

# Justification for the Pragmatic Conception of Truth in Scientific Pursuit of Knowledge

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DOI: <https://dx.doi.org/10.47772/IJRISS.2024.808053>

Received: 12 August 2024; Accepted: 22 August 2024; Published: 30 August 2024

## ABSTRACT

Most Scholars in epistemology have always considered the three classical conditions (Belief, Justification and Truth) to be sufficient for knowledge, however, the rise of scientific empiricism has raised doubts in certain circles about the necessity and sufficiency of the truth condition as adopted by scientific inquiry. In particular, arguments have been raised to demonstrate the impossibility of ever achieving truth of things as they are (correspondence), hence, rendering knowledge by empirical methods (which adopt pragmatism as the concept of truth) impossible. This seems a contradiction to our claims that we indeed can know by way of these methods. This paper establishes that despite the fact that we cannot know things as they are, it is possible to have knowledge of the appearance of these things and our perspectives of them. In order to achieve this knowledge, we must firstly revise the nature of the truth condition to make reference to verifiable claims that have a practical value (which work and can be demonstrated and not just abstract standards inaccessible through empirical investigation). As such, our claims to knowledge via empirical means will be sufficiently justified. The research categorically states that knowledge in its proper sense of the term (the correspondence of an idea with the thing it describes) is impossible because human knowledge relies on the senses and these senses acquire data in a subjective manner. As such, we can only understand reality as we perceive it, not as it actually is. The paper concludes by justifying scientific empiricism as a valid source of knowledge because it not only verifies its claims, but also affords room for improvement of beliefs depending on availability of knowledge.

**Keywords:** Knowledge, Pragmatism, Correspondence, Truth, The empirical method, Abduction.

## INTRODUCTION

One of the three fundamental conditions for knowledge held by epistemologists is truth. In absence of truth, one can never claim to possess knowledge. Concerning the nature of truth, most scholars assert that truth must consist in correspondence of an idea with the reality it represents. As such, it is impossible to erroneously represent reality (Lemos, 2020). Truth of a proposition is not demonstrated by universal acceptance by scholars, neither is it determined by the conformity of a proposition to a set of rules or guidelines for inquiry. Instead, truth is conformity of a statement or theory with the actual state of affairs it seeks to explain (Lynch, Wyatt, Kim & Kellen, 2021). For instance, if one claims that John is ethical, it must be the case that John is a moral person. Truth of this statement will not be determined by subjective experiences or understanding of morality, but will be dependent on observing the conduct of John and comparing it with the principles of objective moral standards.

The correspondence theory stipulates that the only time one makes a justified claim to truth is when their ideas (theories) conform to the actual state of affairs. This position has been held as the proper definition of truth by scholars such as Bertrand Russell and Immanuel Kant. Proponents of this theory, therefore, would

not accept as true any claim that is subject to change with realization of new information or a change in point of view, or any other condition that would result in alteration of information (O'Connor, 2021). Immanuel Kant goes further to assert that our perceptions (and consequently empirical examination of ideas) cannot yield truth because perceptions and data gathered from them is subject to change, hence, we can only claim to have an understanding of a particular manner in which entities present themselves to us, not these entities as they really are (Chukwunyeaka, 2022).

Disciplines that conduct research using experimental means, such as the empirical sciences, describe their findings as an accurate representation of reality based on a rigorous process of testing hypotheses and their consequences (DeWitt, 2018). However, these findings are informed by the evidence available to the researchers at that given time, the perspective from which the experiments and observations were done, and the methodological approach adopted. This means that, if more information were to be availed or the point of view changed, or even the methodological approach (such as the research design) altered, then the outcome of the research would be different. In essence, experimental research of the same phenomenon at various timelines is not guaranteed to have similar outcomes. Nevertheless, scientists claim that this approach is necessary for progress of science towards attaining knowledge.

Proponents of the correspondence theory of truth would argue that scientific claims to knowledge meet the first two conditions; however, the truth condition has not been fulfilled because it presents truth as a matter of subjectivity, convention and arbitrary assignment of meaning. However, according to Chang (2019), a scientist will consider as knowledge a concept, theory or idea that has a practical value (utility), hence, according to them, science fully meets the third condition for knowledge.

An examination of scientific inquiry demonstrates that it accepts as accurate the pragmatic conception of truth. Scientific inquiry concerns itself with inductive processes of knowledge acquisition. For some scholars, especially those who hold that knowledge must involve truth as correspondence, the scientific method of inquiry does not accurately present the actual state of affairs. It is therefore imperative to examine the conception of truth advanced by inductivists so that one can evaluate whether these claims by proponents of correspondence are valid. This paper examines the nature of scientific pragmatism (as envisioned by its key proponents), and whether its adoption would render scientific claims to knowledge fallacious.

## NATURE OF PRAGMATIC THEORY OF TRUTH

The pragmatic theory of truth posits that a proposition is true if, when acted upon it results in practical outcomes that are satisfactory. This school of thought is informed by the understanding that knowledge is dynamic and subject to change when one encounters new ideas or evidence. Among the major proponents of this position include: Charles Sanders Peirce, John Dewey and William James. Their views on the nature of truth were discussed in this section to shed light on the key tenets of pragmatism.

Charles Sanders Peirce, in his work, *How to Make Our Ideas Clear*, describes truth as propositions or beliefs that are accepted at the end of an inquiry. Pragmatic theories, therefore, consider true propositions to be those which may be useful when believed, that are the end product of a process of inquiry, that have persistent rigorous scrutiny, or those that have met established standards of warranted assertibility (Peirce, 2020). Contrary to the correspondence theory of truth which views truth as a relation between a truth-bearer (the object of knowledge) and a truth-maker (the knower) (Philips-Gary, 2020), the pragmatic theory of truth considers truth to be a function of the activities or functions that individuals engage in, as well as the commitments made by people during problem solving processes, when making assertions, or when conducting scientific investigations.

According to Peirce (2020), the meaning of a statement or proposition is necessarily linked to its possible

implications or outcomes. This idea is informed by the understanding that our knowledge is not absolute, hence, can be disapproved even when we hold it for a long time as the truth. Mounce (2002) argues that this fallibility of knowledge is caused by scientific advancements that always result in new evidence, some of which may refute our beliefs and convictions about the universe. It is therefore wise to always keep an open minded perspective which will enable scholars to continually refine their hypotheses and theories after running tests or conducting experiments which yield new findings.

He argues that pragmatism is a means of clarifying and testing ideas or concepts, hence we should not limit ourselves to just examining the practical value of these concepts. Meanings of concepts used by humans can be understood by observing its practical effects on our beliefs (Riga, 2020). Peirce, in this context, is more interested in the methodology of inquiry as opposed to observation of specific beliefs.

Peirce's position is supported by Bain's claim that the sole purpose of empirical inquiry is to overcome the discontent and annoyance that arises when existing theories or beliefs do not offer satisfactory explanation for phenomena. Only empirical tests offer objective means through which we can seek to understand reality and predict future perceptions. Bain supports Peirce's claim that, if we lack such a methodology of inquiry our beliefs would be unsatisfactory to meet the goals for our inquiry, which is not to establish truth, but to find beliefs we believe to be true as a consequence of applying what we consider an objective methodology (empirical testing) (Zimmerman, 2021).

Scientific inquiry owes Peirce for introducing the concept of abduction. Abduction is a form of thinking which aids a scholar to make conclusions based on limited information. This form of thinking operates on the principle that, in the absence of definitive evidence, one should select the explanation that is most likely to be true. The best explanation will be determined by available evidence. If the evidence strongly supports a particular claim over others, then this claim will be accepted as the most probable solution to a problem or explanation for the phenomenon being investigated (Dreamson & Khine, 2022).

The abductive process involves formation of hypothesis (es) which, if true, is more likely to offer a better explanation for an observation compared to other hypotheses (Vitti Rodrigues & Emmeche, 2021). For example, one may not have sufficient evidence to know what happens in a different town from theirs, however, they may opt to believe as true claims made by a trustworthy person in the society as opposed to the claims made by a known pathological liar. If no one else except these two people was present when the occurrence happened, one will be justified to agree with the trustworthy person because there is overwhelming evidence that they have always told the truth whereas the liar will not be trusted due to their history of lying. Abductive thinking implies pragmatism because truth is determined, not by the actual state of affairs, but by what is implied by the evidence available at the time and has utility. Further, it does not encourage differing judgment if evidence is insufficient. If an idea does not result in satisfactory outcomes, it is considered false.

In defence of the pragmatic nature of scientific inquiry, Peirce argues that despite the fact that this inductive approach to knowledge may sometimes be misleading, it will ultimately lead us to knowledge of the truth (objective truth) on any matter that we pursue (Hookway, 2012). At the present moment, we cannot shy away from pursuing knowledge if our expectation is to draw only objective knowledge. Its realization will only come if we start with our subjective inquiries into the nature of the universe with the hope of achieving truth someday. Further, Peirce demonstrates how abductive thinking is essential in bridging the gap between making observations and formulating hypotheses which ultimately become theories. If one does not formulate hypotheses because they do not have conclusive data, they cannot proceed to test the hypotheses to determine whether they are accurate or not. As a result, our pursuit of knowledge is hampered. It is therefore important to make judgments of this kind.

William James, another one of the major proponents of this theory of truth, argues that pragmatism is a

method of resolving epistemic disputes and clarifying concepts. This is an idea that echoes Peirce's (2020) description of pragmatism. In his work, *What Pragmatism Means*, James (2020) argues that the truth of a proposition or an idea should be determined by its practical consequences as well as its ability to aid us in navigating the world we live in. The theoretical or abstract validity of ideas should not be used to define their truth, rather, their usefulness is a much more logical criterion of establishing this truth.

One may consider James' views on truth as instrumental because he asserts that truth of any statement is determined by its ability or effectiveness in helping one solve problems or achieve their purposes. Additionally, James' pragmatic theory of truth rejects absolutism which is characteristic of the correspondence theory. His argument is that the truth of a proposition is not independent of our minds and their experiences, but relies on context and can change when context changes and new perspectives are adopted (Russell, 2020). As such, we can validly claim that truth has a pluralist value, that is, various people can have diverse beliefs and perspectives and still be considered valid in their thoughts. He argues that we have no single unified reality that can be perceived in exactly a similar manner by everyone who encounters it.

An assessment of the pragmatism of James demonstrates that he does not advocate for a theory of truth in which all knowledge is based on indubitable principles. Rather, knowledge should be open to new perceptions, ideas and judgments, and should value practical results of beliefs but not established doctrines.

James Dewey, just like Peirce and James, asserts that truth of a proposition is dependent on its utility. That means a proposition has meaning if it can be used to address the concerns or goals of an individual. This can be interpreted to mean that truth has an instrumental value and it is only achieved when it is helpful in solving a problem of issue at hand. In order to establish that a theory or hypothesis is true, he argues, it has to be evaluated through practical experience (Riga, 2020). This means that a theory may be in coherence with other beliefs or theories but still be considered false because it has not yet demonstrated its practical value.

Truth, Dewey (2022) posits, is a result of a democratic as well as a collaborative investigation which is not based on rigid and dogmatic principles incapable of adapting to new evidence. He further claims that truth is not an end point of investigation, rather, it is a level in a continuous process of investigation which brings out new perspectives, ideas as well as theories as new methods and more efficient tools of investigations are adopted. Dewey proposes adoption of this pragmatic approach to not only scholarly ventures, but also in real life situations such as democracy and ethics. He stressed that ideas are useless and irrelevant if they remain abstract, however, they become meaningful if they are practically applied to address or solve issues in society (Riga, 2020).

The ideas of Peirce, Dewey and James may have slight differences, however, they all stipulate that pragmatism involves emphasizing on the consequences or outcomes of beliefs or ideas as the best criterion for truth. If one adopts the theory of truth that pragmatists propose, it means that they do not consider truth to involve rigid correspondence of an idea in the mind with reality outside of it. It simply implies that this idea must have utility that can be practically demonstrated. Moreover, these scholars reject absolutism of truth because they consider it to be flexible and capable of change when new ideas or evidence are presented. In essence, a pragmatism insists on determining the truth of a proposition on its ability to produce results after undergoing empirical tests.

## **PRAGMATISM IN SCIENTIFIC METHODOLOGY**

In essence, scientific pursuit of knowledge is premised on the following pragmatic tenets;

1. Knowledge of the universe and its workings is possible, albeit systematically and over a period of

time, through establishing how well our beliefs and theories are useful in solving problems and the strength of their predictive power.

2. Human knowledge is a construct of our experiences. These experiences can be studied, patterns observed, and the meaning drawn out of it can be an explanation of how the universe is. Without these perceptions, we would not claim to know anything at all.
3. The concept of truth at any given time is determined by human experiences at the time, the context or point of view of those interpreting these experiences, and the data available to the scientist at this time. This means that truth, at any given time, is tentative and subject to change over time
4. Propositional knowledge about the physical world is not about the truth value (truth or falsity) in relation to the entity that it describes, or its source, rather, truth is about whether the belief leads to its predicted outcome.

In order to demonstrate how scientific research and progress is dependent on adoption of the pragmatic theory of truth, several philosophers of science are worth mentioning. They include: Karl Popper and Thomas Kuhn.

### **Pragmatism in the Popperian Philosophy of Science**

Popper's philosophy of science is not strictly pragmatic, however certain elements can be said to align with the basic tenets of pragmatism. For instance, he advances the view that scientific progress can only be achieved if scholars engage in critically testing and falsifying theories. These processes, according to Popper (2015), emphasize more on practical approaches to knowledge as well as assessment of the utility of the investigation outcomes. In his theory of falsification, he advocates for a method of seeking to refute a theory, rather than proving it right. This is contrary to the inductive method which seeks to justify the accuracy of a theory by seeking evidence that supports this theory. Nevertheless, one may argue that falsification advances pragmatism because it posits that a theory is accepted as valid until such a time when it is practically proven to be false by at least one counter instance.

Additionally, Popper's theory acknowledges the limitation of human understanding due to constant changes in methodology, perspective, investigation tools as well as knowledge. Just like the pragmatists discussed in sub-section 1.1 above, Popper embraces the concept of fallibility of scientific knowledge. He asserts that our knowledge is tentative and can be revised when new perspectives emerge and they contradict an existent theory or belief. When new evidence is found, new beliefs are formed and they in effect replace the falsified ones (Popper, 2002). In essence, one can validly argue that Popper's stance on scientific theories is that they are conjectural and do not correspond to reality as it is (Gorton, 2012).

Thirdly, it is important to note that inductive and deductive logic do not establish the accuracy or truth of a scientific theory; however, they can be effectively used to establish the falsity of these theories. For example, in the claim that "All Swans are White because the observed ones were all white," one may declare that the conclusion is false through deductive logic. Science, therefore, begins with attempts to refute theories, not with observations as claimed by inductivists (Popper, 2002). A theory that has withstood these tests can be accepted, but only tentatively. This makes it impossible for one to know any scientific theory because new evidence may come to light in subsequent tests and falsify the theory. For example, the claim that all Swans are white will be falsified when one black Swan is observed. The theory that all swans are white will be abandoned immediately the contradictory discovery is made. Therefore, Knowledge, in the proper sense of the term (objective and static), according to Popper, is impossible in scientific investigations.

An acceptable scientific finding must be achieved after a rigorous process of observation of a phenomenon, gathering data about it, and testing it to verify the truth of a hypothesis that has been formulated to explain it. Findings of specific instances of a phenomenon are then generalized as the properties of phenomena of the same kind. Testing the hypothesis, analysing the findings and publishing or sharing them with the

scientific community is an important part of this process because it enables scientists to make public their findings and add to the body of knowledge (Popper, 2015). This, at face value, seems exhaustive enough to guarantee certainty of the findings; however, Popper considers it far from achieving truth.

Knowledge, according to Popper, should be sought in an open minded perspective. This means that we should not have predetermined conclusions or principles in our mind because they may distort it. (Mitra, 2020). A flexible mind accepts changes and new perspectives and abandons them when new and more compelling evidence is available. This principle is similar to the pragmatic theory's tenet which posits that knowledge acquisition should involve a process that allows one to abandon a theory due to its inability to fulfil required outcomes and adopt as true one that satisfies their need or meets expectations.

Popper's work clearly demonstrates how scientific disciplines seek and acquire knowledge of the physical world in which we live. These disciplines adopt a pragmatic method which focuses on the workability of ideas and as Popper argues, the only justification one should have, for abandoning a theory in favour of another, is if at least one occurrence of a counter observation proves the theory wrong. As such, the outcome of the investigative process is what ultimately determines a theory's acceptance or rejection. A pragmatism would argue that this is a practical approach that focuses on the usefulness of a theory in making explanations and predictions in order to maintain its validity.

### **Pragmatism in Kuhn's Philosophy of Science**

Kuhn, a philosopher of science, just like Popper has contrary views to how scientific knowledge is attained and advances. However, he still maintains a pragmatic approach in his philosophy of science. In his work, *The Structure of Scientific Revolutions*, Kuhn challenges traditional and classical epistemology by demonstrating that science does not progress by seeking static and indubitable truths that are achieved in a linear manner (Kuhn, 2012). Instead, his theory posits that paradigm shifts are the means through which science evolves. This means that any shift from one scientific paradigm to the next is determined by a shift or change in how scientific communities perceive phenomena.

Kuhn's Philosophy of Science presents human knowledge as a collaborative effort among empirical evidence, social, cultural and historical factors which define our approach and perception of phenomena. These factors influence the nature of our beliefs and what we consider knowledge (Nickles, 2012). As such, each paradigm will have its own principles that qualify as knowledge and these principles are not rigidly accepted. They can change when perspectives change. This, one may argue, is scientific development that is pragmatic in nature because what is considered knowledge is subject to change based on how it adequately addresses the concerns of the paradigm.

In his discussion of normal science, Kuhn (1997) explains how scientific theories face anomalies and action is taken so as to address these anomalies without abandoning the scientific theory experiencing these challenges. As long as the anomalies do not completely compromise the ability of the theory to solve problems and make predictions, the theory will stand. During the period of normal science, addressing anomalies will be done with the aim of maintaining the validity of the theory in the paradigm, but not for the sake of disproving this theory.

Preston (2008) makes Kuhn say that an anomaly that can compromise the integrity of a paradigm violates fundamental principles of the theory in place and resists attempts by scientists to eliminate it from the paradigm. When scientists are unable to defend this paradigm, it is weakened and consequently undermined. At the same time, the crisis is escalated by emergence of a rival theory which seems to be better and more effective than the existing one. Eventually, this paradigm is replaced with the new one.

Additionally, Kuhn advances the argument that scientific acquisition of knowledge is not cumulative, rather,

it is discontinuous. In his claim, he shows how a theory that is no longer effective in explaining phenomena and making predictions is completely abandoned, together with the methodologies, perspectives and assumptions that created it, and a new paradigm emerges. This new paradigm should not have any elements of the previous one because the latter is no longer valid and cannot fit into the point of view and assumptions of the former (Anand, Larson & Mahoney, 2020). His incommensurability thesis helps to clarify this point. Incommensurability means that two different paradigms have nothing in common and therefore it would be futile to attempt to reconcile them or merge them together. The concerns of each paradigm are different and their solutions cannot be effectively adopted in a different paradigm (Kuhn, 2012). Kuhn's work, therefore, is hinged on the assumption that knowledge is not objective, universal and standard. Instead, it is dynamic, depends on one's point of view, instruments of investigation and agenda or purpose.

Various critiques can be advanced against Kuhn's assertions that science evolves through paradigm shifts. For instance, his assumption that there is no continuity of ideas and principles from one paradigm to the next seem to be an exaggeration of how science progresses. It would be illogical to argue that once anomalies have rendered a theory insufficient to explain phenomena, it is completely abandoned and its tenets cannot in any way influence the next theory that replaces it. In some cases, a theory may be abandoned but some of its principles remain relevant. For example, in education, a system of learning is usually not completely abandoned and a new one adopted without some elements of the previous one. In Kenya, the new learning model, the Competence Based Curriculum (CBC) still has some elements of the 8-4-4 systems such as retention of classroom models, levels of learning (primary, secondary and tertiary), and some subjects (e.g. mathematics, languages, religion, etc.) have still been maintained. This critique raises a valid point because not all epistemological advancements require a complete abandonment of previously held beliefs. This notwithstanding, Kuhn's understanding of scientific advancement affirms the pragmatic theory of truth. A keen examination of his work leads to the conclusion that the insistence on practical outcomes for validation of theory agrees with pragmatic tenets. As such, one may associate Kuhnian philosophy of science with pragmatism.

On examining Kuhn's work, one may infer that his major interest is how consensus among scientists (a social process) plays a role in abandonment of theories or paradigms, but not the logical process of determining whether a theory accurately defines the reality it purports to describe. Kuhn risks being referred to as a relativist but in his defence, he argues for a revolution that is headed towards objective description of reality.

Just like Popper (who argues that we can never acquire knowledge due to the impossibility of conclusive investigation), Kuhn also rejects the possibility of paradigm shifts leading to objectivity in future by introducing his incommensurability thesis. The standards and principles of one paradigm cannot be used to assess another because they are both different and do not use similar theories or methodologies. One paradigm replaces another because the one that takes precedence dies off and the new paradigm defines science from that moment onwards until it is replaced. Given this incompatibility of paradigms, one cannot claim that one theory is better and closer to truth than the other, but both explain reality using different points of views and experiences and each is relevant in different circumstances.

Kuhn's work can be interpreted as a rejection of scientific realism, a school of thought that presents truth and consequently, knowledge, as objective and static. His introduction of paradigms and the fact that truth in each paradigm is determined by how well a theory solves problems is an acknowledgement that truth is pragmatic in nature; if it works it is true, if it fails, it is false.

The philosophy of science of both Popper and Kuhn advance the argument that knowledge, in its proper sense (that adopts truth as correspondence) is unattainable through empirical investigations. As such, one may be compelled to make the claim that scientific investigation cannot result in knowledge, but only

beliefs that are largely subject to change, hence humans are incapable of knowledge of things.

## **CRITIQUE OF THE PRAGMATIC CONCEPTION OF TRUTH**

The pragmatic theory, as demonstrated above, advocates for subjectivity of truth, and in effect, subjectivity of knowledge. If one agrees with the basic tenets of this school of thought, they would argue for the existence of truth, even in cases where information does not cohere. For instance, the claim that truth consists in propositions that have utility can be used to show contradicting propositions in which there are practical results. This would render both propositions true. An example can suffice to explain this point. Suppose two different patients are participating in clinical trials; one is offered medicine while the other gets a placebo but they are unaware of it. When both take the pills, they get healed. Each of them believes that they have taken the right medicine for their ailment while in actual fact only one of them is right. A proponent of pragmatism may posit that when this claim is made by the patient who took the placebo, it is true because the outcome was expected. However, the proponent of the correspondence theory of truth will claim that the belief and the actual state of affairs contradict, hence this patient's statement is false.

A further critique that can be advanced against the pragmatic conception of truth is that it seeks to substitute the objectivity of truth with statements that are instrumentally useful. This is an error in knowledge acquisition because truth and instrumental value of a statement are not synonymous, neither is one a prerequisite of the other (Capps, 2019). Skeptics of the pragmatic school of thought can argue that just because an idea is useful does not mean that it is indeed true. For example, in some societies, children are discouraged from playing in the rain by being misled that rainfall causes malaria. This helps keep the children away from cold rainfall and mud, hence, keeping them away from potential germs. If a child believes this claim, they may not fall sick and in return, assume that they were given factual information. However, this is contrary to the truth.

These critiques to the suitability of the pragmatic theory of truth lead one to opt for the correspondence theory as the most suitable theory of truth in scientific research. However, correspondence as a criterion for truth raises more serious concerns. Firstly, there is the verifiability criterion. A statement is true if it is capable of being empirically verified. This means that it has to be compared with reality in order to establish if the idea agrees with the thing itself. The challenge arises when one realizes that this verification is impossible because the physical appearance of things is just that, an appearance, not things as they actually are. Reality and its appearance are two different things which should not be confused. Claims that scientific truth meets the correspondence criterion are mistaken because objective reality is out of reach of the senses. Reality in itself, as Kant demonstrates, is unknowable through empirical channels.

A closer inspection of the method of scientific investigation reveals that scientists are actually not interested in establishing correspondence of their theories with reality in itself, but they seek pragmatic solutions or explanations for reality. That is why they only accept theories as true if they meet expected outcomes. As such, pragmatism is at the core of scientific investigation and is the criterion applied to distinguish a good theory from a bad one. It may have its shortcomings, such as the ones mentioned above, but these can be remedied.

## **JUSTIFICATION OF PRAGMATISM OVER CORRESPONDENCE IN KNOWLEDGE PURSUIT**

Scientific methods, if applied appropriately, lead one to conclude that they can have knowledge, even if it is limited, about the physical universe. This certainty can be used to make claims that one possesses knowledge. Certainty makes reference to the degree of conviction or belief that one knows something. It arises from possession of evidence about a belief or claim as well as lack of doubt or skepticism about it



(BonJour, 2020). For example, one can be certain that the sun will rise tomorrow, even if they do not have 100% proof that that is the case. This certainty will be based on previous observations as well as an understanding of how the solar system functions. Scientists use evidence available to them to make claims and predictions (which they consider to be certain of) about the universe. Certainty, however, is not a guarantee that one is accurate. It is therefore possible for one to be certain of something and still be wrong at the same time. Scientific knowledge, while heavily reliant on empirical evidence, instils a sense of certainty in scholars and some may mistake this to be truth.

Despite the fact that highly probable theories are accepted in science, there is still room for error in interpretation that may arise due to impaired, biased or erroneous observation. In cases such as these, some scientists may use statistical methods to quantify possible uncertainties as well as examine the reliability of empirical methods and theories. This, however, is not sufficient because there is still the possibility of error. This margin of error is occasioned by the fact that experimental results are not absolute or comprehensive. In order to remedy this challenge, scientific investigation demands for peer review of findings in order to seek and correct biases and subjectivity that may distort the results (Matsui, Chen, Wang & Ferrara, 2021). Researchers, other than those who conduct experiments and introduce new knowledge, examine the methodology, quality and quantity of data utilized, professionalism in research, as well as the logical correctness of the research findings in order to guarantee the validity of this new knowledge. In its absence, it is possible that the research findings may be skewed towards the interests of the researcher.

If one adopts the correspondence conception of truth they cannot be able to determine if their ideas correspond to the reality it describes. In fact, proponents of the correspondence theory offer no criterion to determine how well ideas agree with actual objects or the acceptable degree of correspondence required to make a belief true (Vision, 2023). This leads to ambiguity in the definition of truth and could cause lack of consensus and agreement on what truth constitutes. Vision's claim can be affirmed by human experience which only affirms that the truth of an idea conforms to reality it describes but does not have a concise way of determining the nature of this reality or how it can be assessed by way of the senses (which are primary in acquisition and pursuit of human knowledge). How, then, one may wonder, can we know when our ideas are corresponding to reality yet we cannot know this reality using our usual channels?

In addition to the concerns raised in the paragraph above, one may ask, "how can our subjective experiences conform to an objective reality?" this question is triggered by the realization that knowledge is depended on subjective factors such as point of view, tools or instruments used in investigation, cultural and social factors, among other considerations. All these make our perception of things and ultimately formation of ideas concerning these perceptions entirely subjective. Subjectivity refers to biased thinking and it is not compatible with reality in its objective sense.

Additionally, cultural and historical contexts differ over time, and each epoch has its own cultural values which influence the thinking and action of people at that time. As time changes, so do these values and actions. Ultimately, their belief systems and claims to knowledge will gradually evolve. As such, it would be impossible to hold a belief as true over an extended period of time, unless it has been adequately verified and has sufficient proof to support it. This assertion is collaborated by scholars such as Singh, Mazumder & Namboodiri (2021) as well as Ravetz (2020). They argue that at no given time can one validly argue that they have entirety of knowledge concerning the universe and how it works. Knowledge is bound to change because new methods and ways of thinking are invented each day and they introduce new perspectives which may challenge existing knowledge claims.

Our understanding of things as they appear to us is usually systematic, gradual and over a period of time, we acquire more perspectives about them. A major conviction among pragmatists is that knowledge of the universe is based on socially constructed belief systems as well as habits (Capps, 2019). This knowledge, however, cannot be known immediately or once and for all. Our understanding systematically deepens and

allows us to formulate theories which, at times, generalize the phenomenal world. One of the critiques to this form of reasoning is that generalization of the observed to encompass all other realities of a similar nature is fallacious (Urbatsch, 2023).

Pragmatism can be adopted as a theory of truth that can be verified and tested for reliability. Research of any kind, including scientific, aims at achieving true propositions about the universe, and therefore, it is imperative to establish beliefs that cannot be doubted. We cannot have reason to doubt these beliefs if they work (help us achieve our goals) and if they succeed in doing this, then one can confidently say that these beliefs are justified. Critiques may argue that a belief may work but not be true (Mounce, 2002). For example, in some societies, children are discouraged from unethical behaviour by being threatened that they will go to hell if they commit certain actions. They form this belief and consistently act ethically. This belief produces results and yet one may argue that it is not factually correct. One may respond to this objection as follows; firstly, it is impossible to determine that this belief is factually wrong because we cannot compare it with the actual state of affairs to establish this claim. Secondly, the claim that if an idea works it is accepted as true is not only limited to the utility of the belief alone, but also other factors such as; availability of evidence to support the claim, the existence of firm grounds on which this belief is derived, and a coherence of other ideas of a similar nature (Hookway, 2012). This is a demonstration that the pragmatic conception has a wide array of conditions that must be met before a belief is accepted as truthful.

Pragmatism is essential in scientific research because without it, we would not be able to acquire knowledge that defines the universe in which we exist and make accurate predictions of phenomena. It helps us sort scientific theories on the basis of their scientific utility and prediction power, not their absolute truthfulness (which has been demonstrated to be unachievable) (Peirce, 2020; James, 2020). If a theory makes many more accurate predictions of phenomena and demonstrates utility in problem solving than others, it may be considered closer to the truth. Hence, it will be considered the most superior and taken to be the dominant theory of the day. It must have a higher predictive power, generate new knowledge and have more explanatory power than the rest. This means that there must be an evidential basis for selecting theories that describe the phenomenal world.

Moreover, the ability to accommodate new perspectives and revise the existing body of knowledge in accordance with new findings makes pragmatism an ideal theory of truth. Given the fact that knowledge acquisition in humans is dependent on the senses, it is logical to expect a gradual accumulation of information and occasional mistakes that arise from the imperfection of the senses. It is therefore necessary to admit a theory of truth that is capable of making necessary adjustments as well as enhancing improvement of our body of knowledge. Correspondence as a theory is incapable of accepting the possibility of adjustment in knowledge. Its proponents would argue that if this adjustment is done, the previous body of knowledge was false because truth is constant and not subject to revision. As such, pragmatism is accommodative of the limitations of the human cognitive process.

One may also justify the adoption of pragmatism as a theory of truth in scientific knowledge due to the fact that science studies the phenomenal world (as described by Kant) and one of the features of this world is that it involves appearances that may be perceived differently by different people. This means that the same being can be understood from multiple points of view. As such, the explanation that offers a more comprehensive description of this phenomenal world, and can make accurate predictions of it and similar phenomena, should be considered more superior and adopted as valid until such a time when new perspectives emerge and offer us a more comprehensive view of the object of study. Scientists may use pragmatism to assess verisimilitude (closeness of theory to truth) by examining the effectiveness or utility of different theories in producing desired outcomes and making accurate predictions.

Verisimilitude makes reference to the acknowledgement that scientific theories do not accurately describe reality as it is. However, as constructs of the human mind, these theories aim to offer insights that have

utility for human needs as well as seeking to increase the chances that they accurately describe the phenomenal world (Potolsky, 2023). Theories that explain the same phenomenon will therefore be evaluated based on their ability to produce useful results and make accurate predictions and those which will be found to have less accurate predictions or imperfect explanations will be abandoned. This is a pragmatic way of selecting theories and attributing verisimilitude to them.

Apart from verisimilitude discussed above, Richard Rorty introduces a new perspective to pragmatism that was accepted as valid in this thesis. He argues that the idea of foundationalism in knowledge should be abandoned because it implies the existence of indubitable and self-evident facts on which all other knowledge is built (Rorty, Putnam, Conant & Helfrich, 2004). One may agree with Rorty because, the mind, when organizing and giving meaning to data from the senses, has its own points of view and assumptions which may influence the final output of the cognitive process. Truth, will therefore not be indubitable and objective, rather, it will be situated, either socially, historically, or even linguistically. This paper argues that truth, as we envision it, is a product of all these elements and circumstances, hence, it is contingent.

Scientific investigations are all empirical in nature and require empirical methods of determining their validity and quality of their outputs. The only way to determine that a theory has accurate results is by examining whether its predictions have been observed. For example, if we want to test the hypothesis that adding compound X to chemical element Y results in a black solution, we have to perform actual tests in a controlled environment. If the observations made do not concur with the expected results, then the theory can be said to be erroneous because it did not have the desired.

## CONCLUSION

This paper discusses the nature of truth as adopted by scientific methods of investigation. It establishes that scholars in philosophy of science agree that science does not conceptualize truth as correspondence because human perceptions vary from one person to the other and reality in itself is alienated from the senses (which are the conduits through which knowledge is acquired in humans). Their adoption of truth as pragmatic is informed by acknowledgement of the subjectivity of human experience, variations in data collection and analysis instruments, as well as production of tangible outcomes in scientific methodology. As such, the epistemological conception of truth as correspondence has not been met in scientific research. Additionally, knowledge of things as they are is impossible because human understanding is entirely reliant on senses. These senses are limited by the researcher's subjectivity, their environment, nature and quality of investigation tools adopted, as well as the nature and quality of their experience.

This notwithstanding, our pursuit of understanding the universe should not be abandoned. Instead, adoption of the pragmatic perception of truth leads researchers closer to the truth because information is accepted if it has valid and verifiable outcomes that can be replicated in various instances. It is important to revise our conception of knowledge, particularly the nature of the truth condition in order to make reference to that which is possible and available to human understanding. As such, the correspondence conception of truth is unverifiable and beyond the limits of human understanding and should therefore not be the standard of measure for accuracy of hypotheses or theories.

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