

Deification of Science & Its Disastrous Consequences

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Abstract: Our goal is to show that production of knowledge requires different approaches in different areas. In particular, radically different methodologies are suitable for mathematics, science, and humanities. Mathematics requires an axiomatic and deductive approach, while science requires an inductive and empirical approach. Neither of these two distinct approaches is applicable to “social science”. Currently, it is widely believed that “methodology of science” is unique and the only way for production of valid knowledge. This imperialist epistemology is wrong and has caused a lot of harm.

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1. The Axiomatic and the Scientific Method

The first intellectual discipline built on rigorous foundations was that of mathematics. Euclid's twenty four centuries old methodology of taking a set of axioms and deriving logical conclusions is still taught in modern times. When early Greek philosophers started inquiries into natural science, they naturally followed the axiomatic methodology used in Geometry. They started with self-evident truths, and use logical deductions to discover truths about the universe. The brilliance of the early Greek philosophers like Euclid, Plato, Aristotle, and others is demonstrated by the fact that their books are still studied at leading universities. Nonetheless, the axiomatic and hypothetico-deductive methodology, which is eminently suitable for mathematics, is not suitable for science. The main reason for this is that, contrary to the case of mathematics, there are no "self-evident" truths about nature. Many statements believed to be self-evident by the early Greeks, later turned out to be wrong. This inappropriate methodology led these eminent Greek philosophers to the many erroneous conclusions, including the following:

1. The Earth is the center of the universe
2. Heavier bodies will fall faster than lighter ones.
3. Men have more teeth than woman.
4. Human beings see objects because light rays emanating from the eye strike the object making it visible.
5. Matter consists of indivisible atoms (Democritus).

So far, it is not known whether or not Assertion 5 is true; particles identified as the basic building blocks of matter have proven to be divisible. Of greater importance to us is the fact that this proposition was derived from purely philosophical and logical premises which made no reference to any observed or observable properties of matter. It was derived on the basis of an axiomatic methodology. Thus, it was an "un-scientific" claim. In the case of assertions 2 and 3, it is a mystery why these intelligent people did not make the observations necessary to verify them, when it is so easy to do. Why did not Aristotle, who was one of the brightest men in his time, pick up two stones of different weight, and drop them from a high place to check whether or not his theory was valid?

It is important to understand the solution to this mystery. The "scientific method," which is based upon using data, observations, and empirical findings to arrive at truth, was not considered reliable by the ancients. The objections to such methods were strong, and we will show later that they continue to have validity:

1. Suppose we observe some regularity or pattern in our observations? How can we tell if this is the effect of a law, or merely an accident?
2. Without a logical and axiomatic basis, it is impossible to derive a law – thousands of observations of white swans can be contradicted by a single black swan.
3. Exceptions to laws can occur due to accidents, without contradicting the law – for example, a man whose natural teeth were accidentally removed might have the same number of teeth as a woman, without violating the theory of Aristotle in item 3 above.

For all these reasons and more, use of observational techniques in formulation and assessment of natural laws was not considered as valid by the early philosophers. This is why historian Richard Powers (1999) writes that the idea of using observations to settle theoretical disputes, which is due to Abu Ali al-Hasan Ibn al-Haytham (ca. 1000 AD), is the most important idea of the past millennium. The following quote from Powers illustrates the nature of this accomplishment:

Ibn al-Haytham resolved a scientific dispute that had remained deadlocked for more than 800 years. Two inimical theories vied to explain the mystery of vision. Euclid, Ptolemy and other mathematicians demonstrated that light necessarily traveled from the eye to the observed object. Aristotle and the atomists assumed the reverse. Both theories were complete and internally consistent, with no way to arbitrate between them. Then Ibn al-Haytham made several remarkable observations. His most remarkable was also the simplest. He invited observers to stare at the sun, which proved the point: when you looked at a sufficiently bright object, it burned the eye. He made no appeal to geometry or theoretical necessity. Instead, he demolished a whole mountain of systematic theory with a single appeal to data. Light started outside the eye and reflected into it. No other explanation was consistent with the evidence.

This single incident demonstrates the power of the scientific method. Despite the spectacular, world changing advances brought about by science, historical circumstances surrounding the emergence of science in Europe led to the creation of certain myths which must be understood to acquire a perspective on the methodology of Economics.

2. History of Emergence of Science in Europe

The advanced civilization of Islamic Spain brought the light of learning which ended the dark ages of Europe. However the advances to Enlightenment were not peaceful, but marked by several violent battles which transformed the mindscape of Europe. One of these was the battle between Science and Christianity, which has been documented in extensive detail by Hans Kung (2006). Only one minor aspect of this is important for our current purposes. The Church had absorbed several elements of Greek philosophy into its theology. Scientific discoveries in conflict with these ancient Greek ideas threatened the authority of the Church and led to ill-advised attempts to suppress these findings. The burning of Bruno at the stake for his scientific findings, and the trial of Galileo were landmark events in this conflict. There were many factors which led to the eventual victory of Science over Christianity in Europe. However the hostility generated by the battle persists to this day, and has been tremendously influential in shaping European attitudes and ideas about science, scientific methodology and religion.

Both to provide a contrast, and also because it has some relevance to our subject, it is important to note that Islam was only saved by a hairbreadth from suffering a similar fate. Rising to world dominance from a semi-savage and illiterate background in Arabia,

Muslim intellectuals were extremely impressed when sophisticated and complex Greek philosophies were first translated into Arabic. The Mu'tazila movement argued that these philosophies should be treated on par with the revelation, and incorporated into religious teachings. They succeeded in convincing the Khalifa Haroun-ul Rasheed who utilized the coercive powers of the state to enforce this theological position. It was only the heroic resistance of a small number of religious scholars which prevented this from happening. As a result, Islamic teachings were saved from being encumbered and overlaid by defective Greek natural philosophy based on the axiomatic method. Because of this, no conflict between science and theology occurred in Islamic history. Rather there was peaceful co-existence as each side recognized its limits as well as the complementarity of the two spheres of knowledge.

In contrast, the victory of Science over Christianity in Europe led to the attempt by Science to take over all spheres of knowledge. In a process termed the "Deification of Science" by Olson (1995), the attempt was made to promote the idea that scientific knowledge is certain, and that there is no knowledge outside of science. These wrong ideas continue to be widely believed, and have led to several distortions and myths which we will now list and refute.

3. Myths About Science in Europe

History is the conquest song of the victors. As the victors, scientists got to write the history of science in Europe. Global conquest and imperialism led to widespread acceptance of this account throughout the world. In this process, several myths were created which continue to be widely believed. These have resulted in major misunderstandings about the nature of human knowledge. These misunderstandings have facilitated the fabrication of false knowledge to serve the interests of power, as first clearly stated by Foucault. Below we list some of the central myths, and trace their implications.

3.1 Science is Uniquely European.

It has been asserted, and continues to be widely believed, that science was invented in Europe and even further, Europeans are uniquely equipped with the ability to think rationally and scientifically. Blaut (2000) has debunked this and many other claims to European superiority widespread in the writings of historians and widely believed even today. There is now a substantial amount of recent work which documents the origins of science in the Muslim civilization¹, and more particularly, in the open and empirical attitude of the Quran. The Quran records the following conversation between Abraham and his people:

26:70-75: *{Abraham} asked his father and his people, "What is it that you worship?"*

¹ For a brief popular exposition of origins of science in Islamic civilization, see *Arab Science: A Journey of Innovation* by the Qatar Foundation: <http://www.grouporigin.com/clients/qatarfoundation/introduction.htm>

*They answered: We worship idols, and we remain ever devoted to them.” Said he: “Do [you really think that] they hear you when you invoke them, or benefit you or do you harm?”
They exclaimed: But we found our fore-fathers doing the same!”*

Here Abraham chides his people for following traditions without thinking, and asks them to think for themselves. El-Marsafy (2009) has documented the significant impact of translations of the Quran on Enlightenment thinkers in “The Enlightenment Quran.”

Because they were blinded by a superiority complex, Europeans in general have been unable to develop a proper perspective on the role of science within the spectrum of human knowledge. As detailed in “The Theft of History,” by Jack Goody (2012) Europeans have appropriated scientific inventions of other civilizations, such as algebra, surgery, optics, the heliocentric theory, cartography and many others, and claimed them as European inventions. As a result, the dominant European accounts of Science, methodology of Science, and its role in European and human history are seriously flawed. We aim to provide antidotes to some of these errors.

3.2 Scientific Truths are Certain

Because of the war between science and Christianity in Europe, science was offered as a substitute for religion, rather than a complement as it is in all other societies. As religion offers certain knowledge, it was asserted that scientific truths are also certain – even more, these are the only certain elements of human knowledge.

The early Greek objections to use of observations remain perfectly valid – it is in fact impossible to prove a scientific law on the basis of observations alone. A tremendous effort was made to find a valid mode of “induction” – a way of obtaining a universal law after observing a large number of facts in accordance with this law. This effort ultimately failed and was abandoned. It is now universally agreed that a scientific law is valid only until a counterexample is found.

FACT: The DEFINING characteristic of a scientific law is that it is uncertain.

Proof: Science is concerned with observables. A scientific theory is one which rules out certain observable possibilities, and asserts that other events will occur. It is possible to confirm or disconfirm by observations. If a sentence is CERTAIN, in the sense that no possible observation can disprove it, then it is not scientific, because its validity does not depend on observations.

This is basically the position of Popper, and many other philosophers of science, that scientific laws cannot be proven, but they can be rejected. Later, we provide additional evidence for this position.

3.3 Only Science leads to Valid Knowledge

Because religion laid the claim to being the principal source of valid and certain knowledge, Science claimed this same mantle after defeating Christianity in Europe. Unfortunately, this led to a completely distorted understanding of the nature and substance of human knowledge, which persists to this day. Going from one extreme – uncritical acceptance of all traditional beliefs – to the other, the Enlightenment Project launched in Europe took the view that all traditional beliefs were superstitions. The only path to truth was via reason and observation.

This came to be widely believed in the West: knowledge is restricted to that which can be measured and quantified. Michell (2003) has traced the intellectual history of the idea that knowledge consists of the quantifiable and measurable, and its influence on psychology. He quotes Lord Kelvin as follows:

I often say that when you can measure what you are speaking about and express it in numbers you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind;

Restricting the definition of knowledge in this way has had disastrous consequences. The goal of this article is to trace some of these consequences.

4. Logical Positivism

The imperialist project of Science, to claim all valid knowledge for itself, came to a dazzlingly successful conclusion in the early twentieth century with the emergence of the philosophy of Logical Positivism. This is an illustration of a phenomenon known to philosophers of science at least since Kuhn, but largely unknown to the general public. Scientific theories are accepted or rejected not because of compelling factual evidence, but for other reasons such as elegance, intellectual challenge, ideology, etc.

Logical Positivism also swept the academia because it purported to show that only science and scientific statements had a valid claim to knowledge. All other claims were unfounded. Secular minded Western intellectuals had been looking for such a philosophy for a long time, and thus Logical Positivism became widely popular. This philosophy became the foundation for (unsatisfactory) approaches to many disciplines within the social sciences in the twentieth century. Because it appealed widely to the Western intuitions about the superiority of scientific knowledge, it became widely accepted, even though it was based on several unproven conjectures about the nature of knowledge.

Some of most brilliant minds of the twentieth century engaged in all seriousness with the positivist project of showing that all valid human knowledge is based on observations and reason. Von Fraasen (1980), a staunch empiricist, writes “Today, however, no one can

adhere to any of these philosophical positions to any large extent. Logical positivism, ... even if one is quite charitable ... had a rather spectacular crash.” Most of the central propositions of logical positivism have been proven wrong. Positivism is dead, and there is some squabble among philosophers as to “who killed positivism,” with several aspirants, including Karl Popper. No reasonable alternative to positivism has emerged as a dominant view, and the foundations of the philosophy of science are in substantial disarray. After describing the “spectacular crash of logical positivism,” and the “shifting sands of philosophical fortune,” Van Fraassen (1980, p. 2) devotes his book to the study of “what problems are faced by the *aspiring* empiricist today?” (italics in the original). The conclusions are surprisingly weak and tentative, and a far cry from the confident and sharp assertions of the early positivists. Philosophers of science have not abandoned the idea of establishing the superiority of scientific knowledge. The editors of the Handbook of the Philosophy of the Social Sciences set out to establish the distinguishing characteristics of scientific knowledge. In a review of this Handbook, Agassi (2009) writes that “it reflects fairly well the gloomy state of affairs in this subfield.” Agassi (2009) writes, “there is neither need nor possibility to justify science and forbid dissent from it.” Despite dissenters like Agassi, the dominant views among social scientists continue to assume the unique validity of scientific knowledge. Furthermore more than a half century of the intellectual stranglehold of this view has led to the widespread diffusion, absorption and acceptance of this view by the general public.

This very brief and partial summary provides the essential historical background. We now proceed to our main project of listing the many false propositions that have come to be believed in the process of deification of science, and to show the harm they have caused.

5: A Long List of Wrong and Harmful Beliefs

It has been asserted, and continues to be widely believed, that science was invented in Europe and even further, Europeans are uniquely equipped with the ability to think rationally and scientifically. For example, Blaut (2000, Chapter 1) writes that Weber thought that “Only in the West does science exist at a stage of development which we recognize today as valid. ... Weber concluded that Europe is the most rational of all societies.” Blaut has debunked this and many other claims to European superiority widespread in the writings of historians and widely believed even today. He has also documented that influential thinkers like Weber, White, Mann, Hall, and Landes agree on the idea that “Europeans were uniquely capable of creative and scientific thought.”

That Science is the only valid source of knowledge, and that this is a sole and exclusive property of people of European origin has led to a large collection of wrong beliefs which have been extremely harmful to humanity as a whole. We list some of these below.

5.1 Loss of Wisdom From Across Cultures.

Many different types of cultures had evolved, and acquired many different types of knowledge, for example of local herbs and their medical qualities. Robert Hughes writes in the “Fatal Shore” that the Australian aborigines knew how to live off the land, while the English newcomers starved because of the lack of this knowledge. Nonetheless, the whites categorized these blacks as animals and hunted them for sport. Both ignorance and contempt for the knowledge of other cultures are perfectly characterized by Macaulay’s famous minute on education. After a frank confession that “I have no knowledge of either Sanscrit or Arabic,” he goes on to state that “a single shelf of a good European library was worth the whole native literature of India and Arabia.”

This contempt and disregard for the contributions of non-Western civilizations is responsible for a huge amount of violence that we see in the world around us. Although it is no longer politically correct to voice racist sentiments openly, US Ambassador to the UN Madeleine Albright did declare openly on the CBS Nightline program that the lives of half a million innocent Iraqi children were worth sacrificing to achieve political goals of the USA in the region. Israeli soldiers were surprised to find copies of Rousseau among the corpses after the massacres at Sabra and Shatila. As many have since remarked, the extremely ruthless treatment of Iraq in the recent war, which led to a million civilian deaths, and destruction of lives of more than forty million, would not have been possible had Iraq been a European country. In preparation for similar treatment of Iran, a recent cartoon published in the USA depicts the whole country as a sewer full of cockroaches:



Awareness and recognition of the contributions of other civilizations to weaving the fabric of human lives and society could be potentially very useful in the healing the world from the damage done by Eurocentric views. It need to be more widely known that the Inca’s were master botanists who bred maize from poisonous and inedible plants. Their inventions continues to feed the planet. Similarly, mathematical, scientific, philosophical,

legal, agricultural, technological, literary and artistic accomplishments of the Chinese, Muslims, and many other cultures and civilizations have all contributed to the enrichment of human lives today. Greater recognition for the contributions of other civilizations is also tied to re-learning that there are many types of important knowledge which are not scientific. We will focus on establishing this fact.

5.2 Failure to Distinguish Between Mathematics and Science

As we have discussed briefly, the axiomatic method of mathematics is radically different from the methodology of science, which is based on observations. In its imperialistic project of claiming all valid knowledge, science laid claims to mathematics as being a subdomain. Conflating the two separate domains of knowledge led to several misunderstandings concerning the nature of science. The foundations of modern economic theory were laid by Lionel Robbins (1935) who claims that

“The propositions of economic theory, like all scientific theory, are obviously deductions from a series of postulates. And the chief of these postulates are all assumptions involving in some way simple and *indisputable* facts of experience....”

It is a completely mistaken idea that scientific theory is based on deductions from a series of postulates – that is the description of the methodology of mathematics. Because this is a widespread error, we further explain the differences between the methodology of mathematics and the methodology of science.

To some extent, this error was also propagated by the Logical Positivists, who restricted true statements (knowledge) to those which could be derived from facts and logic. Mathematics is based purely on logic with no reference to observations, while science is very strongly tied to observations, and this clearly differentiates the two. Following Kant, the positivists distinguished between analytic truths – those which could be derived purely from logic – and synthetic truths, those which were based on observations. The canonical illustrations of these two types of truth illustrate perfectly the point that we are trying to make here. Analytic truth is a syllogism like the deduction that Aristotle is a mortal, from the premises that All men are mortal and Aristotle is a man. Synthetic truth is the statement that “All swans are white” based on observations of swans in Europe. Just like this synthetic truth turned out to be false when black swans were discovered in Australia, all scientific theories are subject to potential refutation by contrary observations. Furthermore this has happened many times in history. Indeed, as already argued earlier, it is the essence of a scientific theory that there should exist a potential observation which refutes it. If it conforms to all possible observations, than it can only be a logical truth. Thus given any scientific theory, it makes sense to run experiments to check its validity – there is always the possibility of a surprise.

In contrast, mathematical truths are immune to the possibility of refutation by observations. There is no point in trying to check whether the Pythagorean theorem holds

by measuring the sides of triangles. Mathematics is *not* a “science” since it is not based in any direct way on observational evidence. Unlike scientific laws, mathematical laws are not affirmed observational evidence. Recognition of the possibility that there are bodies of knowledge which are not science would lead to greater tolerance and pluralism which is currently desperately needed. Failure to recognize the distinction has led to many mistakes, as we will document below.

5.3 Massive Confusion about Unobservables

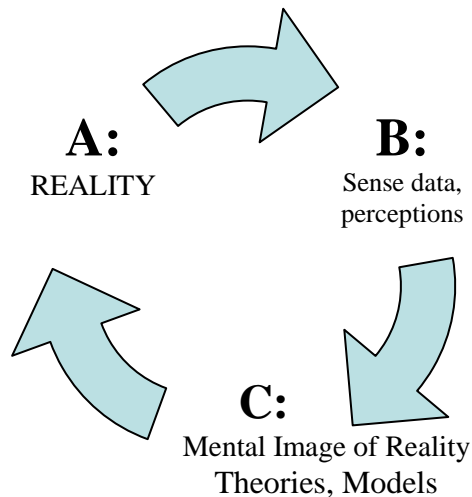
Robbins is mistaken when he declares that the hypothetico-deductive method he describes is “like all scientific theory.” This mistake results from conflating science with mathematics. There is no science which uses axioms and logical deductions to derive scientific theory. Two major misunderstandings have led to deep confusions about the nature of science and scientific methodology. One of these has already been mentioned: the idea that science leads to certainty. In fact scientific laws are always uncertain, but thinking of them as deductions from axioms allows for the possibility that certainty might attach to them. This necessitates thinking about mathematics as a subdomain of science, and creates the confusion that the two distinct fields share a common methodology.

The second misunderstanding is rather complex and subtle. It can be formulated as the problem of “Transdiction”:

The Problem of Transdiction: Suppose a collection of observations (facts) can be well organized by assuming a certain structure of reality. Can we conclude that the posited structure, which meshes beautifully with the facts, exists?

To make it less abstract, suppose the movements of heavenly bodies are well explained by assuming that there is an invisible and unobservable force of attraction (gravity). Does it follow that gravity exists? Similarly, suppose that some gross observed properties of matter are well explained by assuming that it is made up of small homogenous building blocks (like atoms, or molecules). Can we infer the existence of these building blocks without any direct observational evidence? In the context of our discussion, it is important to note that the proof of existence of God from the observation of the complexity of the creation also falls within this category.

Kant resolved this problem in an unexpected way, and his solution has come to be the dominant approach. His solution can be understood by the means of the following diagram:



The problem of Transdiction can be viewed as the question of whether A (reality) corresponds to C (our model/theory about reality). Kant argued that we have no direct perception of reality. Our only interface with reality is through our perceptions, which are the observations of reality available through our five senses. We use these to form an image of reality within our mind. These are our theories about reality which organize these perceptions into a coherent form. He argued that since our *only* access to reality is through sense data, there is no way to assess whether there is a match between A and C. Thus the question of whether or not there is gravity is impossible to resolve. Instead one must focus on the mental process involved in organizing a vast jumble of chaotic sense data into a coherent picture of reality. That is, the problem of philosophy is to figure out the relation between B (sense data/perceptions) and C (our image of reality).

Kants solution bypasses the problem of transdiction, by saying that it can never be solved. Because of the dominant influence of Kant, philosophers of science came to believe that the issue of whether or not scientific theories are true is irrelevant and cannot be resolved. Thus evidence that scientific theories frequently prove to be false, and are replaced by better theories no longer furnished a valid argument against the certainty to be attached to science. Science was the best available means for organizing our sense data or perceptions of reality, and thus was our closest possible approach to certainty.

6. Distinct Methodologies of Math and Science.

We have argued that mathematics and science are distinct from each other, with radically different subject matters and radically different methodologies. The most important difference can be summarized as follows.

1. Mathematical laws cannot be confirmed or disconfirmed by observational evidence.

2. Scientific laws are based on observations, and can be disconfirmed by observational evidence.
3. Mathematical laws are obtained by purely mental processes, without any reference to the outside world.
4. Scientific laws are hypothesized by looking for patterns in observations.
5. Validity of a scientific law depends on the existence of real objects and causes which created the pattern – these underlying real forces will cause the pattern to persist in time. In contrast, mathematical laws do not have any relation to the problem of transduction.
6. In consequence, mathematical laws are certain, because they are logical deductions from axioms. Scientific laws are guesses that a certain observed pattern has universal applicability. These are always uncertain.

The discussion of the differences between appropriate methodologies for geometry and natural science clearly shows that different methodologies are suited for discovery of knowledge in different domains. It would be absurd (and impossible) to construct an empirical test of Euclid's Parallel Postulate by attempting to draw more than one lines parallel to a given point on a piece of paper. There is not much point in empirically verifying by using a compass measure whether or not the angles in an equilateral triangle are sixty degrees. Yet analogous attempts at measurement, quantification and assessment of natural laws have been crucial in the progress of physics. Evidently, different methodologies are suitable in different areas.

The assumption that mathematics and science are the same thing and share methodologies has led to the tyranny of scientific methodology as the be all and end all of all endeavors to obtain knowledge. This problem has been compounded by a severely distorted understanding of what scientific methodology consists of. Once we recognize that the two fields of eminently respectable bodies of knowledge have radically different methodologies, the path to recognition of a healthy plurality of methodologies for different domains of human knowledge becomes much easier.

7. A Distinctively Different Methodology for Social Sciences

In the early twentieth century, the tremendous prestige of science, and the widely accepted idea the scientific knowledge was the only valid form of knowledge, led to the attempt by humanities to become scientific by adopting "scientific methodology". This was a big mistake. Just as mathematical methodology is eminently unsuitable for the needs of science, so scientific methodology is eminently unsuitable for the needs of humanities. Below we will explain why this is so, and propose that a radically different methodology be utilized for studying human behavior and societies. Ultimately, if this suggestion is accepted, we will see that the term "Social Science" itself is a misnomer. The attempt to emulate science and utilize the scientific method is bound to fail within humanities, and the older term for this body of knowledge is the better one.

A long list of problems arises from the attempt to impose “scientific methodology” on a discipline for which it is fundamentally unsuited. We list four of the main problems, and how they lead to errors in social science, particularly economics.

7.1 The Nature of Human Knowledge

Barbara Tuchman (1985) writes that a succession of six popes from 1470 to 1530 exemplified the secular spirit of the age by “an excess of venality, amorality, avarice, and spectacularly calamitous power politics.” She suggests that this was “perhaps the most consequential event in European history.” This betrayal of trust by the religious leaders created a crisis in the theory of knowledge in the west. If sacred knowledge and gospel truth which was nearly universally believed was unreliable, then what was a source of trustworthy knowledge? Enlightenment philosopher vowed to trust only that which they could touch and see, and on what they could understand without relying on any authorities. This principle was enunciated by the influential enlightenment philosopher David Hume as follows:

“If we take in our hand any volume of divinity or school metaphysics, for instance, let us ask, *Does it contain any abstract reasoning concerning quantity or number?* No. *Does it contain any experimental reasoning concerning matter of fact and existence?* No. Commit it then to the flames, for it can contain nothing but sophistry and illusion.”

This idea has gained strength and is currently the dominant view in the west. It is more or less equivalent to the idea that scientific knowledge is the only valid type of knowledge. Nonetheless, it represents a fundamental misunderstanding of the nature of human knowledge. We point out three major problems, which any reasonable methodology for study of humanities must resolve.

7.1.1 *We have innate knowledge:*

Human beings are born with many kinds of knowledge. This knowledge is necessarily non-scientific, since it is not based on experience and logic. As anybody who has experience in raising children knows, children are not born as a clean slate – tabula rasa. Each has a distinct personality, and has a range of skills needed for survival as an infant: crying for help, indicating pleasure and discomfort, suckling and grasping, etc. Psychologists have shown that children have empathy: they respond to distress, try to comfort and help others, and share in joyful emotions.

Behavioral psychology eventually collapsed because observed human behavior could not be explained as a product of the combination of environment and the observed stimuli-response patterns. As Chomsky stated in his extremely influential attack:

One would naturally expect that prediction of the behavior of a complex organism (or machine) would require, in addition to information about external stimulation, knowledge of the internal structure of the organism, the ways in which it processes input information and

organizes its own behavior. These characteristics of the organism are in general a complicated product of inborn structure, the genetically determined course of maturation, and past experience.

In particular, Chomsky showed that children have innate knowledge of linguistic patterns, and therefore acquire languages far more rapidly than standard stimulus response models would predict. Children do not need to learn rules of grammar, as adults do, but acquire them on the fly, without analyzing linguistic input streams for patterns.

Similarly, deep analysis by Kant showed that our perceptions cannot lead us to an awareness of space and time. Thus the structures of space and time must be built in categories within our brains. In order to be able to operate in the world which surrounds us, our brains come equipped with a large amount of knowledge of the real world.

Nearly universal cross cultural agreement on major moral issues shows that we are all born with a moral compass. We can instinctively and intuitively judge between right and wrong. However, this moral sense can be re-trained and mis-directed. Appropriate training can sharpen and hone this sense, and inappropriate training can lead it astray. Also, dishonesty, cruelty to others, and many other kinds of bad behavior cause damage to the moral compass. That is why it is crucial to bring up children properly. Science is confined to knowledge of the external world, and is not applicable to the knowledge of the world within us. Yet, this internal world is just as important to human beings as the external world. Understanding this internal world requires a methodology entirely different from that appropriate for science.

7.1.2. Tradition cannot be rejected wholesale

The idea that all knowledge must be subjected to the test of reason is impossible to implement. The amount of knowledge that we inherit is too vast, and much of it is of kinds that is not amenable to analysis by reason. The traditional method of learning is by the process of discipleship and apprentice-ship, where one learns by imitating and obedience without question. This is just as true in modern disciplines as in the ancient ones. Even within science, there are so many domains of knowledge that it would be impossible for any one person to start from scratch and use reason and observations to discover all that is currently known. There is no option but to accept on authority most of what is told to us. This is true both on an individual and on a collective level.

Wisdom lies in a judicious compromise between the wholesale (blind) rejection of all authority recommended (but not practiced) by the moderns, and the wholesale (blind) acceptance of tradition by the ancients. Since we cannot get by without tradition, it is essential to examine the mechanisms by which knowledge is transmitted, to ensure that valuable knowledge is conveyed to the new generations, and the errors are filtered out. Complete disregard of traditional forms of knowledge and education has led to a failure to examine these processes. This has led to disaster as many essential types of knowledge have not been transmitted to the young. The primary source of moral training is the family; many studies show how families have broken down in the west, and the impact of this on the morality of the youth. The secondary source is education. Gatto (2002)

documents the transformation of education from a process of inculcating wisdom, to a process of producing a docile labor force. Similarly, Reuben (1996) has documented how universities gradually abandoned their mission of providing moral training to the youth over the course of the twentieth century. The impact of this failure to transmit valuable non-scientific knowledge to the younger generations can be documented from many sources. An illustrative example is the recent case where 75% of the students in a large undergraduate Harvard course were caught cheating. Similarly, Josephson Institute of Ethics conducted a large scale survey of high school students in 2008. The survey showed that a majority lied, cheated and stole, and furthermore were not aware that these types of behaviors were immoral.

7.1.3. Experiential Knowledge is essential, and non-scientific.

Human beings have a vast range of potential capabilities. Sen has argued persuasively that material wealth is only a means to the development of these capabilities. Learning how to develop these capabilities requires intimate self-knowledge, which serves as a key to understanding human beings. Because these questions are outside the scope of science, they were ruled to be meaningless questions. One of the important positivist philosophers, A. J. Ayer, (1936) writes “We can now see why it is impossible to find a criterion for determining the validity of ethical judgements. It is not because they have an ‘absolute’ validity which is mysteriously independent of ordinary sense-experience, but because they have no objective validity whatsoever.” Following positivist prescriptions, none of our internal states of consciousness are observable – my feelings of sadness, outrage at injustice, etc. cannot be perceived by anyone else. It follows that they cannot be part of scientific knowledge, and hence they cannot be part of “objective” knowledge. Unfortunately, the most important part and the vast majority of what we know as human beings is subjective. After a lifetime of propagating the positivist philosophy, A. J. Ayer eventually came to the realization that “it was all wrong”. He said that denying the existence or importance of human feelings was like “feigning anesthesia.” Even though Ayer recanted, his students go on believing. A recent survey by Hands (2009) found that most economists believe that normative concepts cannot be part of a scientific theory, and should be kept out of the science of economics.

Chittick (2007) has studied the deep and sophisticated Islamic intellectual tradition relating to the exploration of the inner spiritual world, that developed over the centuries. He has pointed out that it is in danger of vanishing as even Muslims do not devote their lives to quest for knowledge and virtue required for the mastery of this tradition. The replacement of this quest by the pursuit of pecuniary advantage has created a crisis for humanity as a whole, and Muslims in particular. Two essential elements in this tradition are the erasure of the subject/object distinction which is of primary significance in western epistemology. Understanding requires simultaneous comprehension of the one who seeks knowledge as well as the object of that knowledge. As Chittick states:

the quest for self-knowledge provides the key to the profound difference between the Islamic and the modern understandings of “science.” It should be noted that the center of attention in all four domains (of knowledge studied in the Islamic intellectual tradition) was

nafs – the self or soul. The human self is the key issue because it alone can come to know God and the cosmos. The way it does this is by developing and refining its own inner power, which is called “intellect” (‘aql) or “heart” (qalb). If people are to develop and refine this power, they need to know what sort of self they are dealing with. You cannot know yourself by asking the experts to tell you who you are. You do not reach knowledge of yourself from outside, only from inside. Until you know yourself from within, your self-knowledge will be based on imitation, not realization.

According to positivist ideas, the above passage is gibberish – meaningless words put together. Postivism has been decisively refuted, but social scientists have not re-learned how to reclaim the wisdom of the ancients, which was consigned to the garbage heap by the positivists. This is an essential need of the times.

7.2 The Essence of Humanity

There is a big difference between planetary motion, and human behavior. Planets follow fixed orbits while human beings are free. Initial conditions and fixed laws determine planetary trajectories, while human beings can change in directions completely unpredictable with reference to past behavior. I invite the reader to participate in a brief but intense meditation with me.

I am unique. Out of the billions of human beings who have lived and loved in the past and in the future, there is no one who has experienced the life events that I have. Even my brothers and sisters, who have closest environments to mine, have radically different life experiences. This moment of time is unique. It offers possibilities and potentials which did not exist yesterday, and may not exist tomorrow. Human beings have reported a vast range of experiences of levels of consciousness and harmony which may be possible for me to achieve as well. Striving to realize the potentials for excellence within me can change my life and vision in directions which I cannot foresee from my current position.

Certainly, in opposition to this meditation on uniqueness, it is possible to meditate on the sameness and the commonalities shared between myself and all human beings. Any scientific method must focus on these commonalities, and cannot be used to study unique events. It is impossible to learn the significance of unique, one-time events by a scientific method. Thus, if I restrict myself to scientific knowledge, then I will miss what is most important about me and about other human beings I interact with. Furthermore, studying unique moments, environments and experiences *must* require methodologies entirely different from those suited to repetitive and lawlike behaviors of inanimate objects. For example, a Zen exercise of “present moment awareness” enables practitioners to experience each tick of a clock afresh – normally, repetitive sounds are filtered out of our conscious awareness. This leads to knowledge which is extremely important for us, but not “scientific” as science is conventionally defined.

The drive to make humanities “scientific” led to the emergence of the behaviorist school of psychology, which basically treats human beings as robots which can be programmed

by conditioning. The founder of the school, Skinner, argued that we should move “Beyond Freedom and Dignity.” This school of thought became dominant in the post-war era, and continues to be influential. Because science emphasized the measurable and the observable, psychologists focused on observable behaviors, and attempted to measure and quantify human characteristics. In doing so, they lost sight of the most important aspects of what it means to be human. Although the collapse of logical positivism has allowed the emergence of alternatives, like cognitive psychology and humanistic psychology, the damage is deep and not easily repaired.

For example, the scientific stress on observability has led to a virtual ban on serious discussions of spirituality in the academia. In a volume of readings devoted to this issue, the editors Hoppe & Speck (2007) state that “religion has been such a staple of human existence that the attempt to eliminate it from the academy in any meaningful way is to commit intellectual lobotomy.” They consider it intellectually dishonest to “deify reason” and to take it as the opposite of religion – a widespread academic attitude encouraged by logical positivism.

Early in the twentieth century, C. P. Snow talked about the “two cultures” of science and literature and suggested that in the modern world thermodynamics was even more important than Shakespeare. The deification of science and the relegation of humanities to an “inferior” species of knowledge has done tremendous harm, which has not been recognized. Just as maturity and adulthood brings kinds of knowledge to humans which are impossible to convey to children, so spiritual growth leads to insights impossible to convey to those who deny the existence of a spiritual component of human beings. One of these is the experience of the deep connections between all human beings. Another is the understanding of the distinction between human beings and animals. Failure to differentiate between humans and animals, which is a consequence of spiritual blindness, leads to the application of the law of the jungle to human societies. Instead of compassion for the poor, survival of the fittest suggests that weeding out inferior human beings will lead to progress. Among many others, Bauman (2000) has explored the horrifying consequences in “Modernity and Holocaust.”

Especially relevant to economists is the Faustian bargain whereby the discipline as a whole has sold its soul for wealth; this is easy to do when the soul and spirituality are regarded as non-existent entities. The assumption that pursuit of wealth will solve all human problems has become deeply embedded into foundations of economic thinking. Nearly all cultural and religious traditions warn against this. The Bible says that “the love of money is the root of all evil”. Lao Tzu taught us “do not race after riches, or you will let slip the heaven within you.” In opposition to this traditional wisdom, among the fundamental teaching of economic theory is that “participants in a market economy are motivated by self-interest,” and that this self-interest works better than “love and kindness” at promoting social welfare [paraphrasing Manikiv’s introductory text on economics]. Thus economists are shocked and surprised to learn that human beings cooperate, trust each other, and prefer fairness and justice to the maximization of wealth; see Karacuka and Zaman (2013) for documentation. Fundamental misunderstanding of the nature of human beings and human welfare has led to disastrous economic outcomes.

Even though existing planetary resources are far beyond what is necessary to allow all human beings comfortable lives, economists insist on seeing scarcity where none exists, and insist on further accumulation of wealth as the solution to economic problems, even though this strategy has been a demonstrable failure in the past. See Zaman (2013) for documentation.

In response to dramatic failures of economic theories on several fronts, some correctives to the tyranny of “scientific methodology” have recently emerged. Many authors have emphasized that we should be concerned with human development, rather than the accumulation of wealth. Furthermore, the field of happiness studies has confirmed the traditional wisdom that the race for riches does not lead to increases in happiness, welfare or human satisfaction with life. The Easterlin paradox poses a serious challenge to conventional economic theory. Resolution is only possible with a deeper understanding of the nature of human beings, which necessarily requires use of non-scientific methods. Qualitative and unmeasurable characteristics like compassion, trust, freedom and dignity are central to economics, but cannot be studied by the scientific method.

7.3 Values are Essential

Another consequence of the attempt to apply the scientific method to humanities was the consignment of moral values to the dustbin. It was argued that normative statements do not represent “scientific” knowledge, and cannot play any role in a scientific theory. In fact, as we will show, it is impossible to study humanities without invoking values.

Firstly we note that the idea the normative statements should play no role in science is eminently sensible. It makes no sense to say that stones in free fall accelerate at 9.8 m/s^2 but they should accelerate at 5. The physical systems around us are subject to deterministic laws, ignoring quantum effects. However, the same idea applies to humanities only if human beings are robots. If we human beings are subject to deterministic laws then it makes no sense to say that human beings are selfish but they ought to be generous. We must learn to live with whatever fixed determinate innate nature men have. However, human beings are free. We can choose to be selfish, and to be generous. Contrary to positivist conceptions, it is entirely meaningful to say that we should be generous. Perhaps one cannot assign this sentence a binary truth value on the basis of empirical evidence, but human knowledge is not restricted to the class of empirically based statements with binary truth values. A lot of human knowledge is based on experience and intuitions which is not “scientific” in the sense of being derivable from observations and logic.

Social science is *entirely* about the study of human choices. Recognizing human freedom means recognizing that choices are not entirely predictable by the past. Contrary to what is routinely assumed by economists, no mathematical law can describe human behavior. Taleb (2010) demonstrate that “black swans” – events entirely unpredictable from past patterns – are common in many types of situations faced by human beings.

Since particles don't make choices, questions central to human behavior simply don't arise in the context of science. Should we trust the other prisoner and cooperate, or should we betray him to protect ourselves from his (potential) betrayal? Answering this question requires a mixture of knowledge of human beings, empirical knowledge, and moral knowledge. As Putnam (2002) has convincingly argued, normative and positive elements are inextricably mixed in most economic decisions. This means that the scientific method is of no use in resolving questions central to economics in particular, and social science in general.

In any academic article, one is constrained to make a case that the subject under study is of value to human beings. This case must be built on some judgments regarding what constitutes human welfare. Thus, it is impossible to study social science without making value judgments. In the early twentieth century, the wrong idea that scientific methodology does not involve value judgments, combined with the wrong idea that social science must follow scientific methodology, led to a ban on the use of value judgments in social science. This has led to a situation where value judgments are concealed, instead of being expressed openly. Zaman (2012) discusses in detail the many value judgments that lead to "scarcity" becoming the fundamental economic problem; it also shows how changing these value judgments would lead to the emergence of alternative issues as central economic problems.

There is only one principle for evaluation of welfare which is acknowledged as a scientific and objective principle by economists. This is the Pareto principle, which can be expressed as having two parts:

- i: Positive: If everyone has more, then the society is better off.
- ii: Negative: If some have more while others have less, then no scientific and objective judgment of welfare is possible.

To illustrate the idea that values are concealed in economic theory, we show that the above principles affirm a commitment to property values over basic needs. Consider a society where a small collection of rich people have a huge amount of wealth, while at the same time, millions are homeless and hungry. The Pareto principle represents the value judgment that the property rights of the rich have priority over the basic needs of the poor. Different societies have different judgments over the entitlements of the poor, but *there are no value neutral positions*. In particular, the economists position is highly value-laden and strongly favors the rich and powerful.

7.4 Normative, Action Oriented Methodology for Humanities

We propose that an appropriate methodology for social sciences has three elements.

1. Description of an ideal state.
2. A study of differences between actual and ideal.
3. An action plan for removing these differences.

In deterministic systems like those studied in Physical Sciences, such a methodology makes no sense. We can only seek to understand the laws driving the system. For human societies, it is emphatically not the cases that societies are driven by laws. Historical studies of revolutions and wars show that fates of millions are sometimes driven by trivial chance events – as suggested by the proverb “for the want of a nail ...”. To think that our economies are bound by iron laws denies us freedom and agency, which is the essence of humanity. Allowing for freedom and agency leads to a methodology for social science which is dramatically different from that of natural science. It necessarily incorporates normative elements, which are not part of physical science. It is also necessarily action oriented, in contrast with the idea of a scientist as a neutral and detached observer.

Even though modern economic theory claims to be positive, in fact it follows exactly the three principles for social science proposed above. The ideal state is that of “perfect competition.” In this state, all agents take prices as given and maximize their individual utilities or profits under full information with no transaction costs or externalities. Economists study discrepancies between the ideal state and real world economies and discuss how to remove them so as to achieve the ideal state. Suppressing the normative and action oriented elements suppresses vital information about choices that face us as a society.

The structure of welfare programs varies considerably among different European countries. Each represents a different consensus about desirable levels of equity, and social responsibilities for the welfare of the needy. Economic theory suggests that we can separate the study of such normative issues from the positive ones. This is simply false, since the two cannot be separated. One of the editions of the Samuelson textbook cites the difference between the pay of a janitor and that of a doctor as an example of a positive statement. The implication is that returns to investment in human capital are determined by the iron laws of economics and do not involve value judgments. However, the differential between the janitor and the doctor is much higher in the USA and lower in the UK and Canada. The normative decision in UK and Canada that everyone is entitled to medical care, regardless of whether or not they can pay for it, lead to socialized medicine and lower pay for doctors. The normative decision in the USA that everyone including doctors are entitled to maximize their wealth, lead to the AMA restricting entry into the medical profession and exorbitant medical costs relative to UK and Canada. Recent studies show that USA spends more than 2.5 times as much per capita on healthcare than the OECD countries, but provides less services and has a far greater percentage of population with less health coverage. The point is that normative decisions on entitlements to health cannot be studied in isolation from apparently positive issues like return to human capital. Hausmann and MacPherson (2006) have provided a detailed study of how normative issues are essential to the study of economics but are ignored by economists because of the idea that normative statements are not part of science.

Empirical studies show that human behavior is not determinate, as assumed by economists. Rather, it is strongly influenced by social norms. As a society, we can choose to bring up our children as generous and cooperative. We can also choose to train them to be selfish and competitive. The society we create will depend on such choices. By

pretending that economics is driven by laws, we suppress information on the range of choices open to us, and make it difficult to create positive change in desirable directions. An essential part of a remedy is to make radical changes in the methodology of social science.

9. Conclusions

Science emerged as the victor of the battle between Church and Science that took place in Europe. As a result, scientific knowledge took the place of sacred knowledge in the west. Although only a tiny percentage of the population have more than a vague idea of what it is, everyone reveres relativity theory as a holy object. Similarly, in the schools, students read scriptures of chemistry, biology, physics, calculus, even though none of these sciences provide them with any information about how to live a good life. Even though it has manifestly failed to do so in the past, “Future World” of Disney depicts a dream where science and technology has solved all human problems. It is assumed that a vacuum cleaner and a washing machine can compensate for the heartbreak of a divorce, and the resulting trauma to children. Repeated failures have not shaken the faith that science will somehow teach us to achieve the maximum possible welfare in our individual, social, and political lives. If science is the only reliable form of human knowledge, then we must have such faith to have the hope of a better future.

The fundamental problem was stated poetically by Bertrand Russell:

That man is the product of causes which had no prevision of the end they were achieving; that his origin, his growth, his hopes and fears, his loves and his beliefs, are but the outcome of accidental collocations of atoms; that no fire, no heroism, no intensity of thought and feeling, can preserve an individual life beyond the grave; that all the labours of the ages, all the devotion, all the inspiration, all the noonday brightness of human genius, are destined to extinction in the vast death of the solar system, and that the whole temple of Man's achievement must inevitably be buried beneath the debris of a universe in ruins -- all these things, if not quite beyond dispute, are yet so nearly certain, that no philosophy which rejects them can hope to stand. Only within the scaffolding of these truths, only on the firm foundation of unyielding despair, can the soul's habitation henceforth be safely built.

If we take the view, as Russell above, that all human effort is ultimately meaningless, then it becomes pointless to study human behavior. All actions are equivalent, and we are free to behave as we like. However, there is an enormous amount of knowledge, based on human historical experience, that is available to guide us regarding this matter. Unfortunately, this knowledge is not “scientific” knowledge. The deification of science led to the loss of this knowledge in the west. The dominance of western systems of thought is so strong that it is barely surviving in the East – Chittick (2007) has raised the issue of whether the Islamic intellectual tradition can be revived.

To solve essential questions facing us as human beings, we need to study human experience in the past. This is encapsulated in great literature, but not in the modern fiction or Reality TV which has become the modern substitute. What did the ancients who struggled with the bigger problems have to say about how to lead a meaningful life? These books are no longer studied. There is a wide range of options on the menu, and the urgent problem facing is to choose wisely, for we have only one chance at this life. The dilemma is that commitment comes first and knowledge comes later, so it is impossible to make a rational choice. One must trust the heart. The training required to achieve wisdom is no longer part of any of the modern curricula of education. It is impossible to fix social science methodology without addressing this deficiency.

10. References

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