

THE INDIAN INSTITUTE OF WORLD CULTURE

Post Box No. 402, Bangalore 560 004

Transaction No. 46

BRAIN AND THE DILEMMA OF MAN

By

Professor K. N. SHARMA
*(Chairman & Professor of Physiology
St. John's Medical College, Bangalore)*

ALL RIGHTS RESERVED

1976

PREFACE

This lecture on "Brain and the Dilemma of Man" was delivered by Professor K. N. Sharma on 17th January, 1976 at the Indian Institute of World Culture under the Endowment made by Major-General S. L. Bhatia for annual lectures on *Science and the Humanities*. Professor K. N. Sharma is a distinguished physiologist. He is Professor of Physiology and Head of the Division of Neurophysiology and Behaviour at St. John's Medical College, Bangalore. He is also Visiting Consultant, U.S. Army Natick Labs., Massachusetts, U.S.A., Ford Sciences Division. He is Fellow and Member of many National and International Societies.

Professor K. N. Sharma was born at Mussorie in 1926. He received his medical education at King George Medical College, Lucknow, having obtained his M.B.B.S. and M.D. degrees there. In 1956, he moved to All India Institute of Medical Sciences at Delhi and remained there till 1960. Before joining St. John's Medical College, he did research work in U.S.A. at the University of Rochester Medical School and University of Illinois.

His main interest has been in the field of Neurophysiology and Biocontrol systems. He is the President of the Bio-Medical Engineering Society of India, having remained its Vice-President for six years. He has made substantial contribution to the understanding of fundamental concepts related to Brain Mechanisms, Haemophysiology and Alimentary behaviour.

He is a research worker of international repute with nearly 100 original publications to his credit. In joint authorship with Dr. (Mrs.) S. Dhua Sharma and Dr. Jacob he has recently completed a monograph entitled, "The Canine Brain in Stereotanic Coordinates" published by M.I.T., U.S.A.

He has been recipient of Fulbright Fellowship, United States Public Health Post-Doctorate Fellowship and Shakuntala Amirchand Research Prize (I.C.M.R.)* Professor K. N. Sharma has received grants for research from several organizations in India and abroad.

The Indian Institute of World Culture is thankful to Professor Sharma for his excellent lecture and is publishing this for a wider dissemination of this valuable contribution.

Bangalore-4:

Publishers.

8th May, 1976.

BRAIN AND THE DILEMMA OF MAN

K. N. SHARMA,
*Department of Physiology,
St. John's Medical College,
Bangalore.*

The priceless object of evolutionary heritage containing the blue print of human destiny does not lie in the farthest reaches of outer space or in the inky blackness of deep seas. It lies rather inside our skull and is, of course, the human brain. Without this brain man could not have been man—the master of all that he surveys, harnessing the forces of nature to his best advantage and reaching out to control galaxies. To indicate how important this human brain is, I can perhaps do no better than quote George Bernard Shaw, from his play *Man and Superman*, Act III, where a conversation between Don Juan and the Devil is going on :

Don Juan: will you not agree with me.... that it is inconceivable that Life having once produced them (birds) should, if love and beauty were her object, start off on another line and labour at the clumsy elephant and hideous ape, whose grandchildren we are ?

The Devil: You conclude then, that Life was driving at clumsiness and ugliness ?

Don Juan : No, perverse devil that you are, a thousand times no. Life was driving at brains—at its darling object: an organ by which it can attain not only self-consciousness but self-understanding.”

How has this development come about ? To seek an answer let us peep back into antiquity. According to evolutionary theorists, man evolved from primitive fishes who first appeared on earth about 500 million years ago. Their life in sea did not depend upon their own sweet will but on the biological evolution and the ecological factors. The appearance of dinosaurs 200 million years ago and their supermacy on earth for several million years was linked with a warm and sticky climate rather than their disproportionately small brain and poor mental faculties. The Cenozoic era which dates back to over 70 million years ago brought about the catastrophic end of the age of gigantic reptiles ; and this was due to their inability to adapt themselves to a change in environment. The changing ecology was unsuitable and because they lacked intelligence to understand their situation, natural fate forced these giants into extinction. It would seem that the decreasing temperature on earth's surface at that time literally froze reptiles to death because of inadequate internal temperature regulating device, and in their place small, warm-blooded, mammals slowly grew in number and size.

It is claimed that about one million years ago man appeared on the scene who shared with other animals most biological laws and a virtual dependence on natural forces. He did not know how to make a fire or a wheel, and he was not yet able to influence the functions of his own body or to modify his environment. The establishment of his superiority over other living creatures was his gradual achievement of ecological liberation. Slowly the first sparks of intelligence began, to challenge natural fate, and in words of Dalgado the man pondered : “Why should he (man) accept unnecessary hardships ? Why should he be wet because the rain was falling, or cold because sun was hidden, or be killed because predators were hungry ? Why should he not cover his body with the soft skins of animals, construct tools and shelter, collect food and water ?”. In this quest attention was gradually directed toward the human body itself. Personal experience was not lost, but could be transmitted from generation to generation. The growing culture, achieved through a gradually elaborated spoken and written language, represented a turning point to open vistas and lead to continuous advance of

civilization. Ecological liberation could progress not by hiding inside caves but by facing danger. Man challenged the immense power of natural forces, “using a lever to lift weights heavier than muscular power could manage, tricking the wind to push sailing ships through the ocean, and taming the rivers to turn the grinding stones of the mills”. Thus the victory of human intelligence over the fate of nature—a victory without precedent in the history of other animal species, heralded the process of man’s ecological emancipation. The ecological independence has allowed human beings to direct their intelligence towards goals more interesting than mere survival. He has used the power of his intellect and reason to tame atomic power, break genetic code and enhance with a unique pace the tremendous accomplishments that abound us. By sheer ingenuity and foresight of human mind, we are poised today for a leap where the development of civilization, and the charting of our lives depends more on our intelligent decisions rather than on ecological factors. Thus the human mind has become the sheet anchor of the events to come.

There is, however, the other side of the coin. According to Arther Koestler, evolution has equipped our species with a type of brain in which affect-based beliefs are disassociated from and are in perpetual conflict with the reasoning intellect. The result is a split-minded or schizophrenic mentality, which seems to be inherent in man’s condition and is reflected in his bizarre and tortured history. "Evidently something must have gone wrong at some point in the evolution of Homosapiens. But when we ask what it is that has gone wrong, we usually get the dusty answer that all evil stems from selfish, greedy, aggressive tendencies in human nature." This explanation does not appear to be very convincing. “What the record indicates is that in the major disasters in our history, individual aggressiveness for selfish motives played an almost negligible part compared to unselfish loyalty and devotion to tribe, nation, religion or political ideology. Tribal wars, national wars, civil wars, religious wars, world wars, are waged in the purported interest of the community, not of the individual, to decide issues that are far-removed from the personal self-interest of the combatants.* It would seem that the basic problem with man has been his extreme loyalty rather than aggressiveness ; and it is his fanatical loyalty as a motive force that has led him to the point of self-sacrifice, to the king and country, leader or group.

It may be suggested that the self-assertive tendencies in the emotional life of man are less harmful to the species than his self-transcending or integrative tendencies. One can recall from history that the victims of individual crimes are far too less and rather insignificant as compared to the masses cheerfully sacrificed in blind devotion to religion, dynasty or political system. It is a curious fact that man, when alone, behaves in a different manner seeking self-interest, than when he is in a group. The group loyalties, with which he identifies himself, take precedence over his individual expressions. The clues for this ambivalence in his nature are perhaps best provided in the peculiarity of the human brain to sustain affect-based belief-systems that are incompatible with its reasoning faculties but nevertheless co-exist with them.

There are other factors that seem to be equally basic to the human predicament. One is the emergence of language as an exclusively human blessing and curse. It has its substratum in the neocortex. Language not only promotes communication and understanding but it also accentuates the differences in tradition and beliefs and thus tends to erect barriers between tribes, nations, regions, and social classes. Everyone acknowledges the power of language in influencing our way of life. From the primitive use of vocabularies to the organised development of languages, man has made a remarkable progress as are documented in the ever inspiring pieces of poetry and literature. With the latest telecommunication link-ups, the communication media has brought people nearer, yet man tends to be lonelier. It is indeed an

irony that the systems of information transfer are becoming more and more devoid of human element, strangely separating man from man.

Man has risen above the rest of the members in the animal kingdom by the development of the faculty of reason in him—also a manifestation of the neocortex. One marvels at the achievements of man. The various breakthroughs in science and technology bear testimony to his brilliance. But in the process of achieving these goals, the forces released are tending to lead man towards self-extinction. In his bid to control phenomena, and master environment for himself, man is unwittingly slipping into slavery.

Man is also endowed with an equally potent faculty of emotion. In its most fundamental aspect, this faculty helps him to perceive values, realize the significance of the knowledge he has gained and confers on him the wisdom in the creative use of the power at his disposal. Unfortunately “by a tragic twist of irony man has advanced by leaps and bounds in the growth of his intellect, knowledge and power, but his value-perceiving, significance-revealing, wisdom-conferring faculty of emotion remains stunted, by contrast”. In short it may be said that man today is an intellectual giant but an emotional pigmy. This is a major crisis with repercussions in every area of his activity.

We are thus today concerned not so much with the accomplishments of man but his predicament, and the subject has achieved an urgency as never before. While the pace of progress in recent times has been rather phenomenal and we are in the midst of population explosion, knowledge explosion and so on, we have done very little in the domain of ethics and self-understanding. This dichotomy, Koestler suggests, is a consequence of evolution and is related to the development of split-mind. He points out that the evolution proceeds by trials and errors and one need not be surprised if there is some construction fault in the circuitry that we carry inside our skulls. Evidences gained during the last three decades or so suggest that the ultimate cause may be the exceptionally rapid growth of the hominid brain. The brain explosion seems also to have followed the exponential curve; and the explosions rarely produce harmonious results. The consequent effect is that in our case insufficient coordination exists between the phylogenetically old areas of our brain and the new; specifically human areas of the neocortex, which were superimposed on it with such unseemly haste. Paul MacLean calls this disorderly state of affairs in our central nervous system as schizophysiology. He describes it as a ‘dichotomy in the function of the phylogenetically old and new cortex that might account for differences between emotional and intellectual behaviour. While our intellectual functions are carried on in the newest and most highly developed part of the brain, our emotional behaviour continues to be dominated by relatively crude and primitive system, by archaic structures in the brain whose fundamental pattern has undergone but little change in the whole course of evolution, from mouse to man’.

Let us examine in some details what this brain is, like—its capabilities and limitations, the technical problems involved in its possible control and finally the outlook for development of a future psychocivilized society. In the language of MacLean, the human brain is described as a hierarchical system essentially consisting of three brains representing the reptilian, the paleomammalian and the neomammalian stages of phylogenetic development. The reptilian brain corresponds to the greater part of the brainstem and contains much of the so-called reticular system, the mid-brain, and the basal ganglia. This is the oldest of the three brains and is faithful in doing what its ancestors say, but it is not a very good brain for facing up to new situations. It seems to be a slave to the precedent, and performs stereotyped responses thus playing a primary role in instinctively determined functions.

The appearance in evolution of the lower mammalian brain, which nature has built on top of the reptilian brain, is of particular interest to us because it is this lower mammalian brain that plays a fundamental role in emotional behaviour. It forms a ringlike convolution surrounding the brainstem (called as limbic lobe by Paul Broca) and has been found as a common denominator of emotional behaviour in the brains of all mammals. The neomammalian cortex which is well differentiated and is concerned with the higher intellectual functions has ballooned out to such an extent that in man it has folded over and crowded the old one into the cellar of the brain. Thus even on a structural basis, there has been a disproportionate over-growth of neocortex as compared to the paleocortex, and this is certainly reflected in the functional dichotomy.

Our primary emotions are feelings (affect) associated with such basic body needs as food, water, air, territory, sex and so-forth ; and out of these primary emotions are generated secondary emotions such as fear, anger, hate, love, familiarity, strangeness, and hosts of other feelings. During the last three decades, attempts have been made to investigate some of these attributes. With the development of sophisticated electrophysiological and telemetric techniques for stimulation and recording, it has been possible to delineate the functions of different structures lying deep in the paleomammalian brain—the seat of emotional behaviour. By appropriate stimulation, say of hypothalamus, one can experimentally induce a defensive or rage reaction in an otherwise quiet cat or monkey, and this has analogue in man ; on the other hand, an aggressive animal can be tamed or made docile by manipulating another tiny discrete area in amygdala. The various forms of sexual urges and manifestations, grooming and pleasure reactions can be influenced or aroused depending upon the locus, mode and nature of the manipulation. Thus it has been shown that this limbic brain elaborates emotions that guide our behaviour both in regard to self-preservation and preservation of the species.

While, we have discovered certain important of man's brain, the main thrust of exploding science has been directed towards industry, outerspace exploration similar other fields. This contrast between the a growth of technology and our limited advances in the understanding and control of human behaviour a growing threat. Our highly superior mental I the animals have provided us with vast amount of accumulated destructive power but we lack self-know emotional control. This is a grave danger f teaches us that when underdeveloped brains are of great power, the result is extinction. It is time reeducate ourselves to control social antagonism desirable emotional manifestations. As these processes are related not only to environmental features but brain mechanisms, we should know more about our brain. It is reasonable to assume that just as more knowledge natural mechanisms allows us to use and control forces, a clearer understanding of the brain should to use our mental faculties more meaningfully, considerable efforts by social and political or only limited success has been achieved in finding to our present social conflicts, because the reference have been politics, economics, history, the basis of brain mechanisms related to man'; aggressions, desires and pleasures have be ignored. We are geared to produce more machines than to facilitate individual happiness, therefore, that a reappraisal of our frame of done.

May I conclude on an optimistic note that possess the necessary technology for the e investigation of mental activities. We can methods to influence the brain, its functions and purpose, and thereby ensure both the preservation and advance of civilization. Let us try to know ourselves better! That we follow a critical appraisal becomes rather vital since man is standing at cross roads and in spite of his acknowledged supremacy there is the potential danger of his predisposition to self-destruction because of the built-in error in his native

equipment and circuitry of the brain.

REFERENCES

1. **Dalgado, J. M. R. : *Physical Control of the Mind*, Harper & Row, New York, 1969.**
2. **Larry, N. G. (ed.) : *Alternatives to Violence*. Time Life Books, New York, 1968.**
3. **Varma, R. M. : "Yoga and Mental Health", *Seminar on Yoga*, Delhi, March, 1975.**
4. **John Taylor : *The Shapes of Mind to Come*, Panther Books Ltd.. Frogmore, 1974.**
5. **Lyall Watson : *Supernature*, Coronet Books, London, 1974.**
6. **Nigel Colder : *The Mind of Man*, The Viking Press, Inc., New York, 1971.**
7. **Chandler Elliott, H. : *The Shape of Intelligence*, G. Allen and Unwin Limited, London, 1970.**