THE TONY CHADWICK ESSAY PRIZE 1993 - RUNNER UP

IS THE MIND PHYSICAL?
DISSECTING CONSCIOUS BRAIN TISSUE

by Peter Lloyd

The mind-body problem has obdurately persisted since Descartes put it forward in 1641. The problem is: what is the nature of the conscious mind, and how does it relate to the body?

Today, the prevailing view is that the mind is really a physical phenomenon inside the brain. This is **physicalism,** in contrast with two other broad views: **dualism** - that mind is irreducibly different from matter; and **mentalism** - that there is no physical world at all.

I shall describe a hypothetical experiment that could be carried out on a conscious brain, and suggest that the outcome predicted by physicalism is unbelievable. The experiment illustrates the 'unity of mind' problem, highlighted by Descartes in his *Meditations* : that the brain is extended in space and is therefore dissectible into parts, but the mind is not.

WHERE IS MY MIND?

I usually construe my mental sensations as being in parts of my body. E.g. if I drop this word-processor on my foot, then I feel a sharp pain in my foot. Tastes I perceive on my tongue, smells in my nose and so on. And people often feel emotions in the heart or the belly.

The mind, in our everyday view, is interfused with the whole body. But where is it really? Surely the physical correlates of mental events are in the brain?

Consider injuries to nerve fibres which carry signals from sense organs to the brain. For example, sciatica. This condition sends painful signals up the nerves into the brain. The brain construes the pain in the part of the body where the incoming nerves are rooted. This is because the brain is unaware that the signals originate *en route* in the damaged nerve fibres. Or one could electrically stimulate incoming nerves: the brain will project the sensations onto wherever it presumes the signals to have come from.

So the mind is not really interfused throughout the body but is tied to the brain. The brain constructs the illusion that mental sensations are distributed over the body.

PHYSICAL CORRELATES OF THE CONSCIOUS MIND

Neuro-scientists have found which regions of the brain sustain which mental functions. One method is **positron emission tomography.** In this, radioactive glucose is injected into the bloodstream. Since glucose is a fuel for the body's cells, it is absorbed more by brain cells that are currently active than by idle ones. Minute particles are emitted by the radioactive glucose and pass straight through the body. They are detected by electronic sensors, whose readings are automatically fed into a computer. By some geometric calculations, the computer works out where in three-dimensional space the radioactive sugar is being used most rapidly. Those are the sites where brain cells are busy. The computer can display a

diagrammatic slice through the brain - revealing where nerve cells are especially active.

Neural activity can now be determined to within a few millimetres. But imagine that some future scanner can identify individual cells. And imagine that neuro-psychologists can find precisely which cells are involved in my feeling the sensation of my finger being pricked with a needle: the **pricked-finger corpus.** Furthermore, suppose that they have found the essential brain event of that sensation - such that I feel the prick if and only if that brain event occurs. (This would be the firing of some network of nerve cells in some pattern.)

MIND-BRAIN IDENTITY THEORY

When my finger is pricked, my sensation of pain is correlated with something happening in the pricked-finger corpus. But is my sensation literally the same thing as that physical event? According to the version of physicalism known as the **identity theory,** the answer is yes. (Since this is the only physicalist theory specific enough to be intelligible, we shall consider no others.)

The snag with the identity theory is that brain functions are separated in space, but mental experiences are integrated.

I can hear someone talk and see her lips move at the same time. Yet the brain cells that handle hearing and seeing are separated by several centimetres of grey matter and therefore take time to exchange signals. So, if my mental sensations are brain events, then they are not connected in my mind when they occur. They need time to link up in any way.

How can my sensations meld into a mental unity? The stock answer is that the quickness of the neuron deceives the mind. The brain works so quickly that we do not notice the milliseconds taken to send signals from one part of the brain to another. Communication between the hearing and seeing centres of the brain seems instantaneous.

But that does not solve the problem. However quickly signals travel, each cell is affected only by forces in contact with it. Neurons do not communicate by action-at-distance. (Not even with Ian Marshall's speculative quantum-mechanical phenomena.) So, if the identity theory is true, each mental event is a neural event happening in isolation and only afterwards joining the mind. What if we artificially introduce long delays - of minutes rather than milliseconds - between a sensation's occurrence and its incorporation into the mind? According to the identity theory, this is possible - but when we look at the results, they seem nonsensical.

Consider: "A finger-prick sensation occurred in my mind at 1:15 pm". If that sentence is true now, then it was true at 1:15 - as the contents of my mind cannot be altered retrospectively. But the identity theory says otherwise. For (according to the theory), a perception that occurred at 1:15 will not join the mind until a later time. It will normally be a few milliseconds later - but, if we artificially delay it by quarter of an hour, it will not be incorporated until 1:30. I shall elaborate on this below.

CONSCIOUSNESS *IN VITRO*

Having found my pricked-finger corpus, a surgeon could cut out those cells and keep them alive in a test tube. She could then stimulate them electrically to reproduce, in those cells, the

neural activity that had formerly occurred in my intact brain whenever my finger was pricked.

Would my severed brain tissue feel the pain? It seems bizarre that a piece of tissue can have mental experiences. Yet it follows from the identity theory. If the perception of the pain is a neural event, then that perception occurs whenever and wherever that neural event does - be it in a test tube or in my head.

CONSCIOUSNESS TRANSPLANTED

The surgeon repeats the operation on someone else - removing his pricked-finger corpus. She inserts the corresponding part of my brain into the hole in the other person's head, and makes all the normal connections between my transplanted tissue and the matter that now surrounds it. She then pricks this other person's finger. In whose mind does the sensation now occur - mine or his?

The identity theorist might say this:- When the brain portion is isolated in a test tube, its sensations do not belong to anyone's mind. If it is put into someone's brain, then its sensations would belong to the recipient's mind. In essence: if the pricked-finger corpus causes events (such as a grimace) in X's body, then its sensation is said to occur in X's mind.

CONSCIOUSNESS IN TWO BRAINS

So far, this is plausible. Now, the surgeon keeps my pricked-finger corpus alive in a test tube and connects its nerve fibres to a computer. The computer receives signals emitted by the tissue, stores them for a time and can re-transmit them in their original direction. It has a dial by which the delay can be set from zero to sixty minutes. The surgeon now wires the computer to the excised tissue in the test tube. Two cables lead out from the device: one she connects to my brain and the other to the other subject's brain. In each brain, the wires meet all the normal points of connection of a pricked-finger corpus. By flicking a switch, the surgeon can set the device three ways: to relay the signals produced by the severed tissue to my brain; or to the other man's brain; or to transmit identical copies of the signals simultaneously to both brains.

The surgeon begins. Using an electrode, she stimulates the nerve cells in the test tube as before. The cells emit their usual signals and these are captured and stored by the computer. While the cells are firing - and the mental sensation of pain therefore occurring - it is indeterminate in whose mind the pain is. If the outgoing signals are forwarded to my brain, then (according to the identity theorist), I feel the pain. But if they are switched to the other person, he feels it. And if switched to both, both feel it. Finally, if the signals are erased without being forwarded, then nobody feels the pain - the pain would have occurred by itself.

CAN A SENSATION JOIN A MIND AFTER ITS OCCURRENCE?

This conclusion contradicts everyday experience. If I prick my finger then my pain is in my mind *when it occurs.* By the identity theory, the pain sensation does not belong to anyone's mind at the time it occurs. It enters someone's mind only when it causes some events in that mind - after the sensation has occurred.

The delay is first set to thirty seconds, so the signals are held that long before being forwarded to my brain. What happens when I receive one such burst of signals? According to the identity theorist, the sensation of pain now joins my mind. Yet, I do not feel the pain at

that moment - for the sensation occurred thirty seconds earlier, in the test tube.

The identity theorist must say that the sensation acquires the property of belonging to my mind, thirty seconds after its occurrence. This contradicts the normal meaning of saying that a sensation is in my mind. If a sensation is in my mind, then it must be so when it occurs, and cannot become so later.

VARYING THE DELAY OF INCORPORATING A SENSATION INTO A MIND

The surgeon has now set her apparatus so that the signals are forwarded only to my brain. The time delay is shortened to zero. This situation is indistinguishable from that of the intact brain: I feel the pain as normal.

The surgeon gradually turns up the dial. She stimulates the severed tissue, waits for me to report what I feel, then increases the delay, and repeats the stimulation.

Would I feel the pain at progressively longer delays after the stimulation? No, because the sensation would always occur at the time of stimulation. It would already have occurred when the signals reach my brain.

Would I feel a progressively weaker sensation of pain, becoming imperceptible when the delay reached, say, five seconds? No, because the strength - and all other qualities - of the sensation are determined only by the *in vitro* event, which remains unchanged.

Would I suddenly stop feeling the sensation when the delay reached, say, five seconds? No, for the sensation would still occur in my mind provided that the signals are forwarded to my brain.

The identity theory thus excludes any believable outcome.

LOCKWOOD'S RELATIVISTIC ARGUMENT

Let me mention an avenue of thought that seeks to by-pass this problem. Michael Lockwood argues, using relativity, that anything happening in physical time must happen in physical space. He then assumes that mental events occur in physical time - whence it follows that minds are located in space. But he gives no substantive reason for making that crucial assumption. If we are asking whether minds are physical, we should not beg the question by presuming that they operate in a physical dimension of time.

SUMMARY

The 'identity theory' is the popular belief that consciousness is just electrical activity in the brain. Many scientists regard this is as selfevident. But the theory leads to nonsensical outcomes when applied to hypothetical dissections of conscious brain tissue. I suggest the theory is wrong.