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REVISITING BACON'S CRITIQUE ON ARISTOTLE

BY: TESFAYE G/YOHANNES

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BY

Tesfaye G/Yohannes Kidane

ADVISER:

DAGNACHEW ASSEFA (PH.D)

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Approved by Board of Examiners

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Declaration

I, Tesfaye G/Yohannes, declare that this thesis is my original work and has not been presented for a degree in any other university and that all sources of materials used for the thesis have been fully acknowledged. Declared by Tesfaye G/Yohannes.

Signature _____Date_____

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Abstract

This thesis is intended mainly to revise Francis Bacon's critique on Aristotle. Bacon's view of attempting to blossom inductive mechanism as it helps man to enlarge substantive, sensible and scientific knowledge, I think, is a problematic or an implausible. Bacon develops The New Organon through an inductive method, is falsely a Renaming to the Aristotelian Organon. Due to the syllogistic logic is basically constituted by an inductive method, and in this thesis, I argue alternatively by setting out Bacon's questionable arguments, that is, claims that are now anti-syllogism. As the Baconian inductive method is a process from the observed and passed by sorts of procedures or criteria about a particular thing/s to its general (universal), this method cannot help to Bacon to repudiate the Aristotelian syllogistic logic, due to he is arguing about the very same or the same species though his method lacks structure. Both Aristotle and Bacon are empiricists. This implies that they deny advocating for terms of things which are not perceived by experience, as both of them try to study and explain about existing things. Therefore, as empiricism depends on existence, so things that do exist should have also explained in their proper manner, that is, according to their practical way, for through pragmatism we can explain or define existing things for which we experience them through induction, that is, through sense perceptions. In this thesis, I employ a Critical Analysis of a qualitative research method which enables me to evaluate the Baconian works- introducing a new tool or instrument which offers man to acquire or extend his empirical and scientific knowledge using this inductive method is not a new one at all though Bacon has called (entitled) it a new; rather, it is lagged behind by a step from the syllogistic logic. Therefore, what Bacon has jotted down is unlike the Aristotelian knowledge of first principles; and this entails that the Aristotelian method of inference has gone over. Besides, if we critically study the arguments that Bacon introduces in his aphorisms to repudiate the syllogism are either bad arguments or not arguments at all. This implies that Bacon's book is *constituted by full of faults. Further, Bacon is backfired; owing to his inductive method is already the Aristotelian, that is, Bacon owed to Aristotle the inductive method itself. I have not seen a new method which is developed by Bacon that helps man to acquire or extend substantive, sensible and scientific knowledge, except his topic; rather, it leads into error, therefore.*

Key words*: Empirical knowledge, Baconian Method, Syllogistic Logic, Pragmatism*

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CHAPTER-ONE: Introduction

1. Background of the Study

Bacon contends that substantive, empirical and scientific knowledge is acquired through an inductive method than deductive reasoning. This implies that, as he argues, man develops his knowledge if and only if, he uses the inductive method. On the other hand, he says that as the conclusion of any syllogistic logic of the deductive argument is already contained in its premises, hence man does not expect to acquire a new scientific knowledge from it. No matter in what degree (percent), Bacon argues in order to refute the syllogistic logic and instead of it, he fixes inductive method as a reliable and applicable for the advancement of substantive, empirical and scientific knowledge is unlikely. Bacon's initial observation that is before hypothesis about a particular thing that demands multiple procedures is in order to be studied (known) which is the thing in conjecture, and finally may rest on succeeded findings as a premise/s; then Bacon infers from this findings of a particular thing/s to generalize (universalize) definitions as an empirical and scientific knowledge. Even though he declares as he brings a new tool that would help man for an expanding knowledge that is substantive, sensible and scientific, but not yet differ from the Aristotelian *syllogistic logic*, for the syllogistic logic is formulated through an inductive process. In other words, the Baconian inductive method is the Aristotelian too. The Baconian inductive method focuses as an instrument for acquiring and expanding substantive, empirical and scientific knowledge that starts from one direction, that is, beginning with observation of particular things, and lastly ends at certain result which passed by definite procedures; and based on these findings, he moves by asserting that to its general (universal) establishment of an inference. And this tends to lead into the Aristotelian inductive method. So where is the Baconian new method that he has entitled as *The New Organon?* Indeed, it is the title of the book

that coined by Bacon from the inductive mechanism but not yet contains a new instrument. Rather it is publishing by defaming to almost all to the works of philosophers of science at least from Aristotle to Copernicus. In accord with this, Cohen contends,

> The general reader is carried away by the splendid rhetoric with which Bacon denounces as useless all previous work in science; and his errors of fact or relevance of ideas are either not recognized as such or else covered by the very broad but unhistorical reflection that they were good enough for Bacon's times (1949: 105-06).

In other words, there was not science, according to him, until he publishes this book in, 1620. It is clear that scientific revolution provokes Bacon to write this book using the Aristotelian inductive method, but not he provokes to scientific revolution. In this thesis, I claim that Bacon himself owed to Aristotle the inductive method; so that what Bacon has worked in this regard is corresponding with someone who attempts and paints secretly someone else's a shop container with a black colour in order to loot his/her property while the right owner had painted his/her container with white or with non-black colour. In a precise way, I have not seen a new method which is proposed by Bacon, except mistakenly entitled the topic. So the case why Bacon's inductive method becomes since the 17th century is entirely irrelevant, that is, through psychological makeup instead of philosophical reasoning.

On the basis and expansion of substantive, empirical and scientific knowledge, since the 17th century, alternative researches and arguments are done. And these alternative arguments have seemed convincing, logically but not yet. Almost no one denies, predominantly in the area of Philosophy of Science or Science and Technology, as the Baconian (or from Bacon and the

Baconians) inductive method has become popular. It has been believed as it offers and serves man to expand substantive, empirical and scientific knowledge. But, if its foundation/s is/are to be investigated critically, these alternative studies have no logical reasons at all to look down to the view which is presented by Aristotle and by the Aristotelians. Because, Bacon and the Baconians have missed how the syllogistic logic (argument) has been established. Bacon is an empiricist, because he advocates sense experience. Also Aristotle is an empiricist, as he has already advocated to what Bacon advocates: Bacon's inductive method is a process from the observed and passed by sorts of procedures of a particular thing to a general (universal), then this method cannot help him to disclaim the Aristotelian syllogistic logic, due to he is arguing about the very same. Nevertheless, before Bacon, Aristotle has argued and denied the argument which is relying on terms that have empty or null extension. So in other words, Bacon forgets as Aristotle excludes the existential fallacy.

Though Philosophy of science or Science and Technology has given more credit to the what Bacon has issued and presented the inductive method as it helps man to enlarge substantive, empirical and scientific knowledge than the Aristotelian syllogistic logic, what Bacon has argued is already the Aristotelian knowledge of first principle which is formed by the process of induction, this shows that the syllogistic logic has gone over. In general, in this thesis, my objective is to Critique the Critique on Baconian Repudiation of the Aristotelian syllogistic logic of the Deductive Logic. Further, in this thesis, I have attempted to explicate some main points in detail. Some of them are:

- ✓ To show Bacon owed the inductive method from Aristotle
- ✓ To illustrate how Bacon is backfired

- ✓ To remind as Bacon forgets as Aristotle excludes the existential fallacy
- ✓ To show that as the Baconian method lags behind by a pace from the syllogistic logic
- ✓ To declare *The New Organon* is falsely a renaming of the old *Organon*

The basic questions that have been addressed in this thesis are**:**

- ✓ Can inductive reasoning give us substantive, empirical and scientific knowledge more than deductive reasoning?
- ✓ Does not Bacon backfire introducing inductive reasoning to undermine the deductive method?
- ✓ How does Bacon consider the Aristotelian syllogistic argument (deductive reasoning) as an abstraction?

Accordingly, depending on these questions, in this thesis, I argue by providing critical and substantive arguments in order to show against Bacon's problems–inductive method and repudiation of the syllogistic logic.

This thesis aims at critically observing and examining the basis (nature) of methods that help man to extend a substantive, sensible and scientific knowledge, and analyzing their implications in reference to the arguments that have been presented both by Aristotle and Bacon. Accordingly, in this thesis, I have employed a Critical Analysis of a qualitative research method in order to address my major research questions and to achieve both its general and specific objectives. Because, in this thesis, this qualitative research method enables me: To compare and contrast, and finally evaluate *both Bacon's and the Baconian New Organon* with the Aristotelian *old Organon*. Therefore, in this thesis, I review secondary sources, Bacon's book, which is, *The*

New Organon. Further, I review copious of philosophical journal articles that not only that justify to the Aristotelian method of reasoning, but also that justify how Bacon is mistaken to critique on Aristotle.

Excellent and critical studies may be fruitful in a lot of things. Thus, this thesis is intended to show the fact that my effort is to re-establish the Aristotelian *Syllogistic* method of inference as the base of an empirical and scientific knowledge. Besides, this enables for any critical thinker to grasp as Bacon himself is misled and/or in general how the Baconians are misled or at least to bring into undecided. Accordingly, this thesis is being limited itself to the Baconian and the Aristotelian perspectives of reasoning (inference) on empirical and scientific knowledge. Bacon's book, that is, *The New Organon* is almost all an argument against the *Old Organon.* To this end, in this thesis, I have examined Bacon's major points and views that lack logical premises, but that undermines the Aristotelian syllogistic logic, therefore.

This thesis is divided into four solid chapters. The first chapter is an introductory part. The second chapter deals with the Role of Logic in Philosophy of Science (Science and Technology), The Development and Meaning of Empirical and Scientific Knowledge, Alternative Methods which are the Basis of Empirical and Scientific Knowledge, and Challenges and appraisals for both methods of inferences. Also, chapter three is intended to present Empiricism, Existence and pragmatism, The Sub-alteration Relation and the Baconian Inductive Method, and Terms of Empty Extension as the Causes of Existential Fallacy. Further, chapter four is the last topic of this thesis which is intended to illustrate whether Bacon's critiques on Aristotle is logical at all. Since, the researcher has found Bacon's critique on Aristotle is entirely an illegitimate one, in this thesis, I have criticized Bacon for he has wrongly criticized Aristotle. Henceforth, it is to

show by comparing and contrasting both methods: as the Baconian Inductive Method as Lags within a Pace from the Syllogistic Logic, Does Bacon have an Evidence to Repudiate the Syllogistic Logic? The Syllogistic Argument (Logic) and Its Construction, Critiques- in this thesis, I set out basic critiques, and I think this would not be a solution for the problem, but at least to reflect and illustrate where Bacon has mistaken and at the end of this thesis, my conclusion would subsequent to.

CHAPTER-TWO: Conceptual and Theoretical Frameworks

2.1. Overview of the Chapter

Man knows something, that is, his knowledge depends on three (justification, truth and belief) though Gettier has added nothing, but he presents as these elements (JTB) of knowledge cannot be sufficient conditions (1963). Though all of them go together, among these, justification means evidence. So it involves reason or logic. Further, as philosophy of science, often, emphasizes to study and explain nature, then it cries out logic. Therefore, it is possible to infer that how logic and philosophy of science are connected. For philosophy of science studies the physical world, then it attempts to conclude about nature based on experience of perceptions. The adjective word "Empirical" is derived from experiment. Then, since experiment involves observation, so empirical means tangible knowledge which is acquired through induction. As a result, philosophy of science inquires, gathers and explains nature. In other way, it attempts to explain the physical world using at least mechanisms. And these are either the Aristotelian Syllogistic Logic of the deductive Logic or the late comer, that is, in the 17^{th} century which is proposed by Bacon and that has been become popular. For there are challenges and appraisals for both methods of reasoning, so this chapter critically investigates whether man has alternative methods that helps him in order to acquire or expand substantive, sensible and scientific knowledge.

2.2. The Role of Logic in Philosophy of Science

Logic is primarily aimed at constructing and evaluating arguments. But this does not mean that it does not have other role in some other fields of disciplines or knowledge. For example, logic may involve in law, in moral issues, in economics, in philosophy of Science, and so on. But, now there is no room to discuss about except the place of reason in philosophy of Science. Philosophy of Science cries out for reason or more an empirical evidence, and then it is either implicitly or

explicitly accompanied with logic. Philosophy of Science denies the metaphysical theory is not out of anything, but by using reason. Philosophy of Science often claims about this nature based on tangible evidences. In light of this,

> What Carnap now calls the logic of science is in no way concerned with either explaining or justifying our scientific knowledge by exhibiting its ultimate basis; a new role for philosophy vis-à-vis the empirical sciences that will maximally contribute to scientific progress while, at the same, avoiding all traditional metaphysical disputes and obscurities which have constituted (and, according to Carnap, continue to constitute) serious obstacles to progress in both the sciences and scientific philosophy (Friedman, 2008: 393-94).

Logic the science of reasoning process is a matter of argumentation: On the one hand, some philosophers claim that cohere with Christianity, that is, it says the universe has been created by God, and the first human beings were Adam and Eve; so we are descended from them (Genesis 1). But this is a form of revelation. And Plato believes similar to this one. In light of this, Sakkopoulos and Vitoratos claim, "… like Plato, who in his dialogue *Timaeus* (360 B.c.), proposed a different atomism consistent with his beliefs about a supreme god in the sphere of Ideas, creator, supervisor and provident of everything , who imposed order on the atomic matter" (1996: 297). On the other hand, the creationist view is attacked by the scientific theory, that is, by the Darwinian argument. Further, atom is considered as the smallest part of nature accordingly, as physics declares, everything is bodily and can be explained by physics (Lucretius cited in Sakkopoulos and Vitoratos, 1996: 296). If atom is the primordial matter, then everything is made up of atom; then for example, the universe including everything which is found in it is

made up of atom. Then, Science or Philosophy of Science begins from sensible and scientific knowledge and concludes by sensible scientific knowledge. Something is made up of atom. Therefore, the universe including that is found in it is made up of atom.

This argument may deliver at least two clues. 1) Since physics has said proudly everything can be expressed in terms of physics, then the existence of metaphysical theory, that is, the concept of God has been denied, but instead atom becomes the creator of the universe including everything else, but which is found in it. 2) Inductive inference as its usual way becomes uncertain. In other words, if it is logically legible to infer from effect to cause based on induction, then why someone cannot argue about the existence of metaphysical theory? Due to, the conclusion of an argument correlates from its effect to its cause is an inductive inference, which means, it cannot be absolutely certain, but probably. In light of this, for instance, Kosso argues,

> I wake up in the morning and see the ground is wet, the trees are dripping, and there are puddles everywhere. I know it rained, even though I did n't directly observe the rain. And since it is passed, I can't observe the rain. In life as in science, knowledge extends beyond both the observed and the observable. The key is in specifying what kind of inference is reliable for making this extension (2011: 9).

Although the above, that is, Kosso's example is an inductive inference for it stands from an effect to its cause, this is also possible to set in the form of deductive form. Then we can schematize it in the following,

If it rains, then a ground gets wet, trees drip and there will be puddles.

Of course, the ground got wet, trees are dripping and there are puddles.

It must be the case that there had been a rain fall.

If we compare both these arguments (Kosso's inductive argument and the paraphrased deductive argument), we can understand easily as both mechanisms of inferences are involved from observations as well as how reason or logic can play a great role in the field of Philosophy of Science.

2.3. The Development and Meaning of Empirical and Scientific Knowledge

Though Gettier attempts falsely to attack to the traditional definition of Knowledge, it may be defined as having of justification, truth and unshakeable belief. In persistence to this, Ayer mentions not only the 'necessary' but also the 'sufficient' conditions of knowledge. These are: "S knows that P IFF (i) P is true, (ii) S is sure that P is true, and (iii) S has the right to be sure that P is true" (quoted in Gettier, 1963: 121). In persistence to this, Aydede claims, "[what is more important, however, is that the nature of this infallible awareness has been traditionally interpreted in such a way that when S has the *nous of P*, S not only knows that P- as knowledge is [regularly] understood at least as justified true belief- but also S immediately knows that she knows that P" (1998:7).

And at best, empirical and scientific knowledge is knowledge which is acquired out of experience. Therefore, this (empirical knowledge) may lead us to fix with only on perception or perhaps inductive inferences. Perception is the ability to understand concrete things by the senses. In other words, what is not perceived by the senses is either does not know or does not exist at all, because as science is a fact-often it inquires knowledge and explain it based on tangible investigations. Accordingly, "[s]cience is nonetheless limited

to the study of the natural world and cannot study or explain metaphysical events or beings-which are not to say they may not exist" (Nickels, 1998:1). Scientific mechanism that produces empirical and scientific knowledge is often understood as it has been begun in Europe since around the 16th century. And the cause that initiates to wage into a scientific mechanism for the Europeans is logic; for example we can mention here the Copernican theory of revolution. Reason enables man especially for the rational thinker to avoid irrational thoughts. Reason is evidence that justifies something. Therefore, since the 1600s European scientists deny the doctrine of the Supernatural explanations, therefore nature means what it is, but not what may be. In light of this, Betz notes,

> What is essentially different between the civilizations before and after the origin of science in the 1600s is a very different conception of nature. Before nature was merely a manifestation of a Super-nature-the Supernatural and unobservable- the world of religion. Afterward, nature now is only what is observable in the world. Nature is thought about, described, and explained through experiments and theory and scientific paradigms. No longer do we live in a world of superstition and magic. We live in a modern world of science and technology- without magic (2011: 21).

Science or partly the modern Science may work to collect tangible facts though it investigates how the physical world operates. Therefore, empirical and ''scientific knowledge'' has at least three ''forms''. As, fact, often, evolves from perception of experience. In the other way, a scientific theory is developed from observation. "Fact: is a confirmed or, at least, agreed –upon empirical observation (or conclusion if referring to an inferred fact" (Nickels,1998: 4). Besides, as he states that the additional form of a scientific knowledge is "[h]ypothesis". And this is a

"proposed explanation" but not really known its truthfulness, for it cries out for an experiment. Now, hypothesis cannot be more reliable than prediction. Furthermore, a "[t]heory" is the third form of scientific knowledge which is organized body of knowledge which passes through inductive observation then follows certain procedures and rests on result (ibid).

2.4. Alternative Methods that helps man to Expand Empirical and Scientific Knowledge

For there are two types of arguments (Deductive and Inductive) that can be presented alternatively, in this topic, therefore it is expected that to mention some philosophical arguments not only that investigate how empirical and scientific knowledge can be acquired, but also to make clear whether both arguments are constructed from different basis or not. In other words, here, it would be an inevitable task to discuss both the Aristotelian and Baconian methods of substantive, sensible and scientific knowledge. In relation to this, Leo notes, "[i]nduction and deduction are major ways of acquiring knowledge in the modern science, but Bacon acknowledged only the inductive method" (2011:83). Further, "[t]he method of science is either induction or deduction or both. The snag in induction is that its truth or inference [is] not certain" argues Kanu (2015: 81).

Although the "origin of modern scientific method" goes down into around the 16th century, this mechanism goes back to the classical empiricists. Empiricists are naturalists, for they usually focus on the physical world. And to understand this nature, often, they use mechanisms as inferences. Now, since we have two types of inferences which are real alternative mechanisms (for instance, such as observation and hypothesis) that help man for acquiring as well as for an expansion of substantive, empirical and scientific knowledge, then it would be better to make a discourse by scoping on the syllogism of the deductive method and the Baconian inductive

method. In other ways, now, we are going to investigate, compare and contrast the methods that have been proposed both by Aristotle and Bacon. Both Aristotle and Bacon are empiricists. Accordingly, something, for both of them, what is not sensible either does not exist or unknown. Having agreed this, then it has been become an important and necessary factor to explain the explanation of the syllogism of the deductive and inductive methods.

The syllogism of the deductive reasoning is often regarded as a reasoning process or a movement from general (universal) to its particular. Nevertheless, Aristotle's syllogistic inference is not only meant this one. Because, his belief is that deductive inference is a method that applies within pragmatism. But, as this word has been elaborated in the next chapter, then there is no room to present an exhaustive explanation, here. But the syllogistic inference is not to mean only a form of movement from a specific's general (universal) to its particular, but also vice versa. In accordance with this, in the *Analytics,* Aristotle argues, "the path to knowledge begins from the perception of sensible particulars, advances through the formulation of universal concepts and principles, and ends in a grasp of the subject grounded in a knowledge of its ultimate…principles"(cited in Lesher, 2009:1). Now, this quotation highlights how the syllogistic argument infers from. But, Aristotle has argued indeed identical with the common definition of a deductive or a syllogistic method of reasoning, that is, in Book I of the Physics, he contends that just the reverse of the *Analytics*. And Aristotle claims, "describing the natural path toward knowledge as beginning from universals and advancing toward particulars"(ibid). Although these two quotations seem incompatible each other, nonetheless having Aristotle argued these ideas is to show nothing, except to show how the syllogism of the deductive inference illustrates certainty of proofs of existent things. Therefore, the need for a syllogism of a

deductive reasoning explicitly or implicitly entails a certainty of such existent things as either wholly, partially they are or they are not.

Now, in this thesis, I pass to the senses of the inductive method in general; and then principally to the content of the Baconian Inductive method of inference which becomes a popular since the time it has been proposed by Bacon.

Inductive method has been defined by many logicians as the movement from something known to the unknown, that is, the conclusion of a certain or a given inductive argument moves beyond the provided justification/s or premise/s. For the purpose of clarification, let us see the following four examples:

1) Ethiopia has never been colonized. Therefore, she will not be colonized even in the future.

2) The world (earth) has existed, as historians informed us, above 4.5 billion years. So, it will exist forever.

The above two examples show us what an inductive method is meant by. In this thesis, what I want to argue is, in reference to these examples, it is almost obvious for every one – now or in this sense an inductive method is nothing other than a forecasting. But, if predictions had had truthiness or accuracy, I claim that human beings would not have been suffered from different problems, as we often desire pleasure to pain. For science is not only an explanation of facts, but also tries to dissolve human problems which are phenomenon.

3) Most Ethiopians are economically poor. Therefore, probably an Ethiopian athlete, Haile G/selassie, is economically poor.

4) Belay Zeleke, from Gojjam, was a patriot during the fascist regime; so did his brother, Ejigu. This implies that all Gojjam people were patriots during the fascist regime.

And arguments 3 and 4 are instances of enumerative inductive of the "eliminativism" theory, for this mechanism is supposed as a selection of the best and accurate evidence among others. In light of this, Reiss has claimed,

> [t]he most straight forward way to discriminate among evidence-entailing hypotheses is to devise tests or series of tests that eliminate all but one of the alternatives. This idea goes back to Bacon… The evidence relevant to a hypothesis is therefore constituted by the testable implications of the hypothesis at stake as well as those of its alternatives (2010:555).

But, the above (3 and 4) examples are either false or do not have certainty, as these, and such inductive inferences are measured only based on their degree of probabilities. Bacon is an empiricist, and then his inductive method begins from perception of experience. Then, for Bacon, inductive method is a method which asserts a claim of substantive, empirical and scientific knowledge, for it begins and moves from particular certain things to its general terms. Nevertheless, neither the aforementioned definition of induction nor this way of inference, that is, the Baconian inductive method cannot give us a guaranteed knowledge, owning to now it has been becoming a probability, but indirectly it becomes prediction. And prediction cannot be anything other than uncertainty. But, Bacon's inductive method is directly a probability and also indirectly a prediction. So how do we trust all the four examples that have been listed in the above and the inductive method in general?

2.4.1. Challenges and Appraisals for the Aristotelian Syllogistic Method

2.4.1.1 Challenges for the Aristotelian Syllogistic Method

Bacon may be the predominant criticizer of Aristotle. And since Bacon's book (*The New Organon)* profoundly underestimates the Aristotelian syllogistic method, there is no room here to discuss in a detail way why and how Bacon challenges to the works of Aristotle. Nevertheless, some Baconians view that challenge to the Syllogistic method are elaborated, for they consider it as futile. The syllogistic argument of the deductive reasoning has been considered though not by all philosophers of science, as it does not give a new knowledge. This sort of explanation, as some Baconians or commentators argue, is that the conclusion of a syllogistic logic of the deductive inference is already contained in its premises. A Syllogism argument is characterized as a circular reasoning, that is, it gives nothing else which does not stated first. In this regard, this mechanism has been considered as it does not offer man to acquire a substantive, sensible and scientific knowledge. In accordance with this, Coleman argues, "… Vicious circular reasoning, therefore, violates genuine method. Vicious circular reasoning does not add anything new, it does not advance learning, and it does not add to knowledge. Vicious circular reasoning goes nowhere and leads nowhere… "(2006, 1).

In addition to the above critique, the syllogistic method of inference, as some Baconians contend, has been understood as it does not help man to acquire and extend a substantive, empirical and scientific knowledge. They propose that the syllogistic argument lacks "pure observation". In other words, an inference that lacks pure observation is a mechanism that deals with abstract things. This implies that the syllogistic logic cannot be a mechanism for an acquiring and expansion of empirical and scientific knowledge; rather it becomes simply a definition about metaphysical concepts, or perhaps an imagination or a nightmare. In account of this, Quintaneiro

states that, "[t]he Aristotelian method is philosophically unjustified since there is no such thing as pure observation, which makes the method itself futile" (2015:2).

2.4.1.2. Appraisals for the Aristotelian Syllogistic Method

Although the Aristotelian syllogistic of the deductive inference has not been given a more credit as it helps man to acquire substantive, sensible as well as scientific knowledge, there are some advocators and expound the role that it plays for the development of scientific knowledge. Among others, Suter argues that the Aristotelian the syllogistic logic of the deductive logic was a basic, as not only fixed with abstractions or "formal thoughts" but also since it had worked for the advancement of 'science'. It is clear that to make a discourse about science could not be anything else, except to deal with nature, which is, the physical world itself or may be including its cause/s. In relation to this, Suter argues, "it is important that we grasp the immense value for science of this bare, noncommittal, inescapable character of the orderliness of nature which was reflected from the syllogism"(Quoted in Quintaneiro, 2015:2) For Suter advocates the Aristotelian syllogistic method of inference, besides he contends as it would be possible to acquire substantive, sensible and scientific knowledge by using this method. And on behalf of Aristotle, he notes that, "… in the first place, we derive and find true premises that will serve as the foundational principles of a given science. The problem however, is finding such principles. This is not a matter of pure form, rather content" (ibid). Despite the fact that as the Aristotelian syllogistic logic had worked effectively as a mechanism for acquiring scientific knowledge that was developed from experience, so this entailed that induction was in use. Accordingly, it is clear that as Aristotle employs both types of mechanisms (the inductive and deductive respectively). For example, North argues, "Aristotle gave to experience an indispensable role in the process of acquiring knowledge…"(quoted in Quintaneiro, 2015:2).

2.4.2. Challenges and Appraisals for the Baconian Inductive Method

2.4.2.1. Challenges for the Baconian Inductive Method

Although Bacon makes inductive method popular as a mechanism for acquiring and more for extending knowledge that is empirical and scientific, but his discriminative inductive mechanism of the enumerative induction is still less assured than the deductive way of inference, that is, a deductive reasoning that is valid in its form. In light of this, Lane contends, "… Bacons method of eliminative induction cannot be as secure as a deductively valid argument, and therefore that it cannot produce infallibly true conclusions, because of its own logical structure"(1999:182). Despite the fact that, Lane notes that as a valid deductive argument is more guaranteed than the Baconian eliminative inductive, but he has to add its soundness beyond the validity of its way of process, for a syllogistic logic to be categorized as valid or invalid is not a sufficient condition, but it has to fulfill soundness. Now, we turn back to Bacon's additional challenges which are proposed by some philosophers; for example, among others, Ducasse claims that although Bacon himself in his New Organon declares repeatedly as he finds the inductive method which is drastic to the path of the Old Organon, his theory has become questionable if he brings, that is, discovers a new mechanism that is the inductive method to philosophy (cited in Larsen, 1962:435).

Besides, Cohen recognizes what makes Bacon popular is not his proposing of the inductive mechanism, but through words, that is, his 'vocabularies'. Unnoticeably words can make popular if they get a good orator and/or writer. In persistence to this, he notes,

> Bacon seems to have preferred the latter locution, but there is no significance in this preference, and his intellectual posterity often chose the other idiom. What is important is not the choice of vocabulary, but the underlying idea that the reliability

> of certain rules of inference (those given by causal laws) is a matter of degree (Cohen, 1980: 222).

Further, Cohen underlines "[o]f course, Bacon was wrong to suppose that his method could even in the end produce conclusively certain results" (ibid). Further to the above criticisms on Bacon, we learnt both undergraduate and postgraduate levels in the course of philosophy of science as his inductive inference starts from experience, which is, from perception of experience. For inductive begins from observation then hypothesis then experiment and finally rests on result. Nevertheless, Bacon is criticized for he leaves out hypothesis in his method. In accord with this, Leo briefly notes, "[t]he major weakness in Francis Bacon's work is that it lacked hypothesis. For any good work in science, one needs hypothesis… for one's experiments, on the platform of induction. But Bacon says that one may look at facts and the hypothesis would itself" (2011:83).

In addition to the above some critiques, Cohen criticizes Bacon, that is, "[n]ot only did Bacon ignore or oppose what was sound in the science of his day, but also he himself, despite all his grandiloquent claims, failed to make a single important contribution to science" (1949: 101).

2.4.2.2. Appraisals for the Baconian Inductive Method

In fact, Bacon jots down that the primary task of a scientist is to accumulate data by comparing and contrasting from three different stoves that use for different cooks. The first stove then includes sorts of observable facts of occurrences that have familiar or common qualities or attributes. In the other way, copious of terms are predicated in their predicate terms (Bacon's Book II, Aphorism XI). The second stove is targeted on negative illustrations, that is, it separates by means of exclusion for the illustrations of instances which are provided but have not at least similar attributes (Book II, Aphorism XIII). The third and final Bacon's stove is leveling of

illustrations within the observable facts of occurrences. Using this stove, Bacon may conclude in degrees of instances of sensible things like the positive, comparative and superlative that we use in the English language.

Bacon, by some commentators, is considered not only as a philosopher, but also as a scientist. Hence, for example, Shemwell et al. contend, "[p]hilosopher and scientist Sir Francis Bacon grappled with this question in the early 17th century and wrote a series of aphorisms for the organization data and the search for explanations"(2015:2). Besides to this, Bacon is praised by Bertrand Russel; for he made the inductive method popular though he does not articulate it. What makes new the Baconoian inductive mechanism, as Russel argues, is due to it excludes or denies by typifying the obstacles of empirical and scientific knowledge: the four *Idols*- which are the false opinions. Idols of the tribe- those are implanted in human, so are unavoidable. Idols of the cave- are often favoritisms or biases. Idols of the market place- are originated through language communications. Idols of the theatre- are mainly accepted mechanisms of thought (1979:528). Further, Bacon is pronounced as he shifts philosophy into philosophy of science, for he comes up and proposes the inductive mechanism that helps man to acquire or expand substantive, sensible and scientific knowledge. In addition to the above Bacon's method appraisals, Leo notes that Bacon has found a new mechanism that functions for an extending of substantive, empirical and scientific knowledge. In light of this, he notes, "Bacon was the first in the long history of empiricism to yearn for a decisive break with the traditional way of thinking…The new method advocated by Bacon is the basis for the current scientific method is induction. Thus Bacon contributed immensely to science" (Leo,2011: 84).

CHAPTER-THREE: A Comparative Analysis between Aristotle and Bacon

3.1. Overview of the Chapter

Something is perceived entails strictly it exists in reality. Or in the other way, empiricism implies observation. So this indicates that for somebody to observe something, the thing itself must exist. And an existing thing or things may have qualities: accidental and essential- which make them unique among each one another and make them similar, for there are in fact existing things that share common attributes. Accidental and essential qualities of existing things lead us to assert Pragmatism, to explain existing things in their proper way. Therefore, empiricism is a school of thought which studies and declares what it first discovers or perceives to an existent thing/s. And different existing things that are perceived are to be explained in their practical way, otherwise man will have knowledge that is fallible and incorrect. In accord with this, the Sub-alteration relation of the categorical proposition of the syllogistic logic can solve where defective arguments are occurred, but the Baconian method of inference not yet. For the sub-alteration sets out knowledge of preliminary principles as universals, so it explains existing things in their practical manner; otherwise it has detects fallacies for there are vicious inferences that shows only totality. It has been explained earlier that empiricism is about existing things of the physical world. In other way, there is no room to make a discourse about linguistic meanings if such explanations are about abstract and unperceivable issues for such things do not exist or for sure are unknown. Nevertheless, philosophy of science attempts to discover and explain nature using at least a mechanism. So it uses either the Aristotelian syllogistic logic of deductive reasoning or the Baconian inductive inference (or both). However, regarding to empirical and scientific knowledge, both Aristotle and Bacon do not affirm linguistic meanings; unless terms that can be

mentioned have practical ways. Accordingly, neither the syllogistic logic nor the Baconian inductive method gives a credit for empty terms, for such terms of things lack induction, that is, are found nowhere. From this point of view, though Bacon wrongly understands to the syllogistic logic as it does not refer to concrete things, but it is possible to underline that neither the syllogistic logic nor the Baconian inductive logic is an abstraction.

3.2. Empiricism, Existence and Pragmatism

Empiricism, always, relies on perception, for the senses attempt to investigate the physical world, as well as, help to tell us about ourselves in different dimensions. Beginning from the ancient period, not all, but many philosophers believe that perception gives undeniable true knowledge. Philosophy in this area is constrained by a number of properties that we believe to hold of this view: If perception could give us knowledge of about the world around us, which means we are aware (conscious) of about the sensible things by the means of either by sight, hearing, touching, testing or smelling (Blackburn, 2008:270). Besides to this, as is found in the Oxford Companion to the Mind,

> Philosophers have generally considered visual perceptions to be closely related to, or even to be samples of, surfaces of surrounding objects. Thus, vision was thought to be rather like * smell, and as direct and immediate as * touch. However, with the invention the camera obscura, and the related discovery that the object world is imaged optically in the eyes, it became clear that patterns of light the eyes (retinal images) are transmitted to the brain by coded electrical signals (action potentials), which are then, somehow, read as objects having very different and far richer properties than the optical pictures in the eyes (2004:712).

Accordingly, existence precedes experience. In this context, something in order to be perceived, it must be existed. Now, existence may not mean only to be conceptualized but also to be actualized. The case is that, as empiricism is fixed with only perceptions, that is, with the five

sense organs, this implies that it denies all but confirms only what is observed for a thing becomes available. In accordance with this, "[e]mpiricism is a philosophical school of thought which holds the view that it is only through experience that one can have a true knowledge of the world" (Leo, 2011:81). From the classical period, partly, from pre-Socratic philosophers including sophists and even the modern empiricists believe that any knowledge could be established out of perception of experiences. In relation to this, Hossain notes, "… man derives knowledge through the five senses experiences likely sight, hearing, smell, touch and taste. Of course, one may distinguish [the difference] between direct and indirect experience" (2014:226). Further, Aristotle is mainly believed not only as an empiricist, but also as the herald of science that is empirical and scientific, for he argues against reason as it is not the basis of knowledge. This implies that he denies entirely the view of metaphysical theory, for it is an abstraction. Also, Leo contends, "[e]mpiricism is traced to the famous Greek philosopher Aristotle who is described as the precursor of empirical system of knowledge, due to the fact that he was the first thinker who boldly and elaborately articulated the view that experience not reason is the source of all knowledge" (2011:82).

By perception, existence may mean the state of being or actual. This implies that being physical or concreteness proves about the existence of something at least to itself. And whatever exists empirically has a definition or an explanation but that cannot be otherwise. Explicitly a definition or an explanation for an existent thing leads to cite its definiendum or explanandum and its defienen or explanan. Nevertheless, it would not be easy to explain or define properly for an existing thing. How is possible to give a proper definition/explanation of something that exists empirically directs into pragmatism-the philosophical doctrine that declares practical consequences are the criteria of knowledge and meaning and value. Indeed, as King and Stanley

argue, "…among philosophers of language, there is no stable agreement on the semantics/pragmatics distinction" (2003:2). Despite of this, both of them highlights the distinction of those words: while semantics refers to the meaning of words, but pragmatics indicates to 'the use speakers make of words'- this may mean how /what a speaker uses terms (2003:3).

Pragmaticism means "Practicalism." And it is evident that different philosophers have used it in its contextual meanings, for this word is an ambiguous. For instance, Charles S. Pierce, White James and John Dewey, etc. use it differently. But, now pragmaticism in regard to philosophy of science is in its sharpen and precise sense, that is, about knowledge which is empirical and scientific. For science is often an explanation of nature, it is vivid that to define or explain an empirical and scientific knowledge which is developed out of perception of experience by its practicalism. And this undoubtedly entails induction. In the other way, a sensible and scientific knowledge, which is acquired through induction, is through empiricism. In light of this, Asogwa claims, "[i]nduction, which is the process of empiricism, is synthetic akin to an ant, which gathers from outside into itself" (2013:7). It would not be hard to explain or define for such existent things in a practical or pragmatic way of explanation or definition either by means of the inductive inference or by means of the syllogistic of the deductive method of reasoning. Pragmaticism, in this context, is a discourse on what is tangible. Hence, this can negotiate or dissolve to the dispute which is proposed by Bacon for he proposes the inductive method as an effective and reliable way of mechanism to acquire or extend substantive, empirical and scientific knowledge than the syllogistic inference. In order to understand the gap between the Aristotelian syllogistic logic and the Baconian inductive method of inferences; see the following examples.

Take ‘A fish’ as the subject term and ‘living in water’ its predicate term.

Given that as a premise: A fish is an animal that lives in water.

This implies that (conclusion): No fishes are animals that live outside water.

And this conclusion is equivalent with “All fish are animals that live in water.”

This is a practical and scientific knowledge; this implies that it enables for everyone to understand as the syllogistic logic develops out of perception of experiences. No man has ever experienced if a fish lives outside water.

Given that as premises: F1 is fish that does not live outside water;

F2 is a fish that does not live outside water;

F3 is a fish that does not live outside water; and

F4 is a fish that does not live outside water;

This implies that (conclusion): No fishes are animals that live outside water. This is also equivalent with “All fishes are animals that live in water.” This is an enumeration inductive generalization.

Now, the first syllogistic argument and the second argument which is developed by the Baconian mechanism of inference are the very same. But, what if ‘man’ and ‘black’ are given as subject and predicate terms respectively? There are men who are black. And there are men who are not black.

Given that as a premise: man is a black rational animal.

This implies that (conclusion): Some men are black rational animals.

Besides, this is a practical and scientific knowledge; and this enables for an inductivist to understand as the Aristotelian syllogistic logic develops out of perception of experiences.

Given that as premises: Man1 is black rational animal;

Man2 is black rational animal;

Man3 is black rational animal;

Man 4 is black rational animal;

Man 4 is black rational animal

This implies that (conclusion): All men are black rational animals.

Through interpreting the Baconian Inductive method, so this example is an inductive generalization, for it does not have a fact, which is, it looses pragmaticism. Unless Bacon admits this, that is, if his method is absolutely enumeration inductive that passes through elimination or discrimination, then it would be also interpreted the very same with the syllogistic logic. But, inductive mechanism can never be the syllogistic way of reasoning, for syllogistic logic is by its very nature certain whereas an inductive reasoning is a probabilistic, that is, no clear-cut empirical and scientific knowledge is acquired by this method.

3.3. The Sub-Alternation relation and the Baconian Inductive Method

Both the Aristotelian and Baconian method of inferences are sourced out of experience, for both of them are empiricists. And the Sub-alternation relation of the categorical proposition of the syllogistic logic is formulated from perception of experiences. Aristotle believes that knowledge

begins from experience, for his theory (empiricism) justifies easily; and Bacon argues knowledge begins from observation, for his inductive method proofs inductivism, that is, similar to empiricism.

Using inductive method, as Aristotle argues, we formulate knowledge of first or primary principles that came later universals. "[F]or though the act of perception is of the particular, the capacity of perception is of the universals, for example of man, not of Callias the man" (quoted in Biondi, 2010:13). Accordingly, though the Aristotelian square of opposition gives a short summary for the statements that we have, in this thesis, the researcher prefers to introduce the sub-alternation relation in order to investigate the Baconian inductive method. And the reason which initiates me to investigate the Baconian inductive method by chaining with the Aristotelian sub-alternation of the categorical syllogism of the syllogistic logic is, due to there are specified fallacies (illicit sub-alternations) that are committed (occurred) when the movement of inferences become illegal. Bacon's inductive method is the process of from certain sensible particulars to its general (universal). And this type of inductive method is called an enumerative induction. But, to what extent can it give us a guaranteed substantive, empirical and scientific knowledge. Here is an example which is addressed by Reiss in 2010: 557.

"Raven 1 is black

Raven 2 is black

Raven n is black

Therefore, all ravens are black."

For such inductive generalization is unclear, and then imagine if it gives us an assured empirical and scientific knowledge. Such inductive method may be susceptible at least for two cases. Owing to, first, for enumerative induction does not specify how many (much) instances, that is, premises of members of a class are observed in order to infer from, it becomes questionable. Second, as enumerative induction does not specify how many (much) instances, that is, premises of members of a class are observed, it is highly exposed for 'falsification'.

For example, the statement "All swans are white"; in Europe had been confirmed as true until the European explorers arrive in Australia and find Swans that are black. Therefore, "all swans are white" is since it is an inductive generalization because it concludes from enumerative induction, then it has committed a 'hasty generalization' fallacy of the informal fallacy or an 'illicit sub-alternation fallacy' of the categorical proposition of the syllogistic logic. Because certain particular thing/s being something or having some certain qualities does not guarantee if others (the unstated members of a certain class) are identical with the imported instances (premises) of members of a class. For a better understanding, it is possible to introduce another corresponding inductive generalization which begins its premises by the Baconian enumerative induction.

Animal 'D' is a human being.

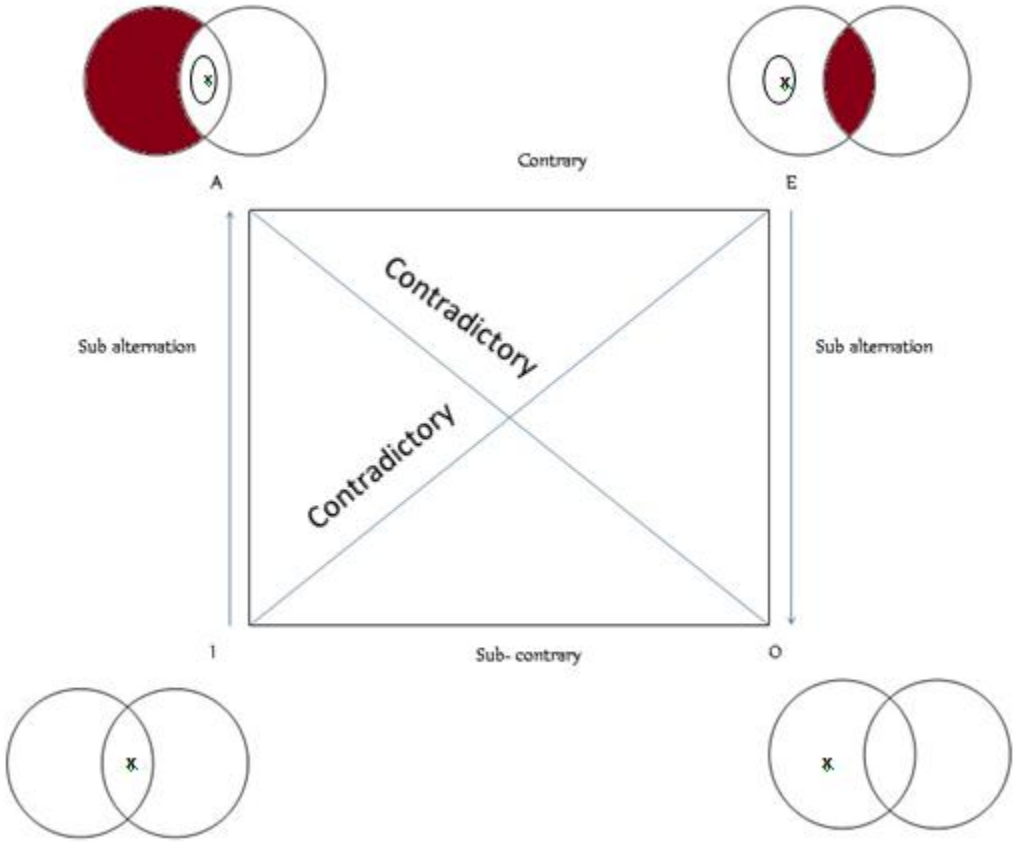
Animal 'E' is a human being.

Animal 'F' is a human being.

Animal ‘G’ is a human being.

Therefore, all animals are human beings.

The conclusion of this argument tells that every animal is a human being. However, this is a vivid false statement. Accordingly, the argument has committed a fallacy of hasty generalization, for it begins by enumerative induction. Nevertheless, this argument can be also specified in the sub-alternation relation of the categorical proposition as fallacy of illicit sub-alternation. That is, as the sub-alternation relation has been schematized in the square of opposition, then the above argument that is inferred from enumerative induction that Bacon often uses is an illegal transference and we know this by referring the schematized formula of the square of opposition.



As there are four types of statements, and these statements are represented by the four English (A, E, I and O) vowel letters to summarize them. Statements which are represented by ‘A’ and ‘E’ are universals, and are equal except in their qualities. However, statements which are represented by ‘I’ and ‘O’ are particulars, and then equal except in their qualities. And the sub-alternation relation is the relation of particular with universal or vice versa: it states that while truth flows down wards, falsity flows upwards. Accordingly, it states that if a statement that is represented by ‘A’ is true, then its corresponding line-the ‘I’ statement is necessarily true. Besides, if a statement which is represented by an ‘I’ is false, then its corresponding line-the statement that is represented by ‘A’ is definitely false. In light of this, “[i]n the classical construal, the proposition Q is subaltern of P iff Q must be true if P is true and P must be false if Q is false” (Raclavsky, 2016:11).

Nevertheless, if a statement that is represented by ‘A’ is determined to have a false truth value, then its sub-alternation statement is represented by ‘I’ letter will have undetermined truth value, that is, will have only probabilistic. Further, here are two examples:

Eg.1) All animals are human beings.

So, some animals are human beings.

This inference is from ‘A’ to its subaltern that is to ‘I’; and as the premise is clearly false, but its conclusion is true. Therefore, this argument committed the fallacy of an illicit sub-alternation.

Eg.2) All wives are husbands.

So, some wives are husbands.

And now the inference of this argument is just like the above example; but neither its premise nor its conclusion is true, that is, both of them are false. As empirical and scientific knowledge is limited only to facts, statements have the same or different truth values of an argument. On the other way, to say there is an empirical and scientific knowledge is to say statements of an empirical and scientific knowledge are constituted from tangible justifications. This entails that the Sub-alternation relation can effectively detect the problems of the Baconian inductive method for which is inferred from enumerative induction.

Eg.1) Animal 'D' is a human being.

Animal 'E' is a human being.

Animal 'F' is a human being.

Animal 'G' is a human being.

Therefore, all animals are human beings.

All its premises are true, but its conclusion is false.

Eg.2) Animal 'H' is not a human being.

Animal 'I' is not a human being.

Animal 'J' is not a human being.

Animal 'K' is not a human being.

Therefore, no animals are human beings.

Also all these premises are true, but not the conclusion. So based on this assertion, that is, following Bacon's inductive method that transfers (concludes) from certain particular existing things to general can lead into the denial of the existence of Bacon himself. Accordingly, Bacon's inductive method of inference is highly exposed into errors; but not yet give certain knowledge of the world that everyone can experience it or its parts.

Nevertheless, such inductive inferences, that is, the Baconian method of reasoning can be solved by pertain to the sub-contrary relation of the categorical syllogism of the syllogistic reasoning, for it says at least one is true.

But, some animals are human beings.

So some animals are not human beings.

Both the premise and the conclusion are true. This argument shows that what matters empirical and scientific knowledge is fact, but not necessarily being valid or invalid, but may be either aware of its falsity.

3.4. Terms of Empty extension as real causes of Existential fallacy

Although some terms have definiens or explanans, such terms lack existence. Therefore, terms that do not have existence are either they are projected by human thought (imagination) or may be resulted out of extinct concrete things. For example, Devil, Holy

spirit, Unicorn, Angel, Chimera, Ogre, etc. are scientifically unknown, as no one has experienced them though we list them.

Besides, some terms that lack existences are due to real things are died out-extinct from this world. In other ways, as there is a saying which gives a hint for this definition. "Name is above the funeral." For example, Dinosaur, and Mammoth can be mentioned here. Currently, we call them, for there are no concrete things. Therefore, to argue depending on such expressions exactly leads into an "existential fallacy", because this makes non-sense or it will be an attempting to proof depending on a proof less, that is, empty terms (YouTube, 2014).

Hence, an existential fallacy is the name given in a deductive reasoning that makes a process (inference) of terms that lack real existence. Such kinds of arguments are merely becoming linguistic or abstract.

Eg.1) No evil spirits are holy spirits. Therefore, no devils are holy spirits, for all devils are evil spirits.

Eg.2) : All Unicorns are animals.

It follows that, a Unicorn is an animal.

Eg.3): Some dinosaurs are big reptile animals.

Therefore, all dinosaurs are big reptile animals.

But, all the above arguments are arguments about terms which are found nowhere; then to make a discourse about the non-existent things makes the discourse itself none-sense, as is not less than as someone nightmares while she or he is in a deep sleep.

Any subject term, as Aristotle argues, is often considered as a definendum or explanandum; and any predicate term is considered as definien or explanan. But, as Aristotle is an empiricist, then his syllogistic logic does not deal with abstract explanations or definitions-in other words, the syllogistic logic deals with only with concrete existent things. In accordance with this, Strawson notes,

> If we interpret the propositions of the [square]as neither positively, nor negatively, nor positively and negatively, existential, but as sentences such that the question of whether they are being used to make true or false assertions does not arise except when the existential condition is fulfilled for the subject term, then all the traditional laws hold good together (1950:343-4).

From Strawson's passage, we can understand that the Aristotelian syllogistic method of reasoning is built by inductive, that is, by perception of experience. This entails that the syllogistic logic always denies for empty terms. As Aristotle is an empiricist, then it would be a contradiction if somebody assumes to his syllogistic logic of the deductive method of inference contains abstract concepts or empty terms.

CHAPTER-FOUR: Major Questions, Arguments, Refutations and Findings of Bacon's Critique on Aristotle

4.1. Why the Baconian Inductive Method Lags within a Pace from the Syllogistic Logic?

Aristotle argues that unless we derive and arrive at an infallible knowledge, then inductive method does not serve to develop (enlarge) our empirical and scientific knowledge. He contends that, "the conclusions are never more accurate than the data. In inductive reasoning we are performing part of the process by which new knowledge is created'' (Aristotle quoted in Fisher, 1935:54). According to him, the conclusion of this method of reasoning is always exaggerated- the conclusion goes or moves beyond from what is stated (justifications, evidences, or premises). In other words, Aristotle insists that inductive should never be true, even though it is till most of the time said and declared by its proponents; owing to its conclusion is no more accurate than the data on which they are fundamentally grounded. However, he argues that man does not have any other option that would offer him to understand universals, except by induction. In pertinence to this, he argues, *"* it is clear that we must get to know the primary premises by induction; for the method by which even sense- perception implants the universals is inductive''(Anal. Post. II 19)(Aristotle quoted in Galik,2006:502*).* Aristotle still contends that the role of an inductive reasoning process which it plays and contributes to empirical and scientific knowledge.

> [T] he right method of investigation: We must start by observing a set similar- i.e. specifically identical–individuals, and consider what element they have in common. We must then apply the same process to another set of individuals which belong to one species and are generically but not specifically identical with the former set. When we have established what the common element is all members of this second species, and likewise in members of further species, we should again consider

> whether the results established posses any identity, and persevere until we reach a single formula, since this will be the definition of the thing (Anal. Post. II 13) (Aristotle quoted in Galik,2006:502-03).

Therefore, what we can understand from Aristotle's definition is, inductive method is the basis or foundation for our knowledge of first principles, but it gives or serves nothing more else.

4.2. Does Bacon have an Evidence to Repudiate the Syllogistic Logic?

Although inductive is as the process, for Bacon, can only be well-organized if and only if, it is eliminative by leaving out in order to move beyond and pass on the inductive method by simple details. This means, according to him, induction is the new way or instrument that helps us to expand or extend scientific and practical knowledge- from the particular known entity (thing) then to generalize about the whole things or entities, as Bacon argues, at least of the same species. Furthermore, he notes that inductive method helps the human mind to discover a way to establish as well as to expand knowledge that is taken place through an experiment. Bacon despises to all sciences for which all were established on the bosom of the Aristotle's and Aristotelians syllogistic logic, because he thinks that the traditional method (the Aristotelian syllogistic logic) is a fruitless and cannot help man to extend our scientific, empirical knowledge. In other words, he says that the current science is worthless and accordingly cannot assist man in order to investigate, inquiry of unknown things of the world by deductive method unless the traditional method (*Old Organon*) is replaced by *The New Organon*. In accordance with this, Bacon argues, "[a]s the sciences in their present state are useless for the discovery of works, so logic in its present state is useless for the discovery of science'' (2000:35).

Furthermore, Bacon firmly argues and attacks to the old logic–the Aristotelian deductive or syllogistic argument. He not only assumes it as it does not help us to expand scientific empirical, knowledge, but on the contrary, it gives us a flawed knowledge-man stumbles an imperfect knowledge instead of the perfect one. And Aristotle's syllogistic logic is considered by Bacon as a method of obstruction, barrier, hindrance, and so on. Then, he means to say that the Aristotelian syllogistic argument is a disclosure for ignorance, because he argues that it directs us to enter into mistakes, or gives us a flawed knowledge. And if knowledge is flawed, then it would be informing an error. Bacon asses and evaluates the syllogistic logic and finally he arrives at a decision and sets out the demerit of this syllogistic argument is higher than its merit offering of science. Hence, here Bacon repudiates, "[c]urrent logic is good for establishing and fixing errors (which are themselves based on common notions) rather than for inquiring into truth; hence it is not useful, it is positively harmful'' (2000:35).

In addition to the above, Bacon criticizes the syllogistic logic, for he knowingly or unknowingly, but projects it as a kind of theoretical principle- which does not bring into the ground. This implies that, it is impossible to bring into an experiment, that is, untested and unanalyzable using labs or in precise and in a legible way- it is a mere projection of abstraction. In relation to this, Bacon argues, "[t]he syllogism is not applied to the principles of the sciences, and is applied in vain to the middle axioms, since it by no means equal to the subtlety of nature. It therefore compels assent without reference to things" (2000:35).

Besides, as Bacon does not stop to undermine the *Old Organon*, hence he stresses to repudiate the syllogistic argument, now and then. And let us see the following an additional aphorism

which has similar content to the above, except it merely differs in words (with the structure of the sentences).

> The syllogism consists [of] propositions, propositions consist of words, and words are counters for notions. Hence if the notions themselves (this is basis of the matter) are confused and abstracted from things without care, there is nothing sound in what is built on them. The only hope is true induction, argues Bacon (2000:35).

Nonetheless, Bacon has argued which is unlike to the earlier, since in his aphorism, he more or less gives a credit (a value) and/or he levels into the same mechanism that offer to discover as well as to expand(extend) our empirical and scientific knowledge. Now, he becomes a flexible. Although he has argued this one and other additional points, but on the contrary, in this thesis, the researcher shall argue later. But, just let us see how he mixes up together the Aristotelian syllogistic logic with inductive method.

> There are, and can be, only two ways to investigate and discover truth. The one leaps from sense and particulars to the most general axioms, and from these principles and their settled truth, determines and discovers intermediate axioms; this is the current way. The other elicits axioms from sense and particulars, rising in a gradual and unbroken ascent to arrive at last at the most general axioms; this is the true way, but it has not been tried(Bacon, 2000:36).

4.3. The Syllogistic Logic and Its Construction

Natural science, as Aristotle grasps and explains, is something which stays behind within the scaffolding of day to day experiences and up on these through perceptions, then it formulates or constructs further precise inside by that scaffolding. He argues that man apprehends and

formulates nature's indispensable and available entities. Therefore, Aristotle attaches so strictly to the external physical world- tangible or solid individual things. These tangible things are limited that encountered in our daily life. Nevertheless, unlike the inductive method which is still faced and exposed to numberless difficulties, yet it is used and serves as an applicable and reliable way of offering to scientific knowledge by modern scientists, and more, philosophers of science; but the Aristotelian science by no means tackles such problems. The likely data of scientific assumptions or anticipations, as Aristotle elaborates, why an inductive method cannot be taken as an instrument for acquiring and expanding our knowledge, are immeasurable, yet the anticipations themselves and their end results are measurable (Aristotle cited in Grene, 1972:395-96).

Moreover, Aristotle is a pioneer in explaining still the relationship between Genus and Species using Formal Logic. Aristotle jots down (puts down) depends on biology the following argument: "If A is a genus of B, B is a species of A, and B is predicated of C, then A is predicated of C" (Aristotle quoted in Malink, 2015:270*).* Let us take three concrete things that we actually believe them for their being true due to the experience we have about these things: suppose 'A' represents cows, and 'B' represents a mammal and 'C' represents an animal. Therefore, based on Aristotle's Formal Logic explanation it has this sort of form: If Cows are mammals, and mammals are animals, it follows that, cows are animals. Directly or indirectly, Aristotle illustrates how or what looks like the relationship between the two terms (subject and predicate) of declarative statements- that make up together an argument.

Now it is important to begin with assessing the Aristotelian way of interpretations in regard to the indeterminate premises. Because this sort of interpretation secures us from committing

formal fallacies (if the things what we mention are not equivalent with the statement that we define).Then, in relation to this, Aristotle notes, *"*o]ccurrences are universal (for they are or come-to–be what they are, always and never case); others again are not always what they are but only as a general rule" (Anal. Post. II 12) (quoted in Galik, 2006: 502). An indeterminate premises are initial statements which set forth evidence(s) or justification(s) in order to arrive at the required general or final point of an argument, yet such sorts of premises are definitely recognized for they lack or do not contain quantifiers- *'all' and 'some'*. In deductive method, using such sort of quantifiers are excluded or left out, because Aristotle believes that such kinds of premises are not hard to interpret and to understand between or among communicators, for pragmatism matters always. In other words, Aristotle deliberately leaves out quantifiers, as statements so are understood in unexpressed manner (Aristotle cited in Malink, 2015: 271).

An evidence or justification, according to Aristotle, is a certain category of '*logos'*- which means either affirming (asserting), or disallowing (denying) something of something. Though the word '*logos'* had been translated into variety of meanings; such as, word, discourse, thought, law, principle and reason, usually, in this explanation it is to mean 'sentence' and that sentence is not any sort of sentence, but a sentence that can be evaluated as either true or false. In the other way, a sentence is a reason if and only if it is the very same or identical with a declarative sentence or statement. Aristotle continues to recognize the types of justifications or evidences that man can have in order to avoid ambiguities, not only in language usage but also in reference to concrete things. Therefore, as he figures a premise is either a universal, if not, then it is a particular, otherwise, it is an indeterminate. Universal declarative sentences are statements that include entirely importation or exportation of things of things–either to affirm *all,* or to deny *all*. Besides, a particular declarative sentence is a reason or sentence that encompasses to some–partially

assertion some things of some things or not all; however by indeterminate sentence is that stands with lacking of quantifying term or has undetermined quantifier explicitly. This category is used where the things that are in discussed are obvious by the individual participants or communicators (Aristotle cited in Malink, 2015:272-75).

Universal statements are reasons or premises; no matter they affirm or deny of things, as Striker sets out, are often indicated as they lack quantifying expressions. For a better understanding, let us observe the following two examples that Malink introduced from Aristotle's translations. (1) "The angry person desires revenge on account of an apparent slight.'' And *(2) "*Someone who has lost knowledge of something has forgotten it" (2015:275*).* Each of these declarative sentences, as Aristotle takes, is to indicate universal premises (sentences) by these two indeterminate declarative sentences. Then when each of these indeterminate sentences is translated in to universal premises, and so is to claim or allege about every angry person and everyone who has lost knowledge of something. In other words, 'The angry person desires revenge on account of an apparent slight' is identical to*:* All angry persons are people who desire revenge on account of apparent slight; and 'Someone who has lost knowledge of something has forgotten it' is identical to: All persons who have lost knowledge of something are people who have forgotten it.

Conversely, indeterminate sentences–declarative sentences can also be translated and are understood in what way they deliver their concrete content for a particular claim. As Aristotle has illustrated it well helping through an example, and so I have added two my own examples corresponding to what Aristotle has given us instances of interpretations. The indeterminate declarative sentence is 'Animal is winged' can be translated in to a particular categorical form

‘Some animals are winged*’;* because this claim is true. Therefore, ‘animal is winged’ is true (Aristotle quoted in Malink, 2015:275). For example, an animal which is winged is such as; crow, eagle, duck, etc. On the contrary, Aristotle argues that ‘*Man is winged’* is false. It is unquestionable that man is an animal, but he is not a winged animal. In addition to Aristotle’s example, in this thesis, the researcher has stated the indeterminate statements are the following:

1). Animal is dog.

Though this statement does not have a quantifier, but it must be translated into its applicable and proper meaning–concerning to what it must be. Accordingly, “Animal is dog”; is to mean nothing, except to say “Some animals are dogs”; and this proposition is true.

2) Mammal is winged.

Hence, some mammals are winged is also true.

3) Plant is carnivore.

This indeterminate declarative sentence is also alike to the above examples which we have seen and is translated into its particular claim. “So some plants are carnivores”; is also true. Nevertheless, if we translate these each example to otherwise, then we commit in each example either a Hasty Generalization or an Illicit Sub-alternation fallacy.

Moreover, ‘Animal is not winged.’ This indeterminate declarative sentence also refers to a particular claim of exclusion although it does not have a quantifier word. Therefore, ‘Animal is not winged.*’* is also to say *‘*Some animals are not winged*.’* This statement is also unquestionable for having its truth value is true. For example, horse, cow, goat, camel, and so on. Each and

every that has been stated here is an animal, but none of it is a winged. As a result, 'Animal is winged,' and 'Animal is not winged', are both true, because as we have seen it in the above or (Some animals are winged) is true, and 'Animal is not winged' is also true, because some animals are not winged' is undoubtedly true. And the same works or applies to the rest examples. In general speaking, Aristotle's 'indeterminate sentence' is to indicate either universal claim or particular claim (or both). The distinction between universal and particular statements is not based on the 'syntactic criterion of the quantifying expressions.' But, indeterminate reason or declarative sentence is translated based on 'semantic', and may be 'pragmatic criteria' be appropriate to what a given statement is understood and agreeable to say by its communicators. Therefore, though Aristotle has mentioned the need to category sentences in to three distinct translations, but we have only two types of declarative sentences, because the indeterminate sentence becomes nothing, but definitely it is either a universal or a particular statement, and it cannot be otherwise (Aristotle cited in Malink, 2015:277).

We have already discussed earlier the Aristotelian syllogistic logic how much it plays, that is, its vital role and helps man to acquire and so it does expand sensible and scientific knowledge. But, what is the source or basis to take as an evidence for the formulation of this syllogistic logic as the method or instrument which is used for acquiring or expanding our sensible and scientific knowledge? Aristotle argues that, of course, scientific knowledge requires an epistemic certainty. And this epistemic certainty is grasped only by the infallible mental faculty–at least about the things which are in discussion are actually true, hence there is a perfect knowledge of principles. Besides, Aristotle explains, umpteen times, us that it is clearly how we acquire knowledge of the first principles. Therefore, he argues that these are derived through inductive method or inferences, but this induction method or process does not begin on a theoretical (speculation) or

from a night dream, rather it begins from experience, that is, stimuli first then sense-perception. And let us observe how our sense- perceptions are interrelated with induction. To underline this, Aristotle notes, " [c]learly, then it must be by induction that we acquire the knowledge of the principles. . ."(100b3) (Aristotle quoted in Aydede,1998:4), he states in his popular passage (100b5-17), as the mainstream understanding has it, the most and objective mental faculty of man, '*nous'*, by which Aristotle has contended, man understands and grasps the crucial as well as decisive knowledge of first principles as such once and for all. Although induction lacks power to shelter or assure epistemic certainty, but it has been adopted the indispensable of inductive process towards the knowledge of the first principles and these are objective, therefore. But, for him '*nous'* is better than any other which contemplates and grasps objective knowledge.

4.4. Critical Remarks

Though we do not know for sure whether Bacon argues knowingly or unknowingly in support of an impossible idea, it is likely he is a little bit confused. For he argues, "[b]ut even in universal propositions we do not require total or absolute affirmation or negation. It is adequate for the purpose if they admit some unique or rare exception'' (2000:153). According to this claim (Bacon's), there is an inconsistency of an expression, that is, how is possible to allow limited affirmation or negation if we are discussing about universal propositions? Universal propositions are ultimate bearers of truth values that either import or export a totality. In other words, when universal propositions import about members of a class, no member of that class is excluded, that is, 100% is affirmed. Besides, if a universal statement negates to members of a given class, hence without exception every member is exported. Also such type of exclusion definition is definitely

100%. Nonetheless, as in thesis, the researcher's emphasis is not this one though Bacon provokes us to make a discourse on an incompatible notion even for a while.

Therefore, now in this thesis, I pass to give responses for which I have raised before: The following questions, which I think, are the most basic questions (three major questionable ideas) for which he has understood as questionable (untrustworthy). And he is going to critique the critique: On Baconian notion of Repudiating the syllogistic logic (Old Organon). Bacon attempts to regress (turns back) the Syllogistic logic of the deductive method, then in this thesis, I argue that the Baconian mechanism has left behind within a pace from the syllogistic inference, for the syllogistic method once has set out knowledge of first principles of empirical things. Aristotle employs the inductive method to acquire or investigate substantive, empirical and scientific knowledge; and if Bacon employs it deliberately, in this thesis, I think that Bacon stands either intentionally to loot the works (contributions) of Aristotle or he does not know how first principles of the syllogistic logic are formed. Because, in this thesis, the researcher has understood Bacon, often, as he attempts to undermine and to discard the syllogistic argument, and he considers it as the old and useless-does not have any merit to contribute for the advancement of substantive, empirical and scientific knowledge. But, let us look at where Bacon stands, over all. Beyond the above critique, now in this thesis, I am going to not only to elaborate by presenting but also to give Critical remarks for each questions for which I have raised earlier, therefore.

1)Can inductive reasoning give us empirical knowledge more than deductive reasoning? Bacon in his book I, Aphorism XXIII argues, "[t]he one, again, begins at once by establishing

certain abstract and useless generalities, the other rises by gradual steps to what which is prior and better known in the order of nature" (1620:7).

How is induction to be understood? First, let us determine the possible interpretation or the meaning it has given by some philosophers. For example, for Hume, induction means the process (reasoning inference) of something starting from the known then goes to something unknown. Hume contends that induction cannot give us a substantive scientific empirical knowledge. He does not reject or doubt to the past or to the present study, because it has been experienced. The problem is about the future-which is unstudied and inexperienced. Hence, it (inductive method) becomes a speculation and a probability. Because on Hume's conception (understanding) no one can argue that our natural suppositions or beliefs are absolutely true. In persistence to this, "[i]nductive reasoning cannot be justified directly by experience, since experience only directly gives us knowledge of sensed states of affairs, and inductive reasoning takes us beyond sensed to un-sensed states of affairs" (Hume cited in Speaks, 2006:4). And in inductive method (inference) there is no certain scientific knowledge that can be an empirical and accordingly man lacks assured knowledge. For example,

1) All observed mules are barren animals.

   Therefore, all mules are barren animals.

In the past we consider that a mule was a barren animal; and often we define her using by genus and difference. But, today, there are mules that have given birth-for instance two mules in our country (in Oromia region, West Shewa zone, around Ambo town, and in Amhara region, Wollo zone. Accordingly, as we have seen this one, just we remind that what Karl Popper has

introduced the principle of falsification-proving empirically of something contrary to a common, or a standard.

2) All observed swans are white birds.

Therefore, all swans are white birds.

To move from the observed to the unobserved is to hold unguaranteed knowledge and is a problematic, and this is the accurate implication of what an induction inference is, therefore. Also, Karl Popper sets out a demarcation between science and pseudo-science by means of falsification. And a pseudo-science may be still a meaningful, according to him, but the problem is it stumbles, often, on truth and what makes it pseudo-science is the impossibility of falsifying. Popper tries to illustrate, and to solve the problem of induction by formulating where this method is facing by serious difficulties. Just let us take an example that we have observed or experienced, introducing the fact that there are ordinary instances of black ravens, in order to apprehend and investigate its (inductive method's) uncertainty. Popper claims, "[s]uppose we observe several thousand black ravens. Let us call this observational evidence e. Then from e we could, quite reasonably, infer the prediction (d say) that the next raven we observe will be black, or the generalization (h say) that all ravens are black'' (cited in Gillies, 2003: 2).

Gillies advocates Popper's notion and argues that though this argument appears reasonable, as Hume notes, on induction, and then Gillies claims that this argument does not have the essence of deductive reasoning process. The reason for the claim is both or even proponents of deductive logic in general think that, if 'B' follows through logical connection with the force of certainty from its premises – 'A' premise, then we definitely understand that 'B' is true if and only if, 'A's

given declarative sentence is true, otherwise, there would be here some problems. Nevertheless, the earlier example of ravens, the initial statement might be true, yet the conclusion still is false. This example illustrates us, there is a probability after observing thousands of black ravens, the next raven that we will be observed turns out to be non-black, or as which has been observed a white raven. In Europe continent, all in thousands, the observed swans were white in colour, and this was thought to be a universal statement. However, after the European explorers moved to the Australia continent, they observed swans, but unlike to what their overall experience about what swans have colour is - that is the universal declarative sentence: Swan is white. Although this statement does not have a quantifying term, but until the European explorers went to the Australia and they observed non-white swans or black swans. First, this was assumed to mean: All swans are white birds. But, later this concept has been changed, that is, since the European travelers moved to Australia and observed black swans. Then their understanding or the knowledge of swans has been become unlike before. That is: Swan is white; is translated accurately to: Some swans are white is true, as well as; some swans are non- white is also true. For example, the black swans that have been discovered in Australia falsify to the aforesaid understanding and explanation of swans in general.

As Popper argues in his popular model, science begins with conjectures instead of observations; and the conjectures or assumptions are brought into an experiment or labs in order to be analyzed–whether the hypothesis is true or not. And if the conjecture is asserted after the experiment or lab, then it may be accepted to at least tentatively, otherwise, it has been refuted and still it requires to be substituted by another conjecture which becomes more or less compatible with the lab. That is as he argues that experiment of a conjecture is never endorsed once and forever. In other words, what Popper wants to note is proofing or testing of a conjecture

continues and therefore all conjectures are never regarded as definitely established. Now the process of testing and refutation does not require any inductive inferences but only the use of deductive logic as Popper tries to sum up. Therefore, from this definition, we can understand that both Hume and Popper agree in denying of inductive inference-as it cannot be a tool to extend substantive, empirical and scientific knowledge though for Baconian is the key path to science and scientific knowledge. Popper notes,

> Hume, I felt, was perfectly right in pointing out that induction cannot be logically justified. He held that there can be no valid logical–arguments allowing us to establish 'that those instances, of which we have had no experience, resemble those, of which we have had experience.' Consequently, 'even after the observation of the frequent or constant conjunction of objects, we have no reason to draw any inference concerning any object beyond those of which we have had experience' (1962:41).

(2) Does not Bacon backfire introducing inductive reasoning to undermine deductive reasoning as a method to acquire and expand human's empirical and scientific knowledge? In this thesis I recap that either Bacon does not know how Aristotle has constituted the syllogistic logic of the deductive method including its proper functional usage or else his intention is falsely to rename the works of Aristotle that he has contributed to science. There is not New Method which differs from the Traditional Method (the *Syllogistic argument*) though Bacon has called (entitled) his book as *The New Organon.* And in the eye of Bacon, this 'New Organon' or tool is assumed more in content than the Aristotelian syllogistic logic, and based on that he critiques and refutes the deductive argument-syllogistic logic, but instead of the syllogistic logic, he overvalues his New Organon as it contains more contents that helps man for an extending of substantive,

sensible and scientific knowledge. But, in this thesis, I argue that Bacon has not brought a new method at all which may contribute to philosophy of science or to science in general. The case that why in this thesis, I say this is due to Bacon owed the inductive method to Aristotle. Does not Bacon know as Aristotle is the classical empiricist philosopher? I hope so Bacon knows as Aristotle advocates empiricism, that is, one who acknowledges that all knowledge is obtained from sense experience or from sense perception. Then, there are stimuli and we perceive and understand them, and gradually we formulate objective knowledge–infallible knowledge. Hence, our scientific knowledge begins from experience and through the contemplation of the mind, that is, through our memory and we build or construct axioms (generally accepted truths), but in order to form axioms man unquestionably the inductive inference. Suppose that we look at for the first time, water flows down ward in a river. That is our experience and we may not think all of us whether water flows only down ward, that is, some people perhaps may think as water flows up wards. This is all about what an inductive inferences means. But, after no one observes as such water flows up wards, but it flows down wards. Then, first, we acquire the knowledge of primary principles which apply accurately at all times so is infallible sensible and scientific knowledge, does not depend in common senses, but is subject to test. If so, how is Bacon's inductive differs or how is it to be considered as a unique one? But, in this thesis, I argue that the Baconian inductive mechanism is lagged behind from the syllogistic logic. Aristotle formulates general rules or principles by inductive method as I have illustrated earlier helping my own examples, so what is wrong with the Aristotelian syllogistic method? How is the syllogistic argument to be considered as circle, that is, does not give additional information to mean knowledge, for its conclusion is already contained in its premises? Although not only Bacon but also there are many other philosophers, authors and thinkers who critique for the syllogistic

argument, because those who criticize to this path into a substantive, empirical and scientific is due to they consider it as it does not give us (man in general) new scientific empirical and substantial knowledge of the physical world that we live in, rather they considers it just like as an o'clock or as a wall watch which circulates while it does operate properly. Nevertheless Bacon thinks this, he misses one fundamental point: that is he does not know how Aristotle has formed the knowledge of first principles that become universals. Therefore, had Bacon had known how Aristotle has formed the syllogistic logic, he could not have undermined (denied) his work, partly to the Syllogistic Logic or the Deductive reasoning in general. Bacon has jotted down something good for nothing, that is, he contradicts with himself; and he is still backfired. And if we critically observe his argument is just simply the Aristotelian inductive method, that is, while Aristotle formulates knowledge of first principles by employing the inductive method, but Bacon generalizes things directly through this method. In other words, while Aristotelian Syllogistic logic or the deductive method is schematized or has formula, the Baconian Inductive method lacks formula; due to that it leads into error. Then, what Bacon has brought is not a new one, and therefore I have no faith whether Bacon from the very beginning has brought inductive method that would be a tool of empirical and scientific knowledge which is different from the Aristotelian inductive reasoning. Because, inductive reasoning is either an inference (a process) from detailed facts to general principles or it is from something known to unknown (or both). Nonetheless, the Baconian inductive inference implies that, the inference (process) from the detailed facts to its general principles, yet not from something known to unknown. So does for Aristotle: He formulates using inductive method knowledge of first principles that would persist and applies forever or at least infallible knowledge. And in this regard, let us see an example whether there is a difference between deductive and inductive reasoning. Example:1) "Metal

expanded when heated. Therefore, all metal expanded when heated''; is Bacon's method that produces empirical and scientific knowledge. In fact, this example is argument of the inductive method. A similar to this example is Chalmers', for he notes that this argument cannot be a reasonably (logically) valid argument. And he argues the following:

> In the case of our example concerning the expansion of metals the argument can be schematized as follows:
>
> Premises:
>
> 1. Metal x_1 expanded when heated on occasion t_1.
>
> 2. Metal x_2 expanded when heated on occasion t_2.
>
> n. Metal x_3 expanded when heated on occasion t_n.
>
> Conclusion: All metals expand when heated.
>
> This is not logically valid argument. It lacks the basic features of such an argument. It is simply not the case that if the statements constituting the premises are true then the conclusion must be true. There can be no logical guarantee that some sample of metal might on some occasion contract when heated (Chalmers, 1999:44).

According to him, this argument is an invalid deductive argument; hence it is an inductive argument. It follows that; this inductive argument has committed a Hasty Generalization fallacy. So, how can we call it empirical and scientific knowledge for such thing for we do not have assured knowledge? Nevertheless, it does not mean that it is impossible to set this argument in a good deductive argument, because the syllogistic logic of deductive method

can help us to avoid fallacies, by detecting certain criteria for uncertain explanations. Therefore, it is possible to the Baconian inductive method of scientific and the above argument of inductive argument can be also set out just this one:

Premise: Metal expanded when heated.

Conclusion: Some metals are things that expanded when heated.

In fact the premise lacks quantifier, but its conclusion is translated into proper categorical statement. Therefore, if the speaker introduces that premises, then he wants to argue, "not all metals are things that expanded when heated." As we have seen this argument from both perspectives (deductive and inductive), the deductive method is the proper and accurate method, because it is free from a haste; then it commits no fallacy. This does not mean that there are no formal fallacies which are committed or occurred in the syllogistic logic of the deductive argument, but if the universal statements are true empirically, then it is impossible to be false its particulars. In other words, the syllogistic logic begins from particular observations, memory, etc. formulates universal statements that refer to actual things. But, the Baconian inductive method is in this regard a problematic; owing to it exposes to commit fallacy, because it is in a speed. So, how Bacon attempts to undermine without making logical justification the syllogistic logic at all? No matter how much (entirely or partially), but we observe while Bacon repudiates the syllogistic logic. Nevertheless, in this thesis, I contend that Bacon begins with holding uncritical thoughts. The syllogistic argument of the deductive reasoning paces by a step from the inductive method. In a precise way, Aristotle formulates universal propositions by means of inductive method; and it cannot be built from otherwise. In relation to this point of view, Aristotle claims,

‘’[I]nduction is impossible for those who have not sense-perception. For it is sense-perception alone which is adequate for grasping the particulars: they cannot be objects of scientific knowledge, because neither can universals give us knowledge of them without induction, nor can we get it through induction without sense-perception’’(Anal. Post. I 18)(Aristotle quoted in Galik,2006:500).

Nevertheless, Bacon still now is in the inductive method, but cannot formulate a universal proposition which is paced by inductive process (begins by observation, then data collection, from the collected data then experiment or analyzing, and finally results). If the result is incompatible with the conjecture, Bacon argues, and then there is a try and error in order to avoid mistakes as well as to build empirical and scientific knowledge. Though he notes that such, and such argument, then why he cannot formulate knowledge of first principles as Aristotle does? Of course, more or less Bacon does not have a faith for our sense organs if they offer to contribute empirical and scientific knowledge; and that is why he is not enlisted in the principal category of empiricists. Accordingly, how Bacon makes inductive method (that involves sorts of procedures until final result) with sense-perceptions if he denies or undermines the senses? In my understanding, why Bacon does not construct knowledge of first principles is so incapable of it, because Bacon lacks sense-perception while in fact he has. Then, to undermine the syllogistic logic which is developed from induction becomes an analogue with the illiterate person who attempts to guide his teacher. Therefore, Bacon does not have even a shred of means to repudiate the syllogistic logic; rather it would have been good to defend this logic by adding had he had contribute to philosophy of science. Because, as inductive method is for Bacon, but for Aristotle both methods–inductive method as level one (or as a base that serves to form knowledge of first principles), and syllogistic logic draws substantive, sensible and scientific knowledge of the

world. Even the syllogistic argument helps to remind us how the things of nature are differentiated among each one another as well as how they are jointed among each one another, but the Baconian inductive gives nothing such definitions. So, in this thesis, I evaluate that his method is still at an early stage though it is an eliminativist enumeration induction.

However, the Aristotelian sub-alternation of the square of the syllogistic logic of the deductive method (the relation of the corresponding line of 'A' and 'I' propositions or vice versa, and it applies in 'E' and 'O' propositions) of the traditional square of opposition restricts us. That is: If 'A' proposition is actually true, then 'I' is definitely true, but it cannot it be otherwise. However, if 'I' proposition is actually true, but 'A' proposition is undetermined truth value. Accordingly, in this regard it commits a formal fallacy-that is named the illicit sub- alternation. The case for this fallacy is nothing else, but only the attempt to stumble or equate an inductive inference (not from the detailed facts to general principle rather it is from something known to unknown) with a deductive reasoning((Raclavsky, 2016:11). So, there is a similarity between in claiming between: ''Metal expanded when heated. Therefore, all metal expanded when heated.''; and; Metal expanded when heated. So, all metals are things that expanded when heated. In both arguments there is a problem, that is, in the former has committed a Hasty Generalization and in the later an Illicit sub-alternation fallacy.

(3) How Bacon considers the syllogistic argument of the deductive reasoning as an abstraction? For Bacon, Induction means (Observation _Data collection _Analyzing /Experiment _ Result). Overall, he means knowledge is acquired through experience. What about Aristotle's deduction reasoning or how Bacon considers the Aristotelian deductive logic as an Abstraction? In accordance with this, Bacon argues, "[t]he syllogism is not applied to the principles of the

sciences, and is applied in vain to the middle axioms, since it by no means equal to the subtlety of nature. It therefore compels assent without reference to things'' (2000:35). Although this is a similar to the above, and in this thesis, the researcher cannot leave it without giving a response (though the above can be a real answer, but for a satisfactory and plausible understanding, it demands an argument. Aristotle argues that our knowledge starts from our experience, henceforth we acquire knowledge of things about which we have perceived, and upon this, we formulate general principles after our knowledge of the things we have experienced then has become infallible, but this is happened by the contemplation of our mind- by the intellect. In relation to this:

> The process of discovery is represented by Bacon's Three Ministrations. Aristotle taught that knowledge had its beginning in the senses. Sense-experience are retained in the mind- hence next enters memory. Sense-experiences of the same kind, repeated, produce experience. And from experience arises the appreciation of the universal by *Nous* or reason. Bacon's Three Ministrations follow the same order. They are the Ministration to the Senses, the Ministration to the Memory, the Ministration to the Mind or Reason (Aristotle and Bacon cited in Dickie, 1922: 483).

So, everything, except mathematics, which is studied by Aristotle or Aristotelian, is based on empirical and scientific knowledge, and accordingly this makes (justifies) itself to be considered as a sensible and scientific knowledge. That is the case why Aristotle is known as the founder of science. Because, he, often, emphasize on natural science particularly in biology. For instance, we can observe Aristotle's Barbara syllogism which demonstrates

the fact that nowadays modern logicians call this argument good argument (Aristotle quoted in Barnes, 1969:124).

"Having incisors belongs necessarily to every carnivore;

Carnivore belongs necessarily to every dog.

Therefore, having incisors belongs necessarily to every dog."

4.5. Conclusion

Both Aristotle and Bacon are empiricists. Nonetheless, Bacon not only underrates the syllogistic logic that constitutes the *Old Organon*, also he throws it away; for he considers it, often, as it does not only moves from general to particular but also as it is an abstraction, that is, does not refers to concrete existing things. Further, he assumes that as the syllogistic method of the deductive logic does not give additional knowledge of this world; rather, he thinks it as a circle, that is, it leads to nowhere. In general, the syllogistic logic of the deductive method, as Bacon claims, is useless. In other words, Bacon contends that the syllogistic logic cannot help us to extend a substantive, sensible and scientific knowledge. And alternatively, he insists that to follow his view-what he has entitled 'The New Organon' that basically sticks and deals with inductive method as the correct and accurate instrument for acquiring and expanding of human knowledge, which is, sensible and scientific. Nevertheless, in this thesis, I argue against Bacon's notion of to what he has wrongly criticized Aristotle, that is, the syllogistic logic. I suspect whether Bacon knows what Aristotle advocates (Aristotle believes that knowledge is profoundly acquired through an inductive process, that is, through sense-perception). And we have to memorize how Aristotle establishes the knowledge of first principles that formulates the Syllogistic Logic or the Deductive Logic in general. I believe that Bacon definitely does know

how the syllogistic logic is constructed by, but, of course, it is schematized by an inductive method. Induction has two senses:

1) Inductive method, as most philosophers of science, logical positivists and/or logicians have defined, is the movement from the known observed instances to the unknown. This entails that a prediction. And there is no justification that makes for such method of inference non-circular. In light of this, Harman and Kulkarni note that, "[i]nduction has been pretty reliable in the past. So, induction will be reliable in the future"(2005: 2). This way of assertion is denied by both (by Aristotle and Bacon).

2) It is the movement from particular to general. And this is the Baconian mechanism that such inductive method is a process (movement) from the observed instance/s of particular/s things to the whole species or universal things. As far as the syllogistic logic paces a step out of the inductive inference (a movement from observed particular existing things to its general or to its partial); then it deduces its particular/s. This implies that Bacon does not bring even a shred of new view which is different from that of the Aristotelian reasoning process. In this thesis, I illustrate as the Aristotelian syllogistic logic of the deductive method develops out of the inductive method, that is, begins with observation then goes up to result through memory. Even though Bacon does not discover a new tool that helps man to acquire or extending a substantive, sensible and scientific knowledge, he jots down that goes along the syllogistic logic, that is, his inductive method lacks form or structure; and this can be reformed by the Aristotelian syllogistic method or by the deductive reasoning. Bacon denounces and renames the works of Aristotle to exemplify his own bogus method as he contributes to the advancement of empirical and scientific knowledge.

We have seen that Aristotle is an inductivist for he brings the knowledge of first principles using the inductive method that passes by sorts of procedures (observation then encoding in memory to the what is observed then setting it in universal rules as it is), but not). And once his syllogistic method has paced through the inductive method, and then he is a deductivist. Accordingly, this does not mean that Aristotle is not an inductivist; rather, he advocates inductive and deductive respectively, for he uses both mechanisms. Here and now, using the method, it is possible to derive at a conclusion that is a guaranteed in its truth or we acquire infallible knowledge. However, the Baconian inductive instrument is lagged behind (still now his method is in the Aristotelian inductive method). Therefore, since the syllogistic logic is paced by a step from the Baconian inductive method, then Bacon cannot undervalues the syllogistic logic. Can say somebody who has not finished his/ her truck race competition to somebody else be fast for she/he who has completed the truck race early? This referent may illustrate, as the Baconian inductive method is still at an early stage, it follows that, Bacon does not have any means to repudiate the syllogistic logic. Accordingly, had Bacon had a proponent of Aristotle, he would not have been back fired himself. In fact, in this thesis, I do not say Bacon has not contributed something to philosophy of science, but he never discovers a radical mechanism to that field-, that is, to philosophy of science or to science though Bacon and his admirers present such claims. But, for sure, his way of method is owed from Aristotle. Therefore, Bacon's critique on Aristotle is consisted of not only arguments that are unconvincing but also with unnoticeable flawed, and full of contradictions. Besides, in his refutations of the syllogistic logic of the deductive method, he fails to present sound or cogent arguments, that is, his refutations are euther bad arguments or not arguments at all. His book, that is, *The New Organon* that he coins is produced out of rhetoric, which is, using language effectively to please or persuade, that is I analyze, therefore.

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