/L understanding; it is the purpose of such auxiliary beliefs to connect the hard core beliefs with the experience and behavior of believers. An example could be the belief in solidarity with the poor and oppressed, which relates a central belief about the Body of Christ with the behavior and interpretations of experience of many of the faithful.

In Chapter Two I showed how P/L epistemology can include hermeneutic systems that are closely tied to interpretations of experience and behavior. Statements from the Vatican indicate that authentic Christian faith is to accompany moral behavior.

Other statements indicate that experience is modified by faith; an example is the following passage by Pope John Paul II:

> Moving beyond the stage of simple believing, Christian faith immerses human beings in the order of grace, which enables them to share in the mystery of Christ, which in turn offers them a true and coherent knowledge of the Triune God. (*FeR*, §33)

Again, it is not difficult to see the set of Catholic beliefs as a hermeneutic system. Part of the hermeneutic system is a reciprocal relationship between behavior, experience, and the hard core. Below, I will discuss some of the Vatican's shortcomings in fully appreciating this.

We now turn to considering whether the set of Catholic beliefs maintains a positive heuristic. Given that the Catholic Church, as understood especially by the Vatican, claims to have the system that possesses the fullness of revelation in Christ, it follows that it sees the possibility of applying the Catholic system of belief to nearly any set of experience. Further, the expansion of application is part of its problem situation, i.e. the mandate given by Christ in the Gospels to spread the Good News. We can see in this orientation a positive heuristic.

Along with the Church's claims to possess in Christ the fullness of truth comes the understanding that there are no areas of application that can remain problematic for it. In P/L terms, this means that the negative heuristic is not as evident in Catholic theology as it might be in other systems. One clearly visible aspect of the negative heuristic are the interventions by the Vatican in order to maintain the integrity of the faith. This can be seen as part of the negative heuristic because it communicates that certain directions of investigation run counter to the hard core beliefs of Catholicism.

Another aspect of the negative heuristic that can be found among the statements of the Vatican involves the topics and issues are to be avoided because the system is

unable at present to deal with them adequately. Pope John Paul II's mandate that discussion of the ordination of women to the priesthood be closed by the faithful illustrates this aspect of the negative heuristic. While certain elements of the experience of the Catholic faithful seem to challenge conjectures that are close to the hard core of the life of the Church (i.e. the male priesthood), at present there is no apparent way to harmonize these experiences with Catholic conjectures. From a P/L perspective, it is a valid move to suspend discussion, especially if such discussion can lead to a breach of other conjectures (including the unity of the Church). Whether there can be found a way to overcome the difficulty remains to be seen; however, one of the barriers that stands in the way of resolving the difficulty is the conservative activism (epistemologically speaking) that the Vatican follows.

With this issue we can turn to P/L criticisms of the Vatican's understanding of the Catholic system of beliefs. The central criticisms I wish to offer revolve around the Vatican's epistemological conservativism. This epistemological conservative activism is illustrated in two ways. First is the Vatican's view that the development of doctrine constitutes an accumulation of truth such that what is added is added to the existing body of teachings without displacing any of the contents. Second, and related to the first point, is the Vatican's view that the meaning of doctrinal statements remains constant while the manner in which they are expressed can change. This latter issue is called the content/context distinction by Thomas Guarino.[121]

The first point, that the development of doctrine constitutes an accumulation of truth, is clearly conservative. In repeated instances, Vatican documents highlight that

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[121] Thomas Guarino, "Rahner, Popper, and Kuhn: A Note on Some Critical Parallels in Science and Theology," *Philosophy and Theology* 8 (Autumn 1993): 83-89.

doctrine develops in such a manner that it builds on what has come before, and it does not undo what came before. An example comes from section 2 of Pope John Paul II's encyclical *Fides et Ratio*, in which he asserts that "every truth attained is but a step towards that fullness of truth which will appear with the final Revelation of God."

A difficulty that attends this view is that it works against the Church's addressing the problem situation of unity among Christians. Asserting that any doctrinal development has added to the set of Christian truths means that attempts at reunification will meet with the problem of agreement on doctrinal issues. If the Catholic Church cannot re-characterize the 'truths' that it has accumulated, then there will be little room for progress in reunification.

From a P/L perspective, the Vatican need not be so concerned about the accumulation of truths and it should be clearer about what constitutes the hard core of the Catholic system of beliefs. While there is recognition that there is a hierarchy of truths, more effort needs to be given to separating which truths are elements of the hard core and which are derivative from that hard core. This would allow for a reevaluation of what place certain beliefs play in the system. Some beliefs can be reinterpreted, particularly if they address problem situations that have passed or if the need that was perceived for them can be reinterpreted in light of a modern understanding. This could be a means for modifying the understanding of beliefs that stand in the way of the increased applicability of the hard core to problem situations or experiences.

The content/context distinction, described by Guarino, is the distinction, introduced by John XXIII in the opening prayer of Vatican II and incorporated into section 62 of *Gaudium et Spes*, that "the deposit of Faith or the truths [of doctrine] are one thing and the manner in which they are enunciated, in the same meaning and understanding,

is another." This theme is more fully developed in section 5 of the CDF's declaration *Mysterium Ecclesiae.*

From a P/L perspective, such an understanding is too simplistic. As has been mentioned, at any point in time a problem situation that confronts a system is how to provide an interpretation of its past that maintains its applicability in the present. But it is necessarily an interpretation that is needed. To state that the meaning of a statement remains the same while the form in which it is expressed can change adds nothing to the system; all a system can do is give interpretations. A P/L perspective can help to bolster the argument of Karl Rahner against such a view.[122]

Another element of P/L epistemology can help in viewing this situation: the understood reciprocation between experience, behavior, and the hard core. A benefit that stands to be gained by the Vatican's attention to the interrelatedness of experience, behavior, and belief is that it could give a much more complete, holistic picture of the life of faith. A consequence is that the Vatican would have to better acknowledge the reciprocal effect of experience and behavior on the Catholic system of belief.

Of course, all of these criticisms are moot in a P/L epistemology if indeed the Catholic set of beliefs as it stands can argue that it has greater verisimilitude than rival

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[122] Guarino, "Rahner, Popper, and Kuhn: A Note on Some Critical Parallels in Science and Theology," likens the view expressed by the CDF in *Mysterium Ecclesiae* to Popper's view of the myth of the framework, that is, Popper's view that it is possible to ascertain the content of an observation apart from one's theories. Rahner's response to the the CDF he sees along these lines of Hanson's view (appropriated by Kuhn) that our observations are so theory-laden as to make it difficult to separate the content from the theory. Rahner's does not reject that a sameness in doctrine should be the goal of any interpretation, but he rejects that the content/context distinction can be made as easily as the CDF seems to think it can be.

From a P/L perspective, Rahner is simply stating the obvious: the interplay between a hard core belief and experience that is made through auxiliary beliefs depends on interpretation. Such an interpretation, given as it is to be applicable to experience, draws from the understanding of experience of the culture in which it finds itself. Later generations, in producing interpretations that tie the hard core to experience and the experience of their predecessors, must try to give an interpretation that accounts for earlier generations' interpretations. To try to identify the real 'meaning' behind the interpretations is not easy.

religious systems and if it is demonstrating robustness through time in addressing its problem situations. Then it is justified in its conservative view that truth grows by accretion, because such an assertion is part of a justified system. Evaluating the Catholic set of beliefs by making comparisons with other systems is beyond the scope of this thesis, and it represents a direction for further inquiry.

There are two elements I will briefly consider in assessing how the Catholic system of beliefs deals with the evolutionary aspects of P/L epistemology; both involve the justification of the Catholic system of beliefs. The first is how well it is expanding its applicability; the second involves how well it is addressing its problem situations and the problem situations of other systems.

In expanding its applicability, the Catholic system shows promise. The emphasis that the Vatican has given to spreading the Good News and addressing the needs of the world can be traced through the Second Vatican Council's *Gaudium et Spes*. The activity of Catholics in such endeavors indicates that the Catholic hard core has maintained its ability to interpret experience and behavior.

An example of one aspect of this focus that is proceeding properly from a P/L perspective is enculturation with its emphasis on adapting the Catholic faith to local cultures without compromising the central tenets of the faith. John Paul II's statements on enculturation in sections 52-54 of *Redemptoris Missio* give an example of such an approach to enculturation. From a P/L perspective, they communicate that the Catholic system of beliefs is able to 'colonize' new cultures. In the process of enculturation, the Pope indicates, the Catholic understanding of the faith is enriched. This also corresponds to a P/L understanding in which the application of a hard core to experience has a reciprocal effect on the interpretation of the hard core.

It is through inter-religious dialogue that the ability of the Catholic system of beliefs to address its problem situations and those of rival religious systems can be assessed. While it is beyond the scope of this thesis to make such an assessment, what can be said is that the Church's willingness to enter into inter-religious dialogue symbolizes a positive move from a P/L perspective. From such a perspective, inter-religious dialogue can be seen as an opportunity for rival systems to address the problem situations of each other and, through the challenges that are brought by rival systems, to strengthen the application of the hard core; this perspective can be used to give approval to John Paul II's statement that

> [o]ther religions constitute a positive challenge for the Church: they stimulate her both to discover and acknowledge the signs of Christ's presence and of the working of the Spirit, as well as to examine more deeply her own identity and to bear witness to the fullness of Revelation which she has received for the good of all. (*Redemptoris Missio*, §56)

One final point is in order, and it pertains to the Vatican itself. In section 2.2.4, I pointed out that it a system sometimes includes provisions for an authoritative body that will interpret the hard core and judge the acceptability of auxiliary conjectures. I also pointed out that the Magisterium is provided for in the Catholic system. At the present time, the Vatican plays the principal role in magisterial pronouncements in the church.

The point to be made here is that to challenge the authority of the Vatican is not something that can easily be done in isolation. P/L epistemology reminds us of the connectedness of conjectures in a system. To make such a challenge implies challenging other elements of the system. The effectiveness of such a challenge will be

measured in P/L fashion, i.e. pragmatically, by the ability of a rival interpretation of the Catholic system to gain adherents, especially among the hierarchy.[123]

3.2. Conclusion

In Chapter One, I presented the philosophy of science and epistemology of Sir Karl Popper, and demonstrated these to be deficient in aiding an understanding of the endeavor of theology. In an attempt to augment Popper's epistemology, I introduced the philosophy of science of Imre Lakatos in Chapter Two. In that same chapter, I modified Popper's philosophy along Lakatosian lines and I proposed a Popperian/Lakatosian epistemology. I gave a brief demonstration of how such an epistemology can aid an understanding of theology.

In this chapter I have given a brief analysis of the Catholic system of beliefs from a P/L perspective. This has served to show the applicability of P/L epistemology to theology, while providing some insight into the Catholic system of beliefs.

In future research, this thesis can be taken in a variety of directions. Two in particular seem potentially fruitful to me. One is to develop the basic P/L epistemology that I developed in Chapter Two into a complete, viable epistemology that has a much wider scope. One of the greatest areas of fruitfulness for such an epistemology is that it provides a means for relating science and theology without succumbing to the pitfall of viewing theology as a purely scientific endeavor. The second is to develop a P/L interpretation of the development of Catholic beliefs in order to lay the groundwork for an

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[123] I recognize that this is problematic, given the Vatican's ability to assert its authority in making episcopal appointments. This, however, is part of the Catholic system at present. From a P/L perspective, the validity of such moves on the part of the Vatican will be borne out by the continued vigor, or lack thereof, of the Catholic system in the future.

assessment of how the system of Catholic beliefs can meet its challenges and problem situations.

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