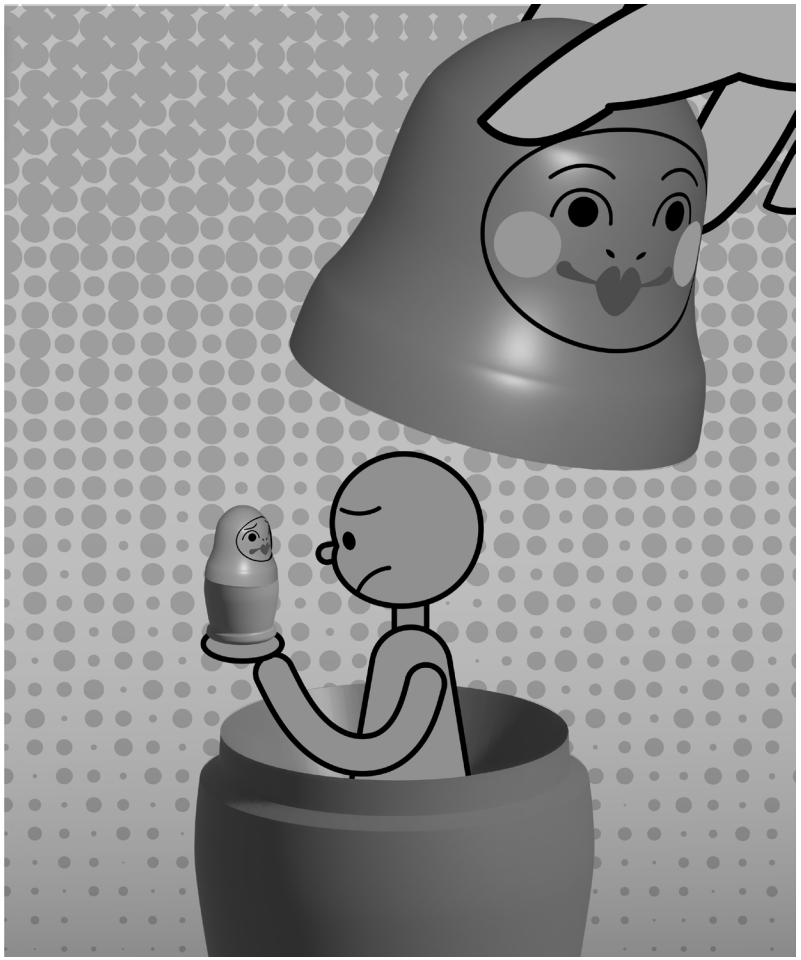
SCIENCE AND THE QUESTION OF TRUTH: An Examination of Whig Realism



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ABSTRACT

The pursuit of scientific truth has long engaged philosophers of science. Miriam Solomon's work in *Social Empiricism* introduces "Whig realism," which proposes that empirical success in science reflects some underlying truths within theories. This paper examines Solomon's argument and discusses its response to a traditional scientific realism argument. I then critique Solomon's treatment of decision vectors and their usage in determining when dissent is normatively appropriate. I conclude that, while Solomon's framework provides some insights into the dynamics of scientific progress, concerns arise regarding its application.

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I. INTRODUCTION

The discussion regarding scientific progress toward truth is not unfamiliar among philosophers of science. Specifically, the distinction between anti-realists and realists contributes to this extensive discussion. Philosophers such as Miriam Solomon have furthered contemporary arguments regarding science and truth. In *Social Empiricism*, she argues for a novel account of realism which she calls "Whig realism."[1] This account is distinct from a separate account of scientific realism, which, though no one philosopher has made this exact argument, has been extracted from the work of several philosophers, and it is as follows:

1. That science is phenomenally successful at prediction is not an unexplained mystery for the theory according to which science is approaching the truth.[2]
2. That science is phenomenally successful at prediction is a significant unexplained mystery for any theory according to which science is not approaching the truth.[3]
3. Given two theories, it is unreasonable to believe one that leaves significantly more unexplained mysteries.[4]
4. It is unreasonable to believe the theory that science is not approaching the truth.[5]

In this paper, I will discuss Solomon's argument regarding science and truth in *Social Empiricism*. In doing so, I will illustrate her response to the previous argument and the flaws within her argument for Whig realism. In Section II, I will explain Whig realism and argue that Solomon would agree with the prior argument's conclusion. For example, Whig realism and scientific realism both conclude that science approaches the truth, as Whig realism claims there is some truth within theories. In Section III, I will explain the reason why Solomon would create a different argument for the same conclusion by delving into a criticism she may have towards the first and third premises of the prior argument: a decision to believe and choose one theory over another considers several decision vectors and is not exclusive to just nonempirical decision vectors such as simplicity—which are less reliant on empirical data and more reliant on extraneous factors such as elegance. Finally, in Section IV, I will critique aspects of Solomon's response, specifically focusing on Whig realism and its methodological upshot (the issues with Whig realism's applications).

I will address the issues with obtaining truths within theories and explain that nonempirical decision vectors like simplicity are imperative in theory choice despite their nonempirical nature.

1 Miriam Solomon, *Social Empiricism* (Cambridge: The MIT Press, 2007).
2 Godfrey-Smith, *Theory and Reality*, 174–79.
3 Peter Godfrey-Smith, *Theory and Reality* (Chicago: The University of Chicago Press, 2003), 174–79.
4 Godfrey-Smith, *Theory and Reality*, 174–79.
5 Godfrey-Smith, *Theory and Reality*, 174–79.

II. UNDERSTANDING WHIG REALISM AND EMPIRICAL SUCCESS

Following the discussion regarding the distinctions between the antirealist and realist perspective, Solomon introduced the concept of Whig realism. The following sentence describes Whig realism best:

> Roughly stated, it is the position that when empirical success needs explanation (that is, when it cannot be attributed to chance or intentional choice), it is due to there being some truth in the theories.[6]

Solomon discusses several cases to explain Whig realism in further detail, but I will take a closer look into her discussion regarding the phlogiston theory. In the phlogiston case, phlogiston still referred to something (oxygen) when scientists like Joseph Priestley utilized the phrase "dephlogisticated air."[7] At the time, it was not called oxygen. According to Solomon, this reference is only known in hindsight. The Phlogiston theory provided some truths within the theory that explained its empirical successes; however, it was largely false. As Solomon claims, certain parts of the theory, such as the theoretical structures, explain the empirical successes and are true. When one considers the time when phlogiston theory was procured, Priestley and his allies did not know what parts of the theory were true. Following the development of the theory of oxygen, the true parts of the phlogiston theory revealed themselves. Therefore, truth within empirically successful theories is known in hindsight, and theories contain some truths.

Understanding Whig realism is imperative in creating an argument Solomon would make regarding scientific progress towards the truth. The following argument is as such

6 Solomon, *Social Empiricism*, 39.
7 Solomon, *Social Empiricism*, 37.

1. Some scientific theories provide some empirical success.[8]
2. Some scientific theories that provide some empirical success contain some truths within the theories.[9]
3. New scientific theories build upon previous theories that provided some empirical success.[10]
4. New scientific theories build upon previous theories that contained some truths within the theories.
5. Any new theory that builds upon a prior theory attempts to increase the number of truths within the theory that can potentially explain the new empirical successes.
6. New scientific theories that build upon previous theories attempt to increase the number of truths with the theory that potentially can explain the new empirical successes.

Solomon does not explicitly state the fifth premise, but the underlying assumption allows for the transition from the fourth premise to the conclusion. Many of the case studies Solomon presents contain theories that attempt to increase the truths within previous theories. For example, whether it be the transition from Newtonian mechanics to Einsteinian mechanics and Quantum mechanics or the transition from Lamarckian evolution to Darwinian evolution, the theories following the preceding theories build upon the truths of those theories. However, examples such as cold fusion show that some new theories may have little empirical success and do not increase the number of truths because there are still many falsities. Thus, the word "attempt" is used because even if the number of truths does not increase, the new theories still attempt to build upon previous ones, trying to increase the number of truths. In other words, they attempted to increase the number of truths within the theories by attempting to find truths that were not previously uncovered. Even if scientists did not intend to increase the number of truths, new scientific theories attempt to uncover more truths over time. As more and more truths become uncovered and revealed, theories can approach truth. They will never reach 100% truth, but as more theories emerge, these theories can progress toward truth.

8 Solomon, *Social Empiricism*, 39.
9 Solomon, *Social Empiricism*, 39.
10 Solomon, *Social Empiricism*, 49.

III. DECISION VECTORS AND SCIENTIFIC PROGRESS TOWARD TRUTH

Of course, the question arises as to why Solomon would need to form a separate argument for the same conclusion. I had already addressed her position as a Whig realist, but I have yet to address her criticisms of the initial realism argument. Solomon would first discuss problems with the simplicity principle and why Whig realism is a better alternative.

Following the discussion of Whig realism, Solomon delves into the concept of decision vectors. Her claim is that decision vectors are heavily involved in scientific decision-making, such as the preference for one theory over another. According to Solomon, decision vectors are certain factors that influence the direction of a certain decision, which may contribute to some degree of scientific success.[11] Moreover, decision vectors allow an agent to make a rational scientific choice.

While Solomon does not expand upon the definition of a "rational scientific choice," she acknowledges that decision vectors do not have to be rational at the individual level.[12] Therefore, her usage of decision vectors still implies that a certain decision within the scientific community is being made. Furthermore, Solomon creates the distinction between empirical and nonempirical decision vectors. While empirical decision vectors are why some empirically successful theories are preferred, nonempirical decision vectors are why one theory is chosen over the other. For example, a researcher may prefer one successful theory due to the theory being supported by their data—which would be an example of an empirical decision vector—and the same researcher preferring a theory due to its simplicity or complexity is a nonempirical decision vector, as the preference is not determined by how empirically successful the theory is.[13] Simplicity could be argued as a decision vector that is not wholly nonempirical; however, choosing one theory over another based solely on its simplicity is irrespective of the empirical success of that theory. Say I have Theories X and Y. Both theories could have the same degree of success, and perhaps even the same data. However, if I choose Theory X over Y because it is simpler to understand and communicate, then I am choosing Theory X irrespective of the factor of empirical success. Unexplained mysteries could be explained in terms of data, as one theory may have more unexplained data than another, but to choose one theory over another is a matter of simplicity and does not necessarily depend on empirical success. A theory can have unexplained mysteries and still have empirical success. With the current scientific

11 Solomon, *Social Empiricism*, 54.
12 Solomon, *Social Empiricism*, 49.
13 Solomon, *Social Empiricism*, 57.

tools, knowledge, and technology we have at our disposal, we may not necessarily fully comprehend or explain the outcomes of some of our theories; however, that does not mean the theory has little empirical success, as the theory could still accurately predict certain phenomena.

The following are examples of *empirical* decision vectors that Solomon provides.[14]

1. Salience of data: choosing a theory because there is some important data that exists.
2. Availability of data: choosing a theory based on how accessible the data and results of theory is.
3. Egocentric bias towards one's own data: choosing a theory based on how the theory supports one's data.
4. Preference for a theory which generates novel predictions: choosing a theory based on the novelty of its data and the overall effort of the research.

The following are some examples of *non-empirical* decision vectors.[15]

1. Ideology
2. Pride
3. Conservativeness
4. Radicalism
5. Elegance
6. Simplicity

Solomon uses these decision vectors to determine whether dissent or consensus is normatively appropriate given the distribution of such vectors. What Solomon means by dissent or consensus is concerning a scientific community and determining whether competing theories or introducing competing theories, which create dissent, are appropriate. The topic of normatively appropriate dissent and consensus is interesting. I will address my concerns to Solomon's account of when both are normatively appropriate in Section IV, so I will focus on the nature of the decision vectors in this section.

Solomon would argue that simplicity is one of many nonempirical decision vectors, so claiming that "it is unreasonable to believe one that leaves significantly more unexplained mysteries" would be disregarding other influential nonempirical and empirical decision vectors. One important note is that Solomon claims that nonempirical decision vectors

14 Solomon, *Social Empiricism*, 57–58.
15 Solomon, *Social Empiricism*, 57–58.

"do not select for or against empirical success or any other primary goal of science (such as truth)."[16] Due to the nature of nonempirical decision vectors, they are not as heavily involved in the preference of empirically successful theories and are not as involved in the progress toward truth. So, preference for one empirically successful theory over another should be based solely on empirical decision vectors equitably distributed to the various empirical successes of different theories. Solomon would still consider nonempirical decision vectors completely. She claims the nonempirical decision vectors should be equally distributed for a normatively appropriate account of dissent. However, given her statement that nonempirical decision vectors do not select for or against empirical success or truth, Solomon would argue that the simplicity principle should not be used as a condition or premise that leads to the conclusion that science progresses toward truth.

IV. CRITIQUES AND RESPONSES

Solomon's argument has its merits and demerits. My main issue lies with certain aspects of her response that involve Whig realism and decision vectors as well as her account of when dissent is normatively appropriate. I will address my concerns individually, separating my critiques into three parts. First, I will begin by explaining Solomon's problem by stating that there are truths within theories that we can isolate and use to progress toward truth. Second, I will critique Solomon's usage of decision vectors and her rejection of simplicity and nonempirical decisions in scientific progress toward truth. Finally, I will critique Solomon's vagueness in these decision vectors and how they result in a vague account of when dissent is normatively appropriate. These critiques aim to determine how exactly we can apply the concepts of Whig realism, if we can at all, in a practical sense of how science is conducted. I will utilize the term "methodological upshot" to refer to the methodological and practical implications of Whig realism and Solomon's claims.

A. ISSUES WITH WHIG REALISM'S METHODOLOGICAL UPSHOT

Solomon expands on Whig realism by introducing some of its conditions, and she is correct that truth is known in hindsight. But how can we truly know what truths to extract from previous theories? If an individual were to extract only the truths, she would create a replication of the previous theory without addressing or improving upon the previous theory's falsities. So, it is important to consider the falsities within previous theories to build upon them sufficiently.

16 Solomon, *Social Empiricism*, 77.

Moreover, how much of the previous theory should she utilize? If a previous theory has several empirical successes but is false in hindsight, how much of each empirical success would she need to take? Some of the successes? All? Solomon does claim that the process of new theories is one of trial and error, but that needs to be more specific. There are many instances where the scientific process is not trial and error, and there are clear methods researchers conduct to achieve their results. Simple trial and error are not orderly enough for a "methodological upshot" of Whig realism.[17]

Solomon's response to this objection would lie in the potential misrepresentation of her account. Solomon claims that new theories seek to increase the number of true statements within theories; however, mistakes can still be considered. Truths can be obtained in addition to improving upon falsities. While this may be true, it is also important to consider that discerning truths from past theories and even replacing the mistaken claims of previous theories with new and true statements can be highly subjective and biased. Solomon makes the claim that a reasonable methodology is that theories should build on various portions of previous theories. However, different researchers may interpret the same body of evidence differently, which can lead to conflicting conclusions about which aspects of past theories constitute truths and which should be discarded. This subjectivity of what portions of previous theories should be built upon introduces uncertainty into the scientific process. Furthermore, by replacing mistaken claims with new, true statements, there is a risk of overlooking the underlying reasons for these past mistakes and failing to address potential systemic issues or biases within the scientific process and theory-building. Ignoring past mistakes and replacing them could hinder scientific progress by perpetuating misconceptions and preventing scientists from understanding the limitations and shortcomings of previous theories.

B. ISSUES WITH DECISION VECTORS

As I have previously mentioned, Solomon would object to the simplicity principle because it is a nonempirical decision vector, so it is not as involved in the preference of one empirically successful theory over another or the progress toward truth. However, through all the examples provided by Solomon, we see that nonempirical decision factors are involved in theory choice. In Solomon's multivariate analysis, they are given the same weight as empirical decision vectors.

Should this be the case? It should not, and certain decision vectors are more influential depending on the context. For example, suppose that

17 Solomon, *Social Empiricism*, 49.

new theories have been developing and providing empirical successes, but unfortunately, they have not been simple enough, and the theories are complex. Then, a scientist proposes a simpler theory that provides empirical success. The two theories have an equitable distribution of empirical decision vectors and an approximately equal distribution of nonempirical decision vectors. Using Solomon's analysis, all the vectors would be weighted equally. However, in this scenario, simplicity should be weighted more heavily over other potential nonempirical decision vectors such as pride or radicalism because previous theories have been too complex. Thus, we can still protect the simplicity principle even though it is a nonempirical decision vector, for it depends on the context if it should be weighted more heavily when deciding between one empirically successful theory over another. Thus, Solomon is incorrect in dismissing simplicity.

I should also be clear in stating that simplicity serves as a guiding principle that can aid in evaluating and comparing competing hypotheses. It is not the only absolute criterion. Indeed, fields like physics and mathematics often prioritize complex frameworks and theories, and it is often said that simplifying these complexities will lead to inaccuracies and potential oversimplifications. However, the goal is not to unquestioningly favor simplicity at the expense of accuracy, but to strike a balance between simplicity and complexity that captures the essential features of a theory. In cases where simplicity conflicts with mathematical or scientific rigor, researchers must exercise caution and evaluate the trade-offs between simplicity and accuracy. Simplicity should not be dismissed altogether but rather should be utilized as a tool.

C. ISSUES WITH SOLOMON'S ACCOUNT OF NORMATIVELY APPROPRIATE DISSENT

Solomon would respond that the previous argument I made is unnecessary, for she already claimed that nonempirical decision vectors, when equally distributed, determine whether dissent is normatively appropriate. However, her normatively appropriate case of dissent is too vague. For example, deference to authority is a nonempirical decision vector, but who exactly is the authority? Ideology is a nonempirical decision vector, but what ideologies are favored over others? Many of Solomon's decision vectors could be more specific, resulting in a vague account of when dissent is appropriate. Her prescription is so vague that it does not tell the scientific and meta-scientific community exactly what to do. By being vague, Solomon insulates herself against counterarguments on decision vectors and when dissent is appropriate. For example, we can use her criteria to deem that if the nonempirical decision vectors are equally distributed, then scientists devoted to researching Young

Earth creationism or Lamarckian inheritance could do so as their dissent from mainstream views is normatively appropriate. This is a dangerous conclusion, which is why her account does not inform the scientific community of anything that is practical and can be utilized, which is why a greater degree of specificity regarding when dissent is appropriate is necessary. For this reason, the argument I previously proposed, where nonempirical decision vectors should be weighted depending on the context, is stronger and does not overly depend upon nonempirical decision vectors. However, it also needs to pay attention to them.

Solomon may also add that it would be quite difficult to know the influence of some vectors over others since we were not present during previous theories. Hence, adding weight to certain vectors over others is an impossible task. However, much like truth can be known in hindsight, the influence of certain vectors can also be known in hindsight. We can do so by observing the theories that succeed prior theories, the differences between them, and the historical context. For example, historians point to several reasons for the cause of World War II, such as the invasion of Poland, the Nazi regime, the Treaty of Versailles, and many more. There may be disputes over what cause was most influential, however, many historians agree that some were more influential than others, labeling some as proximate causes and others as ultimate causes by using primary and secondary sources. The same can be said for theories. While it may be a difficult task, it is not impossible.

My objections are all concerned with Solomon's response to the first argument. I addressed issues that weaken Solomon's Whig realism argument and issues with decision vectors that weaken her response to the simplicity principle. The contemporary debate regarding scientific realism will persist, whether arguments will build upon the first scientific realism argument or upon Whig realism and formulate a different perspective. There will be more arguments regarding science's ability to build upon previous theories and progress toward truth; those arguments themselves will do the same as they progress. Understanding Whig realism is the first step in a cascade of further arguments that dig at the relationship between science and the question of truth.[18]

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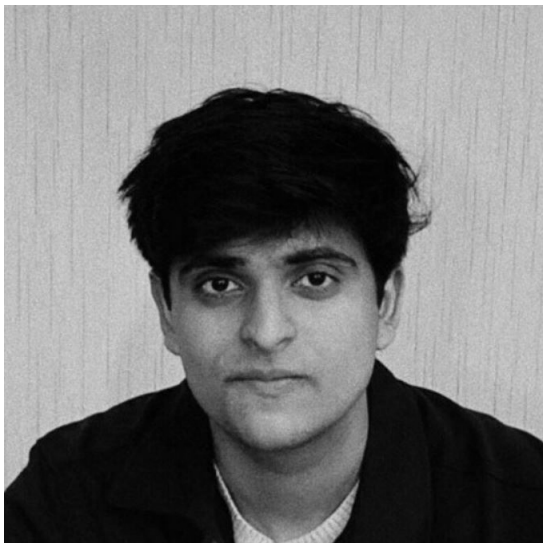

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