Purchase of scientific instruments

In government research institutes/universities, purchase of equipment or instruments is routine. However, these are basically the requirement of individual scientists/researchers in most cases. The valid reasons for purchase are: Non-availability of the instrument, heavy workload on an existing instrument, limited capacity of an obsolete older non-functional and non-repairable existing instrument, upgrading an existing system, etc. However, the inside story is often different and true reasons are personal ego, making a big budget, under-the-table dealings, etc. To check this unwanted purchase of costly instruments, some measures are suggested.

Creation of a Central Instrumentation Facility in a research institute or university should be mandatory and there should be a committee to monitor the maintenance and safe handling of the costly instruments in such a facility. In the four corners of the country, National Instrumentation Facilities with provision for boarding and lodging should also be created. Along with this, transfer of instruments among institutes and universities should be planned. Rigorous maintenance of logbook and auditing will help in this regard. This will yield good results in case of gifted instruments. This timely measure will prevent misuse of funds and check malafide purchasing of instruments.

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Were ancient Indian rishis the earliest biologists?

Francis Crick and V. S. Ramachandran have made some interesting statements in their books: *The Astonishing Hypothesis* and *The Phantom in the Brain*, respectively. Referring to the mind, the behaviour of the brain that can be explained by the interactions of the nerve cells (and other cells) and of molecules associated with them, Crick states: You, your joy, your sorrow, your memories, your ambitions, your personal identity and your free will are no more than the behaviour of a vast assembly of nerve cells and their associated molecules[1]. Ramachandran states: It seems somehow disconcerting to be told that your life, all your hopes, triumphs and aspirations simply arise from the activity of the neurons in your brain[2].

The above statements sound almost Vedantic. In the *Bhagavad Gita*, for example, Sri Krishna tells Arjuna: All beings follow their nature; even the wise man behaves in conformity with his nature. What can restraint do?[3].

Quite often, it would appear, the human behaviour is not rational. Our perception of and response to an issue at a particular moment, presumably, depend on the reactions of the pattern of the nerve cells perceived at that time. They could be different at another time and also with another person. Patanjali says: The same object is perceived in different ways by different minds[4]; The object cannot be said to be dependent on the perception of a single mind[4]; An object is known or unknown depending upon the moods of the mind[4].

There are also other concepts in modern biology which have their overtones in the *Vedanta*; for example on the activity of the genes. It is well known that while all humans have the same complement of genes, subject to mutations and deletions, the genes themselves do not have the same activity in each of us. This, of course, is reflected in the diverse physical and emotional characteristics of each of us. It is stated that the genes in the neurons (and presumably also other genes) have a set point of some characteristic level of activity and this set point can be altered by internal cellular and outside influences[5]. It is possible that the internal influences such as the thought processes of the mother could influence the development of the baby in a mother's womb. The activation of an emotional gene (and even of others) is much better at the childhood stage. It is well recognized that certain type of development must occur within a specific critical period or not at all. Significantly this critical period coincides with the extremely rapid growth of the cerebral cortex.

Another aspect of the brain behaviour is the manifestation of the opposites in human personality. The neurobiologist J. H. Jackson states that loss of one brain–mind function is associated with a reciprocal gain in another.

The above concepts on the activation of the genes are also to be found in the *Vedanta*. Patanjali states: 'Of the tendencies that are present in us, only those are manifested for which the conditions are favourable[4]. The more desirable of the latent tendencies can be brought out by practice.'

There are some other postulates of the *Vedanta* which have remarkable correspondence to concepts in modern biology. These are related to the Vedantic concept of the *atman*. This has resemblances with the functions of the genetic material present in the human bodies (and also other living bodies). Thus:

The *atman* is considered to be an entity present in the human body, but is different from the body. It is the same in each one of us. The *genetic material* is a chemical entity present in human body. It is present in each of the human cells, subject to mutation and deletion. The *atman* uses the subtle body as its instrument for all its activities. The *genetic material* carries the instructions for the functioning of the cells – to grow, to divide, to mature and even to die. The *atman* is imperishable. It migrates to another body, when the body dies. This continues from generation to generation. The *atman* is thus perpetuated. The *genetic material* is transferred to the prog-

eny during mating. This process goes on and on and the genetic material survives along the evolutionary pathway. In a sense, the genetic material is born again and again and is thus perpetuated. The *atman*, as it enters a new body, carries with it its characteristics, the manifestations of the intellect and senses of the body. This could then lead to astonishing resemblances to our parents or even to some of the distant ancestors. Interestingly, even memory is carried to the progeny[4]. The *genetic material* expresses itself according to the program already present in it. This is heredity. Presumably, even memory is transferred. Francis Crick and Christol Koch state that brain uses past experiences, either its own or that of the distant ancestor, which is embedded in our genes, to help interpret the information coming into our eyes[6].

When one considers the above correspondences, one cannot but wonder whether the Vedantic postulates were not the conclusions of the ancient Indian rishis on their everyday observations of the natural events and the relation that men and women have with these events and to each other.

1. Crick, F., *The Astonishing Hypothesis*, Maxwell Macmillan, 1994, p. 3.
2. Ramachandran, V. S., *Phantom in the Brain*, Fourth Estate, London, 1998, p. 256.
3. *Bhagavad Gita*, 3.33.
4. *Patanjali Yogasutra*, pp. 4.15; 4.15a; 4.16; 4.8; 2.9.
5. Boardmann, H. and Ross, S. A., *Biology in Human Affairs*, Voice of America Forum Series, 1974, p. 175.
6. *Sci. Am.*, 1992 September, p. 154.

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Science archives

Science, technology and modern medicine have left their indelible imprint on Indian history for more than a century. From significant contributions in the field of mathematics, physics and modern biology to advancing computer technology and developing vaccines for rabies, drugs for TB, bone marrow transplants and test-tube babies, Indian scientists have pioneered modern research in several fields. Yet, the contemporary scientist in India more often than not remains a 'faceless' entity; his/her contribution, however significant, is forgotten after initial media excitement. Worse, it becomes practically impossible to trace the historical dimensions of any important scientific development for lack of archival resources. Science institutions themselves, with a few exceptions, rarely preserve their history. Bits of history are lost everyday as institutions destroy their old records and documents for lack of storage space, and pioneers retire. In this context, there is an urgent need for the establishment of a centre for archiving the history of modern science in India that would preserve papers, documents, artifacts and pictorial material of scientists and science institutions. Such a centre could play a crucial role not only in locating and ensuring the preservation of these valuable materials, but also in stimulating interest in the records of the scientists. Such records could include correspondence, notebooks, working papers, manuscripts of published works, lectures and speeches, as well as personal records and photographs. The collection would reflect different phases and periods of the lives of the individual scientists. The collections could be catalogued and indexed by the centre and made available for scholarly purposes as well as to interested members of the general public.

In addition to traditional resources, I would also advocate the creation of oral history resources that could supplement printed documents and correspondence. Over the last forty years, oral history has gained legitimacy internationally as a historical resource among scholars in history, anthropology and sociology. Oral history interviews are particularly useful in reconstructing and documenting the personal networks and informal discussions that remain an intrinsic and inevitable part of doing science in a Third World country like India. Moreover, interesting issues like the interaction of science, technology and medicine with society and culture leave only indirect traces on written documents. In the absence of other biographical material, oral history interviews are often the only way to gather information about values, attitudes, motives and culture of scientific institutions.

The Tata Institute of Fundamental Research (TIFR), Mumbai has recently started archiving its activities. Since September 2002, the TIFR Oral History project has started in a modest way by recording, transcribing and editing interviews with scientists who worked at the TIFR. The project has also collected important primary material in the form of correspondence and photographs. Such projects, however, cannot exist in isolation, especially when the collective memory of science institutions in India is so vast and variegated. What we need is a larger repository of historical resources dedicated to science, medicine and technology where institutions, individual and journals can deposit their papers. Apart from engaging scholarly interest, such a centre could also disseminate the material in popular form through educational exhibitions and CD-ROMs. Such a centre is an absolute prerequisite if we wish to foster a serious interest in the history of science in India.

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