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Body Image and the Temporal Lobes

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Before discussing the relationship of the temporal lobes to the body image, it is necessary to consider briefly some other aspects of the neurology of body image and its disturbances. Further, some clarification of the term body image is required.

In their classic paper entitled 'Sensory disturbances from cerebral lesions', Head & Holmes (1911) considered in detail the sensory apparatus of the body, and the effects of various neurological lesions on sensory appreciation. Cortical lesions markedly affected postural recognition and appreciation of passive movements but did not affect the visual image of any body part. In other words, they noted that a patient that had lost all power of recognising posture of a limb was still able, with eyes closed, to visualise the position of that limb. Thus, they distinguished the visual image from that of the ability to appreciate changes in limb position. Since recognisable change of posture enters into consciousness "already charged with its relation to something that has gone before" they referred to the background standard of body posture as 'a scheme'. They note "by means of perceptual alterations in position we are always building up a postural model of ourselves which constantly changes. Every new posture of movement is recorded on this plastic scheme . . .".

Smythies (1953) has considered in detail the semantic and philosophical confusion that surrounds the use of such terms as 'body image', 'body scheme', and 'the perceived body'. He distinguished the perceived body, namely the collection of somatic sensations present at any one instant in consciousness, from the body concept, a collection of beliefs and knowledge that we have about our bodies. The perceived body is regarded as being coincidental with neurophysiological events that make up the body image in the brain. The body scheme is the subconscious entity defined by Head & Holmes (1911). For Smythies, the basis of confusion relates to a conflict between physiological and naive realism. The conflict lies between the idea that the perceptual field represents the real world, or literally *is* the real world. In the former the brain, as the final organ of reception and integration of sensory–motor data, and its actions are the only necessary conditions for the awareness of such data. Literally, sense data are within the brain. In contrast, naive realism assumes sense data are independent of our awareness of them, and are largely or wholly the property of the objects from which they derive. British empiricism, with an emphasis on externality and perceptual data derived from distance senses, has relatively neglected information of other senses, such that while the concept of visual and auditory hallucinations were well accepted in psychopathology, the area of tactile phenomena and disturbances of body sense were poorly discussed (Berrios, 1982). In contrast the Continental authors developed such concepts as coenesthopathy and incorporated such phenomena into discussions of the body scheme and its disorders.

Smythies pointed out that the physical body may be altered in conditions where the perceived body is not, for example in an amputee experiencing phantom limb pain. Alternatively, the perceived body may be deranged, for example in autotopagnosia, while the physical body remains intact. The problem here, as Smythies points out, is that we assume from our own common sense based on naive realism that the perceived body and the physical body are the same, coincident in space and time. However, since the perceived body is, like other sensory data, dependent on neuronal activity for its appreciation, it must, like other sensory data, be liable to disruption from neurological damage.

In particular, the parietal lobe has been implicated in conditions of altered appreciation of the body. Unilateral asomatognosia primarily results from a non-dominant parietal lobe lesion, affecting the left side of the body, exceptions being unusual. These conditions, quite startling to the observer, often arise following recovery from an acute neurological insult. The patient denies the reality of any paralysis, in milder forms, reacting only with indifference (anosodiaphoria), in more severe forms showing hostile personification of the offending limbs (misoplegia).

In contrast, bilateral asomatognosias appear more frequent following dominant hemisphere lesions. Included here would be Gerstmann's syndrome, comprising finger agnosia, agraphia, right–left disorientation and acalculia, and autotopagnosia, described by Pick (1922) as the loss of ability to localise and name different body parts. Although the reasons for the development of these symptoms after parietal cortical destruction are debatable, it appears that the posterior parietal lobe, in particular the area serving as a polysensory integration area, must

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remain intact for satisfactory appreciation of corporeal awareness.

Further evidence for some cerebral representation of the body image in parietal lobes comes from brain stimulation studies and the now familiar homunculus which is to be found in every text book of neuroanatomy. According to Penfield & Rasmussen (1955), the sensory sequence begins in the longitudinal fissure with the representation of toes and probably genitalia and the rectum. It extends down the surface of the Rolandic strip, representing in turn leg, trunk, arm, neck, face, mouth and throat. One striking fact about these diagrams is that they do not reflect the geometry of the physical body at all: there are gross distortions for example of the area representing the lips and mouth. Further, in the older descriptions at least, there were at least two homunculi represented, a motor and a sensory one, although presumably, with associated rerepresentation, secondary and supplementary areas of cortex and their homunculi could also be described providing further areas of sensory localisation. One conclusion from this would be that it was indeed difficult to localise corporeal awareness in the cerebrum, in particular if other aspects of sensation including visual imagery require integration into the sensorial whole.

Schilder (1937), placed considerable weight on some of these other sensory aspects for the integration of sensory–motor information including the vestibular and proprioceptive influences. He also introduced the idea of the libidinous structure of the body image, emphasising narcissism and the traditional Freudian erogenous zones. Although here moving into the realm of what Smythies referred to as the body concept, Schilder does emphasise how the unitary development of the body image of ourselves, which must relate to the body image in the brain, entails aspects of emotional development and experiences. He discussed depersonalisation, where an individual feels so radically different; there is a fundamental change of 'self' in relation to the outside world. Further, the body image and perceived body alters: "The patient sees his face in the mirror changed, rigid and distorted. His own voice seems strange and unfamiliar to him, and he shudders at the sound of it, as if it were not himself speaking . . ." and: "His body feels as if it were dead . . . too light, just as if it could fly" (p. 139). Schilder also noted in one of his cases "loss of unity of the body image" in a case of anxiety with panic attacks. These phenomena immediately bring us to the temporal lobes and to temporal lobe epilepsy.

The temporal lobes

Prior to the writings of Hughlings-Jackson (Taylor, 1931), the concept of epilepsy was essentially that of a motor disorder, usually involving the whole body. Partial epilepsy, and 'small attacks' (petit mal) had been described, but the concept that seizures could arise from only part of the brain and that they could lead to sensory or even psychological symptoms was poorly developed. Jackson introduced the concept of "a peculiar variety of epilepsy", drawing attention to certain symptoms such as episodes of déjà vu that could occur as a manifestation of seizures.

Since that time, psychomotor seizures have been well defined, and in more recent classifications, the term complex partial seizure is recognised. In the 1981 classification (Dreyfuss, 1981), such seizures are defined as those partial seizures associated with alteration of consciousness. As such, experiences such as depersonalisation may be categorised as either simple or partial, depending on the retention of consciousness. The aura of these seizures has been described by several authors, and include marked disturbances of the perceived body. Although somatosensory hallucinations occur infrequently, they can be elicited by electrical stimulation (Wieser, 1983), although without any obvious lateralisation. Williams (1956) describes one of his cases: "He had smaller attacks in which he felt giddy (rotation) and was nauseated. There was then tingling and weakness of the right arm and pulling of the right side of the face. He was compelled to swallow with a feeling of a lump in the throat. He was unable to speak. Then his hands would seem too big, they were unnatural, he could not understand why they were there." The patient, a boy aged 11, had a left-sided temporal epileptic disturbance. Other interesting and related experiences, which again may occur in a seizure, are those of heautoscopy (autoscopy) where a patient may see himself, or a double (*Doppelganger*). These episodes may be preceded by attacks of depersonalisation, and occur quite suddenly, the phantom appearing in vivid detail and being perceived not only visually but also auditorily and being 'felt' as if emotionally and kinaesthetically part of the observer (Lukianowocz, 1958).

The temporal lobe and its relationship to subjective experiences has been discussed in detail by Williams (1968). He grouped the experiences of patients with temporal lobe epilepsy, excluding those of the special senses, as follows:

(a) Elaborate perceptual experiences which usually either relate to the self or contain the self.

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(b) Disturbances of spatial and temporal perception concerning the relationship of the subject to his body or to the outside world around him.
(c) Hallucinations of emotions or moods or their viscero-motor counterparts which are intensely related to the self.
(d) Evocations of memory intimately concerned with the self.
(e) Behaviour disorders of the relationship of the subject to his animate environment.

Macro- and micro-somatognosia are seen in association with epilepsy and are encountered in other paroxysmal disorders, for example, migraine, schizophrenia and drug-induced psychoses such as those of LSD and mescaline. While in some of these states more generalised disturbance of cerebral function may be postulated, the findings in temporal lobe epilepsy do suggest the importance of the temporal lobes for the experiences. In this sense it is interesting that in schizophrenia the evidence for temporal lobe disturbance is also great, especially in relation to some of the more florid hallucinatory phenomena which are seen and often referred to as 'positive symptoms' (Trimble & Rogers, 1987; Trimble, 1988). Among these would be included distortions of the perceived body as reported.

The temporal lobes receive visual, auditory, proprioceptive and other relevant sensory information, by a process of projection from secondary sensory areas of the brain. The entorhinal area provides a major input to the limbic system of such information, integrated with interoceptive data provided from subcortical and diencephalic structures. Thus, as Williams (1968) noted, the temporal lobe "is vitally important in the integration of all sensations . . . both at the time and with past experience to achieve the sense that 'I am . . .'" (p. 642). In the epileptic disturbance there is thus disintegration; this distorts the relationship of various parts of the self and also of that of the self with others.

Is it possible then to assume that the temporal lobes form the cerebral localisation of the body image? To this, the answer surely must be no. It is not possible to localise the body image within the brain, but it is possible to distort and disorganise various perceptual elements that relate to it by parietal, occipital and temporal lobe disturbances, emphasising the primacy of such cortical areas for our experience. It is noticeable that the disturbances of the perceived body described following parietal cortical lesions reflect deficit symptoms, loss of awareness of the perceived body. These are to be seen in contrast to the phenomena that arise following stimulation of the temporal cortex, such differences representing in Hughlings-Jackson's terms (Taylor, 1931) both negative and positive symptoms respectively. Thus, it is difficult to see how positive phenomena can derive from destroyed or temporarily deranged (as in an epileptic ictus) neuronal function, unless by doing so it alters expression of ('releases' in Jackson's sense) activity from other, still healthy, areas of the brain. Thus, the temporal lobe abnormalities of the seizure (acutely) or of the schizophrenic (chronically) disturb the relationship between the perceived and physical bodies by distortion of the integration of sensory data from both limbic and neocortical areas of the brain. It is no accident or aberration of our research techniques that the homunculus, carefully defined in the cortex, seems so grotesque compared with Michelangelo's David. The difference represents that between the body image in the brain and the body image. Distortions of the former, so readily observed with brain dysfunction, serve to remind us that as is "our knowledge of the external world based on perceptions which depend upon the physical structure of the sense organs and the nervous system" (Brain, 1951), so is knowledge of ourselves.

References

Berrios, G. E. (1982) Tactile hallucinations: conceptual and historical aspects. *Journal of Neurology, Neurosurgery, and Psychiatry* **45**, 285–293.

Brain, W. R. (1951) *Mind Perception and Science*. Oxford: Blackwell.

Dreyfuss, F. E. (1981) Proposal for revised clinical and electroencephalographic classification of epileptic seizures. *Epilepsia*, **22**, 489–501.

Head, H. & Holmes, G. (1911) Sensory disturbances from cerebral lesions. *Brain*, **34**, 102–154.

Hecaen, H. & Albert, M. L. (1978) *Human Neuropsychology*. New York: J. Wiley & Sons.

Lukianowicz, N. (1958) Autoscopic phenomena. *Arch. Neurol. Psych.*, **80**, 199–220.

Pick, A. (1922) Storung der Orientierung am eigenen Korper. *Psycol. Forschung.*, **1**, 303–318.

Penfield, W. & Rasmussen, T. (1955) *The Cerebral Cortex of Man*. New York: MacMillan.

Schilder, P. (1937) *The Image and Appearance of the Human Body*. London: Kegan Paul Trench and Trubner & Co.

Smythies, J. R. (1953) The experience and description of the human body. *Brain*, **76**, 132–145.

Taylor, J. (1931) *Selected writings of John Hughlings Jackson*. Hodder and Stoughton, London.

Trimble, M. R. & Rogers, D. (1987) The neurology of schizophrenia. In *Handbook of Schizophrenia* (eds L. DeLisi & F. Henn), pp. 439–466. Amsterdam: Elsevier.

—— (1988) Biological Psychiatry. Chichester: John Wiley & Sons.

Wieser, H. G. (1983) *Electroclinical Features of the Psychomotor Seizure*. Stuttgart: Gustav Fischer.

Williams, D. (1956) The structure of emotions reflected in epileptic experiences. *Brain*, **79**, 29–67.

—— (1968) Man's temporal lobe. *Brain*, **91**, 639–654.

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