

18 October 1965

READING 3

MEMORY (continued)

The New and the Old Brain

PART 1

So far we have been considering the day-to-day memory mechanism whereby sensory impressions are converted into appropriate actions. This is built-in to the forebrain, which is of comparatively recent development in vertebrate zoology.

Very recent investigations have revealed a sleep-wake mechanism built-in to the old brain. This was discovered by continuous electrical recordings from the scalp taken from volunteers during sleep throughout the night. The results have shown that during sleep there is reciprocal activity between the new brain and the old, and when one is more active the other is less so, and vice versa. Developmentally the old brain is a very much older structure than the new brain and carries out the basic functions common to our earliest ancestors. Contrasting with this is our highly developed and complex cortical structure, which distinguishes us as human beings.

(**Technical Information**, only for those who are interested:

Electroencephalogram investigations recently made, chiefly by workers in the USA and by Oswald in Edinburgh, have shown that with the eyes closed and the attention disengaged, the 10 Hz alpha or resting rhythm takes the place of the 3 Hz mixed-up rhythm of activity. This is not yet sleep but is a preparation for sleep. As drowsiness passes into sleep, so the alpha rhythm gives way to a flatter (lower voltage) rhythm having a frequency of 4–6 Hz known as the B stage. Sleep is, of course, very light in this stage and any stimulus, provided it is a novel one, is likely to cause a reversion to alpha rhythm. In the C stage of deeper sleep, the pattern changes to more irregular and slower waves varying from 1–6 Hz; but their voltage is increased, and from time to time occur brief spindles of faster, higher voltage waves. These 'sleep spindles' are considered to be still of frontal (new brain) origin. In this stage any appropriate external stimulus may give rise to a characteristic wave pattern known as a 'K' complex, which consists of a sharp wave followed by a run of faster waves of about 12 Hz. In the two stages of deepest sleep (the D and E stages), there are high voltage slow waves of 1–2 Hz, and the spindles and 'K' complexes gradually disappear. Stage E represents the deepest stage of natural sleep which, if reached at all, lasts for short periods only in the early part of the night.

... except in stages D and E there is a fair degree of cortical activity ('cerebral vigilance') going on all through the night, and this results from the 'continuous activation flow' from the wake system (the Reticular formation of the Hind Brain) to the cortex. When this activation flow diminishes or ceases, cerebral vigilance is lowered. Studies on the effect of monotony and boredom have shown that these make no difference to cerebral vigilance, which is at once lit up by any novel stimulus... Also a sleeping mother who has become impervious to her husband's snoring, will immediately rouse herself when her baby cries even faintly in the next room. Likewise, the husband's screening device may often tell him that this is none of his business and he will not even hear his wife get out of bed...

Forebrain and hindbrain sleep

Developmentally, the hindbrain is a very much older structure than the forebrain or neo-cortex. The hindbrain (or rhombencephalon) carries out the basic functions common to our earliest ancestors and is only one stage ahead of the primitive neural tube. Contrasting with this is our highly developed and complex cortical structure which distinguishes us from the higher apes and separates us further still from lower forms of life in the animal kingdom.

That the hindbrain, which has been present in animal life for so long, should have a different basic function in life from our newly acquired cortex is obvious. What is perhaps less obvious is that this difference is with us in sleep as well as in wake.

The reticular formation is situated in the mid- and hind-brain and, as has already been seen, the mechanism of arousal is centred here. Without the activation which the reticular formation gives to the cortex, consciousness, as we know it, would not be possible. Similarly, the reticular formation facilitates bodily muscular activity and is to some extent responsible for maintaining muscle tone in wake. Without its downward facilitation we would be hypotonic.

It is therefore not surprising to learn that in sleep these two parts of the brain behave differently. Whereas the old concept of sleep was that the activity of the brain declined generally until sleep ensued, we now know, again primarily from electroencephalographic studies, that this is not the case.

We have seen how in the different levels or stages of sleep cortical activity varies but is never completely absent, but we have not so far considered the activity of the hindbrain during these different phases.

Recent studies have shown that during the deepest stage of cortical sleep the hindbrain is still relatively active. We also know that Stages D and E are passed into

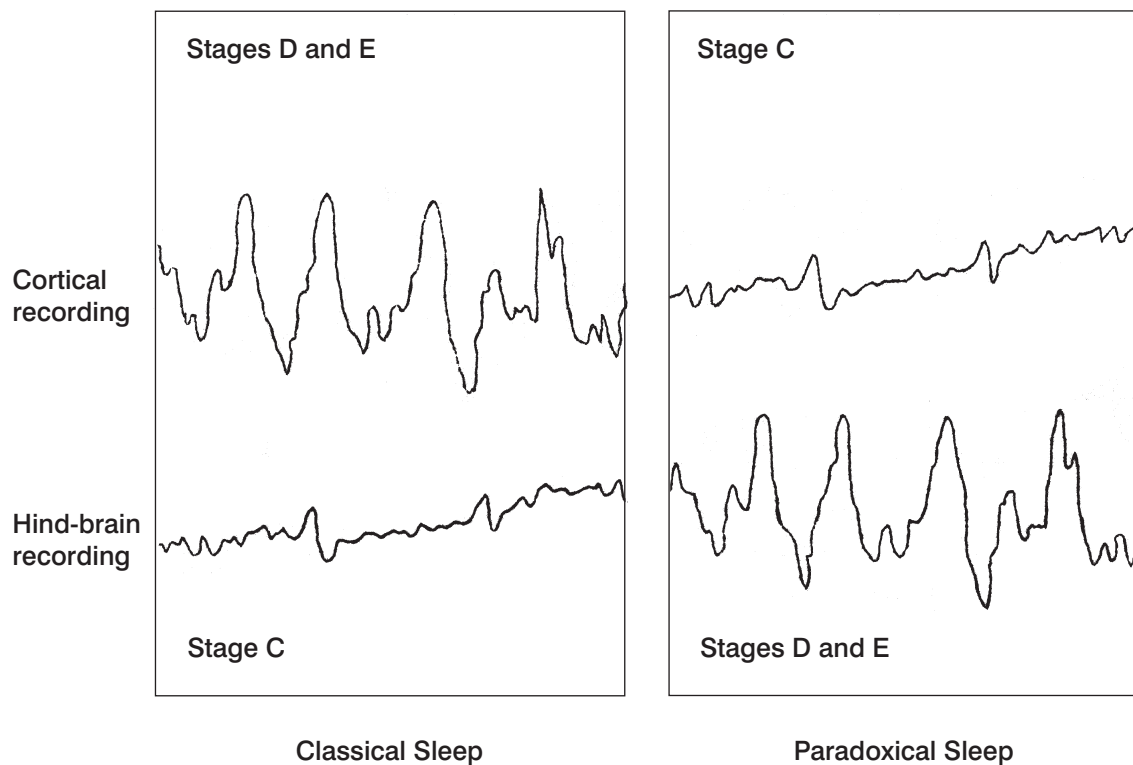


Figure 1

gradually, primarily during the early part of the night. After a spell in the deep stage there is usually a reversion to C stage sleep and several cycles of this kind occur during the night.

EEG studies of hindbrain activity throughout a night's sleep show that when cortical sleep lightens to Stage C so hindbrain sleep deepens. (Figure 1)

With this deepening of hindbrain sleep, cortical facilitation is lost and though the activity of the cortex may be higher it is usually uncoordinated and undirected and is not in fact near to consciousness.

Rapid eye movement sleep

Concurrently with deeper hindbrain sleep and lighter forebrain sleep, which has been termed 'paradoxical sleep' by some writers, there occur occasional bilateral rapid eye movements. The earlier workers used the term paradoxical sleep but the modern and common clinical term is simply REM (Rapid Eye Movement) sleep. REM sleep when studied by the EEG consists of lighter cortical sleep with a near wakefulness pattern. In contrast to this the hindbrain EEG activity changes from fast rhythms to slow waves and spindles.

Studies have been made with the electro-oculogram which have confirmed that these rapid eye movements do in fact coincide with the other findings of paradoxical sleep.)

(From brochure *Mogadon*, Roche Products Ltd., London)

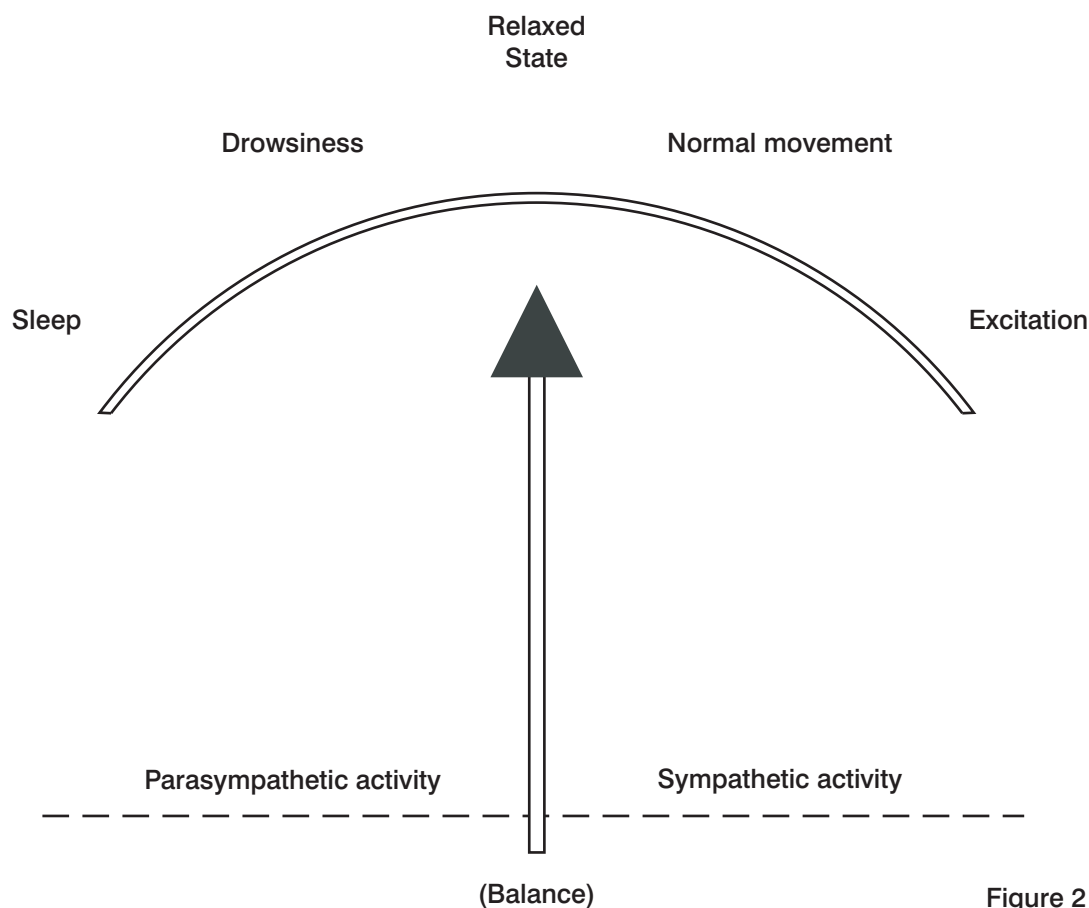
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Questions arising

Although this evidence about two quite different and reciprocal divisions of the brain is so new as to be difficult to grasp all at once, it would be interesting to see some of its implications:

1. It is a law of the nervous system that those parts of the brain most recently developed have short-term memory, are most rapidly fatigued, and put out of action most easily by an injury or an anaesthetic. They can be brought much more easily under the control of the will, but are changeable and ephemeral in their functions, which mostly belong to the domain of Manas, the moving, restless mind characteristic of the 'common man'. In the meditation success depends on dipping through these superficial layers, leaving behind all movement and coming to a part of us which is older and stiller, and from which long-term memories of our childhood and even of pre-existence tend to arise. This part of the brain is like a sleeping giant, Prometheus, and he has to be aroused and made to serve our aims. Does any of your experience confirm this?
2. Not only is the brain divided this way, but the nervous system is divided into a Voluntary part, i.e. a part which *can* be controlled for short periods by what will we possess, and the Involuntary or Autonomic nervous system, which as its name suggests is a law unto itself. Now Being depends on the involuntary nervous system, and all special methods are intended to wake the sleeping giant and bring him under control.

To achieve this it is very important in all systems to recognise that the sleeping giant is himself dual in nature; the figure from a contemporary description shows a pendulum swing



between the Parasympathetic (sleep and inaction) and the Sympathetic (alerting to action), which forms the substance of our nature both by day and by night. (Figure 2)

All special Knowledge tells us that these antagonisms can only be resolved by the intervention of a Third Force (Nitrogen, Sattva Guna) which is unknown to science because not susceptible to measurement, but known to anyone on the Ladder of Self-realization. Only through the intervention of this third element can change of Being be achieved and conflicts and uncertainties resolved. Moreover, since this old part of the brain has existed in organic life right through the mammalian world, it carries with it Memory which is older than man and far older than any individual man's life. The vehicle for this long-term Memory must therefore survive the death of the individual, and may possibly be contained in the DNA molecule, the specific blueprint from which individuals and different species are replicated. Can you see in this description anything of practical importance for yourself?

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PART 2. THE THIRD OR LATENT POSSIBILITY

The familiar simile of the three-storeyed house applies to the brain itself, which is like the mechanism of the watch of which we are unaware. We observe only the manifestations of its work in various parts of our body, just as we 'tell the time' by looking at the dial and the hands of a watch.

All that has so far been described in this paper refers only to the top room ('new brain') and the lower room (the 'old brain'). There is a 'middle room' which is emotional but it plays little

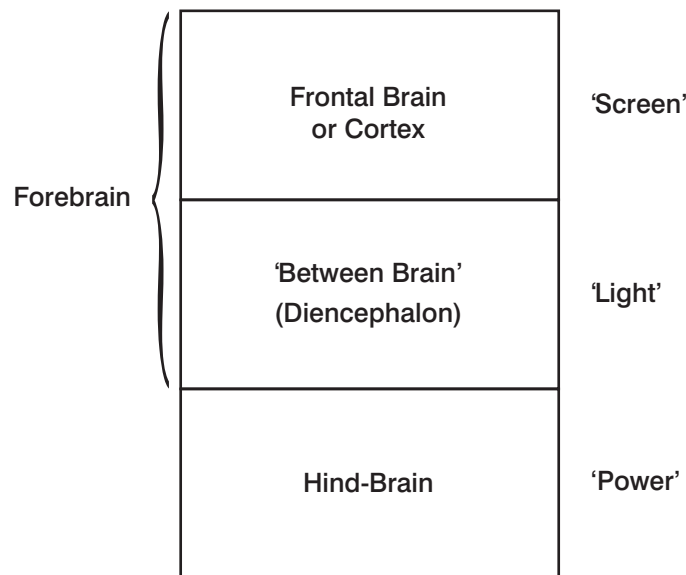


Figure 3

effective part in our lives because it works in a dim light being chronically short of energy. The energy with which it should work is self-less Love, which in Indian Systems is called 'Sattva'. If this energy is accumulated there by special methods then we can be conscious in the top two rooms together – the Light and the Screen. When there is no screen but only the light, that is the state of Samadhi; where the screen is fully illuminated by the light, it is 'Turiya' which is the state of illumination towards which both our Tradition and the Shankaracharya's are aiming.

As in the case of all the manifestations of the brain mechanism, we *don't feel the Sattva in the brain but in the heart*. Similarly, if something happens to a toe or a finger we feel this in the toe, but not in the 'toe part' of the brain where the sensation actually takes place. This is one of the marvels of Nature which are so difficult to understand.

All this becomes much clearer with the help of the meditation, for the rhythm of the mantra is really circulating in the brain (the place where life can be regulated), whereas we often feel the manifestations in various parts of the body. That is why we are urged not to attend to those manifestations, but only to attend to the rhythm of the mantra.

When the middle room of the brain is saturated with pure Love, then the antagonisms between the new and the old brain will vanish in the course of time and the right relation be established between what we call the 'Personality' and the 'Essence'.

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