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KARL H. PRIBRAM¹

I stand accused. I have been found guilty of asserting that subjective states are coordinate with certain brain states. I also have been found guilty of asserting that there is a problem in differentiating the reference for any of these subjective states. Thus, according to my thesis, sometimes the reference is to the skin surface where energy transformations take place, sometimes the reference is introjected to bodily processes within the organism and sometimes to objects projected beyond the skin. I have therefore developed this thesis to state that it becomes useful and interesting to take the skin as an arbitrary boundary which demarcates the world within from the world out there and I have explored some of the issues and problems consequent on holding that thesis.

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Marjorie Grene has taken another stance. Professor Grene suggests that we begin our explorations by envisioning the organism-with-his-world as a unit, that unit to be called the person. In my view mental states derive from brain states; in her view, as I see it, mentation is one aspect or dimension of the person. Marjorie Grene's view takes into account and emphasizes the history of organism-in-his-world to account for changes in mind or consciousness produced by brain injury; my view begins with the here and now dependence of mind on brain and brain on mind and derives history from this circularity.

Professor Dreyfus, in his accusations leveled at both Marjorie Grene and me, unfortunately misses the point. The issue is the difference in the stated assumptions that determine our views. He is therefore confused and confusing. He asserts without giving evidence that we make statements that we do not make. He muddles the term *mind* which in my presentation expressedly stands for the sum of particular subjective states consensually validated. Professor Grene is addressing that part of mind which lends unity to subjective awareness, i.e., self-awareness. I have elsewhere,^[8] addressed the problem of "Selfconsciousness and Intentionality" on the basis of experimental brain research — here it suffices to make the distinction since the failure to make it has been so devastating to Professor Dreyfus' understanding.

Let me present some evidence of the confusion. Dreyfus states: "Perception of an object doesn't seem to be just like perception of an object ... that's what it is." I will graciously assume that his final 'it' refers to

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'perception,' although this is an incorrect usage of the English language. But at least the statement is then correct, albeit trivial. If Professor Dreyfus meant what correct usage would imply, that 'it' refers to 'object,' then he is patently *wrong*. We do suffer innumerable illusions which have provided the substance of experimental psychological research for generations and patients with micropsia or macropsia or with phantom limbs attest to the occasional difference between an individual's percept and what can be consensually validated. For the patient who experiences a phantom, this difference is vital. For Dreyfus, however, "it is not clear why the phantom limb should be thought of as a projected mental state (although Descartes certainly thought of it as such), since there is no evidence that it is first felt in the mind and then projected outwards." Unfortunately for Professor Dreyfus and fortunately for patients with phantoms whom I have treated, I stand squarely with Descartes on this matter and can defend our position both with *proper linguistic analysis* and with *evidence*.

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First, as already noted, my definition of *mind* is the congerie of subjective states coordinate with certain brain states. Dreyfus makes the statement "first felt in the mind and then projected outward." The term "in the mind" is superfluous here (what is felt is mental), but does emphasize the issue. The patient in fact "first feels the phantom" and often asks the attending nurse to massage his foot and unkink his toes *before* he is informed that these are now in the pathologist's jar upstairs. He is then acutely made aware of a disparity in his subjective state; the situation "out there" that ordinarily gave rise to his perception has changed. His perception remains essentially unchanged and for the first time he and his physician must 'really' distinguish between 'mind,' i.e., what is felt; and 'object,' i.e., what is projected. Further, clinical experience has shown that, depending on the duration of the phantom, intervention into 'mind' must become more and more central in the nervous system until only a *brain* operation will accomplish the desired change in feeling.

Dreyfus, therefore, concludes that 'Pribram is a pure Cartesian.' Yes and no. I do not deny dualism but suggest how we may transcend it. In a paper entitled 'Proposal for a Structural Pragmatism' ([4], pp. 426-459), I provide a systems explanation for dualism but suggest a resolution for the problems posed by the Cartesian dilemma without sweeping the problems under a rug as Dreyfus has done here with his attempt at radical behaviorism. That Dreyfus' approach will not work can be seen in his own manuscript. First he

argues that "as a philosopher one must remember that all of these investigations take place in a shared world in which we are surrounded by things and people external to us" — an assumption also shared by Pribram when he defined subjective states as involving consensual validation, a point seemingly missed by Dreyfus. But Dreyfus goes on to say that this shared world is "not in our brains or in our minds. Phenomenologically we are in a public world..." Then two sentences later he has to admit that "to be true to this phenomenon we must radically distinguish the *physical* level of interaction of external energy and internal brain states and processes, from the *phenomenological* level of persons acting in the world." Now, who is the Cartesian? Dreyfus claims "there is no place in this picture for a third level of mental states or processes shoved in between." But the whole point of my present argument is that had Dreyfus *read* my paper properly he would have found that his definition, and Marjorie Grene's as well, of 'persons acting in the world' and my definition of 'mental states' are operationally indistinguishable. What we apparently disagree on is the relation between 'person' or the 'mental states' that make up person and the *brain*. This is a legitimate area for disagreement but here again I claim some expertise. In still another paper, 'Toward a Neuropsychological Theory of Person' ([5], pp. 150-160), I point out once more from the standpoint of *evidence*, much of it accumulated in my own laboratory, what brain mechanisms are involved in which aspects of 'person'.

My argument thus runs: We seem all to be in agreement that (1) any analysis of the mind-brain problem must begin with the phenomenal person. Professor Grene and I both suggest, however, that (2) this phenomenal person is not a simple unanalyzable existential given, but a construction. This suggestion constitutes a paradigm change of considerable consequence which I have pursued in the structural pragmatism paper noted above. In that paper I propose (3) that analysis of person can proceed *either* to the subsystems that make up person — e.g., brain — or to the supersystems in which person is embedded. Professor Grene has, in her report to us, analyzed person in terms of his physical and social surround; I, in my report, concentrated on the person's components. Neither analysis by itself is complete. Person as a biosocial being and person composed biophysically and biochemically are complementary views of person as a whole. I have not here discussed at any length (4) the problem of person as a whole. However, Professor Grene did tackle this question using the data obtained from

patients with callosally split brains. As noted earlier, I have attempted elsewhere to handle this problem by differentiating self-consciousness from the consciousness of perceptual awareness. Further, I have pointed out that psychologists since William James have experimentally approached this issue in terms of the direction and span of attention.

In closing, I want now to illustrate with an example the utility of the component analysis in clarifying a specific set of problems raised in this conference. We heard earlier of the dilemma posed by masochism for an operational analysis of the problem of pain. We heard further that suffering appears to have a voluntary component. Thus pain appeared, on occasion, to be pleasurable and suffering a result of willed choice. Though consonant with the known facts, these observations appeared to be sufficiently paradoxical to bring into question the sanity of observed and observer alike.

An understanding of the physiological mechanisms of pain — the brain part of the mind-brain whole — clarifies the apparent paradox in a way that attention to mind (or person), alone — the exercises we heard presented — cannot. The problem was given us in two parts: (1) pain vs pleasure, and (2) *The* minding pain; the analysis proceeds accordingly.

First, *two* neural systems deal with the effects of nociceptive stimulation. One system is composed of fairly large peripheral nerve fibers that convey impulses rapidly to the brain stem, and thence to the parietal cortex. This fast system has been known for some time to deal with locating the nociceptive stimulus and was termed *epicritic* by Henry Head [2]. Another system, much more interesting for our present purposes, utilizes very fine peripheral nerve fibers to more slowly transmit the effect of nociceptive stimulation to the brain. The terminations of these fibers and the functional mechanisms of the brain parts in which this slow pain system terminates are only now beginning to become clear. I have recently suggested the term *protocritic* for this system since it apparently deals with the elementary intensive aspects, not only of nociceptive, but of all sensory stimulation.

A striking discovery has just been made regarding the protocritic system. We heard earlier of the gate theory of pain proposed by Melzack and Wall [3]. This theory has the advantage ^{THAT} it explains the fact that under certain circumstances nociceptive stimulation fails to produce pain which on other occasions would result from identical stimulation. The recent discovery is that in addition to neural gating, a substance is secreted that acts as a chemical gate. This substance has protective properties against pain, similar

to those of morphine and is thus labeled MLS – morphine-like-substance. This discovery of a pain protective substance places the pain mechanism along with others which depend on the chemical sensitivities of the central nervous system. (The central core of the brain stem is endowed with a variety of receptors sensitive to blood sugar level, osmolarity, partial pressure of CO₂, catechol and indole amines, to name just a few of the most potent of these chemicals monitored by the brain stem structures.)

Characteristic of these chemically sensitive mechanisms is their homeostatic organization. Control over the concentration of the substance to which they are sensitive is obtained by means of a feedback operation. A gate is such a feedback. The control of pain, therefore, is to be conceived in terms of homeostasis.

Homeostatic mechanisms display an appetitive and a consummatory phase. The pain homeostatic mechanism apparently is no exception. As we heard earlier, itch, the masochistic ritual that serves as a prelude to orgasm, and even the initial orgasmic buildup, are appetitive in their manifestations. And, as in all appetitive processes, whether they are perceived as pleasurable or painful depends on a variety of intensive factors such as incrementation, past history (expectation), and duration.

But this is not all. Professor Bakan, in his superb presentation, addressed the issue of minding pain as in part a problem of volition. The feedback homeostatic pain mechanisms of the brainstem, described above, have little to offer by way of explaining this second paradox. But as Professor Bakan noted, pain must often be suffered, and frontal lobotomy has been found to relieve suffering. Suffering comes about when the ordinarily homeostatic *negative* feedback of the pain mechanism is converted by faulty timing, failure to consummate, etc., into a positive regenerative feedback which produces accruing oscillation rather than stability. Such a positive feedback can be brought under control by the intervention of an override [1], a process that converts the feedback to a feedforward. Feedforward processes are characterized by a parallel rather than a hierarchical organization ([6], Chapter 5). Minding – i.e., paying attention (as defined by Ryle and used in my earlier presentation) – initiates such control on the homeostatic feedback operation of the pain system by way of providing parallel simultaneous sensitivities much as do the currently popular biofeedback procedures [8]. In minding, whether by way of biofeedback or more ordinary means, previously automatic processes are brought under intentional, voluntary

control, much as an automatic thermostatic feedback mechanism is converted into a more flexible system by the introduction of a bias, the little wheel on top of the instrument by which one can alter the set point (the temperature) around which the feedback will become stabilized. I have elsewhere reviewed the large body of experimental evidence which indicates that the frontal cortex of the brain operates as an executive to the rest of the brain, ensuring flexibility of operation by a mechanism similar to the introduction of a bias on a thermostat ([7], pp.293-314).

This, therefore, is an example of the utility of a brain functional approach to problems posed by philosophical analysis. The paradox of masochism can be understood when it is realized that the mechanism of pain perception involves a homeostatic feedback process which has an appetitive and consummatory phase. The paradox of the voluntariness of suffering can be understood when it is realized that feedforward intentional operations as well as feedbacks are involved in the control of pain.

The philosopher may argue that such scientific understanding is incomplete, and his argument must be honored. Scientific understanding is never complete. There remains an awful mystery to the proper production of a symphony by a piece of corrugated cardboard, moved by a magnet, controlled by a stereo high fidelity system even after we scientifically know the characteristics of each of the components and have complete access to circuit diagrams and the like. Still, scientific understanding is enriching. In the analysis of the mind-brain problem, the topic of this conference, neuroscientific understanding can contribute enormously. To paraphrase Marjorie Grene's brilliant closing comment at our session: the recent, often astounding, discoveries in brain function have, on occasion, made the neo-Cartesian scientist seem out of this world. This, however, is perhaps to be preferred to the radical behaviorism which, stemming from a positivist tradition, has driven the philosopher out of his mind.

NOTES

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