COMMITTEE IV
The Relationship Between Science
and The Arts and Its Relevance to
Cultural Transformation

DRAFT - 9/15/86
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SCIENCE AND CULTURE: INDIAN CONTEXT

by

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The Fifteenth International Conference on the Unity of the Sciences
Washington D.C. November 27-30, 1986

SCIENCE AND CULTURE: Indian Context

1. Historical Perspective

The contemporary division of science and culture, the existence of "Two Cultures", as C.P. Snow called it, represents the trend of specialization which reduces man to a unit belonging to a specific field, as part of a work force belonging to a specified area. This is, in a way, a logical development of the challenge provided to feudal society and the value system during the Renaissance.

The force of this challenge, which covered art, science, social and political ideas and moral values, lay in the alternative it provided to the constraining influence of a stagnating feudal society - an alternative which covered every field of life and activity. It was a cultural earthquake. To understand the nature of the relationship between science and culture in an Indian context in the present day, it is necessary to understand the challenges contemporary science has provided. Historically, Indian culture results, in part, from an interaction with different cultures, which included science and philosophy, social movements and religions. The two cultural earthquakes were Hu-Islamic influence and latter the British Colonisation.

Throughout the centuries, India has been at the crossroads of history. Its cultural and scientific interaction has been with the Far East, Central and West Asia, East and North Africa, with Greece, Italy and, then, with the rest of Europe. This interaction was through religion (Hinduism, Buddism, Islam and Christianity), philosophy and science and technology. The Islamic Renaissance, which began with the establishment of the Dar-al-Hikma (House of Wisdom) by the Abbaside Caliphs, and the translation from the Sanskrit of texts on medicine, mathematics and astronomy, provided one of the mainsprings of future developments. This knowledge,

following its development with the science and philosophy of Greece and Rome and other areas, returned to India to interact further with what had developed in the meantime.

The second interaction, the cultural earthquake in the 17th and 18th centuries, took place with European science and technology as it had developed since the Renaissance, particularly since the industrial revolution. The efforts of Maharaja Sewai Jai Singh II of Jaipur provide an insight into this process. The study of his efforts so far has been limited to his works on astronomy and the building of his observatories. He obtained information on the new observatories in Europe and the new astronomical instruments, such as the telescope. Accordingly, he sought to reform the calendar and to build more reliable observatories. The impact which European developments created, as can be judged from the works of Jai Singh, was two-fold:

Firstly, it led to the re-awakening of interest in science, particularly in observation and experimentation, an attitude which had declined in India, with which Jai Singh was familiar. Further, in order to show to the people the importance of science and the practical results which it generates, he built observatories and planned a new city of Jaipur. The importance of astronomy to Indian culture is greater than is often realised. Besides organising the calendar for religious and administrative functions, it had another social significance. The exact time and date of a person's birth had to be recorded, so that the horoscope might be cast. This was an essential feature for fixing marriage, and for correlation with other events in an individual's life. In this way, mathematics and astronomy were an essential part of Indian culture.

Similarly with medicine, where its theory, as expressed in the temperament of the person was closely associated with food technology and where the knowledge of

the seasons and the condition of health or disease in a person, along with his/her temperament, necessitated a particular diet in accordance with the season. What is true of medicine and astronomy and mathematics was true of other fields as well (For details see: Science and Technology in Indian Culture, edited by A. Rahman, New Delhi, NISTADS, 1985).

Secondly, the integration of the development of science in Europe, particularly the key elements which Jai Singh sought to integrate with culture, is beautifully expressed in a medallion.[1] The medallion has four items and a legend engraved. The four items are:

1. Samarat yantra - the observational tower which he developed, and which was used for dividing time into equal hours and for giving the exact time of day;
2. Furnace - for manufacturing various metallic objects;
3. Lotus - symbol of beauty (and love);
4. Shining sun.

The legend is: Three things constitute Dharma (religion/guiding philosophy). It can be interpreted as: mathematics and astronomy, representing physical science; metallurgy, representing technology which, when combined with beauty and love, can make the future like the shining sun.

This combination had been the essence of Indian culture, where science was an essential component, and Jai Singh's effort to revive it was a bold one, particularly in view of the times in which he lived.[2]

The colonisation of India by the British disrupted the natural evolution of science and its interaction with other elements in culture. Two major trends emerged, around contemporary science and technology on the one hand, and around the indigenous tradition on the other. The former was called "Western" and the

latter "Indian". This posed a serious problem for cultural evolution. The indigenous culture cut-off from contemporary developments in science and technology began to look to the past, to provide guidance for the shaping of the future. The more it became isolated from contemporary developments, and the more it ossified, the more it looked to past values. In the name of nationalism and opposition to western ideas, the values of science could not be integrated with culture.

2. Contemporary Developments

The major task before the nation, as the movements for political freedom and social and cultural development grew, was to integrate science with the Indian culture and tradition. This was beautifully expressed in the Scientific Policy Resolution, passed by the Indian Parliament in 1958:

"It is an inherent obligation of a great country like India, with its traditions of scholarship and original thinking and its great cultural hertiage, to participate fully in the march of science, which is probably mankind's greatest enterprise today."

There were two main trends in this effort. One was observation and experimentation within the framework of Indian tradition, and the improvement of the latter through the former. The philosophy of Gandhi, in terms of values, ideas and the practice of technology, represented this trend. The second trend was represented by Nehru. He endeavoured, if one can use the word, to overhaul Indian tradition radically, using science and its values as the basis. In a way, he represented the tradition of Jai Singh. For his transformation of society, he sought to promote a scientific outlook and to create, in his phrase, a "scientific temper". In brief, it could be described as using scientific method in an approach to problems, their study and the generation of knowledge; then arriving at conclusions, and using this knowledge for decision-making - the latter affecting individual life

and social problems.

This concept of the "scientific temper" was developed further when Nehru's daughter, Mrs. Indira Gandhi, when Prime Minister, introduced it into the Constitution of India as one of the duties of an Indian citizen. Nehru's efforts to integrate science, in its contemporary form, with India's system and values can be judged by his endeavour to make science an instrument of social and cultural transformation. This was to be through the promotion of science and technology, developing educational and research infrastructures, the import of technology and creation of an industrial base to meet the country's requirements. His approach can be judged by his remark, "The future belongs to those who befriend science and scientists." The method which Nehru used to promote his ideas through his speeches, writings administrative decisions and actions can be identified by a few examples. First, he endeavoured to create a new consciousness. He tried to make scientists aware of their social responsibility in generating culture and helping to bring about social transformation. Also, he made people in general, and administrators, political and other leaders in particular, aware of the importance of science. This, he thought, would create a new ethos, a new way of thinking, and generate a new culture, of which the scientific way of thinking and ideas would be a base.

Second, he used scientific knowledge, through administrative decisions to bring about social and cultural change, the best example of which is the complete change of the numerous systems of measurement prevalent in India by the introduction of the metric system.[3]

Third, he sought to combine the ancient Indian knowledge and tradition with contemporary scientific advances when he formed a committee of eminent scientists to reform the calendar. They produced a new calendar, combining the basic

elements of Indian tradition with contemporary knowledge, which became the official calendar.[4]

Fourth, he tended to promote the use of the latest ideas for practical applications. (This he did by not restricting himself to use of nuclear ideas and persons from within India.) He sought to obtain the newest and the best. It was through his efforts that the distinguished architect, Le Corbusier, came to India and planned and supervised the construction of Chandigarh, the new capital of the Punjab. This city was a complete break with the past traditions of urban centres in India. It represented the integration of new concepts and ideas, of town planning, architecture and art, as they had developed in Europe. However, Chandigarh represented an imposition of European development on an enviornment, where it neither suited the climate nor the living habits of the people. It represented a logical, positivistic approach and a transplanting of ideas neglecting social and cultural aspects.

This was in sharp contrast to the earlier efforts in town planning. Patrick Geddes had come to India to do the town planning of the city of Indore. His social concern and experiences in the Gorgals, in Glasgow, had induced in him a cross-cultural approach to living in urban centres, their organisation, planning and development. His efforts represent a very good example of the transplant of scientific ideas taking account of tradition and their integration with social problems and cultural evolution.

Indore, like many other cities, as a result of a lack of sanitation facilities and an absence of the use of available scientific knowledge regarding infection, public health and facilities, had frequent epidemics of cholera and plague. Clearly, the town required to be planned to help avoid the occurence, or reduce the spread of, such epidemics. But no effort can succeed unless people are motivated and provided

with the knowledge to help themselves.

This is difficult in a tradition-bound society, where people are steeped in old ways, are superstitious and suspicious of new ideas, particularly when they come from foreigners.

Geddes achieved acceptance in a remarkable and highly imaginative way, by incorporating scientific ideas with traditional art forms. Each year in India, the festival of **Dussehra** is organized. It represents an epic story of Ram, the Hindu god, over the demon, Ravana. It is meant to convey to the people, and is regarded by them as, the victory of good over evil. Geddes, with the permission of the Maharaja, introduced a tableau into this festival, under the title of "Victory of Good over Evil." But this "Evil" was cholera and plague, and the tableau showed how victory can be won through the use of scientific knowledge and self-help. Thus, he transformed a ritualistic tradition and art-form into one which helped to transform the lives of the people. The impact of his efforts was so great that he was given the title of Maharaj, (the title is normally reserved for kings and highly-revered saints) and was known as Geddes Maharaj. The title to Geddes repudiated Kipling for whom: East is east and west is west and never the twain shall meet.

3. **The problem of two cultures in the Indian context**

Unlike the problem of the two cultures in Europe, as posed by C.P. Snow, the two-cultures issue in India is more complex and intricate. It is not merely a feature arising out of the educational system and its tradition of specialization. It is centred around major issues which have been part of India's historical evolution.

These are:

1. Integration of old with new

Indian culture over the centuries has been divided on the basis of religion and language. The languages in which science was written, the languages in which

religious texts were written and available and the language of the culture of a period all differed. These languages were **Sanskrit**, the language of Hinduism and, also, the language of science over the centuries, **Pali**, the language of Buddhism and the language of science and culture over a period for a group of people, **Arabic** and **Persian**, the languages of Islamic culture and science, and **English**, associated with Christianity, colonialism and western ideas, including science.

The major problem has been to secularise science and culture to bring about a synthesis of various developments in different periods under different religions and cultural influence, and to lay the basis of science and a unified culture. Different movements in Indian history, from above as well as below, were initiated with this in view; from above, that of Emperor Akbar, from below, that of Kabir and Nanak. They were in the form of new religions.

While Gandhi sought to bring about integration on the basis of socio-political systems and the reform of religious and social practices. Nehru sought to achieve the same objective through nationalism and science-nationalism to provide a geographical, economic and political basis, and science to provide a rational and intellectual basis away from the stagnation of local and limited approaches, obsolete ideas and concepts. This still remains as a major problem in the present-day context of revivalism, growth of fundamentalism and the strong appeal of narrow loyalities.

2. Unity in Diversity

India is a land of diversities, in which the largest number of religions exists, the largest number of languages are spoken, and in which cultural differences between areas are considerable. The efforts to bring about unity in this diversity have been on the basis of religion, language and culture. The interesting feature of these efforts has been the attempt to accommodate ideas, concepts and

philosophies, rather than intellectual imposition. The Sufi movement in Islam represents a major example of this effort. Amir Khusro, in the 14th century, in poetry, music and literature, endeavoured to bring this about. Nehru, through the promotion of a "scientific temper" and the introduction of modern technology, aimed at bringing about a unity through accommodation of the intellectual outlook and its integration with cultural transformation.

3. Social Inequality

India has a tradition of a strict social code, with codification of people into categories as "castes". Knowledge, its attainment and development was the privilege of one caste, and the right to acquire it was denied to at least one caste, the "Untouchables". Each caste, in the context of its role in society, had developed its own, highly formal or folk culture and system of knowledge, based on mystic and common beliefs.

This social inequality and the two cultures associated with it became further strengthened with the import of science, the educational and research systems that went with it and the import of knowledge to develop the industrial base. Those educated in advanced institutions, who were able to use the new developments and benefit from them, came to adjust to and accept the value systems, outlooks and aspirations of an advanced industrial culture - of individualism, consumerism and waste: those without access to such an education did not understand these developments and could not benefit from them; they regressed socially and economically, became isolated from the mainstream and started to look to the past for the redress of their situation.

The revolt of Gandhi against this social stratification, particularly the condition of the Untouchables, represented a new culture within the framework of Indian ideas, philosophy and tradition. Nehru's philosophy was another endeavour,

through education and opportunities for development for the downtrodden. He insisted on quotas in educational institutions and jobs for them.

These efforts to bring about an integration of science and culture in the context of Indian problems, to develop a synthesis between the old and the new, to unify diversity through accommodation rather than imposition, and to remove social inequality, are creditable. However, the murder of Mrs. Gandhi and events since then necessitate a critical re-examination.

4. Concluding Remarks

One conclusion is clear: the effort was not total as in the Renaissance. The Indian culture was once highly integrated with science. Astronomy and medicine were part of everyday life; medical knowledge was part of dietetics and was linked with the seasons and the properties of fruits, vegetables and other foods.

The knowledge of the human body was used in eurhythmics and dance forms, and exercises, yoga, were developed; mathematics was linked with music; and the knowledge of metallurgy with manufacture of art objects, which also formed a basis for religious beliefs, cultural objects and philosophy. Consequently, if science and culture had to be integrated, it had to cover every dimension of life, as was the case earlier.

The scientific revival in India was based on developments in Europe and the U.S., and was imported with their social and cultural implications - the latter in terms of the two cultures, as C.P. Snow has said. The cultural development in independent India was a revival of the indigenous tradition.

In other words, there has been a duality of development in science and in culture, in context, character and trends. This duality, in view of the isolation of the two streams, has an explosive social content.

The main problem is rooted in Indian history: can science be synthesised

without imposition? Can it be unified without losing its diversity and richness? Can it evolve without being controlled?

In the earlier culture of India, religion and religious philosophies provided an integration with other dimensions of human intellectual activity and social life. Humanism and industrial production replaced religion in Europe to give a new dimension to science and culture.

In the context of contemporary problems of itemisation (or atomisation) of intellectual life, of separation of science and culture and the problems created and the challenges offered - what could be the central focus and value system to provide a basis for a new humanism? It is yet to be seen. It would be the take-up of these challenges, to provide an alternative to the existing state of affairs, which would end the contemporary division of science and culture, made much more deep and complex in the context of historical evolution of both in India.

FOOTNOTES

1. This is the possession of a friend in London, who wishes to remain anonymous.
2. For details of Jai Singh's efforts, see:

   Rahman, A. "Maharaja Sewai Jai Singh and the Indian Renaissance." Science and Public Ploicy, vol. 12, Nos. 1 & 2, February and April 1985.
3. It was an interesting experience for a person like me to see even the elderly give up their life-long habits of measurement and adopt very quickly the new system.
4. The new calendar - though the official calendar of the government of India, is not generally used by people, who continue to use the internally used calendar.