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NEUROPHYSIOLOGY AND THE PHILOSOPHY OF MIND

In the middle of the eighteenth century, Julien de LaMettrie developed a doctrine characterized by the title of his best known work, *Man A Machine.* His defense of a purely materialistic view of mind was based on evidence he gathered as a medical doctor. He presents evidence of the physical effects on the "soul" from disease, drugs, sleep, food, age, sex, temperature and climate. Thought, he claims, is one of the properties of organised matter "on a par with electricity."[1] This leads him to say that the brain has its muscles for thinking as the legs have muscles for walking (132). He concludes that "man is a machine and that in the whole universe there is but a single substance differently modified,"(148) suggesting that "if we arm ourselves with the touch of experience" (146) we will not imagine anything beyond nature and will have no warrant for believing in a God or in any supernatural agency. The effect of such a philosophical position, says LaMettrie, can be nothing but salutary.

Interestingly enough, LaMettrie saw himself as a disciple of Descartes, but only of one "side" of Descartes, namely that which emphasized that the world of nature, including animals, was nothing more than a machine. If it is the case that the limbs of animals can be moved by objects of sense without the aid of "soul", it is easy to conclude that humans are also animals and their actions can be explained in the same fashion. LaMettrie claimed that his conclusions were based on empirical evidence, on physiological observations and not on deductive reasoning.

Medical science in the 1750's had not, however, advanced much beyond the discoveries of Vesalius and Harvey. While LaMettrie himself had actual experience as a physician, his findings were limited to those accessible to one of his own day, with limited instruments, limited skills and no technology for studying the brain as a physical object. He could not actually point to muscles in the brain that produced thought; he merely inferred that there had to be such. He could observe the results of certain physical stimuli on the body; he could not literally stimulate the brain itself or test his theory in any empirical way.

It is only comparatively recently that neuro-physiologists

have been able to conduct actual experiments on the brain itself. They have not found any muscles for thought but they have been able to stimulate electrically certain sections of the brain and thereby produce highly interesting conscious experiences in their patients. One is now led to wonder what conclusions are warranted philosophically by such explorations as to the topic the philosophy of mind.

Philosophers who themselves have never conducted any physiological experiments on the brain have worked out conclusions on the nature of the brain-mind relationship on the basis of conceptual analysis, introspective investigations, phenomenological explorations, metaphysical speculation or psychological experiments on animals. Some have allowed the requirements of a metaphysical system to dictate what they would accept as an appropriate philosophy of mind Others have allowed their philosophy of mind to prescribe a metaphysics, moving as LaMettrie did, from a strictly physicalistic view of mind to what today is called scientific realism. In some cases, a long religious tradition has been influential in molding a contemporary theory of mind and its place in nature. But we must now ask how much credence can be given to the results of science on this topic.

The problem turns on what one will accept as evidence and what one will accept as explanation. LaMettrie thought he had accumulated enough evidence to warrant a purely materialistic explanation, that is, an explanation by means of causes. He observed what caused certain reactions in animals and inferred that the actions he saw in humans had similar causal support. Those in the general "materialist" tradition also take the view that explanation must be fundamentally causal. If one cannot find a scientific cause, either he keeps searching for one, or abandons the problem as insoluble. The persistent and undoubted position is that if explanation is not causal it is not explanation. Jacques Monod, surely not a philosopher, even asserts that he can "explain" the apparent human need for "explanation". Of course he does that by means of scientific causality. It strikes him as "beyond doubt" that the imperious need for explanation "develops spontaneously, that it is inborn, inscribed somewhere in the genetic code."[2] Monod then glibly identifies scientific knowledge as "objective" and "the only authentic source of truth," which stands out coldly and austerely to renounce "the ancient animist covenant."[3] Accordingly,

for Monod, explanation equals scientific objectivity—as if reason could not stand in judgement over that ! Even so broad-minded a psychologist as Robert Ornstein insists that the only explanation model possible is a scientific one. At the same time he wants a "complete science of psychology" which includes both the "Eastern" and "Western" emphases, these being caused by the domination of the right hemisphere and left hemisphere of the brain, respectively.[4]

Now without challenging that simplistic but pervasive view of explanation, we may still ask what we can learn about the philosophy of mind on that level. In a zealous and overconfident book, Dean E. Wooldridge claims that we are on the brink of solving the problem of consciousness. Consciousness, he says, is a property "possessed only by very special organisations of matter when placed in a suitable electrochemical state."[5] Using the analogy of a computer, Wooldridge affirms a thoroughly reductive materialistic view of mind hoping thereby for a 'permanent plugging of the hole in the logical structure of the mechanistic philosophy."[6] He discusses the automatic control circuits in the nervous system, the "permanently wired-in behaviour patterns" of lower animals, the "electrical nature of conscious mental processes," and the like, concluding that "of the greatest human significance.... is the probability that our subjective sensations are ruled in a regular and predictable way by the processes of natural law." When the computer and brain sciences converge "the result may well be the transfer of the phenomena of consciousness out of metaphysics and into the realm described by the physical laws of nature."[7] Of course, we could also consult the work of psychologists who engage in experimental research on behaviour, but their work, for ethical reasons, is almost exclusively confined to the exact study of animal behaviour. They cannot use human subjects in any thoroughgoing way. To be sure, they have discovered some truly remarkable things not only about salivation in dogs, but about rat activities, the ability of pigeons to detect differences in colours, how chickens trigger food dispensing machines, and more recently the exciting data about chimpanzees who can communicate their wants by putting words together in sign language.

The argument of those who have given their serious efforts to such animal experimentation is that the more they can discover about such behaviour, the more they will know about human behaviour and human intelligence. When they have been able cau-

tiously to test out some of their hypotheses on humans, there have been some analogues, but there have also been differences. A few persons have willingly volunteered to become subjects for experimentation, but the kind of detailed and "controlled" experiments that can be done with animals cannot yet, and probably never should be done with humans. In 1980, for example, a head of one monkey was transferred to the body of another monkey with some remarkable but tentative results. It is inconceivable that two human beings would willingly involve themselves in such experimentation in order that some third person would get new light on the mind-body problem !

Regardless of the confidence of some Western psychologists about their work, they have not yet begun to probe the depths and nature of mind in their quest for causal explanations. They cannot even explain why human minds want to find out about themselves. Nor can they account for the motivation of scientific knowledge itself or why such activity is significant. They can not even explain why it is worthwhile to conduct experiments! On a strictly materialistic account, it is difficult to explain how it is possible to decide what is relevant and what is irrelevant in experiment. If a purely *causal* account is given, then how can one *decide* to avoid error? If all actions have a simple physical causal base, then all the actions of the psychologist himself as well as his findings are no better or no worse than the findings of anyone else since they were "caused" in him, and were not the result of careful reflection, of sifting evidence, of deciding. One cannot decide what is true if the deciding process itself is caused by some physical agency, — if one is not free enough himself from causal law to reject error about causal law. But that logical implication does not seem to bother many scientists. It is of considerable importance to philosophers of mind.

The view that explanation is causal does get some support from practicing neurologists and neuro-physiologists. Here are some scientists who have actually had occasion to experiment with the brain itself in the courses of their efforts to alleviate epilepsy or deal with the unique difficulties of brain damage in accidents. Neurologists like the late Wilder Penfield have come upon their findings in the course of their work with epileptics and only since 1973 have some striking results been obtained.

In his recent book, *Purpose in a World of Chance : A Biologists' View*,[8] W. H. Thorpe challenges the "received" materialism of some

natural scientists like Jacques Monod and some psychologists. The scientific materialist denies that there is any problem of consciousness because he claims that consciousness is an "introspective fantasy." There are only brain states. Thorpe asks : "How can brain-states provide a complete up-to date description of themselves?" (82) He chides Skinner's modern behaviourism for relegating conscious experience to a minor role and for resolving the mind-brain problem by ignoring both brain and mind. He concludes :

> Skinner's approach remains, as it always has been, completely anti physiological, considering the brain as unavailable to useful study, as if it were enclosed in a black box which could in no way be penetrated, and reducing the mind to utter ineffectiveness. (82)

Thorpe then notes that the progress of brain neurology since 1953 "has been such as to reveal a complexity beyond imagining." (83) We cannot rehearse all of his findings here, but the major general point is that there is a neuro-physiology of conscious experience experimentally based and that this leads to a clear distinction between minds as it experiences itself to be and the physiological states of the brain.

The evidence for this comes from actual experiments by the neuro-surgeon Wilder Penfield. Penfield was able physically to stimulate the motor cortex of conscious subjects and thereby evoke actions which the person said were not his own. The person would remark : That was due to something done to me and not something done by me. The person was not consciously aware of having initiated an action himself though an action took place in his body which he was aware of but which was the result of external stimulation to the brain. Penfield also recounts that when his electrode touched the cortex of some patients they would report memories of past experiences not ordinarily subject to recall. One case is suggestive :

> D. F. could hear instruments playing a melody. I re-stimulated the same point thirty times (!) trying to mislead her, and dictated each response to a stenographer. Each time I re-stimulated, she heard the melody again. It began at the same place and went from chorus to verse. When she hummed an accompaniment to the music, the tempo was what one would have expected.[9]

Without for a moment denying the intimate connection between brain and consciousness, Penfield and others are never willing to say that the two are the same. They have direct experimental evidence that it is quite otherwise. Penfield takes the position that the mind can be a causal agent to stimulate the brain and proposes the instructive analogy that the brain is an elaborate computer and the mind is the programmer. In an experiment with a patient whom he could make unable to speak (i.e. aphasic) by a gentle electrical current, he noticed that the patient, when asked, could control his attention. Penfield concluded :

> I can say only that the decision came from his mind. Neuronal action began in the highest brain-mechanism. Here is the meeting of mind and brain. The psychophysical frontier is here. The frontier is being crossed from brain to mind since the mind is conscious of the meaning of the neuronal succession that determines the content of the stream of consciousness.

The neuronal action is automatic as it is in any computer. (53) He gives another convincing example in the case of Lev Landau, a Nobel Prize winning physicist who had a very severe accidental head injury. The case showed how it is that when consciousness is present, the highest brain mechanism is used to activate and employ other brain mechanisms that are capable of normal function, though the mind itself cannot recall past experiences unless the brain's special mechanism of scanning and recall is functioning normally. (71) Later, Penfield claims that the mind "seems to act independently of the brain in the same sense that a programmer acts independently of his computer, however much he may depend upon the action of that computer for certain purposes."(79)

As a neurophysiologist seeking causal explanation, Penfield is hesitant to affirm conclusively that the mind is a distinct and different essence though everything seems to him to point in that direction. He also proposes that man is not alone in the possession of consciousness for there is evidence of it in the highly complicated nervous structure of the ant and such mammals as the beaver, dog or chimpanzee, the brain, he assumes, making consciousness possible in them too. (62)

He then distinguishes three integrative mechanisms in the brain, each of which has a major area or nucleus of grey matter, an aggregation of nerve cells that may be activated or paralyzed.

(a) The highest brain mechanism carries out the neuronal action that corresponds with action of the mind. An injury to this area in the higher brain stem produces invariable loss of consciousness. (b) Automatic sensory-motor mechanism. This has the function of co-ordinating sensory-motor activity previously programmed by the mind. It is a biological computer mechanism which carries on automatically when the highest brain mechanism is selectively inactivated. (c) The Record of Experience. Electrode activation of this mechanism is to recall to a conscious individual the stream of consciousness from past time. (64)

Penfield has evidence to conclude that conscious attention adds something to brain action that would otherwise leave no record.

> It gives to the passage of neuronal potentials an astonishing permanence of facilitation for the later passage of current, as though a trail had been blazed through the seemingly infinite maze of neuron connections. (75)

He then points out that in focussing attention, being aware, reasoning and making decisions, the mind "acts as though endowed with an energy of its own." (76) There is no place in the cerebral cortex, Penfield discovered, where electrical stimulation will cause a patient to believe or decide. (71) Nor is there any "valid evidence that either epileptic discharge or electrical stimulation can activate the mind."(78) though the record of consciousness can be activated. He concludes that the mind "must be viewed as a basic *element* in itself. One might, then, call it a *medium*, an *essence*, a *Soma*. That is to say, it has a continuing existence." (81) [Italics in original] He goes on to add this : "On this basis, one must assume that although the mind is silent when it no longer has its special connection to the brain, it exists in the silent intervals and takes over control when the highest brain-mechanism does go into action." (81)

That view is far more probable than the position which avers that the highest brain mechanism, a spatial entity, should itself understand and reason and direct voluntary action or decide where to focus attention. Later, Penfield makes the following remarkable statement : "What a thrill it is, then, to discover that the scientist too, can legitimately believe in the existence of the spirit!"(85)

We may now ask again what one may require as evidence and

what one may mean when he probes the question of mind. The fascinating evidence Penfield and others supply obviously fulfills the canons of scientific method. But we need not yield the conclusion that the only kind of explanation is therefore causal. Nor need we wait for some bright day when science has explained away the mystery of the mind in some causal way. If one takes into account the findings of Penfield and considers seriously his proposed conclusions, it seems to me that he has convincing reasons to reject any simplistic mind-brain identity theory and probably any form of scientific realism. Those views cannot "explain" the phenomena neuro-physiologists have observed. Of course, a view like LaMettrie's is vacated. And one would think that any view like Ryle's which denies the uniqueness of introspection would also have to be set aside, along with Skinnerian behaviourism. When practical scientists with hard data show experiential grounds for distinguishing mind and brain, for saying that consciousness is not a mere epiphenomenon, it ill behooves a philosopher to insist on some reductive identity theory. The burden of explanation is now switched to them.

Of course the impact of such findings, including those of Karl Popper and John Eccles, has not yet been fully explored. Penfield himself believes it reasonable and possible that a mind can communicate with God, that energy from without can reach a human's mind. He goes so far as to say that in that case "it is not unreasonable for him to hope that after death the mind may awaken to another source of energy,"(88) though science itself could never verify such a view. Penfield's own religious and philosophical orientation is primarily a Western one as is that of W. H. Thorpe, referred to above. Neither has gone very far into the philosophical or metaphysical issues, though Thorpe concludes his study with a marked leaning towards Whitehead's position.

Nor do either of these two thinkers give any special attention to the Yogic view of the utter uniqueness of consciousness and its remarkable abilities, when trained, to control attention, or physiological happenings like voluntary control over the autonomic nervous system.[10] But their objective scientific findings would show how such events would be factually possible. That is more than any western materialist or scientific realist could do. Perhaps some of the relatively speculative theories of Yoga, especially Kundalini, could be fruitfully reviewed in the light of the neuro-

physiological data now available. Up to now, it seems that such theories have been more revered and protected than tested against sound neuro-physiology, though a man like Professor K. N. Udupa has indeed tried to make such linkages.[11]

The philosophical issues raised by the discoveries of the neuro-physiologists are fascinating and far-reaching. If, as Penfield claims, memory is unmistakeably linked to the higher brain mechanism, indeed has its exclusive home in the highest brain mechanism, separate from the mind, the aggregate of experiences previously programmed into it, then it would seem that the mind itself would have very little describable content if it were to exist apart from the brain mechanism. A Westerner could well ask, "What interest would there be in continuing to live after physical death if there were no awareness of who one was?" A mere persistence of consciousness without any self-identifying memory to preserve uniqueness would seem of doubtful significance. The personality would be gone.

On the other hand, Penfield has been able to stimulate memories in persons which they themselves have long since forgotten.[12] Theoretically it would seem that with enough experimentation one could reawaken one's memories of the very earliest childhood experiences. And could one not also awaken experiences of a putative former life? If that were done by a neuro-surgeon, it would be convincing evidence of reincarnation, more convincing than the anecdotal material gathered by Prof. Stevenson of the University of Virginia, because it would be verifiable *in principle*. However, if memory is a function of the highest brain mechanism and is to be understood on the analogy of a computer, then when there is brain disintegration there is also no memory. Thus, it would really not be possible to produce any memory of a previous life in the consciousness of some living patient for there would be no preservation of the requisite physiological material.

This leads us to another query. Can one say that a mind can be meaningfuly said to exist if there is no memory content whatsoever after physiological death? If the mind is a basic element in itself, as Penfield is wont to believe, what content would it have when totally separated from the fund of memory rooted in the physiological mechanism? While mind is an agent with independent power on this neurological view, that power is merely an abstract essence unless there is some persistent awareness of one's self and his past

decisions, some persistence of individual personality. On the other hand, one could speculate that a mind viewed as a spiritual essence without the support of physiological memory banks might well persist as impersonal consciousness apart from any awareness of self-identifying individuality.

That mode of speculative projection would provide a reasonable, even scientific account of what it means for one to enter into union with Brahman-Ātman. Further thought, however, suggests that this would introduce serious difficulties concerning the theories of reincarnation and karma. What instrumentality would carry the record of past lives into one's present life and to the next life in order to ensure that karmic consequences would be realized?[13] If mind is a spiritual essence in itself without specific content after death, not only would the personality be lost, so too would any persistence of karmic effects. Neither Western nor Eastern idealistic thinkers would find that view acceptable. On the other hand, dare any philosopher overlook actual neuro-physiological findings when it comes to udertaking the mind? If the mind is "programmer" and the brain the "computer", of what significance is a programmer which persists without a computer?

Thus, instead of solving problems relating to the philosophy of mind, such neuro-physiological data as we have mentioned seemed to raise yet deeper and more intriguing qustions. We can rest, however, with some satisfaction for these experimental scientists have provided decisive evidence aginst any brain-mind identity theory and against any reductive materialism. That may be enough to be grateful for even though more problems are yet to be dealt with.

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NOTES

1. Julien Offray de LaMettrie *Man a Machine*, tr. G. C. Bussey, (Chicago : Opencourt, 1912), p. 114. Parenthesized numbers in the paragraph refer to pages in this volume.
2. Jacques Monod, *Chance and Necessity*, tr. A. Wainhouse, New York Alfred A. Knopf, 1971), p. 167.
3. *Ibid.*, p. 169f.

4. Robert Ornstein, *The Psychology of Consciousness* (New York : Viking Press, 1972).
5. Dean E. Wooldridge, *The Machinery of the Brain* (New York : McGraw-Hill, 1963) p. 240.
6. *Ibid.*, 239.
7. *Ibid.*, 241.
8. W. H. Thorpe, *Purpose in a World of Chance : A Biologist's View*, (Oxford: Oxford University Press, 1978). Parenthesized numbers immediately following in the text refer to pages in this book.
9. Wilder Penfield, *The Mystery of the Mind* (Princeton : Princeton University Press, 1978), p. 22. Parenthesized numbers which follow in the next several paragraphs are citations to this volume.
10. K. N. Udupa, A *Manual of Science and Philosophy of Yoga* (Varanasi : Banaras Hindu University, 1976), p. 21.
11. For example, Udupa suggests, that the Sahasrara Chakra "can be compared to the hypothalmic region". *op. cit.*, p. 10.
12. Cf. Wilder Penfield, *op. cit.*, Chapter 6.
13. See Karel Werner's instructive essay "The Vedic Concept of Human Personality and its Destiny" *Journal of Indian Philosophy* Vol. 5, (Jan. 1979), pp. 275-289. The three levels of personality structure he adduces do not coincide with experimental neurological findings,— the unborn center, the phenomenal self, the body.