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A Heideggerian route through Kuhnian revolutions

Ashley Knox

Louisiana State University and Agricultural and Mechanical College

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A HEIDEGGERIAN ROUTE THROUGH KUHNIAN REVOLUTIONS

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
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by
Ashley Knox
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TABLE OF CONTENTS

ABSTRACT.....	iii
CHAPTER 1: THE STRUCTURE OF SCIENTIFIC REVOLUTIONS AND <i>ALETHEIA</i>	1
1.1 Introduction	1
1.2 The Problem: Relativism and Scientific Progress.....	2
1.3 The Solution: Heidegger’s <i>Aletheia</i>	7
CHAPTER 2: THE KUHNIAN VIEW.....	11
2.1 Introduction.....	11
2.2 The Structure of Scientific Revolutions.....	11
2.3 Where Kuhn Goes Wrong.....	16
CHAPTER 3: THE HEIDEGGERIAN VIEW.....	21
3.1 Introduction.....	21
3.2 “The Origin of the Work of Art”.....	22
3.3 Truth as <i>Aletheia</i>	28
CHAPTER 4: SYNTHESIS.....	31
4.1 Introduction.....	31
4.2 Two Parallels.....	31
4.3 Kuhn’s Missing Element: <i>Aletheia</i>	35
4.3.1 Relativism.....	35
4.3.2 Scientific Progress.....	43
4.4 Concluding Remarks.....	48
REFERENCES.....	50
VITA	51

ABSTRACT

The aim of this thesis is to offer a defense of the philosophy derived from Thomas S. Kuhn's seminal work, *The Structure of Scientific Revolutions*. I focus on the persistent criticisms that Kuhnian science entails relativism and forbids scientific progress. My unusual line of defense appeals to Martin Heidegger's concept of truth as the Greek *aletheia* as explicated in his essay, "The Origin of the Work of Art." More specifically, I follow the concept of *aletheia* as presented through Heidegger's example of Van Gogh's *A Pair of Shoes* (1885).

The relevant parallels found between Heidegger's philosophy of art and Kuhn's philosophy of science suggest that a more Heideggerian interpretation of Kuhn is plausible, perhaps even enlightening. Kuhn's philosophy, however, lacks a crucial counterpart to Heidegger's *aletheia*. In the end, a Kuhnian-Heideggerian hybrid model of truth relating correspondence theory of truth to aletheic truth is presented. I propose that under this model Kuhn's most central theses regarding paradigms and the nature of scientific progress can be maintained. Moreover, the criticism of relativism and assertion that Kuhnian science does not permit scientific progress can be avoided. Thus, Kuhnian science finds a promising line of defense in Heidegger.

CHAPTER 1: THE STRUCTURE OF SCIENTIFIC REVOLUTIONS AND *ALETHEIA*

1.1 Introduction

It would be a safe bet to say that in 1962 no one could foresee the lasting reverberations that Thomas Kuhn's *The Structure of Scientific Revolutions* would have on the philosophy of science. The author himself wrote the essay as the expression of an idea that had been building in him all along, first as a physics student at Harvard, and then as a historian and sometime lay-philosopher of science. In its preface, Kuhn explains that exposure to antiquated scientific theory and methods in a science course aimed at non-scientists initiated his exploration into the rift between historical approaches to science and how scientists view their field and proceed with science. The main causes for concern were the apparent dissimilarities in perspectives regarding the very subject. If the goal is to come to an understanding of science as Science, then historical accounts need match up with the brute facts of Science itself.¹ Likewise, these brute facts of Science must be cashed out in such a way that is amenable with its history. In *Structure* Kuhn attempts to give a new conceptualization of Science based upon a reexamination of the historical record.

Kuhn focuses on the pattern in which Science is carried out, performed, *done*. His aim is to present a more accurate representation of how Science proceeds based upon what has occurred historically. While he concedes that the philosophical implications of his project are grand, it is not his interest to entertain such a conversation, at most mentioning those points he deems obvious or important. His seemingly neutral position creates a wriggling philosophical mess at which more than a few critics have taken stab. So great was the response to *Structure* that it earned the title of

¹ The "brute facts" referring to the enterprise of "Science," as opposed to the "facts of science" which might include such things as the Earth's being roughly spherical, light traveling at approximately 3×10^8 m/s, force being equal to mass times acceleration, etc.

most referenced book in the *Arts & Humanities Citation Index* from 1976-1983, a list which contains the likes of Derrida, Wittgenstein, James Joyce, and other influential thinkers.²

Additionally, it joins the group of “The Hundred Most Influential Books Since the Second World War” compiled by *The Times Literary Supplement*.³ As of 1992, *Structure* had sold more than one million copies worldwide, and has been translated into 16 languages.⁴

In a work that largely declines comment on the philosophical issues it raises, Kuhn opens up quite the can of worms with *Structure*. The overwhelming response can be attributed for a few reasons. Firstly, because Kuhn leaves the philosophical issues open ended. The implications of his account remain for the reader to fathom. As frequently noted, *Structure*'s aim is descriptive rather than prescriptive. And secondly, I imagine, because the implications that readers tend to gather rub both philosophers and scientists alike in the wrong way.

1.2 The Problem: Relativism and Scientific Progress

One unpleasant conclusion drawn from *Structure* is the charge of relativism. The claim stems from one of Kuhn's main theses, that scientific paradigms provide the model for how science is conceived of and carried out. Paradigms lay the foundation for the scientific problems, methods and standards that define a particular scientific tradition. A change in paradigms signals a scientific revolution: “Scientific revolutions are...non-cumulative episodes in which an older

² E. Garfield, "A Different Sort of Great Books List: The 50 Twentieth-Century Works Most Cited in the *Arts & Humanities Citation Index*, 1976-1983," *Current Contents*, No. 16, (20 April 1987). <http://www.garfield.library.upenn.edu/essays/v10p101y1987.pdf>, March 12, 2009.

³ "The Hundred Most Influential Books Since the War." *The Times Literary Supplement*, (6 October 1995), p. 39. http://entertainment.timesonline.co.uk/tol/arts_and_entertainment/the_tls/article5418361.ece, March 12, 2009.

⁴ Steve Fuller, “Being There with Thomas Kuhn: A Parable for Postmodern Times,” *History and Theory*, Vol. 31, No.3, (October 1992), p. 242. http://www.jstor.org/stable/2505370_March_21, 2009.

paradigm is replaced in whole or in part by an incompatible new one.”⁵ Not at all without controversy has Kuhn asserted that paradigms are incommensurable, meaning that they cannot be compared to one another. The extreme view suggests that paradigms are so radically different from one another that the language used in one cannot be understood from the perspective of the other. Given that paradigms are completely incompatible, there is no conceivable way to judge if one program of science is better than another. Which paradigm solves more problems or explains the facts more clearly? Which paradigm brings us closer to the truth? No outside criteria by which to judge paradigms can be provided. The upshot is that there is no good *reason* the scientific community selects one paradigm over another.⁶ The adoption of theories/paradigms is not a matter of comparing them against a set of clear scientific standards. Rather, the defining choice ultimately boils down to a battle of the subjective concerns of the scientists. The choice is *irrational*.

Accordingly, theories (at least some of which are candidates for paradigm status) are weeded out by the community of scientists essentially by a vote of yay or nay. But these votes are not based upon the notion of good old-fashioned “objective” scientific criteria. No, Kuhn suggests that each scientist understands and evaluates theories based upon her personal and subjective reasons, which are determined by her history and social standing. Scientific values are a matter of nurture, as opposed to nature. Once historical and sociological factors come into play it is often taken as a guarantee of relativism—for objectivity lies outside the realm of space, time, and human convention.

⁵ Thomas S. Kuhn, *The Structure of Scientific Revolutions*. (Chicago: University of Chicago Press, 1996), p.92.

⁶ Dudley Shapere, “Meaning and Scientific Change,” *Scientific Revolutions*. Ed. Ian Hacking. (Oxford: Oxford University Press, 1981), p. 55.

It is no surprise, then, that critics argue that Kuhnian science is deeply embedded with relativism. The Kuhnian view is damned on two levels. First, cultural relativism can be found with respect to individual scientists. Scientists make evaluative claims about new and old theories based upon their scientific values. Kuhn identifies five: accuracy, fruitfulness, breadth of scope, simplicity, and consistency. These scientific values are not completely objective, as a scientifically minded person is prone to think, but contain a subjective aspect. Each scientist judges the relative import of each value according to her own scale, itself a product of a complex mix of social and historical factors. Thus, the judgments of scientists, and subsequently, the ordered ranking of scientific values produced, are influenced by their social and historical standing. The implication is that the evaluation of theories does not take place against a standard set of scientific values, but is relative to one's subjective values, which are relative to their culture.

The choices of individual scientists combine to make up the decision of the scientific community as a whole. Scientists choose particular paradigms, and “there is no standard higher [for paradigms] than the assent of the relevant community.”⁷ The mark of a good paradigm is not its value with respect to objective, scientific values—those values typically considered to bring Science closer to the Truth. No, paradigms *become* good through assertive choice of a significant portion of the scientific community alone. Paradigms are not adopted because they are good; they are good because they are adopted. Since one's subjective values are shaped by her personal history and position in time and space, what counts as a good theory is actually a culturally dependent decision.⁸

⁷ Thomas S. Kuhn, *The Structure of Scientific Revolutions*, pp. 93-94.

⁸ Note that I am still following the traditional scientific view whereby good theories are those that help us get closer and closer to the truth. Scientists or philosophers with vastly differing views may hold other ideas about what counts as good. The point here is to briefly lay out the general criticisms raised against Kuhnian science.

In addition to cultural relativism, so-called truth relativism becomes apparent through Kuhn's notion of paradigms. Paradigms provide the framework for how science is carried out on a daily basis. They define the theories, methods and standards for how science can be done. Experiments and hypotheses are set up with respect to the current paradigm. Consequently, the conclusions drawn from experimental evidence are also made with respect to the current paradigm. The upshot is that the scientific "truths" discovered in Kuhnian science, not surprisingly, are defined by the paradigm. Kuhnian science seems to entail that science does not aim for reality "as it is," but merely describes it relative to the framework in place—the current paradigm. Scientific truth can no longer be considered an approximation of nature. Instead, it is a "truth" set out by the paradigm itself.

Typically scientific progress is said to occur when new theories/paradigms are thought to better approximate what nature is really like; that is, theories/paradigms are better and should be adopted whenever they get closer to describing how nature really is. But if truth is relative to a paradigm, then science can no longer take truth for its ultimate goal. Critics argue that without truth as the ultimate goal of science, the idea of scientific progress is compromised.

Thus, a second point of conflict concerns the nature of scientific progress. Given the criticism outlined above, it follows that new theories/paradigms do not bring us closer to understanding reality because all "truths" discovered under a particular paradigm are relative to the framework instated by the paradigm itself (as opposed to some "goal set by nature in advance").⁹ Because theories are evaluated based upon subjective, rather than objective, criteria, there are no proper standards for judging whether science is getting closer to the truth. A change in paradigms does not represent a shift towards a better or more complete understanding of nature. A change in theories/paradigms is just that, mere change. The result is that there is no basis for comparing

⁹ Ibid., p. 171.

scientific regimes to one another. The standards of *this* society and culture cannot properly be applied to those foreign or past. From the traditional scientific view, all paradigms are considered equally good, or more commonly, equally bad. Effectively, Kuhn is challenging the traditional notion of scientific progress—the idea that scientific facts are accumulating into a mass of knowledge that grows ever nearer a more accurate understanding of nature. The argument is that it is impossible to say resolutely whether science is *progressing* because “the replacement of one paradigm by another is not cumulative, but is mere change.”¹⁰

Kuhn insists that the idea of incommensurable paradigm shifts does not bar him from believing in scientific progress. As he explains, his understanding of progression borrows from the value-neutral Darwinian concept of evolutionary progress. This position can be seen as related to his commitment to anti-realism—a view that is a bit more than contrary to the typical scientist’s or philosopher of science’s realist view. The fervor with which realists deny anti-realism contains at least a smidge of the contention that anti-realism is *damaging* to the whole of the scientific project. Note, however, that while an anti-realist like Kuhn can consider science, lower case “s”, a “project,” the realist believes in Science with a capital “S”. For the metaphysical realist, Science aims at Truth itself, the way things “really are.” On the other hand, Kuhn adheres to the view that there is no comprehensive understanding of the universe which science creeps nearer still. Science continues *from* what has been given in the past, *towards no goal in particular*.¹¹ Scientific progress is non-linear.

The proposal is akin to the evolutionary process of natural selection whereby individuals well-adapted for the current environment will have a greater chance of reproducing (thus passing

¹⁰ Ibid., p.54.

¹¹ Steve Fuller, *Thomas Kuhn: A Philosophical History for our Times*. (Chicago: University of Chicago Press, 2000), p.13.

on their genes through their progeny) than those too ill-fit to live long enough to reproduce or win proper-enough mates to reproduce well. Similarly, in Kuhn's eyes scientific theories play a game of survival of the "fittest," with the scientific community acting as the selector.¹² Since the community's assent or dissent to particular theories is based upon subjective values, Kuhn's version of progress is a bullet that not all scientists or philosophers are willing to bite.

But not all hope is lost. In the Postscript addendum to the third edition of *Structure*, Kuhn presents a relatively brief defense that attempts to clear up all the confusions and expound upon ideas which were left too inchoate in the original work. The problem is that too little space is devoted for offering a full reply to each point of conflict. Not much is settled there and the same criticisms regarding relativism and progress have persisted. What might help clear the air, however, will not be obvious at first.

1.3 The Solution: Heidegger's *Aletheia*

The solution I am proposing draws upon the work of Martin Heidegger, a name that perhaps renders a small shock. Heidegger's own deprecating views¹³ of science notwithstanding, there are several, pertinent parallels to be found between his and Kuhn's thinking. Regarding

¹² This has come to be known as the Planck Effect, after Max Planck, who Kuhn quotes as saying, "...a new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because the opponents eventually die, and a new generation grows up that is familiar with it." Thomas S. Kuhn, *The Structure of Scientific Revolutions*, p.151, via Steve Fuller, *Being There*, p. 247.

¹³ To say Heidegger's view on science are deprecating is an understatement. Heidegger sees science as a disclosure of Dasein which renders everything in terms of objects. Rather than opening up the question of being, science forgets the question all together. Heidegger asserts that the particular ways in which science and technology proceed obscure the fact that they are particular ways of disclosing Being, amongst many others. Therein lays the problem. I take a less value-laden stance, based upon the position (the degree to which Heidegger would go along with is arguable) that science is fine and dandy as long as we recognize it for what it is, a particular mode of disclosure. One can take science as just another step, perhaps even a necessary one, in the question of Being. Perhaps it is our destiny to fulfill and complete this role. Likewise, one can view the "error" that philosophers had been thinking since the time of Plato as an era required in order for Heidegger to reach his revolutionary conclusion, namely that it is an error to think of beings rather than Being.

ontology, Heidegger noticed that the way the whole history of philosophy had preceded theretofore was based upon an error. Since the time of Plato, says Heidegger, philosophers had been perpetuating the mistake of thinking of being in terms of entities found in the world rather than how Being is disclosed in the first place. Similar to Kuhn's approach, Heidegger's revolutionary work relied upon a reexamination and reconstruction of the history. Secondly, as I shall draw out in greater detail, Heidegger's descriptive account of the work of art sounds remarkably in line with Kuhn's description of the manner in which Science proceeds.

The similarities between Kuhnian science and Heideggerian art are what initially attracted me to this project and stand for its justification. I know of no work that employs a systematic comparison of the relevant parts; one goal will be to rectify this.¹⁴ By taking a Heideggerian route through Kuhn's (scientific) revolutions, a viable path uniting science, philosophy, and truth will be blazed.¹⁵ The assumption is that the intuitions of scientists, philosophers of science, and realists alike pose a very real concern that needs to be addressed. They will want to know why it is they should take Kuhn, an anti-realist naysayer, seriously at all.

A few of my own intuitions for a Kuhnian defense appear in the Postscript to *Structure*, in nearly identical form to those I had formulated on my own prior to reading it. Given my background in Heideggerian philosophy, it is fair to surmise that Kuhn's thinking is a lot more in line with a Heideggerian interpretation than initially given at first glance. Despite his ignorance of Heidegger's work, it is possible that Kuhn's *Structure* is implicitly Heideggerian.¹⁶ I recognize

¹⁴ Barring Joseph Rouse's *Knowledge and Power*, whose attempt at bringing Heidegger and Kuhn together is of another sort. Rouse is concerned with hashing out the political effects that science has—a political philosophy of science. Joseph Rouse, *Knowledge and Power*, (Ithaca: Cornell University Press, 1987), p.xiv.

¹⁵ Ambitious? Yes, indeed.

¹⁶ I am no expert on Kuhn's life, but nothing I have encountered heretofore has suggested that Kuhn was at all familiar with Heidegger. This is especially plausible given his proper training in science and history rather than philosophy.

that this conjecture may serve merely to highlight the extent to which my own Heideggerian “hat” is being laid over Kuhn’s. But if the two accounts are amenable, and what’s more, *Kuhn’s theory becomes strengthened by such an interpretation*, it does not seem at all unreasonable to do so. In fact, it may prove enlightening.

The key components of Kuhn’s description of science will find an equal counterpart in Heidegger’s description of art. Heidegger’s philosophy on art, however, contains one critical element that Kuhnian science lacks, namely the notion of Truth as *aletheia*. For Heidegger, there are two “levels” of truth. The theory typically held by scientists is the correspondence theory, whereby truth is the accurate matching up of world and statements. Heidegger thinks that this type of truth is grounded by a separate notion of truth, the Greek *aletheia*. *Aletheia* is a type of truth which comes *prior* to and provides the “ground” for correspondence theory of truth. It is the truth of beings “as they are,” unconcealed and revealed as they stand before us.

Truth as *aletheia* will prove helpful in understanding Kuhn’s position. The defenses offered against charges of relativism and a questionable notion of progress in *Structure’s* Postscript will become more sensible and seem less antithetical to science if they are placed within a Heideggerian context. I hope to make it clear that it is a mistake to think of Kuhn’s work solely from the perspective of correspondence theory—the criticisms discussed here stem from this error. Whether Kuhn recognizes it or not, *aletheia* provides a unifying theme for *The Structure of Scientific Revolutions*.

I will begin in Chapter 2 by taking a look at what it is that Kuhn has to say about the inner workings of science in *Structure* and why it is that so many cry “Relativist! *Progress?*” In Chapter 3 I will focus on Heidegger and “The Origin of the Work of Art” so that in Chapter 4, a synthesis applying Heidegger’s concept of *aletheia* to Kuhnian revolutions can be presented. The parallels

found between *The Structure of Scientific Revolutions* and “The Origin of the Work of Art” will serve as a justification of sorts. Through the concept of *aletheia*, the defense offered in Kuhn’s Postscript to *Structure* will become much clearer, its force more powerful. *Aletheia*, as it turns out, will be Kuhn’s saving grace.

CHAPTER 2: THE KUHNIAN VIEW

2.1 Introduction

With the arrival of *Structure* came the introduction of a new vocabulary with which scientific and philosophical communities talk about science. Kuhn draws a distinction between normal science and revolutionary science. Normal science refers to “puzzle-solving” science that scientists carry out on a daily basis. Revolutionary science, as the name implies, consists of those much rarer occasions when a significant shift is made in scientific thinking. Essentially scientific revolutions mark the acceptance of a new paradigm in lieu of the old theories. This is perhaps most plainly illustrated by the Copernican revolution whereby the Ptolemaic view of an earth-centered universe was replaced by Copernicus’ heliocentric theory.¹⁷ Scientific revolutions are characterized by the controversial rejection of the old theory, effectively rendered incompatible with the new theory, and the proliferation of a new set of scientific problems for scientists to mull over. Revolutionary science does not just spring from nowhere or out of the unprecedented brilliance of one or a few scientists. It is the result of a continual process of anomaly accumulation, novelty recognition, and crisis. The purpose of Kuhn’s *The Structure of Scientific Revolutions* is to describe the scientific cycle of normal science and revolutionary science through these terms.

2.2 The Structure of Scientific Revolutions

The phrase “normal science” refers to the sort of routine science that is practiced everyday. It is defined by the so-called overarching paradigm which directs current scientific research. Paradigms provide the foundation for further scientific inquiry. They are the framework under

¹⁷ Ibid., p. 6. Kuhn also includes the work of Newton, Lavoisier, and Einstein as examples of scientific revolutions.

which normal puzzle-solving science proceeds and particular traditions of science are born. In other words, the paradigm sets up a structure for science in which there are not only specific problems available for solving, but also the means and information required to solve them. Kuhn explains, “Paradigms provide scientists not only with a map but also with some of the directions essential for map-making. In learning a paradigm the scientist acquires theory, methods, and standards together, usually in an inextricable mixture.”¹⁸ The paradigm itself determines how science is and can be done. Once a paradigm is in place, normal science sets out to solve all the “puzzles” the paradigm has constructed. Effectively, normal science attempts to tie up all the loose ends created by the paradigm.

From the scientist’s perspective, these puzzles are solvable under the paradigm so long as enough time, effort and resources are exhausted. This type of research comprises the everyday routine science that scientists carry out with the hopes of solving puzzles, or solving them more completely than anyone before them.¹⁹ Herein lays the scientists’ motivation. But if science is to progress (at least in the way that it has already done so), there must be a way for paradigms to change in order that inferior models be replaced.

As the process of normal science advances, says Kuhn, a mass of anomalies accumulates. Through the course of everyday science, scientists happen upon data notably dissimilar from the prediction made in the hypothesis. These data are inexplicable under the current paradigm; they are anomalous. Thus, anomalies are phenomena which resist explanation under the paradigm in place. They come in a variety of forms, from experimental results to fortunate accidents.

A collection of these anomalies prepares the way for the perception of novelty. Novelties often call forth new theories to help explain, for lack of a better word, their novelty. Novelty does

¹⁸ Ibid., p. 109.

¹⁹ Ibid., pp. 38-40.

not arise without resistance and difficulty, however. It is manifested against a background of expectation provided by the paradigm in place. Moreover, anomaly and novelty are often overlooked because of the influence of the anticipated results. Despite the difficulties, one or a few scientists (often coincidentally) will take notice of the novelties, perhaps recognizing a pattern in them which the current paradigm fails to explain. They begin to question the adequacy of current theories and even going so far as to formulate new theories in their place. Often new theories manifest themselves only implicitly at first, as a “hunch.” A scientist’s intuition about anomalies can slightly alter his course of experimentation or interpretation of results.

Kuhn explains that the mere awareness of anomaly opens up a period in which conceptual categories are tweaked until what initially appeared as anomalous eventually becomes appropriated as the norm.²⁰ The novelty of anomalies does not transform into the expected all on its own. No, anomalies earn acceptance through the proliferation of possible explanatory theories put forth by sympathetic scientists. But not all new theories will progress to paradigm level, warns Kuhn. He explains:

Both during pre-paradigm periods and during the crises that lead to large-scale changes of paradigm, scientists usually develop many speculative and unarticulated theories that can themselves point to the way of discovery. Often, however, that discovery is not quite the one anticipated by the speculative and tentative hypothesis. Only as experiment and tentative theory are together articulated to a match does the discovery emerge and the theory become a paradigm.²¹

As data begin to corroborate with a tentative theory, a discovery occurs. At that point scientists have the option of choosing between competing theories, including the old one. Ultimately the approval of a significant portion of the scientific community marks the inauguration of a new paradigm.

²⁰ Ibid., p. 64.

²¹ Ibid., p. 61.

The time between the recognition of anomalies and the adoption of an entirely new paradigm is marked by insecurity, debate and controversy within the scientific community. Kuhn notes that “scientific revolutions are inaugurated by a growing sense, again often restricted to a narrow subdivision of the scientific community, that an existing paradigm has ceased to function adequately in the exploration of an aspect of nature which that paradigm itself had previously led the way.”²² Scientists begin to have the uneasy feeling that some of the most fundamental suppositions guiding their work may actually be flawed. In Kuhn’s word, *crisis* has set in.

During the crisis stage, the boundaries of the old, still reigning paradigm become increasingly blurred. The rules of everyday science’s puzzle-solving become looser, “ultimately permit[ting] a new paradigm to emerge.”²³ The scientific society divides itself into two parties, those traditionalists holding on to the old ways, and those revolutionaries seeking to institute a new view, a new paradigm. The two camps represent competing paradigms with incompatible modes of scientific life. Each camp, however, can argue for the supremacy of its paradigm only from within the paradigm itself. A particular scientist’s “hunch” and subjective concerns will be lost on others. As in political revolution, change must be instated through mass persuasion rather than logic or probability.

Because the scientific community decides the fate of scientific theories, the progress of science depends part and parcel upon the society in which it is instituted and the accompanying values. In terms of rivaling paradigms, the scientists become divided based upon their subjective

²² Ibid., p. 92.

²³ Ibid., pp. 80, 84.

opinions. Once a majority has been swayed, it is safe to say that the new paradigm rules and the “old holdouts” will eventually be left behind.²⁴

Kuhn thinks the initiation of a new paradigm signifies a bona fide revolution. Since the paradigm itself determines the structure of how science is thought about and done, that is, it defines the theory, methods and standards available, a change in paradigms causes significant alterations in the scientific program. The criteria determining the problems and solutions to be worked on in normal science and anticipated under the new paradigm must also change in light of the new model. Once a new paradigm has been instituted, the whole perspective of science necessarily shifts accordingly. The scientists’ world *changes*.²⁵ Therefore, a switch in paradigms is appropriately called a *revolution*.²⁶

The changes instituted by a new paradigm take on a “global” level. Here Kuhn is not talking about a world-wide change, but an all encompassing shift in the way science is done. Not only do paradigms provide the basis for how scientific puzzles can be solved, but also determine what “shows up” as a scientific problem. They become the model from which all normal science

²⁴ Even old holdouts will eventually “talk the talk” of a new paradigm, may be fully persuaded by it, and even use it without the accompanying, necessary “gestalt switch” conversion. “He may use the new theory nonetheless, but he will do so as a foreigner in a foreign environment, an alternative available to him only because there are natives already there. His work is parasitic on theirs, for he lacks the constellation of mental sets which future members of the community will acquire through education.” Ibid., p.204.

²⁵ Ibid. p. 111. Kuhn’s idea that the world *changes* is not met without its own heap of controversy. Here I would make a Heideggerian explanation (and Kuhn, I think, would not disapprove), that the *earth* does not literally change, but the relationship the scientist maintains with it has. Kuhn: “Led by a new paradigm, scientists adopt new instruments and look in new places. Even more important, during revolutions scientists see new and different things when looking with familiar instruments in places they have looked before.” When Heidegger’s hammer suddenly breaks, its unsuitability for the task at hand becomes apparent. Other familiar items may “show up” as something else, i.e. a thing good for hammering. An example might be of a brick in the garden—simply pick it up and continue your hammering. Kuhn: “What were ducks in the scientist’s world before the revolution are rabbits afterwards.” World, in the Heideggerian sense of the word, *changes* but is always grounded in earth (to be discussed more thoroughly in Chapter 3).

²⁶Ibid., pp. 109-110.

flows. A change in paradigms signals a scientific revolution whereby the “inextricable mixture”²⁷ of theories, methods and standards that accompany a paradigm shift to match the new paradigm.

So great is the shift that paradigms are said to be incommensurable.

Of utmost importance to Kuhn’s theory is the idea that the practice of normal science effectively allows for novelty and paradigm shifts to occur. While normal science does not directly aim at this goal, and even seeks to suppress novelties, it nonetheless produces the novelties which initiate paradigm shift. In this way “traditional pursuit prepares the way for its own change.”²⁸ The structure of science ensures its own advancement.

2.3 Where Kuhn Goes Wrong

The now familiar criticisms lodged against Kuhn finds their roots in Dudley Shapere’s review published just two years after the original publication of *Structure*. Shapere discusses the way in which Kuhn’s account of science leads to relativism and the negation of progress.²⁹ The criticism of irrationality may be inferred. As characterized by Kuhn himself, critics contend that:

...the proponents of incommensurable theories cannot communicate with each other at all; as a result, in a debate over theory-choice there can be no recourse to *good* reasons; instead theory must be chosen for reasons that are ultimately personal and subjective; some sort of mystical apperception is responsible for the decision actually reached. More than any other parts of the book, the passages on which these misconstructions rest have been responsible for charges of irrationality.³⁰

²⁷Ibid., p.109.

²⁸Ibid., p. 65.

²⁹ Dudley Shapere, “The Structure of Scientific Revolutions,” *Paradigms and Revolutions*. Ed. Gary Gutting. (Notre Dame: University of Notre Dame Press, 1980), pp.34-38. See also: Dudley Shapere, “Meaning and Scientific Change,” *Scientific Revolutions*. Ed. Ian Hacking. (Oxford: Oxford University Press, 1981), pp. 28-59. This second article focuses more on relativism as found in Paul Feyerabend, but Shapere believes that Kuhn’s view follows the same wicked route. For Shapere’s critique of Kuhn, see especially pp.52-59 of the same essay.

³⁰ Thomas S. Kuhn, *The Structure of Scientific Revolutions*, pp.198-199.

If theories and paradigms are incommensurable,³¹ then theory-choice cannot be rational. Without recourse to objective criteria by which to judge particular theories and paradigms, then the traditional notion of science as Truth seeking is undermined. Moreover, if science is not truth-seeking, then when might a paradigm shift be considered progressive rather than regressive? What is more, the fact that theory/paradigm choice is dependent upon “personal and subjective” reasons makes Science a wholly relativistic discipline.

Shapere’s criticism begins with Kuhn’s claim of incommensurability, that “the differences between successive paradigms are both necessary and irreconcilable.”³² Recall that paradigms come with their own sets of methods, standards and instrumentation for carrying out science. Since paradigms “...disagree as to what the facts are, and even as to the real problems to be faced and the standards which a successful theory must meet...” they cannot be compared in any systematic way. Opposing paradigms are like apples and oranges. When choosing an orange over an apple, or vice versa, one’s only recourse is to subjective values. One cannot convince another that oranges are tastier by simply asserting their subjective feelings about oranges, although one may be persuaded by the other’s enthusiasm. Similarly, Shapere thinks that the adoption of a new paradigm cannot be based upon good *reason* of any sort.³³ It is only after a paradigm has been instituted that the decision appears to be a good one. Indeed, “what counts as good reason is determined by the decision” itself.³⁴ If one chooses the orange over the apple, then “tastier” *becomes* a good reason after the fact.

³¹ The extent to which paradigms are incommensurable is another point of contention among scholars. In this instance I resolve to let sleeping dogs lie.

³² Ibid., p.103.

³³ Dudley Shapere, *Meaning and Scientific Change*, p.54.

³⁴ Ibid.

Given an era of crisis, the theory that ultimately triumphs does not succeed based upon a convincing rational argument. One scientist will not persuade another by appealing to his own subjective opinion regarding the five scientific values (accuracy, consistency, fruitfulness, breadth of scope, and simplicity). A simplicity-lover does not trump a fruitfulness-abider. Arguments touting consistency cannot go to battle with those of accuracy. Kuhn likens the process to one of political revolution wherein the populace is converted with rhetoric rather than reason. Therefore, the choice between theories is at the very least *a*-rational, and more strongly, *irrational*.

Because paradigms are incommensurable, there are no objective standards, i.e. good reasons, applicable to theory-choice. The paradigm itself sets the standards. One cannot determine which paradigm solves more problems, solves problems more completely, or deals with the facts better. Accordingly, judgments of good science cannot be made between two paradigms, but only from *within* the paradigm by its own standards. Since there are no objective criteria, the various scientific “truths” uncovered by different paradigms are not comparable either. It is impossible to say whether one paradigm is scientifically superior, whether it comes closer to the truth. Scientific truths are relative to its framework—the paradigm in place. Hence, Kuhn’s dreaded relativism.

If Shapere is correct, then Kuhn will find himself with yet another problem. Quite obviously, relativism with respect to truth undermines the idea that Science is aiming (or should be aiming) at Truth.³⁵ Without this notion of truth, the idea of scientific progress falls apart. Shapere notes that a change in paradigms does not signify the accumulation of more facts or knowledge. Rather, it is mere change.³⁶ Furthermore, Kuhn: “What occurred was neither a decline nor a raising of standards, but simply a change demanded by the adoption of a new paradigm.”³⁷ Kuhn

³⁵ At least when one thinks of truth in the traditional sense (correspondence theory). Later, I will argue that Kuhn’s view makes more sense if we think of truth in terms of Heidegger’s *aletheia*.

³⁶ Dudley Shapere, *Meaning and Scientific Change*, p.54. My italics.

³⁷ Thomas S. Kuhn, *The Structure of Scientific Revolutions*, p.108. My italics.

concedes his view of science entails the rather “disturbing” conclusion that science is “...a process whose successive stages are characterized by an increasingly detailed and refined understanding of nature,” but that “nothing that has been or will be said makes it a process of evolution *toward* anything..” despite our being “deeply accustomed to seeing science as the one enterprise that draws constantly nearer to some goal set by nature in advance.”³⁸ Progress is change in response to, perhaps even adaptation to, the scientific community.

Through the choice of a new paradigm, the community of scientists bears a considerable amount of responsibility for guiding the course of science. If there were only objective standards to consider when choosing a theory, then scientists and philosophers could rest a bit easier. Theories would be judged according to specific criteria in a checklist of sorts. The process of determining which theories are best and most promising would run like a routine checkup. Simply tally the score and reward the winner—no dispute there. But Kuhn’s whole thesis relies on its inclusion of the subjective aspect; without it, his view is no different from the traditional one.³⁹

The subjective aspect suggests that theory-choice is culturally relative. During a period of crisis, the community of scientists is faced with a number of competing theories to choose from, including the old ones. The theories are evaluated and selected based upon the five fundamental scientific values. However, the order in which a particular scientist ranks the importance of each value will depend upon her personal history. One may be drawn to simple, elegant theories over those offering an overarching scope. Another may favor accuracy above all else. A third, fruitfulness; and so on and so forth. It is even conceivable that a particular scientist’s values may waver over time or with respect to specific kinds of problems. The point is that each individual

³⁸ Ibid., pp.170-171.

³⁹ Husain Sarkar, *Group Rationality in Scientific Research*. (New York: Cambridge University Press, 2007), p.157.

scientist's beliefs, which determine theory-choice—and thus the course of science—are a result of their place in history and society; in a word, their *culture*.

If Shapere (and others) are correct, then Kuhn's view, while an interesting one, bears no weight upon the champions of science. If anything, it marks out what science should avoid. Embedded with relativism, irrationality, and a questionable idea of progress, Kuhn's view seems not at all respectable from a scientist's perspective. Indeed, the central theses presented in Kuhn's *The Structure of Scientific Revolutions* seem to undermine the very foundations of the scientific enterprise.

CHAPTER 3: THE HEIDEGGERIAN VIEW

3.1 Introduction

Heidegger holds an unusual opinion of science that is often considered antithetical. Heidegger makes no bones about his derisive view, but I shall lay these concerns aside for others to contemplate, especially as they relate to this thesis.⁴⁰ Although it is not my goal to pass any evaluative claims upon Kuhn's work—however implicit or explicit they might be found to be—I think Heidegger would be very dissatisfied with the aim of this project. Still the point here is that 1) relevant parallels between Kuhn and Heidegger's thinking abound, and thus 2) Kuhn's view might find a good line of defense through a more explicitly Heideggerian approach, and if so, 3) Kuhnian science begins to make more sense and seems *less* antithetical to science as it wards off the claims of relativism and charges that his view implies a denial of scientific progress. The comparison is not only permissible but perhaps even desirable for Kuhnian science. Note that my aim is not to demonstrate through textual analysis that Kuhn does in fact maintain the idea of truth as *aletheia*. *Aletheia* will not be found buried beneath the surface of his prose, at least not here. Some textual analysis will be given in order to demonstrate that Kuhn's view is at least open to this addition. I intend to show that Kuhn's defense becomes more sensible—and thus strengthened—if we consider the notion of truth as *aletheia* to be at work, whether Kuhn recognizes it or not.

Now it is time to take a brief pause from science and ease our way into Heidegger and the work of art. The path may feel like a winding detour at first, but after the synthesis presented in

⁴⁰ An interesting project, I think. Heidegger has been criticized for his seemingly dogmatic allegiance to the primitive and the pastoral, to poetry and the arts. While he does give good reason for doing so—that is, he believes that the disclosure offered by science and technology is one of *Gestell*, or enframing, whereby man forgets that he has forgotten the true nature of being—his unwavering loyalty is perhaps a bit overzealous and could benefit from moderation.

Chapter 4, I hope to have found a Heideggerian shortcut straight through the heart of Kuhnian science.

3.2 “The Origin of the Work of Art”

Perhaps the only *uncontroversial* thing to say about Heidegger is that his philosophy is mainly concerned with Being. Heidegger thinks that all of Western philosophy has made an error in thinking about ontology in terms of the particular entities, *beings*, rather than Being. By reexamining the history of philosophy, he attempts to correct the mistake and provide a new way of reflecting upon ontology. The path made from a history of ontology towards a new understanding of ontology runs parallel to the road from the history of science towards a new understanding of science.⁴¹ The Heideggerian route lies not far from Kuhn’s.⁴²

Especially germane to Kuhn’s work is Heidegger’s philosophy on the work of art. Heidegger’s investigation into art is not one of aesthetics, but primarily one involving the “work” of art. The artwork works, but in what way? Heidegger thinks that the work of art “opens up the Being of beings” such that it is a “deconcealing” of the “truth of beings” which happens in the art.⁴³ “Art,” says Heidegger “is truth setting itself to work.”⁴⁴ The truth that art sets to work is that of *aletheia*.

⁴¹ One notable difference appears that is worth mentioning. Heidegger is making a normative claim about how we *should* think about ontology. Kuhn, on the other hand, vehemently denies any sort of normative claims, implicit or explicit, within *Structure*. Given the parallels between the two, and the arguments presented against Kuhn to that end, it seems a fair case to say that Kuhn’s philosophy might very well contain a normative element. This debate, however, extends beyond the scope of this thesis.

⁴² Although I suppose Heidegger was first, so if anything Kuhn wrought his path not far from where Heidegger’s lay.

⁴³ Martin Heidegger, “The Origin of the Work of Art,” *Poetry, Language, Thought*. Trans. Albert Hofstadter. (New York: Harper Collins, 2001), p. 38

⁴⁴ *Ibid.*

Heidegger offers the example of the peasant shoes depicted in Vincent van Gogh's *A Pair of Shoes* (1885) to help explicate his claim.⁴⁵ The peasant simply wears the shoes without reflecting upon them. They are an item which appears as "ready-to-hand" equipment for their owner who normally proceeds about life without concern for them until they fail in their usefulness, as when holes permit the entrance of wind and rain. For a fleeting moment the inadequate shoes show up as "present to hand," a different and deficient mode of encountering objects in which items appear separate from their usefulness or relation to their perceiver. In Heideggerian terms the perceiver is Dasein –quite literally, "being there."⁴⁶ For an item to appear separate from Dasein is for it to appear merely as "earth," outside of Dasein's interpretive projection, what Heidegger calls "world."⁴⁷ It only takes a moment before the shoes reappear as ready-to-hand, this time as an item needing repair.

⁴⁵ Art historian Meyer Schapiro has famously noted that the peasant shoes in the painting are Van Gogh's own, and thus, do not belong to a peasant. See Meyer Schapiro, 'The Still-Life as a Personal Object – A Note on Heidegger and Van Gogh,' *Theory and Philosophy of Art: Style, Artist, and Society*. (New York: Braziller), pp.135-42. While some find this to be a contentious bone for Heidegger's philosophy of art, I think that if anything it serves to show that interpretation of the *world* (Heideggerian sense of the word) is inescapable. It is irrelevant what the actual painting depicts if that is how it is "working" i.e. as peasant shoes. Babette Babich offers a defense of Heidegger's interpretation of Van Gogh's shoes in "From Van Gogh's Museum to the Temple at Bassae: Heidegger's Truth of Art and Schapiro's Art History," *Culture, Theory & Critique*, 2003, 151-169, especially p. 161.

⁴⁶ For all intents and purposes of this paper, Dasein can be thought of as any being for which there is a world, i.e. human beings. Dasein's primary mode of being is being-in-the-world, that is, Dasein is always in relation to world.

⁴⁷ A more in-depth discussion of these two terms appears a bit further down.



Figure 1, Van Gogh, *A Pair of Shoes*, (1885)⁴⁸

The peasant's world consists of all that is ready-to-hand to her, including her shoes. We can gain access to the peasant's world through Van Gogh's painting. The painting opens up the peasant's world for us:

From the dark opening of the worn insides of the shoes the toilsome tread of the worker stares forth. In the stiffly rugged heaviness of the shoes there is the accumulated tenacity of her slow trudge through the far-spreading and ever-uniform furrows of the field swept by a raw wind. On the leather lie the dampness and richness of the soil... This equipment is pervaded by uncomplaining anxiety as to the certainty of bread, the wordless joy of having once more withstood want and trembling before the impending childbed and shivering at the surrounding menace of death. This equipment belongs to the *earth* and it is protected in the *world* of the peasant woman. From out of this protected belonging the equipment itself rises to its resting-within-itself.⁴⁹

The peasant, however, knows all of these things without pausing to notice or reflect upon them.⁵⁰

For her the equipmental quality of the shoes arises out of their usefulness, the "abundance of an essential being of the equipment... [that which we call] reliability."⁵¹ From this reliability the

⁴⁸ <http://en.wikipedia.org/wiki/File:VanGoghShoes1885.jpg>

⁴⁹ Martin Heidegger, "The Origin of the Work of Art," p.33.

⁵⁰ Ibid.

⁵¹ Ibid.

peasant worker hears the “silent call of the earth. . .she is sure of her world. World and earth exist for her, and for those who are with her in her mode of being, only thus—in the equipment.”⁵²

Through the shoes’ constant reliability, the peasant woman’s world and existence are assured.⁵³

Moreover, the truth of equipment—what the shoes are—becomes known to the peasant. We, on the other hand, have access to the peasant’s world only through the work of art. The truth of equipment—the truth of the shoes—makes itself known through the painting as a sort of uncovering.

To reach Heidegger’s understanding of truth as uncovering that is revealed in the work of art, we must first grasp his concepts of world and earth. The two terms take on a special meaning. By earth, Heidegger is referring to that which is raw empirical, *uninterpreted* perception. Earth is brute existence, outside of interpretive Dasein. On the other hand, *world* denotes Dasein’s interpretation of earth.

The *world worlds*, and is more fully in being than the tangible and perceptible realm in which we believe ourselves to be at home. World is never an object before us and can be seen. World is the ever-nonobjective to which we are subject as long as the paths of birth and death, blessing and curse keep us transported into Being. Wherever those decisions of our history that relate to our very being are made, are taken up and abandoned by us, go unrecognized and are rediscovered by new inquiry, there the world worlds.⁵⁴

In plain English, world is not made up of mere “tangible and perceptible” objects but the meaningful web created by all that is ready-to-hand for Dasein.⁵⁵ The notion is a bit abstract.

Examples of worlds might include that of a peasant in 19th century Europe, a 21st century American

⁵² Ibid., pp.33-34.

⁵³ Robert B. Stulberg, “Heidegger and the Origin of the Work of Art: An Explication,” *The Journal of Aesthetics and Art Criticism*, Vol. 32, No. 2 (Winter, 1973), p.259. <http://www.jstor.org/stable/429043>, April 6, 2009.

⁵⁴ Martin Heidegger, “The Origin of the Work of Art,” p. 43.

⁵⁵ William H. Bosshart, “Heideggers’ Theory of Art,” *The Journal of Aesthetics and Art Criticism*. Vol. 27, No. 1 (Autumn, 1968), p. 58. Stable URL: <http://www.jstor.org/stable/428529>, April 9, 2009.

philosophy student, or that of an ancient Greek. Through Van Gogh's painting, Heidegger says we are exposed to a whole new world, i.e. the daily toils, troubles, and simple joys of a 19th century peasant woman.

World consists of the collection of *meaningful* interpretations of Dasein. Consequently, plants, animals and stones cannot rightly be said to possess a world but as Dasein, the peasant woman does. The peasant woman "dwells in the overtness of beings, of the things that are. Her equipment, in its reliability, gives to this world a necessity and nearness of its own....In a world's worlding is gathered...[a] spaciousness..."⁵⁶ The worlding of a world gathers the "spaciousness," the opening available to Dasein. As the peasant woman's world *worlds*, the space or clearing that is accessible to her is opened up.

The clearing represents the space of possible projection available to her. For instance, given that she is of a certain age and sufficient health, the possibility of bearing children is open to the peasant woman. As her world *worlds*, the space is "gathered" and opened up, but not all possibilities are possible. The peasant woman does not have the option of becoming a blogger because the World Wide Web and blogging would not come about for roughly another 100 years. Furthermore, the clearing is the background against which Dasein's interpretive projections play, against which beings show up.

Just as the reliability of the peasant shoes reveals their equipmental truth to their owner, the artwork reveals their truth to *us*. This is the function of art. Art sets up a world and holds it open. As a work that works, artwork "makes space for that spaciousness."⁵⁷ In Van Gogh's painting, the shoes represent brute existence (earth) while the painting itself opens up a space (the world of the

⁵⁶ Martin Heidegger, "The Origin of the Work of Art," pp.43-44.

⁵⁷ Ibid., p. 44.

peasant woman) and offers it to us. The apparent rift between world and earth allows us (Dasein) to call Being into question. In the process, the “actual natures” of beings are revealed.

World and earth are in conflict, but also depend upon one another. Dasein’s interpretive world is his attempt to render the unintelligible earth intelligible. These worldly interpretations are not completely arbitrary, however, but grounded in earth. “The world is not a mere collection of the countable and uncountable, familiar and unfamiliar things that are just there. But neither is it a merely imagined framework added by our representation to the sum of such given things.”⁵⁸ What is more:

The world is the self-disclosing openness of the broad paths of the simple and essential decisions in the destiny of an historical people. The earth is the spontaneous forthcoming of that which is continually self-secluding and to the extent sheltering and concealing. World and earth are essentially different from one another and yet are never separated. The world grounds itself on the earth, and earth juts through the world...The world, in resting upon the earth, strives to surmount it...As self-opening it [world] cannot endure anything closed. The earth, however, as sheltering and concealing, tends always to draw the world into itself and keep it there.⁵⁹

Dasein’s interpretive projection (world) strives to understand earth/existence, which is actually impenetrable. The earth conceals itself and becomes apparent only through Dasein’s interpretive projection onto it, his world. When the artwork works, another world is opened up and the rift between unintelligible earth/brute existences/the shoes and world/interpretive projection/what is expressed in the painting, manifests itself. The painting grants access to “what the peasant shoes really are...by unveiling the truth of the peasant shoes’ being...art works reveal the ‘actual nature’ or ‘being’ of things and serve to unveil ‘the truth of what is’...”⁶⁰ The shoes/earth become

⁵⁸ Ibid., p. 43.

⁵⁹ Ibid., p.47.

⁶⁰ Robert B. Stuhlberg, “Heidegger and The Origin of the Work of Art: An Explication,” p.260.

disclosed, unconcealed to us through the work of art. For Heidegger, this type of unconcealment that happens in a working work is an occurrence of truth. But what sort of truth is it?

3.3 Truth as *Aletheia*

The peasant already knows the truth of the shoes through her relation to them as equipment. But how did *we* come upon the truth? Heidegger says that their truth is made known not by description or analysis, but by the presence of the painting. “The art work lets us know what the shoes are in truth.”⁶¹ Standing before the work of art, the truth of the peasant shoes is revealed through the work. Heidegger:

Van Gogh’s painting is the disclosure of what the equipment, the pair of peasant shoes, *is* in truth. This entity emerges into the unconcealedness of being. The Greeks called the unconcealedness of beings *aletheia*...If there occurs in the work the disclosure of a particular being, disclosing what and how it is, then there is here an occurring, a happening of truth at work.

The artwork works as a disclosure of being as it is. The artwork unconceals beings in their being; it reveals the truth in the Greek sense of *aletheia*. Truth happens “in the fighting battle between world and earth” brought about when the artwork works.⁶² This truth is an objective truth.⁶³

Through Van Gogh’s *A Pair of Shoes* (1885) the true nature of the peasant’s shoes reveals itself. The essence of “art is truth setting itself to work.”⁶⁴

Heidegger proposes that the truth of beings is an uncovering, or *aletheia*, which occurs through the work of art. This is in contrast to the traditional notion of truth which is usually formulated as the correspondence theory. In the correspondence theory of truth, statements are true

⁶¹ Martin Heidegger, “The Origin of the Work of Art,” p.35.

⁶² *Ibid.*, p. 48.

⁶³ William S. Hamrick, “Heidegger and the Objectivity of Aesthetic Truth,” *The Journal of Value Inquiry*, Vol. 5, No.2, (March 1971), p.120. <http://www.springerlink.com/content/x0361658272018r6/>, April 22, 2009.

⁶⁴ *Ibid.*, p.38.

if they match up, i.e. correspond, to the state of affairs found in the world. Thus it is easy to see why this is the definition of truth commonly held by scientists—their whole project is an attempt to accurately match up propositions with nature. Yet Heidegger believes that this is not the full story.

Truth as *aletheia*, the Greek notion of unconcealment, comes prior to correspondence theory:

Truth means today and has long meant the agreement or conformity of knowledge with fact. However, the fact must show itself to be fact if knowledge and the proposition that forms and expresses knowledge are to be able to conform to the fact; otherwise the fact cannot become binding on the proposition. *How can fact show itself if it cannot itself stand forth out of concealedness, if it does not itself stand in the unconcealed?...This nature of truth which is familiar to us—correctness in representation—stands and falls with truth as unconcealedness of beings.*⁶⁵

Truth as correspondence depends upon the notion of truth as *aletheia*. Beings must reveal themselves in unconcealment before one can determine their level of correspondence with propositions. Thus, *aletheia* “underlies our familiar and therefore outworn nature of truth in the sense of correctness.”⁶⁶ Heidegger believes that the unconcealedness of beings (Being) is what allows for representation in the first place.⁶⁷

The entire *realm* in which this ‘conforming to something’ goes on must already occur as a whole in the unconcealed; and this holds equally of that *for* which the conformity of a proposition to fact becomes manifest. With all our correct representations we would get nowhere, we could not even presuppose that there already is manifest something to which we can conform ourselves, unless the unconcealedness of beings had already exposed us to, placed us in that lighted realm in which every being stands for us and from which it withdraws.⁶⁸

In order for there to be something to correspond to propositions, those things must first reveal themselves in unconcealment. They must stand out in the “clearing,” the space that allows for

⁶⁵ Ibid., p. 50, My italics.

⁶⁶ Ibid.

⁶⁷ Ibid.

⁶⁸ Ibid., p. 51.

human access to beings other than us.⁶⁹ The work of art holds open the clearing, permitting the struggle between world as Dasein's interpretive projection and earth as brute existence. Out of the wreckage arises the truth of what is, the uncovering of being. In a word, *aletheia*.

⁶⁹ Ibid.

CHAPTER 4: SYNTHESIS

4.1 Introduction

At this point the parallels between Kuhn and Heidegger have yet to become obvious, and likely even more unclear than before. Heidegger's unusual discourse about the work of art, earth, world and *aletheia* seems to have taken us far from the beaten trail. In this final chapter I hope to show us the way back—a Heideggerian route through Kuhnian revolutions.

The key move will be to demonstrate the analogous thoughts between Heidegger and Kuhn. The comparison will show that Kuhnian science lacks a counterpart to Heidegger's concept of *aletheia*. I propose that the addition of *aletheia* to Kuhnian science will moderate the persistent criticisms concerning relativism and the nature of scientific progress.

Heidegger re-appropriates the Greek notion of truth as *aletheia*, or unconcealment. Beings must be revealed in truth, aletheically, before propositions about them can be found to be in accord with them. Thus, *aletheia* comes prior to and provides the ground for correspondence theory of truth. Without the notion of *aletheia*, Kuhnian science lies prone to the criticism of relativism. And if Kuhnian science is relativistic, then the notion of scientific progress is compromised.

4.2 Two Parallels

The first parallel worth mentioning involves the procession of art and science.⁷⁰ Heidegger's description of the cycle of art is remarkably similar to Kuhn's scientific cycle of revolutionary and normal science. Heidegger thinks that artworks open up the question of Being and reveal the truth of beings. Each work of art raises the question anew, thus revealing truth in a

⁷⁰ For Kuhn's own take on the relation between art and science, see Thomas S. Kuhn, [The New Reality in Art and Science]: Comment, *Comparative Studies in Society and History*, Vol. 11, No. 4 (Oct., 1969), pp. 403-412. <http://www.jstor.org/stable/178072>, April 19, 2009. There, Kuhn is largely critical of "Professor Hafner's" attempt to draw parallels between art and science, particularly his effort to make scientific value one of aesthetics. Kuhn disagrees with him on three points (that are quite different from those that appear here).

new light. Occasionally, truly innovative artworks arise which frame the question of Being in a new manner. These artworks are revolutionary. Revolutionary artworks open up a new “era” for a people. By defining a people’s epoch, i.e. their history, these artworks set up the frame for how the truth of beings is revealed. It is a people’s duty to fulfill their destiny—to work out the issues raised by the work of art. This is their vocation. Usually this entails the production of subsequent works of art that act as “articulators” of the question raised by the revolutionary work. The “articulation” of the question continues until it is appropriated by a people.⁷¹

Revolutionary artworks can be compared to revolutionary science, articulating artworks to normal science. Revolutionary artworks/paradigms instituted by artistic/scientific revolutions provide the framework not only for how truth is uncovered, but also come with accompanying methods and standards for carrying out the “work” of the issues that they define. Subsequent art articulates the question raised by the innovative artwork until a people has exhausted or assimilated the question. Similarly, normal science carried out under a particular paradigm articulates the problems raised by revolutionary science until a people, usually limited to the community of scientists, has (nearly) exhausted or assimilated the issues. Unlike artwork, however, the course of science is guided by and thrust forward by anomalous data. Anomalies “stick out” and refuse to be appropriated, thus calling attention to areas of the paradigm which require revision. By bringing attention to specific areas, the anomalies *point* towards the space in which science must go. While normal science often goes so far as to suppress the appearance of novelties, some (and certainly not all) manage to peek through. Hypotheses regarding anomalies can become paradigm contenders, and thus contenders for the course of science. As Kuhn says, the process of normal

⁷¹ Unlike scientific paradigms, artworks are not entirely incompatible. Revolutionary artworks need not completely replace the ones from before. There can be several instances of great artworks and accompanying unconcealments of being acting simultaneously.

science, anomaly accumulation and revolutionary science ensures the progression of science.⁷²

For both Kuhnian science and Heideggerian art, the cycle consists of articulation and revolution.

The second comparison I would like to draw is between Kuhn's conception of empirical data and paradigms versus Heidegger's earth, world, *aletheia* and the clearing. Kuhnian paradigms appear to perform a similar role as Heidegger's clearing, while scientific data are comparable to Dasein's interpretive projections. Both science and art have specific materials, methods and standards which participate in "articulating." Finally, just as art movements frame the question of being and the revelation of truth in particular ways, different paradigms will provide different frameworks for how the question is asked and how truth is revealed.

The obvious parallel to Heidegger's concept of world (the collected interpretive projections of Dasein) is the collection of scientific data as interpreted information gathered from experiments involving nature/entities.⁷³ Dasein's interpretive projections are limited to the range set out by the clearing. The work of art further opens up and holds open the clearing so that beings "as they are" may be revealed. By extrapolation, the materials, methods and standards which compose art serve as the tools of articulation for that particular art movement. What is more, the materials, methods and standards are those set out by the revolutionary artwork. The different schools of art may raise diverse questions about Being, thereby shaping the way truth of beings is revealed. In the case of science, interpretations are held within the limited range carved out by the particular paradigm in place. Experiments open up and hold open the paradigm, while the theories, methods and standards

⁷² Heidegger never spells out what sort of "novelties" might direct the course of art, if any. However, there must be some elements which are retained in successive eras of art, such that revolutionary artworks are relatable to those prior. If new artworks were completely dissimilar than those before, then the people would not recognize it as art. (Even artwork that takes a completely opposite approach would still be relatable, i.e. as the exact opposite of prior art.) Despite incommensurability of paradigms, the same might be said for science.

⁷³ Using the word "interpretation" here is not meant to insinuate any sort of relativism or evaluative judgment on the part of science that is not inherently present already. Recall that one of the final steps of the scientific method (which is widely agreed upon) is entitled "Interpretation of Data." The scientific method itself leaves open an area of subjectivity.

instantiated by that paradigm act as the tools of articulation. In Kuhn's words, normal science attempts to "mop up" or tie up all the loose ends set out by the paradigm. A shift in paradigms (a scientific revolution) signifies a drastic change the way the same scientific issues are looked upon—as Kuhn says, what were once ducks are now rabbits. As in the case of the work of art, the paradigm also shapes the way truth can be revealed. Note however, that the paradigm does not dictate or determine what counts as truth.

The fact that the clearing and paradigms determine how truth is revealed does not entail that truth is merely relative to the framework. The clearing/paradigms mark out the possibilities for how and which truths can be unconcealed in the play between world/earth and scientific interpretations/nature. These interpretations are not wholly arbitrary, however, but insofar as they participate in the unconcealedness of being, i.e. *aletheia*, they uncover truth. Heidegger explains that Dasein's interpretive projection, *world*, is grounded in brute existence, *earth*. The truth of beings arises out of the struggle between the two. Similarly, it seems fair to say that interpreted scientific data is grounded in the objects of scientific inquiry; quite literally, scientific data is based in "earth." In science, truth is discovered in the struggle between interpretive data and nature.

The conflict between world and earth might be applied to science as well. Interpretive data attempt to grasp the ever-unintelligible entities of nature just as Dasein's world tries to comprehend being. In both cases, earth/entities interject themselves into world/interpretation as needing to be understood. But earth/entities remain ever elusive. Earth can never be fully comprehended by Dasein's world, because the earth is self-secluding. Likewise, scientific data can never completely account for natural entities. Scientists are alerted to the inadequacy of their work by anomalous phenomena. These anomalies resist appropriation by the current paradigm, thereby calling attention to the impenetrability of nature. Carrying the analogy through, Kuhn could argue

that somewhere amidst the struggle between data and objects of scientific inquiry, the beings of nature are unconcealed.⁷⁴ Science, then, truly does reveal truth.

4.3 Kuhn's Missing Element: *Aletheia*

The key element lacking in Kuhn's *Structure* is that of unconcealment, revealing, *aletheia*. In order for science to expose objects of inquiry (beings) "as they are," some sort of ground is required; otherwise, Kuhnian science will fall back into truth relativism. Taking the Heideggerian perspective, the reality of beings is revealed in the conflict between interpretive data and natural entities. Once beings in nature are revealed, they can be evaluated in terms of level of correspondence with propositions. Thus, correspondence theory of truth is dependent upon objects of inquiry revealing themselves first. Just how *aletheia* saves Kuhn from his critics is the topic for the following sections.

4.3.1 Relativism

Recall that there are two senses in which critics argue that Kuhnian science is inherently relativistic. The first involves cultural relativism as a result of the social and historical aspects affecting an individual scientist's endorsement or rejection of a particular theory. Applied across the whole scientific community, the adoption of a new paradigm rests upon subjective

⁷⁴ Heidegger would disagree. He thinks that science and technology have only one mode of revealing, that of the "standing reserve." Under their ruling, all beings (nature) are revealed as objects from which to garner energy or usefulness. They are not revealed in truth, but as resources to be used up. This is extended even to human beings—we need only to visit any company's *Human Resources* department to illustrate this. Still, as I mentioned before, Heidegger has been criticized for his unwavering loyalty to the pastoral and primitive. He offers no real "arguments" for his positions, but depends upon our consensual recognition of their phenomenological accuracy. If his ideas seem to run parallel to Kuhn's then it is arguable whether they can or should be applied. I think this is a debate for another time, another thesis. Here, if the Heideggerian shoe fits, then Kuhn may wear it. Furthermore, even if Heidegger is correct and science and technology reveal beings as mere resources, and not in their "actual nature," then there is still a process of unconcealment occurring. Beings are being revealed in some manner, which is grounded in the play between interpretive data and objects of inquiry. As long as a ground can be found for Kuhnian paradigms, then he is saved from truth relativism (how Heidegger saves Kuhn will be discussed in the following section). In this case, science might not be getting at how things "really are," but would still represent a system of revelations. The bullet to bite would be that Kuhnian science adheres to a *coherence* theory of truth (still a somewhat unpleasant conclusion). Again, another time, another thesis.

considerations rather than objective ones. The inauguration of a new paradigm signifies the arrival of a scientific revolution—a marker in the course of science. Thus the approval or denial of theories is a rather important decision. In Kuhn's view, however, this choice is not based upon objective criteria, but is left up to individual scientists and their subjective concerns. Since the subjective concerns are formed by one's social and historical standing, the implication is that theory choice—and consequently, the direction of science—is guided by culturally relative factors.

The idea that science is a culturally relative enterprise completely undermines some of its central tenets. Most importantly, it implies that science does not aim for the truth of things “as they really are.” If good science is taken to be that which approaches ever nearer to the truth, and what gets counted as good science is determined by one's subjective values, which are themselves relative to one's culture, then truth itself seems to be a product of one's culture as well. Truth, it is argued, is relative to its framework. In the case of Kuhn, the framework is the instantiated paradigm. Moreover, if science cannot aim for Truth, then how can the idea of scientific progress be maintained, if at all?

If we borrow Heidegger's notion of *aletheia*, then Kuhn is able to avoid the challenge of truth relativism. In the artwork, says Heidegger, the struggle between world and earth is laid bare. The truth of beings as unconcealed (*aletheia*) falls out of the conflict. Similarly, in science the struggle between interpretive data and nature allows for the revelation of objects of scientific inquiry “as they are.” Amidst the struggle between data and the objects of interest, their truth is revealed. Only once these objects are revealed is it possible to judge their correspondence to propositions. Truth, then, is not arbitrary or without ground, but finds its roots in the unconcealment of beings. The truth of beings, their “actual natures,” is not undermined, nor is it relative to anything.

This startling conclusion deserves a bit more discussion. In a moment of weakness, delirium or lapse of reasoning, I know not which, it occurred to me that since the entities of nature are disclosed only through the play between interpretive data and objects of interest, which occurs with respect to the paradigm, that the alethic truth is also relative to the paradigm. This is a rather unhappy conclusion, and happily, an error of reasoning that I hope to clear up. The mistake is to place truth solely in the paradigm. Instead, I would argue that the paradigm provides the *medium of access* to truth, which in fact *influences* how this truth is revealed, but does not define what counts as truth; essentially it does not determine what truth *is*. This is more clearly illustrated through the work of art, where the canvas and paints serve as the media through which truth occurs. In Van Gogh's painting the canvas and paints allow one to access the truth, but do not define this truth. No, truth is defined by the entities themselves. There is a truth in nature which can never be totalized, but is always disclosed partially through the paradigm.

The shift of truth from the paradigm to an alethic disclosure is not an arbitrary one. Traditionally, objectivists hold that both objects and facts exist independently of the mind. The Heideggerian-Kuhnian hybrid⁷⁵ put forth here suggests that while objects exist independently, facts (as accurate correspondence between propositions and nature) necessarily involve interpretations. A distinction between interpreted and uninterpreted data is called for. Uninterpreted data, I take it, refers to the quantifiable information extracted from experiments cut off from their scientific context/interpretation. Examples might include measurements of weight, wavelength, percent compositions, etc. Pure uninterpreted data is "not a criterion of anything except itself,"⁷⁶ for, given the appropriate dial, scale, print out or meter, even a layman could read off the numbers. In a second step, the data are interpreted. They are placed in a context and given scientific meaning by

⁷⁵ Or perhaps Heideggerian-Kuhnian "monster" is more appropriate!

⁷⁶ Thomas S. Kuhn, *The Structure of Scientific Revolutions*, p. 198.

the community of trained scientists. Scientists are then able to put forth propositions regarding their interpretations.

Propositions can not lead to alethic truth. Rather, alethic truth can match up with propositions. This is an occurrence of truth correspondence. Propositions are formed based upon interpretive data, which struggle against nature and in so doing reveal the truth of entities. Propositions are accurate so long as they match up with what has already been truthfully revealed in the struggle between nature and interpretation. Effectively, Heidegger’s assertion that correspondence theory depends upon alethic disclosure boils down to a distinction between truth as fact as subjective, which is dependent upon the paradigm, and the truth of entities which are objective and yet accessible only through the paradigm. A diagram is in order:

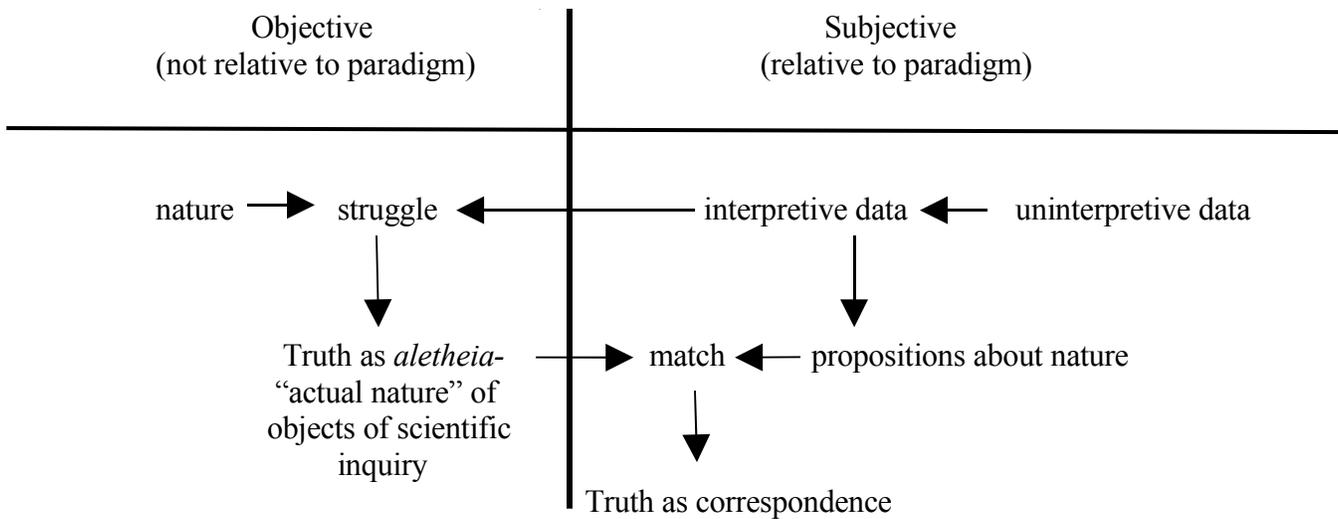


Figure 2, The Relation between Truth as *Aletheia* and Truth as Correspondence (A Heideggerian-Kuhnian Hybrid)

Note that the direction of the arrows is not reversible. Note also that truth as correspondence (facts) is relative to the paradigm; truth as *aletheia* is not. Alethic disclosure only occurs through the paradigm, but it is itself an objective truth. Scientific paradigms provide access to these truths in a particular way. By taking the Heideggerian route, Kuhnian science gets to keep its notion of

paradigms and not be reduced to relativism. Science, even of a Kuhnian variety, involves Truth itself.

One might wonder why the correspondence theory of truth is placed in the subjective/paradigm- dependent side. If aletheic truth has input from both sides of the chart and still manages to result in objective truth, then why not correspondence as well (i.e. the “match” should occur on the non-paradigm relative side)? Why might Kuhn insist upon having correspondent truths as subjective? Interpretive data have access, indeed allow access, to the objective side, but propositions do not have (direct) access. Putting correspondence theory on the non-paradigm relative side is making a stronger claim than Kuhn wants to make. He says: “There is, I think, no theory-independent way to reconstruct phrases like ‘really there’; the notion of a match between the ontology of a theory and its “real” counterpart in nature now seems to me an illusive principle.”⁷⁷ How can Kuhn say this while also denying relativism in the same breath? Heidegger and *aletheia* seems to be the only way to make sense of this.

The Kuhnian response I have suggested is based upon metaphysical commitments, that is, Kuhn wants to remain an anti-realist. I have devised Figure 2 in such a way that the relation between correspondence and aletheic truth maintains the anti-realist thesis that theories about unobservable entities do not refer to anything, and more strongly, that unobservable entities do not exist. The addition of *aletheia*, however, permits the truthful disclosure of observable entities, from which, I take it, the paradigm-dependent theories and correspondent truths are formed.⁷⁸ Still, one might wonder why not just lose all the extra postulations and become a realist. Ockham’s razor could certainly do some trimming.

⁷⁷ Thomas S. Kuhn, *The Structure of Scientific Revolutions*, p.206.

⁷⁸ Traditionally, anti-realism deals only with unobservable entities and may be open to this addition. I am not sure, however, what Kuhn might think.

In some sense, the anti-realist perspective is relying upon an epistemological claim about the relation between knowledge and experience. Scientists never experience unobservable entities the way they do observable entities.⁷⁹ In Heideggerian terms, the anti-realist view might be said to come closer to our phenomenological experience of world. Thus, the justification for maintaining Figure 2 and Kuhn's anti-realism involves epistemological issues regarding the relation of experience and knowledge (of facts).⁸⁰

What of subjective concerns and cultural relativism? Kuhn is willing to admit that the varying amount of influence that the five scientific values press upon a particular scientist prevents complete objectivity with regard to the adoption of new theories, and thus the direction of science. More clearly, he leaves open the possibility that when given a choice between rival paradigms different scientists will choose opposing theories due to the subjective accordance of weight to each of the five values. But very often, says Kuhn, scientists do arrive at the same conclusion even if for different reasons. While theory choice ultimately relies upon a mixture of subjective concerns, they are not completely unfounded. That is too radical a view. Instead he suggests that there is a normalizing force acting upon the community of scientists—perhaps due to the overall acceptance of the five values, the pressure to conform, or the sheer size of the community—such that radical views fall by the wayside.

Kuhn explains:

⁷⁹ Here, the notion of what counts as evidence and what counts as observable would need to be worked out. For instance, what might be said of entities observed under various magnifications of a microscope? What about technological advances that allow for observation of entities previously unobservable? The scope of this thesis is a little more general, but these questions provide areas for future research.

⁸⁰ The “knowledge” of alethic truths, I think, would be wholly different from the knowledge of correspondent truths. Briefly, alethic truths involve a phenomenological experience of the entities as such; correspondent truths about unobservable entities will rely upon a different type of evidence/experience.

...such reasons [the five scientific values] *function as values* and ... thus [they can] be differently applied, individually and collectively, by men who concur in honoring them. If two men disagree, for example, about the relative fruitfulness of their theories, or if they agree about that but disagree about the relative importance of fruitfulness...neither can be convicted of a mistake. Nor is either being unscientific...it is the *community of specialists* rather than its individual members which makes the effective decision.⁸¹

So the community acts as a sort of normalizing force against radical views. Arguably, more than any other discipline the participants in the community of science are well-trained specialists in their endeavor. As Kuhn explains, “the dominant criterion for most members of a scientific group” is that of puzzle-solving.⁸² To be admitted into the community of scientists, one must be a puzzle solver trained in the relevant ways. Essentially, Kuhn is saying that we need not worry so much about small difference in subjective opinions of the individual scientists because the choice of paradigms is determined by the group as a *whole* and what is more, the special training of scientists ensures a shared system of values. Who gains admittance into the group of scientists is determined by who has the specialized training and is committed to the five values. The five scientific values are the objective standard for what counts as science.

Because theory/paradigm selection is dependent upon personal and subjective values, critics contend that Kuhnian science is irrational. The point is that there are no good *reasons* why a scientist should espouse one paradigm over another. Furthermore, there are no *rational* arguments that can be employed in trying to convince an opponent. Scientists have recourse only to persuasive rhetoric based in their subjective values. But Kuhn says that this does not entail that there are *no* good reasons for being persuaded.⁸³ Indeed, he identifies five: accuracy, consistency, breadth of scope, fruitfulness, and simplicity. While these reasons take on values with respect to

⁸¹ Thomas S. Kuhn, *The Structure of Scientific Revolutions*, pp. 199-200. My italics.

⁸² *Ibid.*, p. 205.

⁸³ *Ibid.*, p.199.

each individual scientist, it does not mean that they are irrational. Value-laden or not, the five scientific standards provide *reason* for one to make judgments regarding paradigms. “Good reasons for choice provide motives for conversion and a climate in which it is more likely to occur.”⁸⁴ While a scientist who touts accuracy cannot convince a fruitfulness espouser based on his subjective concerns alone, Kuhn says that these values are still rational and allow for persuasion.

It seems possible, however, that even these five values may change over time. Perhaps new ones are added and old ones removed. In this case, Kuhnian science would most certainly be a relativistic enterprise. But Kuhn says that adherence to the five values are what makes one a member of the scientific community. Even still, using his own theory that the values are influenced by one’s history, is it not reasonable to think that over the course of time the scientific community could “vote in” or “vote out” the values, perhaps even unwittingly? Imagine a scenario such that one of the values gets continuously ranked at the bottom of concerns, so much so that it becomes irrelevant. It is no longer a concern. If values can be added or subtracted relative to the scientist’s subjective whims, then the whole project of science is decidedly relativistic. To avoid this, Kuhn would have to say that what counts as science *must* adhere in some way to the five values.⁸⁵

Turning back to Heidegger, this does not seem so unreasonable a view to put forth. As subsequent works of art must relate to each other in some way such that they are recognized as works of art—even if the relation is one of complete reversal or opposition—so too might scientific paradigms. Paradigms are incommensurable insofar as they cannot be compared against

⁸⁴ Ibid., p. 204.

⁸⁵ Effectively, the values demarcate what counts as science and what is not. Is this Kuhn’s response to the problem of demarcation? A new can of worms!

any standards. Indeed, the only “standards” offered are the five subjective *values*. But this does not mean that we cannot recognize that different paradigms do in fact currently exemplify or have exemplified the five values in the past. In other words, having the five elements, in whatever proportion, is a mark of what counts as science. Without them, a project is not recognized as scientific, for it is not science.

But how do we know when one paradigm is *better* than another? In other words, what constitutes scientific progress? Furthermore, if there is no way to judge paradigms objectively, how can we determine if the adoption of a new paradigm is progress? Is it possible for science to regress?

4.3.2 Scientific Progress

Hence, the second point of contention of Kuhnian science is its apparent disavowal of scientific progress. If truth is found to be relative, as critics have argued, then the traditional notion of scientific progress as a goal-directed accumulation of knowledge that grows ever nearer the “truth” is thrown into serious question. As demonstrated above, Kuhn’s position can be saved from truth relativism by appealing to a notion of truth which always lies outside the paradigm, *aletheia*. By extension, it might also save his view of scientific progress.

Just as Heidegger found the disclosure of beings in artworks, so too might scientific paradigms be said to be participating in the disclosure of beings. Revolutionary artworks open up the clearing in a particular way, while articulating artworks maintain the clearing such that being may be revealed. Different works of art open up the clearing, and thus reveal being, in slightly (or in the case of great art, vastly) different forms. All, however, raise the question of Being and result in truthful disclosures of being. Similarly, revolutionary science opens up the paradigm (sets it forth), while normal science sustains the paradigm. Different scientific regimes instantiate

different paradigms, thus revealing objects of inquiry in different manners. The disclosure of these objects is carried out under various paradigms, but all are revelations.

Insofar as scientific paradigms reveal the objects of scientific inquiry, they are grounded in *aletheia*. A shift in paradigms is essentially a change in the way the objects are revealed. As in Heidegger's philosophy of art, Kuhn could consider alethic disclosures in science are revelations of objective truth. Therefore the change in paradigms is not *mere* change for the sake of change, but reveals another way to conceive of the objects of scientific inquiry, in truth.

Unlike art, science has the additional feature of being truly progressive. As in evolution, the scientific progress is described as directional and irreversible.⁸⁶ Directional because there is some restriction to the possible avenues of change available; irreversible along the same vein of the evolutionary concept of "ratcheting" whereby a species may not "return" to an earlier evolutionary state.⁸⁷ Similarly, once the scientific community reaches a particular paradigm it will not regress back into a prior state because the solvable puzzles set up by the previous paradigm have been exhausted to the point where anomalies begin to accumulate. As suggested earlier, the particular anomalies that show up during the course of normal science actually point the way for the course for scientific evolution. The subsequent paradigm can be seen as progressive--not simply a change--because it must be able to account for the data that has been collected previously **and** the emergent anomalies.

Essentially, the anomalies are aberrant data that resist interpretation under the current paradigm. This means that the accompanying correspondent truths require alteration. Considering Figure 2 (above), this is exactly what happens when a paradigm changes. The objects of scientific inquiry are revealed in a new manner, and thus, the propositions involving them must also change.

⁸⁶ Ibid., p. 206.

⁸⁷ Kuhn says that scientific progress is unidirectional and irreversible, but does not explain why or how. The idea of "ratcheting" is my own addition; one that I think is not unwarranted.

The anomalies point the way that science must go in order to advance, i.e. to be able to take new data into account. In this way, change is not mere change, but progress. Not only does science ensure its own advancement, but it pulls its own leash.

An illustration might help. Imagine that aletheic truth is something like a pole around which the paradigms revolve. The discovery of anomalies forces the team of scientists to move in order to get another view. In each movement, a new objective truth is revealed—the entities of nature are disclosed in their (incomplete) truth. The propositions and correspondent truths that accompany the move add to the collective understanding, but the pole can never be seen at once in its entirety. There is an accumulation of facts (correspondent truths), but they do not bring one closer to the Truth; one is always circling the truth. Thus, there is no end goal towards which science is progressing. Furthermore, Kuhn's idea that scientific progress is non-linear means that scientists may move around the pole in a non-continuous manner.

Combining Heidegger and Kuhn, scientific progress consists of the irreversible and directional sequence of revolutionary paradigm shifts which allow for objects of scientific inquiry to be revealed “as they are” in truth, aletheically. The change is not mere change, but represents progress in the sense that the new paradigm is able to account for not only the emergent anomalies, but those that have come before. This definition of progress is in accord with Kuhn's idea that paradigms are progressive so long as they set up new puzzles to be solved and methods for solving them. It also agrees with his insistence that science is not just an accumulation of facts approaching ever closer to the “truth.” The correspondent truths that accompany a particular aletheic disclosure do produce more facts as they modify accordingly. However it would be inaccurate to say that this collection of facts is getting nearer to the Truth. Truth is not located in paradigmatic propositions. Rather, the truth is already inherent, aletheically, in the objects of the proposition.

There is one more consequence of Kuhnian science that does not sit well with critics. The inclusion of the subjective aspect leaves Kuhn vulnerable to the same sorts of criticisms that

subjectivity about morality leads to. In simple ethical subjectivism, this amounts to the idea that what counts as moral is whatever one feels is moral; in Kuhnian science, what counts as good science is whatever one chooses as good science. The upshot is that scientists are infallible. Whatever the group chooses is right.

Consider a situation in which the community of scientists is in crisis and must decide between rival theories. For simplicity's sake, let us limit the number of opposing theories to two; the situation becomes increasingly complicated as the number of theory candidates grows. Given these two theories, scientists will select the best theory based upon their own subjective reasons. If theory X is chosen over theory Y, then theory X will have proven itself to be a good theory. The same is true of the reverse situation. If theory Y is chosen over theory X, then theory Y is the better choice. If Kuhnian science permits both occurrences, how do we know that the best choice has been made?

The implication is that all theories/paradigms are equally good. Intuitively, this seems false. There is a crucial difference between subjectivity in science and subjectivity in morality. Because of the permissibility of any possible belief set imaginable, subjectivity in morality lends itself to blatant contradictions. That is, one may feel that abortion is wrong, while another believes it is permissible. Both are equally right so long as they are expressing their feelings accurately. On the other hand science is limited by a number of important constraints, several of which have already been put forth by Kuhn and were discussed earlier: the normalizing force of group size, the adherence to the five values (reasons) which mark one as a scientist, the specialized training which admits one to the community of scientists, and the relatively few directions set out by the anomalies. Moreover, theories must "come to a match", empirically, with the anomalous data

before reaching paradigm candidate status.⁸⁸ These forces prohibit science from running wild with arbitrary theories.

Kuhn's claim garners additional support through the appropriation of Heidegger's concept of *aletheia*. If asked whether all paradigms are equally good, the short answer is yes. The long answer is that the consequences of this fact are not so dire. Recall the illustrative "pole" of aletheic truth discussed earlier. As anomalies appear, scientists find a new spot from which to "view" the truth. So if theory X reaches paradigm status, its particular methods, standards, and theories will direct the course of normal science. Data will be collected and correspondence theory truths will be formulated as facts whenever the experimental data matches up with the aletheic truth. Likewise, if theory Y becomes the new paradigm, a similar process will occur—with the distinction of its own set of methods, standards, and theories that will direct the course of normal science for awhile. Data will be collected and correspondent truths will be formulated. Taking only correspondence theory of truth into account, it appears that truth is relative to the paradigm, either X or Y.

The key here is that correspondence theory of truth is grounded in *aletheia*. So while paradigm X and paradigm Y may result in various correspondent truths, both have their basis in The Truth of the objects of inquiry as *aletheia*. X- and Y-correspondent truths are relative to their paradigm (see Figure 2), but both are saying something (truthful) in regard to entities that are revealed more primordially in aletheic truth. Moreover, because there is an (always incomplete) truth underlying propositions, I suspect that even differing paradigms may happen upon similar anomalies at some time or another. For instance, the route of X paradigm and Y paradigm may both lead to Z paradigm in the future.⁸⁹ Both, then, are good choices. In fact, they are good science.

⁸⁸ Thomas S. Kuhn, *The Structure of Scientific Revolutions*, p.61.

⁸⁹ But they do not have to. Or they may, but through different routes of various lengths. Kuhnian science evolves non-linearly.

4.4 Concluding Remarks

It has proved a difficult route, but a Heideggerian path has been forged straight through the heart of Kuhnian revolutions. From the beginning, my justification has relied upon the notable similarities of the two men's views. The parallels between Heidegger's philosophy of art and Kuhnian science have highlighted the fact that Kuhn's theory lacks the notion of *aletheia*.

Aletheia, it has been argued, provides a proper response to the assertions that Kuhn's view entails relativism and denies scientific progress. Regardless of whether Kuhn acknowledges it, the theme of *aletheia* provides a unifying and strengthening support to his defense.

Indeed, Kuhn does recognize the possibility that his theory is lacking a crucial element. On scientific truth and progress:

These last paragraphs... indicate that scientific progress is not quite what we had taken it to be. But they simultaneously characterize the scientific enterprise so long as such an enterprise survives. In the sciences there need not be progress of another sort. We may, to be more precise, have to relinquish the notion, explicit or implicit, that changes of paradigm carry scientists and those who learn from them closer and closer to the truth.⁹⁰

A scientific theory is usually felt to be better than its predecessors not only in the sense that it is a better instrument for discovering and solving puzzles but also because it is somehow a better representation of what nature is really like. One often hears that successive theories grow ever closer to, or approximate more and more closely to, the truth... Perhaps there is some other way of salvaging the notion of 'truth' for the application to whole theories...⁹¹

The "other way" for "salvaging the notion of 'truth'" is nothing other than *aletheia*. Indeed, it is the error of thinking of truth only in terms of correspondence theory that has led to the criticisms discussed here. There are alternate routes. Truth as unconcealment of beings comes prior to the correspondence theory of truth espoused by scientists. By combining Heidegger's concept of *aletheia* with science, Kuhn can maintain his central theses— 1) that science proceeds in cycles of

⁹⁰ Ibid., p. 170.

⁹¹ Ibid., p. 206.

normal science and revolution under incommensurable paradigms, and 2) that there is a subjective element to science (which does not lead to relativism), and 3) that science is truly progressive.

I suspect that the solution offered here will not win over many converts. The tensions between realists and anti-realists versions of science run much deeper than a brief paper on Kuhn and Heidegger can dig. Furthermore, there is not much one can say that will convince another that Kuhn's work is important if one does not find it interesting. Kuhnian supporters will not be able to rationally convince Kuhnian detractors of its relevance. Kuhnians, at least some I think, are an army of those more concerned with understanding how things *are* than how they are applicable to one's life or society. Their exploration remains metaphysical, and resists entering the realm of the pragmatic. The problem of talking past one another is a rather old and difficult one.

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VITA

Ashley Knox was born and raised in Baton Rouge, Louisiana from 1984 until present. She took a brief hiatus from 2002 until 2006 for her studies at Tulane University in New Orleans where she received her Bachelor of Science degree in cell & molecular biology, *cum laude*, 2006. She will complete her Master of Arts in philosophy at Louisiana State University, August 2009.