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Why an Alignment of Hypothesis-Formulation and Theorization with Cultural and Cross-Cultural Frames of Reference is Required: A Rough Guide to Better Hypothesis-Formulation and Theorization

Sujay Rao Mandavilli

Abstract:- In this paper, we proposition and champion the idea that theorization and hypothesis building, both of which form an intrinsic and a crucial part of formal scientific method, must be linked and tied to the concepts of cultural frame of reference, and cross-cultural frames of reference, two concepts that we had mooted in our previous papers. This approach, we argue, is necessary, in order that scientific concepts be better grasped and more thoroughly understood by the masses, and by the common public. We therefore, present a brief recapitulation of these two concepts besides introducing, and briefly explaining the twin ideas and the twin concepts of ideological frame of reference, and epistemological frame of reference as well. We also recapitulate and overview our earlier concepts of irreducible simplicity, "Continuous zero-based reassessment of assumptions, hypotheses and methods", and structured apperception tests for socio-cultural change, and integrate them into the tenets of this paper. Last but not the least, we explain how all these concepts can lead to a percolation of scientific ideas, and a scientific temper among the masses, and lead us to what we have always called, "scientific progress at the speed of light." These approaches and techniques must be followed as far as practically possible, and exceptions justified on a case to case basis.

I. INTRODUCTION

"Strength lies in differences, not in similarities." – Stephen R. Covey

"The crucial differences which distinguish human societies and human beings are not biological. They are cultural." - Ruth Benedict

Keep your language. Love its sounds, its modulation, its rhythm. But try to march together with men of different languages, remote from your own, who wish like you for a more just and human world." - Helder Camara

In this paper, we proposition and champion the idea that theorization and hypothesis building, both of which form an intrinsic and a critical component of formal scientific method, must be linked and tied to cultural frames of reference, and cross-cultural frames of reference, two concepts that we had mooted in our previous papers, and described at a fairly reasonable level of detail. For the benefit of our esteemed readers, we revisit them once again, and recapitulate their core essence. This approach, we argue, is necessary, in order that scientific concepts are better grasped and more thoroughly understood by the masses, and the common educated man in the street, and aligned to their own points of view such that gradual process of cultural change is more easily facilitated. After briefly recapitulating these two concepts, we introduce, and briefly explain the twin ideas and the twin concepts of ideological frame of reference, and epistemological frame of reference which are also related to the idea of cultural frame of reference, and cross-cultural frame of reference, but also have their own role to play in the advancement of our ideas. We also recapitulate and overview our earlier concepts of irreducible simplicity, "Continuous zero-based reassessment of assumptions, hypotheses and methods", and structured apperception tests for socio-cultural change, all of which we had mooted in the last few years, and integrate them firmly and deeply into the tenets of this paper.

Last but not the least, we explain how all these concepts can lead to a wider and faster percolation, permeation and dissemination of scientific ideas, and an increased and enlarged scientific temper among the masses, not only in one particular region of the world, but also everywhere, and lead us to what we have always called, "scientific progress at the speed of light." These approaches and techniques must be followed as far as practically possible, and exceptions justified on a case to case basis. There could be some valid exceptions indeed, but these must be adequately and sufficiently justified. For example, scientists may prefer to use the term nature in lieu of the term "God", but once again the preferences of various cultures must be taken into account and consideration. In some cases, such as theoretical physics, and molecular biology, (where many ideas are still abstractly, obtusely or

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obliquely articulated, presented or communicated) this technique may not apply directly; however, the cultural and non-cultural preferences of other scientists must always be borne in mind in order to facilitate a smoother understanding, and institutional coherentism must be maintained as far as possible. Indeed, this is a complex issue, and the technicalities and modalities can only be worked out as time progresses, and more and more research is done in combination with other fields of the social sciences. The approach we therefore moot is to formally understand cultural and cross cultural frames of reference with all their attendant technicalities such as thought worlds, world views, mind space, and of course, cultural taxonomies. Structured apperception tests must also be executed and worked out as described in our previous paper. We can also see if social science research techniques can be made an integral part of the science communication process, and whether these can be worked back to hypothesis formulation, and the entire flow of the scientific method. Examples of social science research techniques include interviews, surveys, questionnaire, focus group discussions, emic approaches, etc. These could be used to capture individual and group cultural frames of reference. All these will comprise crucial inputs into the process of hypothesis formulation. Needless to say, several other aspects, not represented here, but forming a part and parcel of good and bona fide scientific method, must also be processed, and recognized. This approach will also bear crucial similarities with the appreciation of diversity through diversity, equity, and inclusion, and building an understanding of these differences into core scientific method. Thus, we can ensure that science communication is robustly built into all stages of the scientific method, right from the cradle to the grave. [1] [2] [3] [4]

II. WHAT IS A THEORY?

The modern English term "theory" which has been in wide currency and usage since at least the sixteenth century, is thought to have been derived from term used in Ancient Greek. The term "Theoria", as it was used in ancient Greece, meant "looking at, viewing, or beholding", but in other cases, meant a conceptualization and rational interpretation of natural phenomena and manmade objects. In many or most cases today, it represents "rational, abstract thinking" accompanied by observational study, and is used in many fields of science both natural or physical sciences, and the social sciences too. According to the Orphics, an ancient Greek school of contemplative thought, theoria meant "passionate sympathetic contemplation", though other thinkers such as Pythogoras and Aristotle introduced slightly different meanings. In sum, it represented ways and techniques of knowing. The term and its usage of the term have remained more or less unchanged over the past few centuries, but has also since taken over added dimensions and shades of meaning. Theory is often distinguished from praxis, and the latter refers to the act and art of putting theory into practice; therefore issues arising from a practical implementation of concepts are discussed in this technique. Theories must also be consistent and compatible with the scientific method, and must be falsifiable. They must be reliable and comprehensive, and must be arrived at thought rigorous thought, and wide ranging and diverse data. All data by me correlated and systematically analyzed. From our perspective, all contradictory evidence must be taken into view, and cross-cultural perspectives understood. Transdisciplinary approaches may also be adopted as possible and necessary. These criteria would normally and naturally distinguish formal, robust and rock solid scientific theories from mere hunches, random guesses, and ad hoc conjectures. Theories are also more certain than hypothesis, and consider a wider diversity and breadth of evidence to boot. Smaller and less significant theories may form a part of larger overarching theories, and at times, composite models may be built. [5] [6] [7] [8]

[1] Towards scientific apperception tests for twenty-first century social sciences research: Formulating 'Structured apperception techniques for socio-cultural change' in twenty-first century social sciences research Sujay Rao Mandavilli IJISRT June 2023

[2] Advancing the use of "Continuous zero-based reassessment of assumptions, hypotheses and methods": A vital tool and technique in the interests of better science Sujay Rao Mandavilli IJISRT, February 2024

3 Conceptualizing 'Cultural Frames of Reference' and 'Cross-cultural Frames of Reference' for various cultures and societies: Employing these concepts to bring about social and cultural change in different societies, Sujay Rao Mandavilli, IJISRT, September 2023

[4] Orchestrating "Irreducible simplicity" in science and science communication: Positioning "irreducible simplicity" as a vital guiding principle for effective and bona fide science Sujay Rao Mandavilli IJISRT, February 2024

5 Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. Academy of management journal, 50(1), 25-32

6 Zima, Peter V. (2007). "What is theory? Cultural theory as discourse and dialogue". London: Continuum (translated from: Was ist Theorie? Theoriebegriff und Dialogische Theorie in der Kultur- und Sozialwissenschaften. Tübingen: A. Franke Verlag, 2004)

[7] Articulating comprehensive frameworks on socio-cultural change: Perceptions of social and cultural change in contemporary Twenty-first century Anthropology from a 'Neo-centrist' perspective Published in ELK Asia Pacific Journal of Social Sciences Volume 3, Number 4 (July 2017 – September 2017) Sujay Rao Mandavilli

[8] The relevance of Culture and Personality Studies, National Character Studies, Cultural Determinism and Cultural Diffusion in Twenty-first Century Anthropology: An

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➢ *Hypothesis*

The modern and now commonly and widely used English word hypothesis comes from the ancient Greek word bearing the same name which canonically meant "putting or placing under" and had several extended uses as well. This term was used by several ancient and medieval scholars such as Plato and Galileo. In modern usage in the twentieth and twenty-first centuries, the term came to connote a provisional or a tentative idea that needed to be further ratified and tested through further research and examination, and may also refer to a proposed explanation for an observation or a phenomenon. After further ratification and evaluation, most often through rigorous experimentation, a hypothesis evolves into a theory. Hypotheses must never be confused with theories, though there are often fallaciously interchangeably used. Hypotheses are not merely hunches represented by a gut feeling, or even half-baked guesses. They must incorporate some provisional data, and must be able to make predictions with some degree of certainty through the mechanism and usage of inductive and deductive approaches. Hypotheses must also be conservative, and fit in with all observed data. It must also be falsifiable; the last canon was famously proposed by the philosopher of science Karl Popper. Other researchers and philosophers of science propose other yardsticks such as verificationism, testability, or confirmation holism. Hypotheses may also be provisional; such hypotheses may often be referred to as working hypotheses. [9] [10] [11]

III. SCIENTIFIC METHOD

The antecedents of the scientific method can be traced to rationalist explanations of various naturally occurring and non-naturally occurring phenomena. In ancient Greece, Socrates, Plato, Aristotle, Protagoras, Leucippus, Thales of Miletus, and Democritus, contributed in some way to scientific method, and in ancient India, the Nyaya, Charvaka schools, Vaisheshika schools (one of the six schools of Hindu philosophical thought founded by Kashyapa), and Buddhist schools, contributed to scientific thought. In ancient Egypt, the Edwin Smith papyrus, named after Edwin Smith who bought it in 1862, was an ancient Egyptian medical textbook dated to around 1600 BC, which contributed in a way to early scientific method. Another important text is the Ebers Papyrus of 1550 BC, purchased by Georg Ebers in 1873-74. Ancient Mesopotamians and Babylonians had also developed their own version of astronomy which employed scientific method. The Chinese also contributed to ancient philosophical thought, though it was generally eclipsed by western traditions. The school of Pyrrhonism introduced skepticism as a basis for understanding phenomena. In the Arabic and the Islamic world, Ibn al-Haytham, Ibn Sina, and Al-Biruni, are also accredited with having contributed to scientific thought. Roger Bacon had been greatly inspired by the writings of the philosopher and theologian Robert Grosseteste who belonged to an earlier European renaissance of the twelfth century, and described a repeating cycle of observation, hypothesis, experimentation, and the need for independent verification. Francis Bacon is known for his philosophy of science. He believed that scientific knowledge is obtained through repeated observations and controlled scientific experimentation.

According to Occam's razor, assumptions should be kept to the barest minimum possible. Rene Descartes was another important thinker who contributed to reasoning of the mind, and the scientific method. Charles Sanders Pierce wrote about deduction and induction. Austrian-British philosopher Karl Popper who lived in the twentieth century, is widely credited with providing major improvements in the understanding of the scientific method, and promoted the theory of falsification. His ideas have proved to be highly influential in modern scientific circles. The American historian and philosopher of science Thomas Kuhn, The Austrian philosopher Paul Feyerabend and the Hungarian philosopher and mathematician Imre Lakatos believed that there was no single superior and innate scientific methodology, and that a broad variety of tools and techniques could be employed. They also believed and argued that some amount of anarchy was inevitable. Modern thinkers have warned against cognitive biases and prejudices, and errors in assumption. A large number of scientific and logical fallacies have been developed – and which we have examined – we also believe that a lot more work needs to be done here. The scientific method typically begins with defining a question, gathering of information and resources through a systematic process of observation, forming a working or an explanatory hypothesis, gathering and analyzing data, testing the hypothesis, arriving at preliminary results or conclusions, refining the hypothesis, etc. [12] [13] [14]

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9 Hilborn, Ray; Mangel, Marc (1997). The ecological detective: confronting models with data. Princeton University Press. p. 24. ISBN 978-0-691-03497-3

10 Wilbur R. Knorr, "Construction as existence proof in ancient geometry", p. 125, as selected by Jean Christianidis (ed.), Classics in the history of Greek mathematics, Kluwer.

11 Popper, Karl R. *(1959),* The Logic of Scientific Discovery 1934, 1959

[12] Paul Tibbetts, Tomas Kulka, J N Hattiangadi, "Feyerabend's 'Against Method': The Case for Methodological Pluralism", *Philosophy of the Social Sciences* 7:3 (1977), 265–275. DOI 10.1177/004839317700700306

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IV. CULTURAL FRAME OF REFERENCE

But what is a cultural frame of reference? A "Cultural frame of reference" as a layman would understand it, is a complete set of ideals and ideas that an individual possesses that determines the way he or she looks at, and interprets various aspects of the world, and interprets them. A cultural frame of reference is also often very deep-rooted, comprehensive, and is dependent on the entire gamut of the human experience, including processes of enculturation, acculturation or transculturation, and can be understood through the techniques that we had proposed, an example being the techniques of the 'ethnography of enculturation'. It is also determined by the individuals own culture. These processes would also in turn determine his own cultural-orientation, mind-orientation, worldviews, thought worlds, and mind space which are birthed in his own unique social or cultural context and his sum total of experiences and learnings. It is also an aggregated superset of all his emic perspectives on various issues, and is related to a cultural taxonomy as well. It must therefore also be constructed in tandem with the aforesaid cultural taxonomy, a concept which already exists, but we had aligned with in several of our papers. Another closely related and an extremely important concept is that of 'Cross-cultural frame of reference' represents any component of a cultural frame of reference which can be applied across cultures and societies, i.e. that which is productive and beneficial for isolating and identifying globalized and cross-cultural trends and commonalities in this respect and regard. For further information, read our paper, "Conceptualizing 'Cultural Frames of Reference' and 'Cross-cultural Frames of Reference' for various cultures and societies: Employing these concepts to bring about social and cultural change in different societies", which was published by us in 2023. [15] [16] [17] [18]

V. IDEOLOGICAL FRAME OF REFERENCE

The English word "Ideology" may be traced to the French word "idéologie" which was coined around the time of the French Revolution, when it was introduced by a philosopher by name A.L.C. Destutt de Tracy, as a short name for what he called his "science of ideas". The term strangely enough became very popular and common place, and is used in a wide variety of languages. An ideology is a set of mostly unsubstantiated, rigid or dogmatic opinions or beliefs of a group of individuals in a society or culture, or across societies and cultures. Political systems such as capitalism, communism, socialism, and Marxism are often equated with ideologies. There are however, many other different types of ideologies. We had also discussed scientific ideologies off and on, and examples of these could be Indocentrism or Eurocentrism. Characteristics of an ideology have been explored by various scholars, such as Willard A. Mullins, David W. Minar, and Terry Eagleton. For further information, read our paper "Enunciating the Core principles of Twenty-first Century Historiography: Some additional extrapolations and inferences from our studies and observations on Historiography", published by us in 2018. Ideology determines the way people look at the world. For example, many Indian communists opposed the 2008 U.S.–India Civil Nuclear Agreement or Indo-US nuclear deal on ideological grounds; many Indian communists are also believed to have clandestinely and surreptitiously sided with China during the Indo-China war that took place in the year 1962. [19]

VI. EPISTEMOLOGICAL FRAME OF REFERENCE

The English word epistemology arose from the Ancient Greek word "episteme" which means "knowledge", and "logy" which means a branch of philosophy or science. Epistemologists formally study and chalk out issues pertaining to the nature of knowledge, origin or sources of knowledge, (such as reason, perception, memory, experience and testimony), the conditions required for a belief to constitute knowledge, (For example, knowledge is "justified true belief") and scope of knowledge, epistemic justification,

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[16] The relevance of Culture and Personality Studies, National Character Studies, Cultural Determinism and Cultural Diffusion in Twenty-first Century Anthropology: As assessment of their compatibility with Symbiotic models of Socio-cultural change ELK Asia Pacific Journal of Social Science Volume 4, Issue 2, 2018

[17] Articulating comprehensive frameworks on socio-cultural change: Perceptions of social and cultural change in contemporary Twenty-first century Anthropology from a 'Neo-centrist' perspective Published in ELK Asia Pacific Journal of Social Sciences Volume 3, Number 4 (July 2017 – September 2017)

[18] Unveiling the Sociological Ninety-ten rules for Social Sciences research: Towards better hypothesis formulation in the Social Sciences in the interests of higher quality research and intellectual multi-polarity Sujay Rao Mandavilli Published in IJISRT, February 2023

[19] Enunciating the Core principles of Twenty-first Century Historiography: Some additional extrapolations and inferences from our studies and observations on Historiography Sujay Rao Mandavilli ELK Asia Pacific Journal of Social Science (ISSN: 2394-9392) in Volume 2, Issue 4 July to September 2016

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the rationality of belief, and various other attendant and related issues. By epistemological frame of reference, we mean that different people (either belonging to the same culture of different cultures), have different levels of knowledge, and therefore, different reference points that can be used to interpret and process new knowledge differently, and relate it to existing knowledge. [20] [21]

VII. IRREDUCIBLE SIMPLICITY

In a previous paper, published by us in the early part of 2024, we had discussed and laid bare, the canon of what we had proposed be called "irreducible simplicity". By this narrative and account, we had meant that any approach, principle, or technique must be simplified to the extent it is genuinely possible, and to the extent it is practicable; unless there are reasons to justify otherwise, it must be simplified to such an extent that it cannot be simplified any further. Contrarily, it must also be comprehensive enough, and must always and necessarily take into consideration and account, a wide array and gamut of data, and address, to the extent that it is possible and necessary, all real world scenarios. Therefore, the requirements and needs of these two seemingly divergent and contradictory principles must be counter-weighed against each other at any given point in time. This principle is naturally and fundamentally quite dissimilar with the principle and canon of irreducible complexity proposed by the evolutionary biologist Michael J Behe – the latter constitutes in the view of some other scientists and intellectuals, pseudoscience. For further details and information, read the paper "Orchestrating "Irreducible simplicity" in science and science communication: Positioning "irreducible simplicity" as a vital guiding principle for effective and bona fide science".

"Continuous zero-based reassessment of assumptions, hypotheses and methods"

By "Continuous zero-based reassessment of assumptions, hypotheses and methods", we mean that a grounds up assessment and a grounds up reassessment of assumptions, hypothesis, and methods be constantly and consistently done so that the truth is not obviated. By assumption, we mean anything that is accepted as true or as certain or expected to happen, but without adequate justification or proof. By hypothesis, we mean a proposed explanation made on the basis of rather limited evidence, and is used as a starting point for further investigation. On the other hand, a method is a specified or a pre-determined procedure and a fairly complex set of instructions that is used to accomplish or achieve a certain or given task at hand. This approach and techniques as we see it, is fairly important in the twenty-first century scheme of things, and integral to our globalization of science movement. For more information, read the paper "Advancing the use of "Continuous zero-based reassessment of assumptions, hypotheses and methods": A vital tool and technique in the interests of better science." [22] [23]

VIII. STRUCTURED APPERCEPTION THEORIES OF SOCIO-CULTURAL CHANGE

Structured apperception theories of socio-cultural change can be used to bring about positive, beneficial or meaningful change in society. Various other concepts that we had discussed and proposed all along, with "Structured apperception tests for socio-cultural change", include other pre-established methods tools and techniques such as vignettes, eureka points, and mini-eureka points, and these can come into play too. For more information, read the paper "Towards scientific apperception tests for twenty-first century social sciences research: Formulating 'Structured apperception techniques for socio-cultural change' in twenty-first century social sciences research", published by us in 2023. In addition to all this, theories and hypotheses (particularly in the social sciences) must be prioritized in such a way that they solve or address the most burning or pressing needs faced by society most rapidly; this, research must be prioritized accordingly. While developing theories and hypotheses particularly for the social sciences, but also for other fields of sciences in many or most cases, there must be an alignment with social, cultural, or cross-cultural needs so that theories are properly assimilated and ingested. This is also an important aspect of science communication, and the sociology of science. It will also lead to what we have always called 'scientific progress at the speed of light.'

IX. CONCLUSION

The core objective of this paper was to proposition and promote the idea that theorization and hypothesis building, both of which form a very intrinsic and a core and crucial part of formal scientific method and all forms of scientific endeavour, (they indeed constitute its pivotal starting point) and must be connected and associated with the concepts of cultural frame of reference, and cross-cultural frames of reference, two concepts that we had mooted in our previous papers. This approach, we had argued, is absolutely necessary, in order that scientific concepts be better grasped and more thoroughly understood by the laity and the larger masses, and

[20] Annis, David (1978). "A Contextualist Theory of Epistemic Justification". *American Philosophical Quarterly*. **15**: 213–219

[21] BonJour, Laurence. 2002. *Epistemology: Classic Problems and Contemporary Responses*. Lanham, MD: Rowman & Littlefield.

[22] Research Methodology: Methods and techniques: Second revised edition, CR Kothari, New Age publishers

[23] Research Methodology: A step by step guide for beginners, Third edition, Ranjit Kumar, Third edition, 2011

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by the common public as well. As a part and parcel of this approach, we had also presented a brief recapitulation of these two concepts besides introducing, and briefly explaining the twin ideas and the twin concepts of ideological frame of reference, and epistemological frame of reference as well. We had also recapitulated and reviewed our older concepts of "irreducible simplicity", "Continuous zero-based reassessment of assumptions, hypotheses and methods", and "structured apperception tests for socio-cultural change", and had integrated them as well into the core tenets of this paper. Last but not the least, we had also explained how all these concepts could lead to a percolation of scientific ideas, and a scientific temper among the masses, and lead us to what we have always called, "scientific progress at the speed of light." We had also suggested and implied that these approaches and techniques had to be followed as far as practically possible, and exceptions only justified on a case to case basis. The jury is still out on whether these approaches and techniques by which we steadfastly and staunchly stand and abide by, will be abided by, by most scholars and intellectuals or not. It done, it has the potential to launch science and science communication into an altogether different trajectory, with just rewards to science and society as a whole.