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Modern Science in India and the Emergence of a Wholesome and Flourishing Worldview

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*Abstract***:** Serious study and reflection on the phenomenal developments in science and technology reveal that they have transformed not only the way we live – better home, health, means of travel and communication, etc. – but also in the way we think, act, shape our value system, frame our worldview, etc. This paper discusses these points in some detail, pointing

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out that the result has been a mixed bag of several well-effects and ill-effects. It suggests that the best strategy to deal with this situation is to focus on maximizing the well-effects and minimizing the ill-effects. It further points out that this noble task can best be achieved by blending harmoniously the latest findings of contemporary science the deepest insights of religions. The paper pays special attention to highlighting this important interplay in the context of the developments in India.

Keywords: Science-technology impact, Worldview, Science-religion interplay, Science & technology in India

Introduction

In the past science was very much looked upon as a provider of important but dispensable amenities and comforts of life. However, today it is being recognized that science has and does play a far deeper and wider role in our world and society, thanks mainly to recent developments in science and technology, particularly in the field of the biological sciences. It can be said that today modern science is in a position to have an important say in determining not only what we have and want to have, but also what we are and want to become. Not only is modern science an integral constituent of our culture, it also is slowly but surely reshaping our culture, paving the way for the emergence of new world order.

India has always been the home of an ancient and rich culture, noted for its wide variety and deep spirituality. Today modern science is daring to reshape India's deep-rooted values and time-tested customs.

This paper is a critical study of certain developments in modern science and technology which exert a profound influence on contemporary world culture in general and Indian culture in particular. After discussing briefly some of these important developments, I will point out that these changes have come to stay, and there seems to be no turning back. A new order is taking definite form in the world scenario, and a new culture is emerging in India, with all its 'well-effects' and ill-effects, offering serious and almost unavoidable challenges. It is for us to transform these challenges into genuine opportunities in order to usher in a more prosperous and nobler world. I will further argue that creative and constructive interaction between modern science and spirituality can be of considerable help in this laudable venture by maximizing the 'well-effects' and minimizing the ill-effects. Furthermore, India is in a privileged position to contribute substantially towards this dialogue since here both science and spirituality have always been taken very seriously.

1. Some Recent Developments in Science and Their Implications

A number of developments initiated or catalyzed by developments in science have played a pivotal role in bringing about the new world order. I discuss below some of the more important ones.

a. Shift from the Age of Discovery to the Age of Mastery

Thinkers are pointing out that today science is moving from an age of discovery of nature to an age of mastery over nature. In the past scientists were pleased and felt

fulfilled when they succeeded in revealing the secret laws of nature. Johannes Kepler, Isaac Newton, Albert Einstein, etc., were acclaimed as outstanding scientists because of their discovery of important laws of nature. Today scientists seem to be far more ambitious: Not only do they want to make new discoveries, they also want to have mastery over the operations of nature, but they also want to have a hand in determining the destiny of nature. A good illustration for this new focus is the Genetic Revolution and Neurological Revolution that is being unfolded before us, conspicuously from the second half of the 20th century onwards. Certainly, this revolution involves the discovery of new laws. However, today we see that these laws are being skillfully transformed into tools of mastery to reshape the nature and destiny of humans and the world around.

b. Paradigm Shift in the Role of Science

Closely linked to the shift of focus is the transformation taking place in the role of science and the impact science has on society. As mentioned already, in the past the role of science was confined very much to providing certain amenities and comforts in life. Computers, TV sets, mobile telephones, etc., were some of the outstanding gifts of modern science to humanity. These contributions certainly helped to enhance the quality of life, at least for those who could afford them. But they remained optional: one could remain neutral towards them without being affected in any significant way. They touched humans from the outside; they concerned the world around humans. But today science is in a position to go deeper, to human persons themselves. For instance, the main actors of the Genetic Revolution – genetic engineering, the Human Genome Project (HGP), cloning, nanotechnology, etc. - touch human persons themselves in a significant way. We may say that so far science dealt with the conditions of life, but today, thanks to developments like the Genetic and Neurological

Revolutions, science is in a position to deal with life itself. So far, science focused on what humans have and want to have, but in Genetic and Neurological Revolutions it focuses on what humans are and can be.

c. The Narrowing of the Geographical Boundaries and the Formation of the Global Village

The term 'global village' is closely associated with Marshall McLuhan, who popularized it way back in the 1960s in his well-known books like *The Gutenberg Galaxy: The Making of Typographic Man* in 1962 and *Understanding Media* in 1964. Although in the past it was used as a metaphor to describe the amazing speed with which the electronic and internet media could interlink the different parts of the world, today it is becoming more and more literally true. Our globe has become a village in a true sense – whatever happens in any part of the world, however remote and inaccessible, is almost instantly made accessible to anyone, anywhere. This revolution cannot be passed over as a mere advance in the ease and efficiency of communication, it has very serious implications and far-reaching consequences – social, cultural, political, economic, religious, etc.

d. Tension between Global and Local Interests: Emergence of Regional Nationalism and Power-Centres

The present world scenario is full of inconsistencies and contradictions, apparent as well as real, giving rise to tensions and uncertainties. One such instance is the tension between global and local interests. Never in the history of our globe has there been so much progress made in the process of globalization and widening of interests as well as concerns. At the same time one sees local groups with their own specific agenda clamouring for world attention and support. The aborigines (*adivasis*, first settlers), the dalits and other disadvantaged groups in various parts of the world are raising their voices for sympathetic and decisive hearing. There is no doubt that the process of globalization has come to stay; there is no turning back. The challenge facing our world today is to

discern and identify appropriate ways of responding to these local needs without jeopardizing the process of globalization.

e. Greater Realization of the Need and Relevance of Collaboration and Teamwork

One area in which the positive impact of the globalizing tendency is noticeably seen is the growing awareness regarding the need and relevance of collaboration and teamwork. It is becoming more and more evident that great advances are brought about not so much by isolated efforts of individuals, however gifted, as by collaborative efforts of talented, committed and open-minded persons. The old paradigm of *"genius in isolation"* for serious, creative achievements is giving way to that of *"experts in collaboration."* Newton in the 17th century and Einstein in the 20th did outstanding, creative work almost as isolated individuals. But today the Human Genome Project, the Space Programme of NASA, God Particle discovery, Gravitational Wave discovery, etc., owe their success to the well-planned and meticulously executed collaborative efforts of experts from different fields.

f. Greater Awareness and Recognition of the Power and Limitation of Science

Another apparent contradiction we find in our world of science today is the growing awareness of both the power and the limitation of science. Never before in the history of humankind have we witnessed the amazing power and capability of modern science. At the same time, never before have scholars exposed the inherent limitedness and inescapable weakness of modern science. Science, indeed, is the creation of humans and seems to share in the limitedness of humans. Gone are the days of scientism when many a megalomaniac scientist assumed that science

was the panacea for all problems and the scientific approach the sure path to all success. Today, thanks to several groundbreaking developments in science itself and in the philosophy of science, it is becoming more and more accepted that, although science is mighty and potent, it is not omnipotent. Scientific findings and predictions are reliable, but can claim no inerrancy; Science has given us *the best knowledge,* but not *perfect knowledge.*

I refer to this turnaround as the "humbling experience" of science, wherein science has come to a genuine and realistic self-understanding, recognizing its real power and capabilities, acknowledging its clear limitations and shortcomings. This is a very healthy development that opens the door for greater enrichment. In particular, this opens the door for constructive and creative dialogue between science and other areas like religion.

g. Shift from the Mechanical Philosophy of Nature with Its Mechanistic World to a Non-mechanistic, Complex World

One of the points emphasized by contemporary philosophy of science is that science is not just a collection of laws, theories and methodological rules, but brings with it a worldview that plays a crucial role in our understanding of the world and in the shaping of our value system. Classical science or Newtonian science was most successful from the 17th to the end of the 19th centuries and brought along with it a worldview known as the Mechanical Philosophy of Nature (MPN), according to which the universe was a gigantic machine following the rules and principles of mechanics with assured certainty and guaranteed predictability. Practically all the prominent scientists during this period subscribed to this view, to some degree or other, hoping that science would give us sure and absolute knowledge. However, later developments in science, particularly the advent of Relativity and the Quantum

Theory, have exposed the poverty of MPN, revealing the complex, indefinite nature of the universe. The mechanistic view of the universe is not fully given up since even today it persists in many areas of science, particularly in the medical sciences. But the awareness is growing that pure mechanical principles alone cannot capture the complexity and diversity of our universe.

h. Shift from a Deterministic, Static, Sure and Certain Universe to an Indeterminate, Dynamic, Uncertain and Unpredictable World

The mechanistic world was characterized by determinism according to which everything acted in accordance with strict laws of nature. It was also a static world prohibiting any radical change of the system itself, although within the system changes could take place. Furthermore, it claimed to yield sure and certain knowledge about the universe, including human actions. But more recent developments in science like quantum mechanics showed that ours was an indeterminate world; evolution showed that ours was an ever-evolving dynamic world; the Uncertainty Principle of Werner Heisenberg showed that ours was an uncertain and hence unpredictable world. These changes, far from being confined to the academic circles, were recognized as having far-reaching consequences in other important areas as well.

i. Shift from Humans as Creatures to Humans as Co-creators: Human Dignity Enhanced

One of the positive results of these developments in science was the enhancement of human dignity. This was particularly true of the developments in the biological ad neurological sciences, like cloning, the Human Genome Project, genetic engineering, Artificial Intelligence, robotics, etc., which offered unprecedented powers to

scientists to reshape and even alter the nature and function of living beings. In the past humans were mere creatures living helplessly subject to the creator. With these advances, humans have been elevated to the level of co-creators and collaborators empowered to chart the future course of creation.

j. **Reaffirmation of the Unity of the Universe**

Another far-reaching consequence of the developments in science, particularly since the dawn of the 20th century, is the reaffirmation of the unity of nature. In the first half of the twentieth century the different discoveries in particle physics revealed the unity in diversity of the non-living world, since, according to them, the whole material world is made up of the same fundamental particles like protons, neutrons, electrons, etc. In more recent times, the genome project and related developments show this unity in diversity of the living world. Just as atoms of different material elements are made up of the same fundamental particles, the DNA of different beings is made up of the same kind of nucleotides – A(Adenine), G(Guanine), C(Cytocine), and T(Thymine). Even in the sequencing one can see a remarkable similarity. The genomes of different organisms like yeast, nematode worm, fruit fly, mouse, etc., show remarkable similarity with the human genome. According to some estimates, humans share 99% of DNA with chimps. With cow the DNA shared is 90%, with mouse 75%, with yeast about 30%, with *E. coli* 15%, etc.[1] The human race has crossed the 7.5 billion mark in 2017. Despite such large numbers spread over many continents, cultures, and races, humans show a remarkable deeper unity in their biology. It is found that any two individuals differ on the average only in one nucleotide per one thousand.

2. Interconnectedness of the Universe – The Butterfly Effect

Many religious traditions, particularly the eastern ones, have always upheld the interconnectedness of the myriad of beings in the universe.[2] Today this is being confirmed by developments in contemporary science. Quantum theory, particularly as developed in the Copenhagen tradition, strongly endorses this view. The theory of quantum entanglement focuses precisely on this point. The "butterfly effect" in chaos theory, according to which, "a butterfly flapping its wings in Hong Kong can affect the course of a tornado in Texas" also carries the same message. The genomic data presented above show how deep the genetic connection is, not only between the different living beings but even more among the billions of human beings. In a real sense, we are brothers and sisters, having a real common origin and a common destiny.

This interconnectedness is not confined only to the quantum world or the genomic world. Today we find echoes of it in the world of our everyday experience too. The action of a single person, however insignificant, has the potential to affect the rest of the world. Think of what the action of Bin Laden, Abu Baker al-Baghdadi, etc., who were almost unknown and unheard of persons till recently, have done to the world. Today it is becoming clear that no person, whatever be his/her status and background, can be taken for granted.

The Return of the Mystery Dimension of the Universe

It was hoped, mostly by the opponents of religion and God, that with the emergence and growth of science, all mysteries would be demystified, thereby banishing religion and God to the limbo of the superfluous and the

superstitious. But this has not happened; on the contrary the mystery dimension has only reasserted itself, taking up more sophisticated forms. The human genome, recent findings about the human brain, etc., reveal the mastery and mystery of creation. They all bear testimony to the creator's mastery over creation. At the same time their complexity and intricacy has become a baffling mystery to us humans. The sheer number involved is staggering. The latest estimate show that in an average human body there are 37.2 trillion cells. In the nucleus of each cell there is DNA, which contains about 3.1 billion base units or nucleotides, each one of which has over 50 atoms. Now one can figure out how many atoms there are in each cell, how many in the whole human body! And all these trillions and trillions of atoms are arranged in the most orderly manner to make complex life possible. This is for just one human being, and there are over 7.5 billion of them walking around on the planet. These facts exposed by contemporary science simply astound us. The only answer Francis Collins, the director of HGP (Human Genome Project), could give to this, was "a sense of awe." His sincere and hard-headed science transformed Collins from an atheist in his younger days into a practising Christian today. Speaking of his most important work on HGP, he comments: "I experience a sense of awe at the realization that humanity now knows something only God knew before. It is a deeply moving sensation that helps me appreciate the spiritual side of life."[3] Collins is not the only scientist to have this kind of experience. The well-known British astronomer late Allan Sandage too had a very similar experience through his work in contemporary astronomy. Speaking of his turnaround from "almost a practising atheist as a boy" to a believer at 50, he says: "It was my science that drove me to the conclusion that the world is much more complicated than can be explained by science. It is only through the supernatural that I can understand the mystery of existence."[4] One can give many other similar cases. Decades

ago, both Albert Einstein and Werner Heisenberg had voiced similar sentiments.

3. Scientific Developments and the Indian Scenario

India is a country that has always accorded great importance to science and technology, and hence these revolutionary developments cannot but have a serious impact on the situation in India. I discuss below briefly some aspects of it.

a. Some Positive Aspects

i. Shift from a Backward, Primitive, Un-technical, Underdeveloped Country to a Technologically Advanced, Vibrant Nation

In the past, particularly during the colonial, and initial parts of the postcolonial times, the stereotype perception of India was that of a third-world, third-rate country, teeming with poverty, hunger, illiteracy and superstition – all leading to an underdeveloped nation of no serious significance. But today this questionable perception has taken a total turnaround. According to reliable reports, today:

- India has the second-largest pool of scientists and engineers in the world.
- India is among the top 10 most industrialized nations.
- India is ranked the sixth country in the world in terms of satellite launches.
- India is the only country, other than US and Japan, to have built a supercomputer indigenously.
- India is ranked 2nd in the software industry.
- Four out of 10 Silicon Valley startups are run by Indians.

• Mangalyaan and Chandrayaan projects of ISRO (Indian Space Research Organization) have placed India among the top echelons of space science and exploration.

• There are almost 4 Million Indians in America. Their involvement in the field of science and technology in the US is impressive. For instance, according to some past records, 38% of doctors in America are Indians; 12% of scientists in America are Indians; 36% of NASA employees are Indians; 34% of Microsoft employees are Indians; 28% of IBM employees are Indians; 17% of INTEL employees are Indians; 13% of XEROX employees are Indians.

According to experts, "India finally has started acting as the technology superpower in the 'new world' where countries become superpower by virtue of technical strength and capability and not colonial wealth!" Albert Einstein has the following to say about India: "We owe a lot to the Indians, who taught us how to count, without which no worthwhile scientific discovery could have been made"[5]

ii. Shift from a Poverty-Stricken, Impoverished Colony to a Potential Economic Giant

For centuries India was looked upon as a poverty-stricken, impoverished state, colonized by foreign masters. But today this situation has changed significantly.

• According to the latest data India is the world's 5th largest economy by nominal GDP and the 3rd largest by purchasing power parity (PPP).

• India has become an attractive centre for investors. As Bertie Ahern, former prime Minister of Ireland, says, "India's unprecedented economic growth over the past decade makes it an attractive prospect for companies seeking new markets for their products and services...."

iii. Shift from a Land of Diseases, Epidemics, Malnutrition and Other Health Hazards to an Attractive Centre of Medical Tourism

In the past India was often depicted as a land of high health hazards, abounding in diseases and epidemics. Foreigners, particularly from the developed, affluent nations, hesitated to come to India. But today the scenario has changed dramatically. India has become an attractive spot for medical tourism – India is placed 5th highest in the world and 2nd highest in Asia in the field of medical tourism. Of course, India has always been noted for Ayurvedic medicines, massage treatments, yogic meditation techniques and other ancient medical traditions. However, today she is at the forefront of modern medicine as well, attracting huge numbers to her state-of-the-art medical facilities in various parts of the nation. The records in these world-class medical institutions are impressive.

iv. Increasing Food Production and Move towards Self-sufficiency

With regard to the production of food also India has made great strides. The statistics in this regard speak for themselves. For instance, the total area under the high-yielding-varieties programme was a negligible 19,000 km² in the financial year 1960. However, since then the growth has been spectacular, increasing to nearly 1,54,000 km² by the financial year 1970, 4,31,000 km² by the financial year 1980, and 6,39,000 km² by 1990.

b. Some Negative Aspects

i. Shift from Self-reliance to Techno-Reliance

Indian culture and tradition were noted for its simplicity, practicality, closeness to nature, and self-sufficiency. Mahatma Gandhi crystallized these effective, time-tested

traits in his concepts of *swadeshi* and *swaraj* in which the aspect of self-sufficiency and self-reliance are fundamental. In his own words, "My idea of village *swaraj* is that it is a complete republic, independent of its neighbours for its own vital wants, and yet interdependent for many others in which dependence is a necessity."[6] This would mean that the epicentre of Indian culture and tradition are the villages. In Gandhi's vision "The true India is to be found not in its few cities, but in its seven hundred thousand villages. If the villages perish, India will perish too."[7] Furthermore, this would mean that we focus on production by the masses rather than mass-production. In Gandhi's view, mass production is only concerned with the product, whereas production by the masses is concerned with the product, the producers, and the process.

In contemporary India, thanks to the explosive growth of science and technology, this tradition is fading away, and a culture of techno-reliance is fast spreading. People become so dependent on machines that they cannot manage if the machine-system breaks down, as evidenced almost daily when we are afflicted with electricity power cuts. This change has serious consequences. The simplicity of life is lost; the use of the hands becomes rarer and rarer; unwanted and unnecessary dependence sets in. Speaking on this scenario Gandhi wrote: "It's a tragedy of the first magnitude that millions of people have ceased to use their hands as hands. Nature has bestowed upon us this great gift which is our hands. If the craze for machinery methods continues, it is highly likely that a time will come when we shall be so incapacitated and weak that we shall begin to curse ourselves for having forgotten the use of the living machines given to us by God."[8] Accompanying this disregard for nature and what is natural is the mechanical mentality which looks upon fellow-humans as machines, and which wants to analyse their life and behaviour mechanistically.

ii. Economic and Cultural Exploitation

Another negative aspect of technological development is that it can quickly become an effective tool of exploitation in the hands of profit-hungry multinationals and technocrats. In fact, it has already become in many cases. This has come about because any technology, particularly the frontline ones, requires highly expensive infrastructure, which only very few can afford. Again, the nations and companies which are already ahead and well-established have a decisive advantage. Also, today technology and regulations are such that those ahead can claim a monopoly, and prevent others from coming up. For instance, today the genetic technology can produce terminator seeds that do not allow new seeds to be produced from them, forcing the farmers to purchase fresh seeds each time they want to cultivate. Since only the original company with a monopoly and copyright can produce and sell these seeds, the farmers are forced to buy the seeds from the parent company, often at an unjustly high price.

A number of instances of this kind of economic colonisation and exploitation have been reported and documented. It has been said that these companies with very good capital base, particularly in India because of the attractive Rupee foreign exchange rate, first buy up all possible local competition by offering a highly attractive and even disproportionate price. For instance, it was reported some years ago that in Brazil the Monsanto Company - a US multinational agro-product company, headquartered in St. Louis, Missouri - spent more than $1 billion to buy out 60% of all the seed companies in just two years. In India, it bought major holdings in the largest seed company. Once this is done, these multinational companies introduce their own product along with their

production technology and monopolize the field. It may be noted that the seeds produced by these genetically engineered products either do not germinate or need for germination certain specific chemicals developed by these companies. This means that once farmers begin to use this product, they are permanently dependent on the companies, leaving these multinational giants full freedom to wantonly squeeze out money from the local people.

There is not only economic exploitation but also cultural exploitation, often introduced in a subtle, innocuous manner, as part of entertainment, advertisements, etc. Cultures and cultural values have specific contexts, and once detached from these contexts and introduced into another culture, they can become not only unhelpful, but even harmful. This is already happening in India today. For instance, family values are taking a strong beating in many parts of India, particularly in the urban areas. It has been pointed out that one of the sources of this tragedy is the invasion of the entertainment media from certain countries where family values have lost their centrality.

iii. Tension between Material Prosperity and Spiritual Poverty

Progress in science and technology is often accompanied by material prosperity, particularly in the technologically advanced countries and groups. More food, better education, improved health, more leisure, longer lifespan, etc., are the usual indicators of this prosperity. However, it has been found that this material prosperity is not accompanied by any spiritual, or inner growth. In fact, in some cases, one can see a concurrent decline in the world of the spiritual. Commenting on this asymmetry in the growth of the material and spiritual worlds, Louis de Broglie lamented: "Our enlarged body clamours for an addition to the spirit."[9] "Now, in this extremely enlarged body, the spirit remains what it was, too small now to

fill it, too feeble to direct it," he continued, "Let us add that this increased body awaits a supplement of the soul and that the mechanism demands a mysticism."[10] In his view, "Humanity groans half-crushed under the weight of the advances that it has made. It does not know sufficiently that its future depends on itself. It is for it, above all, to make up its mind if it wishes to continue to live...."[11]

This imbalance between material affluence and spiritual hunger cannot be brushed aside as something insignificant or irrelevant. This is a serious matter demanding our careful attention, since this mismatch exhibits itself in many ways like decline in the law and order situation, increase in the cases of depression and suicide, etc. Our contemporary society in many parts of the world, including India, is afflicted by this unhealthy situation.

iv. Widening of the Gulf between the Haves and the Have-Nots

Another unhealthy outcome of the explosive growth in science and technology is the widening gulf between the rich and the poor. The economic growth, in many ways, has been a one-sided one, giving rise to a deformed monster rather than a well-balanced organism. The rich seem to be getting richer and richer, while the poor becoming poorer and poorer. Nowhere is this anomaly more conspicuous than in India which still has the world's largest number of poor people in a single country. Of its more than 1.3 billion inhabitants, an estimated 22% live below the poverty line, 75 per cent of them in the rural areas. The level of illiteracy is alarmingly high, particularly among women. More than 40 per cent of India's population is illiterate, with women, tribals and scheduled castes particularly affected. With regard to infant mortality also, the statistics are equally dismal. India

is ranked 53 in the world with 55 deaths for 1000 births, and 78.6 deaths for 100-births in the case of children under 5.

v. Rise in Environmental Degradation and Pollution level

Another unfortunate victim of all these developments triggered by an unprecedented advance in science and technology is mother-nature, particularly the environment. Much has been written on this problem under the heads of deforestation, acid rain, green house effect, ozone depletion, etc. Pollution in all its virulent forms – air pollution, water pollution and land pollution, has been inflicting serious health problems on India. A number of Indian cities have been listed among the most polluted ones. For instance, some reports in November 2019 say that Delhi is the most polluted city in the world. Many steps have been taken by governmental and non-governmental agencies, but much more needs to be done.

4. Some Serious Consequences of these Developments

a. The Cultural Confusion

There is no doubt that the astounding developments in science and technology have played a significant role in bringing about the changes and shifts, with their accompanying blessings and curses, as discussed above. No doubt several other factors also have their share of responsibility. But since the capability of science with striking immediate results is far greater than that of many other influencing agents, the major responsibility rests with it. Moreover, since science's forward march is an ongoing one with ever-increasing pace, one can expect more surprises on the way.

Perhaps one of the immediate consequences is the cultural confusion these developments are giving rise to, presenting formidable challenges to various sections of our society. It is clear that many of the items in this package are good, and are to be encouraged. For instance, many aspects of globalisation

with its broadening of vision and opening up of new vistas are beneficial. But the challenge is how to safeguard many legitimate local needs and concerns in this process of globalisation so that the individuality and uniqueness of local cultures is not sacrificed. So often we are saddened by the spectre of many abandoning their Indian cultural values in a mad chase after certain western fads.

The challenge is not something that will go away with time. In fact, it will only become stronger and more formidable since there is no turning back of this process. Nor is the traditionalists' solution of "retreat to the good-old-days" a healthy response to this challenge. Ours is an evolving world; evolution is not only a law of life, it is also a law of the universe. As Teilhard de Chardin and other thinkers have passionately and persuasively argued, no power on earth can stop this process of ongoing evolution. This world of ours will have to learn to deal with this situation constructively and creatively. Therein lies the path to future success.

b. How to Meet this Challenge?

At the very outset, we need to admit that this challenge is only natural and to be expected since culture by nature is a dynamic, growing/evolving phenomenon. As the "Theme Overview" of this seminar puts it, culture can be looked upon as "the sum total of all the devices and methods that a society has at its disposal to control, direct, and modify the material conditions of its existence**."** In the case of such a complex, dynamic phenomenon, changes and challenges are to be welcomed as part of the growth process. History tells us that Indian culture is one of the most ancient and experienced ones, having had to face the onrush and impact of many outside alien influences, even destructive ones. India has faced them successfully and

creatively in the past. No culture or outside influence that has come into close contact with India has remained unaffected by some aspects of her unique traits. The well-known British writer Mark Twain has remarked: "India is the cradle of the human race, the birthplace of human speech, the mother of history, the grandmother of legend and the great grand mother of tradition."

The present challenge seems to be rather formidable, having many apparently conflicting strands, defying any easy integration. We are called upon to do due justice to the different strands without undermining the essential elements of our own culture. Among other things:

- This would mean the challenging task of keeping our technological edge that is essential for growth, without sacrificing the human face.
- It would mean keeping the path of material prosperity open without marginalizing those below the poverty level.
- It would mean developing frontline medical treatment, without ignoring the basic medical facilities for the ordinary people.
- It would mean that India's economic plans should focus *not only on profit-making, but also profit-sharing***,** particularly with the less-privileged ones.
- It would mean that science and technology be put primarily at the service of meeting the basic needs of humans, rather than making lucrative cosmetic items for the rich and famous.
- It would mean using the almost inexhaustible nuclear power for useful, peaceful programmes, rather than for

the production of more and more sophisticated weapons of mass destruction.

- *It would mean transforming the national and multinational corporations from profit-hungry organizations to service-sensitive ones.*
- *In fine, a cultural, value-based restructuring is required in the light of these developments, giving rise to a new culture, a new world order, a new India.*

5. Science-Spirituality Dialogue and the New World Order

In this final section, I wish to point out that a creative and constructive interaction of science and spirituality is necessary for this cultural restructuring. This collaboration is only natural since science is today an integral part of any culture, particularly our Indian culture, and spirituality has always been a central part of it, although it is expressed in different ways.

This all-important process of value-based cultural restructuring is a long and complex process requiring judicious and skillful intermingling of many elements. This certainly involves adapting and integrating the emerging new trends into the cultural setting of India. Not all new trends can be assimilated wholesale; nor should all the traditional values be thrown overboard. Identification of the new items to be admitted and of old ones to be abandoned will have to be done with the utmost care and sensitivity.

a. Certain Traditional Values to Be Reemphasized

This process also involves the reemphasizing of many of our traditional, time-tested values and principles. For instance, India was noted for her positive appreciation of other cultural values. History tells us that we accepted

other cultures with a welcoming attitude. This spirit has to be preserved and further developed. Again, India was noted for her spirit of tolerance. In fact, many serious scholars have shown that Hinduism is the most tolerant among the major religions of the world. In the process of cultural restructuring this spirit will be of immense assistance. The spirit of *nishkamakarma*, selfless service, was another value very much emphasized by our Indian religious traditions. In today's profit-hungry, success-oriented world, driven by cutthroat competition and rivalry, this principle should play a central role. The spirit of the *mahatma*, large soul, is another treasured value in our rich tradition. This spirit too needs to be reemphasized. I leave the experts to extend this list further.

b. New Values to Be Developed

This process involves also developing new values in the light of the developments around – a task demanding well-informed, discerning, creative, innovative, and daring persons. Here also a constructive interplay between scientific and spiritual values can be of immense help. To suggest a few possibilities, along with the scientific values of efficiency and expediency, concern and care for others are to be cultivated. Again, along with the scientific values of exactness and certainty, room will have to be provided for a certain imperfection and uncertainty. Furthermore, along with the scientific values of predictability and self-reliance, provision will have to be made for a certain unpredictability and reliance on other sources, particularly on divine providence.

Conclusion

The challenge is clear, but the line of response awaits further clarity. But one thing is non-controversial: neither science alone, wherever its success may take us, is competent to meet this challenge, nor is spirituality left alone, whatever be its resources, competent to deal adequately with this situation. On

the other hand, together they can meet the challenge more effectively, creatively and constructively. A serious, well-planned, and skill-fully executed dialogue between modern science and spirituality should be one of the principal players in the creation of new world order for the betterment of humans and the

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[1] For details see Michio Kaku, *Visions* (Oxford: Oxford University Press, 1998), pp. 152-153. Please note that the percentages given are only approximate, since different researchers give slightly different figures.

[2] About eighty years later, as early as 1963, Edward N. Lorenz,[2] using Poincaré's mathematics, described a simple mathematical model of a weather system that was made up of three linked nonlinear differential equations that showed rates of change in temperature and wind speed. Some surprising results showed complex behaviour from supposedly simple equations; also, the behaviour of the system of equations was sensitively dependent on the initial conditions of the mathematical model. He spelled out the implications of his discovery, implying that if there were any errors in observing the initial state of the system (which is inevitable in any real system), prediction as to a future state of the system was impossible. Lorenz labelled these systems that exhibited sensitive dependence on initial conditions as having the "butterfly effect": This unique name came from the proposition that a butterfly flapping its wings in Hong Kong can affect the course of a tornado in Texas. This has become the emblem of chaos theory, following James Gleik.

[3] John Cornwell, "Scientists Playing God," in *The Tablet*, 8 July, 2000, p. 920.

[4] Sharon Begley, "Science Finds God," *Newsweek*, July 20, 1998, p. 47.

[5] https://www. goodreads.com/quotes/ 1128408-we-owe-a-lot-to-the-indians-who- taught-us, acceessed on 4 November 2019.

[6] M.K. Gandhi, "My Idea of Village, Swaraj," in *Harijan*, 26-7-1942, https://www.mkgandhi.org/panchayat_raj/village_swaraj.htm, accessed on 4 November 2019.

[7]Satish Kumar, "Gandhi's Swedeshi – The Economics of Permanence," https:// www. google. com/search? sxsrf= ACYBGN QClPll3J7Yl_ UIHd Bxf1HK6cam_g:1 5728 6200694&q=Mahatma+Gandhi:+%22The+true+India+is+to+ be+found+not+, accessed on 4 November 2019.

[8] Mahatma Gandhi, "Mahatma Gandhi Quotes, https:// www. azquotes. com/quote/877358, accessed on 4 November 2019.

[9] Ken Wilber, ed., *Quantum Questions*, 1984, p.121.

[10] Ibid., p.122.

[11] Idem.

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