THE SCIENTIFIC LEGACY AND THE ROLE OF PHILOSOPHY IN THE CONTEMPORARY SOCIETY.

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Abstract: The elevation of science and scientific knowledge above other disciplines and knowledge is not without reason or justification. Science has made life easier for people. It has reduced the level of superstition. Above all, it has made the world a global village. However, it has come with its own challenges. In a world dominated by science and technology, can Philosophy, as a discipline, play major roles in the development of a society? How progressive is the society with the rise of philosophy and science? There is no doubt that Philosophy is abstract and largely theoretical. Philosophy is also argumentative and its major tool is argument. Nothing is correct or right unless it is proved. What is however not correct about Philosophy is that it is of no use to non-philosophers and the society in general. As science has its values and usefulness to the society, so also is Philosophy. They may not play the same roles, but their roles are complimentary which eventually leads to the development of the society. Thus, for the success of this work, we shall systematically analyze the successes recorded by scientific growth, the philosophical footprints and influences of these successes and the possibility of a scientific society illumined by philosophical principles.

Keywords: Science, Revolution, Faith, Philosophy and Society.

Introduction

It would be pertinent to begin this work by surveying these terms: science, philosophy and society. Science, etymologically from the Latin word *scire,* denotes "knowledge". It can also imply "understanding". This has to do with the particular ways of gaining understanding about the facts of one's world. However, scientists do more than identify facts. They employ the use of logical procedures to explain the facts they have observed in order to establish notable theories. These theories are not accepted by faith rather are subjected to various tests and experimentations to assert their validity. Thus, science evolves in a continuous manner. New theories do not contradict past theories. The new theories do not simply refute the earlier empirical generalizations in their field; rather, they show that within a certain limited range defined by qualifying conditions, the generalizations hold true in fairly close approximation[1].

Philosophy is an amalgam of two Greek words: *philo* (love) and *Sophia* (wisdom). Philosophy (*philosophia*) is therefore the love of wisdom or knowledge. Philosophers are lovers of wisdom. Wisdom is synonymous with the ultimate truth or reality. Thus, Philosophy is the search for the ultimate truth or reality[2].

The society is an organized group of persons associated together for religious, benevolent, cultural, scientific, political, patriotic, or other purposes. More still, it is a highly structured system of human organization for large-scale community living that normally furnishes protection, continuity, security, and a national identity for its members.

[1]'Understanding Science' in https://courses.lumenlearning.com/atd-tcc-worldciv2/chapter/roots-of-the-scientific-revolution. Accessed 22nd October 2022.

[2] Definition of Philosophy' Anyanwu S. U. *Unpublished lecture note on History of Ancient Philosophy*. Seat of Wisdom Seminary Owerri, Imo State, 2019.

Synthesis to the Background Study

Traditionally, science was viewed as a cumulative process moving steadily towards truth. It was the truth, and the prediction and control that came with it that was the goal of logical-empirical science. Such perspective maintains that one theory´s known successes does not have anything to do with certain accidents of history than with the theory itself. However, their conception of scientific progress was thus a more comprehensive theory replacing older theory. Thus, each successive theory's explanation was closer to the truth than the theory before.

On the other hand, the success of the early modern science was orchestrated by historical rise of mechanism and materialism, the mathematization of natural philosophy and the emergence of profound experimentalism[3]. The synthesis of ´mechanic-corpuscularism[4]' with mathematics considered as the materialistic perception of reality, precipitated the scientific experimentation and observation of the 17th century science, which have been defined as the processes that guaranteed the rise of modern science. Thomas Kuhn has three spectacular phases of scientific growth. They include the pre-paradigm phase, the phase of normal science and the phase of revolutionary science[5].

Pre-Paradigm Phase (600bc-300AD)

The pre-paradigm phase captures the achievements of ancient Greek science which were amongst the finest in period of ancient philosophy. There are two major period of Greek science which include the Early Greek science and the Late Greek science. The early Greek science captures the period of the pre-Socratics (Thales 640-547BCto Plato 427-347BC) whereas the Late Greek science flourished during the second century AD capturing the Hellenic period whose science was highly mathematical, complex and difficult[6]. However, besides its great achievements, Greek science had its flaws. Observation was undervalued by the Greeks in favor of the deductive process, where knowledge is built by means of pure thought. This method is vital in mathematics, but the Greeks put such an emphasis on it that they falsely believed that deduction was the way toobtain the highest knowledge.

Scientific Legacy of the Ancient Period Philosophy

Some of the main ideas of science had been expressed long before the Scientific Revolution, in fact; some of the basic ideas of science are inherent in the ideas of these ancient scientist philosophers. For instance:

- During the 26th Dynasty of Egypt (c. 685–525 BCE), the ports of the Nile were opened for the first time to Greek trade. Building on Egyptian and Babylonian knowledge, important Greek thinkers expressed ideas that, today, we would call scientific[7].
- Thales of Miletus, c. 600 BCE first developed the idea that the world can be explained without resorting to supernatural explanations. It is likely that the astronomical knowledge that Thales got from Egyptian and Babylonian astronomy allowed him to predict a solar eclipse which took place on 28 May 585 BCE.
- Anaximander, another Ionian, argued that since human infants are helpless at birth, if the first human had somehow appeared on earth as an infant, it would not have survived. Anaximander reasoned that people must, therefore, have evolved from other animals whoseyoung are hardier.

[3] John, Onyekachi Nnaji. *Concepts of the ´Scientific Revolution: An analysis of the historiographical appraisal of the traditional claims of science.* Doctoral Thesis presented to the Department of Philosophy UNIVERSITAT DE LES ILLES BALEARS, June 2013, 98.

[4] Mechanic-Corpuscularism has to do with the interpretation of the structure of the natural world on its resemblance to the physical artifacts though it goes to the extent of trying to explain the mechanism of corpuscles in the areas thatcould not be observed.

[5] Thomas, Kuhn. *The Structure of Scientific Revolutions.* Chicago: University of Chicago Press, 1996, 39-42.

[6]Jerry, Obi-Okogbuo. *Modern Science: Threshold and Philosophical Problems.* Owerri: Hallmarks Digital Image Services, 2015, 67

- Empedocles first taught an early form of evolution and survival of the fittest. He believed that originally "countless tribes of mortal creatures were scattered abroad endowed with all manner of forms, a wonder to behold", but in the end, only certain forms were able to survive.

The Greek achievements in mathematics and astronomy were also one of the finest in antiquity. Greeks derived mainly from Egyptian mathematics rules of thumbs with specific applications. Egyptians knew, for example, that a triangle whose sides are in a 3:4:5 ratios are a right triangle. Pythagoras took this concept and stretched it to its limit by deducting a mathematical theorem that bears his name: that, in a right triangle, the square on the opposite side of the right angle (the hypotenuse) is equal to the sum of the squares on the other two sides. This was true not only for the 3:4:5 triangles, but it was a principle applicable to any other right triangle, regardless of its dimensions[8]. Pythagoras too was the founder and leader of a sect where Greek philosophy, religion, art, and mysticism were all fused together.

The undervaluing of empirical observation and the emphasis on pure thought as a reliable starting point for building knowledge can also be reflected in the famous account of the Greek philosopher Democritus who removed his own eyes so the sight would not distract him from his speculations.

He too considered man as a constituent of conceivable types of atoms and therefore a microcosm of the universe.

The great philosopher Aristotle, for example, wrote about astronomy, geography, and many other fields. But his greatest contribution to science was the idea that people should observe the world carefully and draw logical conclusions about what they see. It thus established an authority in deductive reasoning which strengthened the overestimation of deduction in science. Aristotle's logic system was recorded in five treatises known as the ***Organon***[9], and although it does not exhaust all logic, it was a pioneering one, revered for centuries and regarded as the ultimate solution to logic and reference for science that it took many centuries to notice the flaws of his approach to science.

Another Greek thinker was Ptolemy an ancient astronomer who developed the Ptolemaic system. The Ptolemaic system championed by Ptolemy, studied the skies, recorded observations, and offered theories to explain such observations. Ptolemy was also a geographer who made the best maps of his time.

The Renaissance Era (1250-1600)

Renaissance as a term means *rebirth* thus, it is the period of rebirth in learning. This period was characterized by humanism, secularism and scientism. Marked by the intensive interest in wisdom of antiquity contained in Greek texts like Corpus Harmeticum, it was born in Italy[10].

In *The History of Science and the New Humanism*, George Sarton, argued that science was first introduced to Western Culture in the 12th century during the Arabic-Latin translation movement[11]. The threshold of this renaissance period involves when numbers of works, predominantly those by Aristotle, were translated from Arabic into Latin and thus became known in the West for the first time. This period placed more emphasis on form over facts and adored ancient authorities over empirical investigation. During the Renaissance, Europeans studied the works of Greek rationalists and as such, they began to view the world in a rational way and equally began to think like scientists. For instance, the Jewish scholar Maimonides studied and wrote about Aristotle, trying to unite his work with Jewish ideas[12].

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[7]Christian, Violatti. *Ancient Greek Science.* Ancient History Encyclopedia, 13 June 2013. In www.ancient.eu.com accessed on 25th February 2020.
[8]Christian, Violatti. *Ancient Greek Science.* In *www.ancient.eu.com*, accessed on 25th February 2020.

The Christian scholar, Thomas Aquinas, tried to unite the work of Aristotle with Christian ideas[13]. Humanist artists and writers spent much of their time studying the natural world. The scientific ingenuity of Leonardo Da Vinci is also very influential in this period. His concerns in mathematics and his anatomical physiological and embryological studies were insurmountable in certain aspects of science for hundreds of years[14]. All of these developments—the interest in ancient Greek writings, the growth of humanism, the experiments of alchemists—came together in the early 1500s to as the propelling forces to the Scientific Revolution.

Philosophical Overview of the Scientific Advancement

In The *Critique of Pure Reason* (1787), Immanuel Kant discusses the definitive way to turn metaphysics into science. He demonstrated that in its actual stage metaphysics displays the 'mere groping in the dark'[15] characteristics of a non-secure science. Generally, the 'concerns of Reason' that had acquired 'the secure pace of a science' are logic, mathematics, and the empirical sciences[16]. Then he goes on to illustrate this how mathematics after being turned into an established and indubitably secure science by the Greeks set the stage for the empirical sciences to achieve thestatus of a secure science.

A field of thought gains the secure pace of science when it passes from the stage of aimless observations to active interrogation of its subject material through conscious experimentation. It is this revolution in mode of thought that gave such figures like Bacon, Galileo, Torricelli and Stahl the prominence in the big picture of the modern science in the society. The reason was because of their key discoveries that enabled the empirical sciences to move on from the groping stage to the secure pace of mature science[17]. They also inspired others like Auguste Comte, Emile Meyerson, Leon Brunschvicg to follow the right track of achieving genuine science in the society.

Historical Overview of the Scientific Progress

Alexandre Koyre's *Études Galiléennes* projected a coherent Platonist idealist view into the accountof the early modern science, which eventually became the pioneer historical overview of scientific ideas in the course of the Scientific Revolution in 17thCentury. Koyre is recognised to have been the first to coin the term *Scientific Revolution* in its current meaning. The *Galileo Studies*[18], a 1978 translation from Koyré's original 1939 French version, discusses the development of Galileo´s theories of motion and their impact on the scientific world. He lists its intellectual achievements

as the geo-metrication of space and the subsequent dissolution of the cosmos which allowed the universe to be broken into it's constitute parts and the substitution of the concrete space of the pre- Galilean physics with the absolute space of the Euclidian geometric system.

The historicity of Koyre account lies in the fact that he tied his notion of the revolution in the science of the 17th century with the work of Galileo, one its major proponents. Central to Koyré account of Galileo achievement was his introduction of mathematics to physics which lead to genuine geo-metrication of space and the overthrow of the impetus theory. Galileo was heavily influenced by the thought of Plato which made him to side with 'Platonian mathematicism' against Aristotelian empiricism with its claim that real physical bodies have no geometrical forms[19].

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[9]Organon is the title of Aristotle's work on logic where he developed the ten categories and his theory of deductivesyllogism as means to acquire perfect knowledge of realities.

[10]Onuoha, J.A & Obiagwu, V.O. *Philosophy of Science; History, Problems and Prospects. Lagos:* De-Heritage Concept Ikorodu, 2016, 30.

[11]John Onyekachi Nnaji. *Concepts of the ´Scientific Revolution´: An analysis of the historiographical appraisal of the traditional claims of science.* June 2013, 98.

[12] 'Preserving ancient knowledge of Science' in https://courses.lumenlearning.com/atd-tcc-worldciv2/chapter/roots-of-the-scientific-revolution, accessed on 26th February 2020.

Koyre notes that the classical concept of motion developed by Descartes, Galileo and Newton shows motion as a state in time, and also, that bodies have a set inertia. These fundamental achievements refuted three essential facts central to the Aristotelian physics. The first is that natural motion did not exist. Second, motion is not the consequence of the nature of the body. Third, none of such nature could bring it to rest[20]. However, the way Koyre greatly emphasized the importance of mathematics in the Galilean achievement shows his understanding of physics as truly the incarnation of mathematics—indicating why the language of mathematics really expresses the essence of reality.

Another mathematician by training, Eduard Jan Dijksterhuis reiterated the view of the mathematization of nature as the defining feature of early modern science. His *The Mechanisation of the World Picture* (1950) was written with the intent of surveying the way in which the mechanistic conception of the world came into being[21]. Butterfield had published his work a year before the publication of Dijksterhuis´s in which, as a 'general historian' than a 'historian of science', demonstrated the importance of understanding the achievements of the early modern science only in the historical context of the era[22]

A. Rupert Hall is also one of such early historians to establish a historical overview of the account of the science of the early modern period. Unlike Butterfield, he is a full blown historian of science. However, he recognises Butterfield, Alexandre Koyre, Joseph Needham and Charles Singer as his mentors. His principal objective was to illustrate that 'there was no unique reason for the development of science in early modern Europe, since one is free to argue that every feature of the European civilisation was a contributing factor.'[23] What made the science that developed in Western Europe between 1500 and 1800 so unique was the overall rational character which marks it throughout. His objective was more to discuss the rational nature of the Scientific Revolution as opposed to the various brands of mysticism, magic, superstition, and the like, which early modern science conquered and gradually out-grew.

The Revolutionary Science: A Paradigm Shift from Philosophy to Society

In general, etymological sense, "revolution" is derived from the mediaeval Latin *revolutio*, which means a "*rolling back or a return"*, usually with an implied sense of revolving in time[24]. Its Latin root verb is're-*volere*' which means "*to roll back"*. In later Latin, the noun ´revolutio´ had the sense of '*conversio'* of classical Latin, of which its root verb *´convertere´* has the sense of *turning on an axis* or *of rotating*, and so is akin to revolving. It was employed to illustrate the daily revolutions observed in the stars and in the sun, moon, and planet, and the orbital apparent motions of the planets[25]. This thus captures the sense behind the concept of scientific revolution which appears emphatically in the title of Copernicus´s classic work *De Revolutionibus Orbium Coelestium* (On the Revolutions of the Celestial Spheres, 1543) and also in various places in Galileo´s dialogue (*On the Two Chief World Systems*, 1632).

During the Renaissance an event took place that caused Europeans to doubt some of what the Greeks had said. In 1492, Christopher Columbus sailed west across the Atlantic Ocean in hopes of reaching Asia. As a guide, he took the map of the world that Ptolemy had created. Columbus never reached Asia because he ran into North America instead. Within a few years voyages of exploration made it clear that there was an entire continent that Europeans hadn't even known existed. This discovery stunned Europeans. This continent was not on Ptolemy's map. Ptolemy was wrong. Observation of the real world had disproved the teachings of an ancient authority. Soon, European scholars began to question the accuracy of other Greek authorities. More and more, observations the Europeans made did not fit with what the authorities had described[26]. Such observations helped lead to the Scientific Revolution. Thus, the rise of such figures:

[13]Onuoha, J.A & Obiagwu, V.O. *Philosophy of Science; History, Problems and Prospects.* 2016, 30.
[14]Onuoha, J.A & Obiagwu, V.O. *Philosophy of Science; History, Problems and Prospects.* 2016, 31.
[15] Immanuel, Kant. *The Critique of Pure Reason*. trans. J. M. D Meiklejohn, New York: Dover, 2003, xxiv .
[16] Immanuel Kant. *The Critique of Pure Reason*. trans. J. M. D Meiklejohn, 2003, xix, 15.
[17]John, Onyekachi Nnaji. *Concepts of the ´Scientific Revolution´: An analysis of the historiographical appraisal of the traditional claims of science.* June 2013, 27.
[18] Alexandre Koyré. *Galileo Studies*. trans. John Mepham, Hassocks: The Harvest Press, 1978.

Nicolaus Copernicus (1473-2543):

Ptolemy had written that the earth was the center of the universe and that the sun and other planets orbited the earth. For 1,400 years, people accepted this belief as fact. But Copernicus in his book *On the Revolution of the Celestial Spheres* radically dethroned the Ptolemaic system and established his heliocentric theory which posited that the sun is at the center of the universe with every other celestial body revolving around it. What Copernicus had done was practice science. Instead of trying to make his observations fit an old idea, he came up with a different idea to explain what he observed. Copernicus never proved his theory, but it gave rise to the beginning ofScientific Revolution.

Tycho Brahe of Copenhagen (1571-1601):

Another important astronomer of the Scientific Revolution was Tycho Brahe, a Danish who spentmost of his life observing the stars. Brahe emphasized the importance of careful observation and a detailed accurate record is to scientists. In this way, Brahe made an important contribution to modern science by charting the positions of more than 750 stars in the late 1500s and his ideas influenced Pierre's theory of tychism.

Johannes Kepler (1571-1630):

Brahe was assisted by the German astronomer Johannes Kepler. Kepler tried to map the orbits of the planets but ran into a problem. According to his observations, the planet Mars did not move in a circle as he expected it to. Kepler knew that Copernicus had stated that the orbits of the planets were circular. But Kepler's observations showed that Copernicus was mistaken. In 1609 Kepler wrote that Mars and all other planets moved in elliptical, or oval, orbits instead of circular ones. Here was a new theory that fit the observed facts. Kepler's work helped prove Copernicus's theory that the planets orbit the sun. In fact, Kepler became one of the first scientists to speak out in support of Copernicus. Kepler continued to study the planets for the rest of his life. His basic ideas about the planets' movements are still accepted by scientists today.

Galileo Galilei (1564-1642):

Galileo Galilei was one of the most important scientists of the Scientific Revolution. He was the first person to study the sky with a telescope. With his telescope, Galileo discovered craters and mountains on the moon. He also discovered that moons orbit Jupiter. In fact, his biggest contribution to the development of science was the way he learned about mechanics. Instead of just observing things in nature, he set up experiments to test what he observed. Galileo was the first scientist to routinely use experiments to test his theories. For this, he is remembered as the father of experimental science.

Sir Isaac Newton (1642-1727):

The high point of the Scientific Revolution was marked by the publication of a remarkable book by Sir Isaac Newton in 1687 titled: *"Principia Mathematica"*. In his effort he simplifies the works of other scientists by reviewing everything scientists had been learning, coupling it with his own observations and ideas, and identifying four theories now taken as laws that described how the physical world worked. One of Newton's laws is called the law of gravity. You may know that gravity is the force that attracts objects to each other. It's the force that makes a dropped apple fall to the ground and that keeps the planets in orbit around the sun. Newton's other three laws are called the laws of motion.

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[19] Floris, H. Cohen. *The Scientific Revolution: A Historiographical Inquiry*. 78. Web.
[20]John Onyekachi Nnaji. *Concepts of the ´Scientific Revolution´: An analysis of the historiographical appraisal of the traditional claims of science*. June, 2013, 32.
[21]John Onyekachi Nnaji. *Concepts of the ´Scientific Revolution´: An analysis of the historiographical appraisal of the traditional claims of science*. June 2013, 33.
[22] Herbert Butterfield. *The Origins of Modern Science. 1300-1800*. 17. Web.
[23] Rupert, A. Hall. *The Revolution in Science 1500-1750*. London: Longman, 1983, 36. Web.

They describe how objects move in space. One of them reads: "For every action there is an equal and opposite reaction." Newton proposed that the universe was like a huge machine. Within this machine, all objects follow the laws he identified. In short, Newton explained how the physical world worked. Newton also invented calculus, an advanced form of mathematics that scientists use to solve complex problems. For all these, Newton is remembered as a great scientist.

Philosophical Quintessence of Scientific Revolution

The early protagonists of modern science believed that they were carrying out a revolution. They were sure that they were inaugurating a novelty in the methodology of science and as such a new concept of knowledge. This claim is quite evident in the little no allusion to the earlier writers except to disagree with them. It is also supported by their frequent use of the term *NEW* in the titles of their books, for instance, Francis Bacon's *New Atlantis* and *New Method*; Johannes Kelpler's *New Astronomy*, and Galilei Galileo's *Two New Sciences*. To this end, came certain dominant strands today regarded as the philosophical quintessence of scientific revolution.

The New Physical Model of the World

A physical model of the universe is a coherent picture of everything known about the world. The last popular one in history of Western Civilization was the model of the universe described in the thirteenth century by Alighieri Dante (1265-1321). This model was in actual fact ancient Greek model as formulated by Aristotle, Hipparchus and Ptolemy. It projects geocentric saturated account of the universe. The change from geocentric to heliocentric physical model was proposed by Aristarchus of Samos in the 3rd century BC. But the controversy that arose then was that if the heliocentric model was true then the earth like other planets must rotate in circle with the sun at the centre. At the end of a six-month period, the earth must be on the far side if its orbit about the sun relative to its starting position[27]. The major attack of the Ptolemaic system was launched in by **Nicholas Copernicus** *De Revolutionibus (1543)* which gave a mathematical demonstration that heliocentricism was in principle a simpler and workable model than the Ptolemaic one.

Tycho Braheof Copenhagen (1571-1601) in his book *De Stella Nova* carefully recorded a sudden appearance and disappearance of a bright star in the constellation of Cassiopeia in 1572 and 1574 respectively. This thus questions the unchanging nature of the celestial realm. **Johaness Kepler (1571-1630)** in his *Commentaries on the Motion of Mars (1609)* struck a devastating attack on Ptolemaic system by establishing laws that that encapsulates enormous knowledge about planetarychange and motions of his time and earlier times.

Galilei Galileo (1564-1642) through his *The Two Chief World Systems (1632)* gave the most popular polemics ever against Ptolemaic system. Written in favour of Copernicus, it gave proofs for the physical truth of the Copernican system. Thus, with his telescope turned to the sky, he showed anyone that cared to look that there were mountains on the moon and spots on the sun which change from day to day. He also showed that there were moons which circle about Jupiter and not about the centre of the earth.

Sir Isaac Newton (1642-1727) solved the puzzles through his book *The Mathematical Principles of Natural Philosophy (1687)* known for short as *The Principia*. In part III of this book titled *The Systems of the World* Newton completed the Copernican revolution and thus gave the new working model of the solar system by establishing how mathematically the motions of everything we see in the sky can be explained and predicted by three simple laws of motion and one law of universalgravitation.

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[24]Felix, Gilbert. *Revolution*. in Dictionary of the History of Ideas, ed. Philip P. Wiener. 5 vols New York, 1973, IV,152-67.

[25]John Onyekachi Nnaji. *Concepts of the ´Scientific Revolution´: An analysis of the historiographical appraisal of the traditional claims of science*. 16.

[26] 'New Discoveries' in https://courses.lumenlearning.com/atd-tcc-worldciv2/chapter/roots-of-the-scientific- revolution accessed 24th October 2022.

[27]Norman, F. Dessel, Richard B. Nehrich & Voran Glenni, *Science and Human Destiny,* McGraw Hill Books Comp.New York, 1973, 33.

The New Conception of Physics

Galilei Galileo in his *De Motu* (On Motion) quantified and mathematicized motion by concentrating on distance rate and time of motion ignoring medium and weight of falling body as of no value. On another note, Rene Descartes asserts that to be a body is to be extended thus no vacuum can exist in nature the only events therefore which physics has to consider are the transfers of motion between particles and the changes in the direction of motion. The laws of Sir Isaac Newton too gave rise to the new conception of physics.

The New Scientific Methodology

Today scientists use a new procedure called the scientific method when doing their research. The scientific method involves a step-by-step system for performing experiments and other scientific research. Because of this, the basics of the scientific method—observation and experimentation— are considered the main principles of modern science. Philosophy remains the bedrock that inspired these methods.

They include:

- ❖ **Stating the problem**. The problem is often a question that begins with why. For example, Copernicus's problem today would be stated, "Why do the planets move as they do?"
- ❖ **Gathering information**. This can involve reading what other scientists have written and making observations.
- ❖ **Forming a hypothesis**. A hypothesis is a solution that the scientist proposes to solve the problem. A hypothesis differs from a theory in that a hypothesis has not yet been tested.
- ❖ **Testing the hypothesis** by performing experiments.
- ❖ **Recording and analyzing data gathered from the experiments**.
- ❖ **Drawing conclusions from the data collected**.

The Reconstruction from *"Techne"* to Technology

The Philosophy of the Greeks in their understanding of science which was based on *techne* (arts, craft, and skill) gave rise to the idea of technology which saturated the period of revolution in science.

The Scientific Revolution and Philosophy: Towards a Discontinuity and Continuity of Historiography

In the history of ideas, there are two ways to observe the problematic encountered in the history of modern science. These ideas involve the continuity thesis and the discontinuity thesis:

The continuity thesis (Evolutionary approach):

This is of utmost agreement with the tripartite division of the history of civilization into glorious antiquity, medieval darkness and the light of modern humanism. It asserts that modern science was a direct derivation from antecedent thought (Greek and medieval) but that the medieval period had contributed nothing (medieval hiatus). The history of scientific development does not follow a sporadic process; rather it is subject to the law of continuity. And it is in this regard that the great discoveries are almost always the fruit of slow and complex preparation, which is pursued in the course of the centuries. The awakening created by the continuity concept of Duhem[28] led to massive subsequent works that sought to provide details of medieval scientific achievements and uncovering the ¨germs of later scientific discoveries¨[29] in the works of medieval masters.

The Discontinuity thesis (Revolutionary approach):

The concept of ´epistemological break´ underlines the discontinuity at work in the history of science. It is this idea of break that informs the basis from which the scope of Koyre's thesis was developed. This notion of ¨epistemological rupture" developed by Bachelard and later re- interpreted by Alexandre Koyre obviously informed Thomas S. Kuhn to develop his theory of the paradigm shifts. Thus, the discontinuity thesis asserts that modern science had a total break with the past. Modern science had a new start without any roots of the past. This thesis is in tune with the so called *"vulgar triumphalist"* view of the origin and development of science. This view holdsthat modern science had a complete and decisive break with antecedent thought: medieval and Greek.

Scientific Objectivity: Towards a Complementary Thesis

Obviously, scientific truth is objective to the extent that arguments are based on the objectivity or rationality of shared values applied by proponents of rival paradigms at the time of theory choice. To this end Khun asserts that "An apparently arbitrary element, compounded of personal and historical accident, is always a formative ingredient of the beliefs espoused by a given scientific community at a given time"[30]. Thus, it does not follow, as so many ignorant persons think, that the medieval activities were sterile. The Middle Ages were pregnant with many ideas which could not be delivered until much later. Modern science, we might say, was the fruition of medieval immaturity. Vesalius, Copernicus, Galileo, Newton were the happy inheritors who cashed in[31].

Having established such conception, this paper shall at this point tread a *via media* of continuity and discontinuity theses by positing a *complementary thesis* which entails a continuity- discontinuity thesis. The novelty of this thesis is a projection that modern science was prepared by evolutionary changes. It captures that modern science evolved through a recovery from the antecedent thoughts but that the profundity of this recovery was so fundamentally novel and unprecedented that it amounts to a revolution[32]. Thus, there was no total break with the antecedent thoughts as there is continuity in the organizing power of the mind, belief in the intelligibility of nature, textual sources, continuity of terminologies like matter, motion, time and force, and continuity of problems, semantics, and context. Summarily, as Loren Eiseley rubs this point when he writes that in science, there is no such thing as total independence from one's forerunners[33], there is however a birth of new thought out of the knowledge pregnancy of one's forerunners.

Scientific Outbreak and Possible Philosophical Influence in the Society

Scientific *inventor bus* has posited various influences to man's existence as being in the world. Such influences are:

- Scientific know-how posits a *hubris* in the professionals. Thus, scientific professionals in our societies play the god and as such fall into the danger of over-reaching the self and over-weening pride.
- Science has introduced many into the dubious act of *sciecolatry*. Thus, science through successes recorded now enjoys adulation, worship, unlimited admiration and unrestrained fascination in the society.
- Science has brought us into the period of *sciencocracy*. Thus, science now reigns supreme and uphold a culture of materialism.
- Scientific inventions have brought the idea *crusonianism*, which entails a feeling of loneliness, estrangement and alienation.
- Science too has brought a crisis in functionalism as it has occupied many functions of theindividual.

[28]Pierre, Duhem. *Études sur Léonard de Vinci: Ceux qu´il a lus et ceux qui l´ont lu*. 3 vols. 2nd imprint, Paris: De Nobele, 1955. First published in 1906.
[29]Lynn, Thorndike. *History of Magic and Experimental Science*, 8 vols. New York: Columbia University Press, 1923-1958, Vol. 4, 612.
[30] Thomas, Kuhn. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press, 1996, 4.
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Conclusion

The only unifying feature that stands out in virtually all of the accounts is the new image of science that resulted from the activity of the scientific revolution. This science has displaced the earth from the centre of the universe and made of the universe a gigantic machine quite independent of human feelings and needs. In fact, the Scientific Revolution created modern consciousness and its science.

The argument of the continuity thesis as discussed illustrates that the casual considerations possess more explanatory force to demonstrate the continuous development of the Galilean dynamics from the ancient and medieval dynamics. To this end, Steven Shapin gives an outright negation to the idea of Scientific Revolution since there was no revolution in the period of science[34]. However, the revolutionist proved this wrong by establishing significant changes compared to the medieval and ancient science.

Having expounded on this topic, though traditional accounts of science present science as being couched in the epistemology of radical empiricism—the theory that all knowledge is derived from the senses most modern science rejects this in the guise of positivism cum logical empiricism and to some extent, falsificationism as evident in Popper. To this end therefore, the nature of the scientific development that emerges is one that is both continuously cumulative as well as revolutionary. Such model of scientific development supersedes the ´naive cumulative´ model presented in Logical Empiricism and the ´wanton revolutionary´ model argued in Falsifications.

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