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The 'Truth' Between Realism and Anti-Realism

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Abstract: This article examines what realists and anti-realist debates are all about. Through presenting the core of the main arguments in these debates, these are significant arguments and they are the kind of arguments that can clarify what it meant by 'truth' between Realist and anti-realist in general. The concluding remark is that though the main anti- realist's arguments in these debates can be seen as some powerful arguments through raising questions on the relationship between theory and evidence, success and truth. However, the success of science and the use of science in everyday life has not been given any satisfactory explanations by the anti-realists nor the use of it has been shut out from the daily life by these arguments against it.

Keywords: Science, Epistemology, Methodology, Realism & Anti-Realism, UTE, Truth, Logic, Knowledge

1. Introduction

The intention of this article is to look into what realists and anti-realist debates are all about, through presenting the core of the main arguments in these debates. The arguments that are discussed in this article are those that can clarify what it meant by 'truth' between Realist and anti-realist camp in general. The first section deals with what realism is in general and specifically focuses on scientific realism. In the second section the main argument against them will be presented.

Science are successful, society relay on and make a use of scientific theories. The use of the scientific theories outcome is almost everywhere and almost about everything one makes a use of in every day livings, for instance: from dialing the emergency number to using a modern transport to attend the hospital and in diagnoses of any health conditions and finally in receiving treatments and medications. Other examples are in using any kind of equipment's at home and place of work, or in any of online communications; the use of computers, iPads, smart phones, satellites, TV, etc. And this is what all of these arguments are about, they are all well-constructed philosophical arguments from both sides, debating whether science can convey truth about the world; whether scientific theories are true. These debates are important in relation to truth and knowledge in the fields of methodology and epistemology when studying philosophy. Further, the scientific theories and their conclusions constitutes a large part of knowledge, therefore these arguments are of importance in the contemporary philosophy in general. The conclusion is that though the main anti- realist's arguments in these debates can be seen as some powerful arguments through raising questions on the relationship between theory and evidence, success and truth, however; the success of science and the use of science in everyday life has not been given any satisfactory explanations by the anti-realists, nor the use of it has been shut out from the daily life by these arguments against it.

2. Realism and Scientific Realism

Most of the debates on the knowledge of the external world can be captured through realism and anti-realism debate. Realism in general is a philosophical viewpoint that many philosophers hold. Philosophers who endorse a view that, there is a reality- nature-world that exist and its existence are independent of whether they can be perceived or a belief can be formed about them; these philosophers can be counted as a realist. The idea behind realism is in the acceptance that both observable and non-observable phenomena actually exist, and that they are real, perceiving them and thinking about them or not; changes nothing of their existence, they do exist and they are out there and they are part of the world. What usually is seen to create problems are what it is referred to as 'unobservables' they are

theoretical entities, one of a much used example can be given to clarify what it meant by ‘unobservables and theoretical entities’ is the existence of black hole; for none of the scientist talks about them has ever seen a black hole, but theory predicts that they exist, and the observation of vast clouds of matter swirling around super-dense objects leads many physicists to state that ‘black holes’ to be regarded as truth.

An offshoot of realism which is the main support for the idea of realism is 'scientific realism'. Therefore, to explain the dimensions of realist commitment is best done through the most debated kind of realism that most of realist philosophers have contributed to, which is scientific realism[1].

Traditionally, realism more generally associated with any view and position in philosophy where philosophers endorsed belief in the reality of something. Thus, not only philosophers but one can be a realist about one's perceptions of basic things, such as the exitance of doors, walls, flowers, foods, wine, drinks, tables and chairs, and so on.

Scientific realism in turn is a realism about whatever is described by the best major scientific theories, hence, the description of scientific realism has been given as a positive epistemic attitude towards scientific theories, including parts putatively concerning the unobservable.

To see what scientific realism amounts to, it is best to see its dimensions. In general, scientific realism has three dimensions: one is a metaphysical or ontological dimension, the second dimension is a semantic dimension, the third one is an epistemological dimension.

In its metaphysical dimension realism is committed to the mind-independent existence of the world investigated by the sciences. This contrasts with other positions in philosophy which deny the mind-independent reality, for instance, idealism and some forms of phenomenology; according to them there is no world external to and thus independent of the mind. Another one of the common rejections of mind-independence is the neo-Kantian views of the nature of scientific knowledge; they deny that the world and experience is mind-independent, even when some versions of this position accept that the world in itself does not depend on the existence of minds.

The dispute in relation to the claim here is that, when the scientists do their scientific inquires the world investigated by the sciences is distinct from the world in itself, at least in some sense dependent on the ideas one brings to scientific investigation, for example theoretical assumptions, perceptual training and their beliefs.

But some have argued that, it is important to note in this connection that human convention in scientific taxonomy is compatible with mind-independence. For instance; Psillos[2] is a realist philosopher who ties realism to a mind-independent natural-kind structure of the world. Others argued before Psillos that mind-independent properties are often conventionally grouped into kinds,[3] where if something categorized as a 'natural kinds' it usually means they corresponds to the structure of the world.

To explore what realists say about scientific knowledge in their debates, it is best to put them in contrasts to other views of the wider anti-realist arguments, this should give a clear view on the historical continued debates between realist and anti-realists. The realists usually say that realism, when taken semantically, is a view that is committed to a literal interpretation of scientific claims about the world. Realists take theoretical statements -as it is - at face value because according to realism, claims about scientific entities, processes, properties, relations, and observable or unobservable entities, should be construed literally as having truth value. This is the semantic commitment for realists, in contrasts with the instrumentalist epistemologies of science which deny the existence of the unobservable; for them unobservable entities have no meanings, they hold that the descriptions of unobservable are only good to be used as instruments for the prediction of observable phenomena and for systematizing observation reports.

Realists have other commitments. One of their commitments is that theoretical -scientific theories constitute knowledge of the world, this is the epistemological commitment that realists hold. This contrasts with sceptical positions that doubt that scientific theories can yield knowledge. Even when some versions of sceptical views might grant the metaphysical and semantic dimensions of realism they still hold doubts on the connection of scientific conclusions to knowledge. Parallel to this are some anti-realist positions which insist that scientific theories can only be good enough to yield knowledge regarding observables, but not the unobservable, like the instrumentalist stance mentioned above.

Realist in general share this epistemological dimension or commitment of realism, yet the realist camp has many different versions of what they hold as 'realism', of what they accept as ‘truth’, and what they hold for scientific realism. When reading the debates and responses, one finds that many realists subscribe to the truth; others subscribes to the approximate truth; other times the truth applied to theories in terms of some version of the correspondence theory of truth; some prefer deflationary accounts of truth; and so on. However, despite these differences within the realist camp, the general claim that realists have widely agreed on, and have shared between them, is that the best of scientific theories give true or approximately true descriptions of observable and unobservable aspects of a mind-independent world; that is the real world.

Debates about scientific realism are centrally connected to almost everything else in the philosophy of science, for the debate is about the very nature of scientific knowledge which constitutes the large part of knowledge in general. Scientific

1 To read more on this debate see: (Miller 1987), (Leplin 1984), (Putnam 1984), (Putnam 1982), and (Boyd 1984), (Van Fraassen, Churchland, and Hooker 1985), and (Gasper 1990).

2 Stathis Psillos, Scientific Realism: How Science Tracks Truth (Routledge, 1999).

3 Richard Boyd, Philip Gasper & J. D Trout eds., the Philosophy of Science (MIT Press, 1991).

realism is an attitude towards the content of the best major scientific theories and models, which recommends belief in both observable and unobservable aspects of the world described by science and scientists. The realist claim has important metaphysical and semantic dimensions, as well as epistemic ones, and these various commitments are contested by a number of rival epistemologies of science, all under one umbrella known as anti-realism.

The unobservable entities -theoretical entities- are vital parts and components of scientific theories; for scientists construct their theories to describe the world through entities which one cannot have direct access to them, at other times one has no access at all, hence, these entities are theoretical-unobservable entities. Scientists operates a standard account, in which they take a few basic laws 'Axioms', then they try to show through experiments that the known phenomena follow from these basic laws. Based on this, the main claim in scientific realism is of two components:

[1] The semantic component of scientific realism: that scientific theories should be interpreted realistically. Scientists not only construct theory to explain the known phenomena, but they produce novel predictions. Applying this semantic component of the realist thesis, namely; that scientific theories need to be interpreted realistically, emphasizes that there must be some kind of explanatory connection between prediction success and the theory being true.

[2] The epistemic component of scientific realism: says that these theories can be reliably confirmed. In this realist claim that the method by which scientists derive and test theoretical predictions leads to correct predictions and experimental success. Therefore, realists conclude that mature and empirically successful scientific theories should be accepted as true.

One might be able to say, this is what mainly most of realists are agreed on, and to this point there is no different even between the scientific realism and what is referred to as 'The No-miracle argument' on the realist camp side. Yet in general, the no miracle argument can be used as an example of the differences between realists. Let us examine the no miracle argument here to show two things; one is to show an example of what differences exist within the scientific realist camp, and secondly is to give an idea of what the anti-realists do usually attack.

The No-miracle argument[4] is a realist view written by Putnam, the argument here defends scientific realism by putting an addition emphasis on what was discussed above, as the main components of realists' commitments. Putnam argues that scientific realism specifically offers 'the best explanation for the success of science'. But this has been interpreted as a claim that scientific realism is 'the only explanation' that would not make the success of science a miracle, this is because Putnam argues it is only by the realist account that the successful predictions are no surprise and no miracle. Putnam argues that the success of science is no-miracle, it is as it should be, it is as the realist claims to be; the theories are true and this implies the existence of theoretical entities, and further, the casual powers of these entities are not exhausted in the already known observable phenomena, therefore, the scientific theories can give rise to another unknown phenomenon.

Putnam's argument had many advocators in philosophy, all of the advocators of no-miracle argument see realism offers more plausible explanation in comparisons to the empiricists and the anti-realists claims in general and what instrumentalist have to offer as an explanation for the success of the scientific theories. The instrumentalists accept theoretical entities only to co-ordinate observable phenomena in a certain way, they have not offered an explanation as to why the phenomena just happens the way scientific theories say they do.

On this view most of realists are in agreement, that instrumentalists have no explanation to account for the success of science, therefore they are committed to a Gigantic cosmic coincidence thesis. Whilst realism leaves no space for such coincidence as they take the theory to be true, and therefore the phenomena are the ways scientific theories describe them to be. This argument originally comes from Jack Smart (Austrian Philosopher), Maxwell Grover used it in 1960s, and then Hilary Putnam put the argument in the No-miracle form; that scientific realism is the only form of argument which does not make the success of science a miracle.[5]

It is useful to distinguish between different kinds of definition or positions in this context: one is the common position which is described in terms of the epistemic achievements constituted by scientific theories. In this view, scientific realism is a position concerning the actual epistemic status of theories which can be described in a number of ways, but all define scientific realism in terms of the truth or approximate truth of scientific theories, or at least certain aspects of scientific theories. Some may define it in terms of the successful reference of theoretical terms-unobservable and observables to things in the world. Others may define scientific realism not in terms of truth or reference, but in terms of belief in the ontology of scientific theories.

Yet, despite different ways of defending and ways of explaining, the realists have one thing in common, namely, their commitment to the idea that the best scientific theories yield knowledge of aspects of the world, including unobservable and theoretical aspects. This is what is referred to as the epistemic status of scientific theories; realist epistemology of science.

Richard Boyd's work is one to be mentioned when it comes to explaining realism, for he developed a philosophical program out of this debate for the defense of a

4 Hilary Putnam, *Mathematics, Matter and Method* (Cambridge University Press, 1979), 323-357.

5 Richard Boyd, "Observation, Explanation power, and simplicity" in *Philosophy of Science*, eds; Richard Boyd, Philip Gasper and John D. Trout. (MIT Press, 1991): 349-377.

realist epistemology of science. The argument is widely discussed and referred to as: 'Explanation defense of Realism' and the 'Inference to the Best Explanation', also called ' Abduction' to differentiate it from deduction and induction inference.[6] Boyd says: "The abductive arguments for realism are in the first instance directed against the empiricist, who denies the possibility of 'theoretical' knowledge-knowledge of 'unobservables'. Against the empiricist, the realist argues that only by accepting the reality of approximate theoretical knowledge can we adequately explain the (uncontested) instrumental reliability of apparently theory-dependent scientific methods."[7] Boyd further argues: "There are two important consequences of the realist explanation of the reliability of the methodology in question. First, scientific research, where it is successful, is cumulative by successive (but not necessarily convergent) approximations to truth. Second, this cumulative development is possible because there is a dialectical relationship between current theory and the methodology for its improvement. The approximate truth of current theories explains why our existing measurement procedures are (approximately) reliable. That reliability, in turn, helps to explain why our experimental or observational investigations are successful in uncovering new theoretical knowledge, which, in turn, may produce improvements in measurement techniques, etc. theory dependence of methods and the consequent dialectical interaction of theory and method are entirely general features of all aspects of scientific methodology-principles of experimental design, choices of research problems, standards for the assessment of experimental evidence and for assessing the quality and methodological import of explanations, principles governing theory choice, and rules for the use of theoretical language. In all cases, there is a pattern of dialectical interaction between accepted theories and associated methods of just the sort exemplified in the case of the theory dependence of measurement and detection procedures. Moreover, this pattern of theory dependence contributes to the reliability of scientific methodology rather than detracting from it." [8]

Boyd's strategy of Abduction inference can be captured in this: "call a theory instrumentally reliable if, and to extent that, it yields approximately accurate predictions about observable phenomena. Similarly, call methodological practices instrumentally reliable if, and to the extent that, they contribute to the discovery and acceptance of instrumentally reliable theories." [9] In different words, the claim is that scientific method forms approximately true theories and these true theories account for the reliability of these scientific methods. The immediate problem with Boyd's argument is that, it is circular. Boyd defends realism by arguing that realism employs inference to the best explanation, but realism employ inference to the best explanation.

Another problem is that Boyd developed inference to the best explanation to defend scientific realism against empiricist and agnostic instrumentalists[10], trying to provide reasons to take current scientific theories to be approximately true and to be warranted in this acceptance. Boyd's argument here is what is called a begging question as it employs the very argument which is in question, that is whether one should believe a hypothesis because best explains the evidence. A realist affirms this, while empiricists deny it.

3. Anti-Realist and the Pessimistic-Induction

Let us turn to the anti-realist camp and present their arguments against what realists hold. As noted above that the inescapable problem scientific realism has is that inference to the best explanation is circular, for it uses inference to the best explanation to show a scientific theory is true, then uses the truth of a theory to show the reliability of the inference to the best explanation.

On the question of circularity which was identified by anti-realists, the realist response is that inference to the best explanation has a sort of circularity, but it has rule circularity and not premise circularity. The difference between these two types of circularity is that premise circularity is when one proves a conclusion P and uses that conclusion statement P in the premise to reach the conclusion. For example, if one uses: 'Everest is the highest mountain in the world', because Everest is the highest mountain in the world; this would be a premise circularity. Whereas for the rule circularity that realist accepts, the obvious example is the inference to the best explanation, in which one uses the rule of inference R to assert statement P, and the statement P implies that the rule of inference is reliable.

However, some philosophers argued that inference to the best explanation is circular, whatever its circularity is, for the argument uses the rule to reach conclusion and the conclusion shows the rule is reliable. Still, realists could argue that rule circularity can be significantly different than premise circularity, this difference becomes vital and important if the conclusion denied reliability of the rule used to reach that conclusion. Further, the realists can argue that this is the case with all attempts to justify the rule of inference; in reflecting on inferential practices, in all attempts to evaluate them; and in doing so, the very same mode of inference is used, the one that involved in inferential practice.

In this sense inference to the best explanation is no different to induction; in that it has a problem of circularity, similar to the problem of circularity in induction. Therefore, it can be argued that for philosophers who can accept induction, by analogy, they can accept inference to the best explanation too, and it shouldn't raise any further problems,

6 Richard Boyd "Realism, Approximate truth and Philosophical Method" in, *The Philosophy of Science,* ed. David Papineau (Oxford University Press, 1997): 215-255

7 Ibid, 221-22.

8 Ibid, 222-23,

9 Richard Boyd, "Observation, Explanation power, and simplicity" in *Philosophy of Science*, eds. Richard Boyd, Philip Gasper and John D. Trout. (MIT Press, 1991): 349.

10Richard Boyd, "Realism, Approximate truth and Philosophical Method" in, *The Philosophy of Science,* ed. David Papineau (Oxford University Press, 1997): 221-22.

and by this analogy the problem here is no worse than induction. It can be further argued that, in relation to scientific theories, induction has been accepted when it comes to observable phenomena by empiricists in general, induction inference only raises a problem when it comes to unobservable phenomena- theoretical entities.

In general, empiricists hold that knowledge of unobservable entities is unattainable and the inference from some premises of observable phenomena to conclusions about unobservable entities is not justified. That is precisely why empiricists, specifically positivist empiricists and instrumentalists, insisted on a reductive account of the scientific language, in which they make the claim that the truth condition of theoretical- unobservable- entities are reducible to observable phenomena. On this view, empiricist view theoretical terms either have no truth condition at all, or if they have; it is reducible to observables. That is why the instrumentalist position is that scientific theories are not supposed to offer a true description of the phenomena but to 'save the phenomena'; [11] Van-Fraassen in his argument which hold the same title argued that, it is to offer a mathematical framework in which the phenomena can be embedded, so that the scientific theories are taken to be useful as an instrument for classification, systemization of observed phenomena. In this can be argued that, the instrumentalists accept the semantic part of scientific realists' thesis, for they accept reductive empiricism.

Another problem develops and enters these debates when considering the role of evidence in confirmations of theories and the additional emphasis of the No-miracle argument has brought into scientific realism which was the claim that scientific realism is the only stance which makes the success of science No-miracle.

The claim here relies on that there is only one theory that can best explain the phenomena, and in accepting empirical methodology; the theory must be confirmed by evidence. However, the Underdetermination of theory by evidence (UTE) claim that the evidence cannot determine the truth of a theory, as there can be more than one theory which are observationally indistinguishable, yet these theories are incompatible. That is to say, they entail exactly the same observational consequences, but they provide inconsistent explanations for the same evidence. This clearly undercuts the No-miracle argument, for according to this, there can't be one theory on the basis of evidence. UTE also shows that there can be more than one theory that are equally empirically adequate, therefore, any of the theories can explain the same phenomena and account for the predicative success of science in any given domain. For instances, suppose that there are these theories; H, H1, H2, H3. H* they are all equal candidate to explain the same phenomena. Now suppose for any other reasons the decision is made to choose theory H over the rest, and later theory H turn out to be false. The falsity of theory H by no means makes the predictive success, supposedly made by theory H, a miracle. Because there are other theories, namely H1, H2, H3 and H* to explain the very same phenomena and account for the same predictive success.

To this extent the UTE does its job against the core of the No-miracle argument in its attempt in establishing there is only one theory that can explain the phenomena or the evidence. However, while UTE theory shows the entailment of evidence is not sufficient for confirming a theory, it relies on; or presupposes the entailment of evidence to be the only constraint for confirmation in first place, to attack the No-miracle argument. Another problem with UTE is that it presupposes a distinction between observable and unobservable, for it relies on the independency of observation from theory. But according to Duhem's [12] argument against this distinction, which is the claim that there is no observation of observable phenomena which is purely observational, that is to say; without reliance on background theories in building the instruments used to see observables or to test the experiments. Further, there are no theory neutral language and terms to construct observation sentences-theories. This part is known as the theory laden argument which undercut the UTE argument.

If the claim that the entailment of evidence is not sufficient for confirmation of a theory is accepted, then other conditions should be added. That is why realists applied to Coherentism (consistency) as a condition; for the theory to be consistent - coherent with other major theories. This is precisely why scientific theories and terms get their meaning in a holistic manner, to avoid the problem of the underdetermination of theory by evidence. Yet Coherentism or Holism bring with it two other problems: one is circularity, the other is incommensurability. The problem of circularity emerges in that coherent views assertion of a theory X relies on theory A; this means to confirm theory X one has to presuppose the truth of theory A, and this is circular. The problem of incommensurability is, according to Holistic view, that theory laden- meaning of theoretical terms are determined by the theory as whole, but theory changes and each time theory changes the meaning of the terms changes too. This is the claim that nothing is left fixed to act as neutral orbiter between two successive paradigms, or to compare theories.[13]

Some of anti-realists have argued against realism by studying the history of scientific theories, this argument came to be known as 'the pessimistic- induction'. While Van Fraassen [14] targeted the epistemic aims of scientific inquiry-scientific knowledge, by which some of realists has thought of the realist position in terms of what science aims to do, for the scientific realist holds that science aims to produce true descriptions or approximately true descriptions of things in the world. Most scientific realists committed to something in

11 Bas Van Fraassen, "To save the phenomena," in. *Philosophy of Science*, ed. Richard Boyd (Bradford Books, 1991).

12 Duhem, Pierre (1954). '*The Aim and Structure of Physical Theory*'. Princeton: Princeton University Press.

13 Thomas Kuhn, *The Structure of Scientific Revolution* 2nd edition, (University of Chicago Press, 1970).

14 Bas C. Van Fraassen *'the Scientific Image'*, (Oxford University Press, 1980).

terms of achievement and the success of science. Van Fraassen rejects that the scientific theories yield truth:" In part my argument will be destructive, countering the arguments brought forward by scientific realists against the empiricist point of view. I shall give a momentary name, 'constructive empiricism', to the specific philosophical position I shall advocate. The main part of that advocacy will be the development of a constructive alternative to scientific realism, on the main issues that divide us: the relation of theory to world, the analysis of scientific explanation, and the meaning of probability statements when they are part of a physical theory. I use the adjective 'constructive' to indicate my view that scientific activity is one of construction rather than discovery: construction of models that must be adequate to the phenomena, and not discovery of truth concerning the unobservable."[15]

The other argument that mentioned earlier above; in terms of studies of history of science, that came to be known as the pessimistic-induction and sometimes referred to as pessimistic meta-induction. This was originated by Larry Laudan, aimed to rebut scientific realism specifically on the epistemic notion.[16] More resent works on that are attempts to advance it by incorporating different interpretations of it[17]. Laudan argues, by presenting a list of past scientific theories – called "Gambit list"- which were thought to be true in the past but turned out false. In presenting this historical evidence Laudan argues that: these past, true scientific theories were empirically successful, their terms referred, they made predictions, but later they turned out to be false, for the entities they posited are no longer believed to exist and the laws of mechanism they postulated are no longer parts of the descriptions of the world. Laudan's argument is a powerful argument against scientific realism and the No-miracle argument, for they rely on the explanatory connection between predictive success and the theory being true. Laudan's argument is to refute this connection by showing that truth cannot explain success and the connection fails, therefore the realists warrant for truth cannot be held.

Laudan further argues that the realist warrant for the current theories as true, cannot be held too, for if one claims the current theory is true, then the past theory cannot be, and obviously if one claim past theories were true then the current theories cannot be.

Realists have so far not produced an effective counter argument to the "Gambit list", the list of a theories Laudan exhibits. There are suggestions that if the list can be shortened and with it Laudan's argument can become less effective, for the pessimistic induction argument itself is a kind of enumerative induction argument. That is why realists suggested if the numbers of the theories are reduced the conclusion is weakened, on the basis that will no longer have the representative induction which is required in this type of enumerative induction arguments. To achieve this, realist must do some historical study and show theories on the list were not successful.

The response to the pessimistic induction argument are many from the realist camp, among them one argument that has been put forward which has been highly supported, it is 'structural realism' by John Worrall. [18] What Worrall have done is to accept part of the point made by pessimistic-induction argument, namely to accept that there can be discontinuity at theoretical level, but at the same time remains in support of realism and part of no-miracle argument, namely by claiming that there is continuity at mathematical level. Structural realism is one significant argument that brings in the continuity at structural level as a defense for scientific realism, but given that theoretical level means empirical level, Worrall defense of scientific realism is weakend by denying the empirical continuity, by which makes it dispensable, for realists rely on empirical success to support the truth. Further, Worrall's argument cannot block Laudan's pessimistic-induction, for Laudan's argument is about the disconnecting the empirical success and truth, and Worrall accepts the discontinuity of the theoretical level-empirical success. Furthermore, Worrall's argument not only restricts the cognitive content of scientific theories to the mathematical structure, it also presupposes a distinction between the structure and the content. This distinction cannot be attained while in modern physics structure as content-nature form a continuum; that is to say, to talk about what the entity is, is a talk about how this entity is structured, what properties it has, and what relations it has with other entities.

In general, realists has grounds to stabilize the kind of truth one can retain, these grounds are cushioned by restricting the domain of theories suitable for realist commitment to those that are sufficiently mature and non-ad hoc as Worrall has pointed out.[19] Maturity may be thought of in terms of the well-established scientific theories of the field in which a theory is developed, or the duration of historical time that theory has survived, or its survival in the face of significant testing, and the condition of being non-ad hoc; preferably all of these together.

All these restrictions and conditions are intended to guard against theories that are merely posited to account for some known observations in the absence of rigorous testing of the trial and error. The ability of a theory to do this marks as genuinely empirically successful by the realists and accepted as the sort of theory to which realists should be more inclined to commit.

Finally, let's bring in what Hacking and other later arguments says on realism. Hacking's argument offers another motivation for realism, this time on 'Corroboration'; in connection with at least some unobservable described by

15 Ibid, 5

16 Larry Laudan, "A confutation of convergent realism," *Philosophy of Science* 48, no. 1 (1981):19-49.

17 Wray k. Brad, "Pessimistic Inductions: Four Varieties", International Studies in the Philosophy of Science, 29(1): 61–73. 2015.

18 See John Worrall, "Structural realism: The best of both worlds?" Dialectica, 43 no 1-2 (1989): 99–124. Also, reprinted in David Papineau, Philosophy of Science, (Blackwell Publishing Ltd, 1996) 139–165.

19John Worrall "Structural realism: The best of both worlds?" Dialectica 43 no 1-2: 99-124 (1989):153-154. also, see Stathis Psillos, Scientific Realism: How Science Tracks Truth (Routledge, 1999): 105–108.

scientific theories come by way of corroboration. Hacking argues in this way: if an unobservable entity or property is putatively capable of being detected by means of a scientific instrument or experiment, one might think that this could form the basis of a solid argument for scientific realism as a truth yielding. However, if that same entity or property is putatively capable of being detected by not just one, but two or more different means of detection; forms of detection that are distinct with respect to the apparatuses they employ and the causal mechanisms and processes they are described as exploiting in the course of detection, this may serve as the basis of a significantly enhanced argument for realism.[20]

Closely linked with this and to the argument presented by Worrall's structural realism, other arguments provoked, among them is Chakravartty's attempt[21] to defend Scientific realism by connecting it to the metaphysical conception of the world, Chakravartty argument is to capitalizes structural realism and entity realism. Thus, mainly by claiming that both of the entity realism and structural realism embrace the same epistemic and ontological commitment. Further, Semirealism which is a kind of selective scepticism that restricts epistemic commitment only to theories that has detection properties, this is seen to provide the ground for the structures to be preserved with the truth of the empirically successful theories. Given that, Semirealism is committed to the restricted truth or a "restricted subset of claims made by particular theories."[22] which has a detection property. This is in addition to the Corroboration which gives an extra "independent reasons for believing in the existence of entities, and with this much in hand, structures representing relations between detection properties of these entities are likewise substantiated." [23]

In another words, what all of the later arguments to defend realism have in common is the claim that the fact that one and the same thing is revealed by distinct modes of detection on more than one occasion, suggests that it would be an extraordinary coincidence if the target of these revelations did not exist. The many more distinct modes of detections that confirm the same phenomenon, means the greater the extent to which detections can be corroborated by different means, hence, the stronger the argument for realism in connection with their putative target.

4. Conclusion

Science is successful and to explain this success is what these debates are about. The two camps of Realist and Anti-Realists arguments assessed here pull in a contrary direction; scientific realism see the success of science as an indicator for the truth of scientific theories. The pessimistic-induction argument pulls this connection of success and truth apart.

However, scientists construct their theories to describe the world through entities, to which one cannot have direct access- sometimes no access at all- these entities are theoretical –unobservable entities. Scientists do this on a standard account in which they take few basic laws-axioms- then they try to show through experiments that the known phenomena follow from these basic laws of a theory. The theories they construct predicts phenomena which their existence follows from scientific theory- their existence not known before the theory. Further, it is the outcomes of these scientific theories are what all make use of in everyday life, the scientific theories are behind almost every equipment that one makes a use of in living experience, and this is the case whether one is a realists or anti-realists in doing philosophy and in everyday living; this is important to bear in mind when reading these debates and arguments against the truth of scientific theories.

Further, realists are not rigid, but are generally fallibilists, hence, they can accept that theories may turn out to be false given further evidence in future, and- or can settle for approximate truth; holding that realism is appropriate in connection with the best major theories even though they likely cannot be proven with absolute certainty. This is powerful acknowledgement in rejection of absolutism – absolute truth-, and the rejection of absolutism was the main idea behind the emergence of empiricism in the history of philosophy in first place. Realists are right in accepting that, for some of the best theories could conceivably turn out to be significantly mistaken, but realists also can maintain that the scientific theories are at least approximately true, granting this possibility.

Anti-realists in general have produced powerful arguments against having any kind of 'truth' in general and the possibility of any true knowledge about the mind independent world. Yet to accept the anti-realist arguments, one must abandon not only most of knowledge but also all scientific theories, hence, the use of them along with all what it has produced as an outcome of scientific theories. And if that is the case to abandon the use of most of knowledge and all scientific theories and with it the 'truth' of scientific knowledge altogether; the anti-realist then has to produce more arguments to show that all can do without in all aspects of living.

20 Ian Hacking, Representing and intervening: Introductory topics in the philosophy of natural science. Cambridge University Press, 1983), 201; also, Ian Hacking, "Do we see through a microscope?" Images of science (1985): 132-52.

21 Anjan Chakravartty, 'A Metaphysics for Scientific Realism: Knowing the Unobservable', Cambridge University Press. 2007.

22 See p. 391. Anjan Chakravartty, 'Semirealism', Studies in History and Philosophy of Science, Vol. 29. 3. pp. 391-408. 1998

23 See p. 406. ibid.

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