Visual perseverance in temporal lobe epilepsy

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SUMMARY Ictal visual perseverance is reported in two patients with temporal lobe epilepsy. A distinction is drawn between visual perseverance and palinopsia, or recurrence of a visual image.

Persistence or recurrence of a visual image after the exciting stimulus object has been removed, sometimes termed palinopsia (Bender, 1963; Bender et al., 1968), is a rare phenomenon. The image itself is usually of an object seen in the patient's immediate environment, and does not relate to a more distant visual experience. Visual perseverance of cerebral origin must be distinguished from persistent after-images of retinal origin, from visual hallucinations, from psychogenic elaborations or fantasies of visual experience, and from primary sensory seizures (Bender et al., 1968). Visual perseverance occurring as part of a seizure was recorded in a single case by Robinson and Watt (1947) but it seems not to have been recognised since. In this report I describe two patients in whom transient visual perseverance was a presenting manifestation of temporal lobe epilepsy.

Case reports

CASE 1
A 50 year old executive was referred after a generalised seizure which occurred while he was gardening. For three years he had experienced attacks in which his vision seemed to become fixed, so that an image was retained for several minutes. During these episodes the real world was seen through the retained image, which was clear at first, but then gradually faded, slowly losing coloration and solidity, during a period of several minutes. There were no associated olfactory, auditory, tactile, or motor disturbances, and behaviour and memory were normal during the attacks, which occurred about four times a year. Headache was not a feature of the attacks. About six months before the first attack he had suddenly developed crushing chest pain. Despite this he drove 30 miles to his home, but he became shocked and drowsy on the way, and was admitted to hospital where myocardial infarction was diagnosed. Recovery was uneventful. At age 11 years he had been briefly concussed in a cycling accident. There was no family history of epilepsy or migraine, and clinical examination was normal. A routine interictal EEG was normal but during barbiturate-induced sleep, runs of sharpened theta activity appeared in both posterior temporal regions, especially on the left. A computerised tomographic scan of the head was normal. Phenytoin treatment was begun, and he had no further attacks in the subsequent six months.

CASE 2
A 20 year old woman was referred for investigation of a single, generalised seizure. In addition, she described episodes of dizziness during which she felt dissociated from her environment. During these attacks her husband noticed that she seemed to stare blankly for a few seconds. These attacks had occurred about once a week for some four years, but sometimes she had several in a single day. In some her vision seemed to become fixed so that despite moving her eyes, she continued to see the object she had first regarded. This image persisted for several minutes, the false image slowly fading so that the real world could be seen with gradually increasing clarity through it. The perseverated image retained its normal coloration and stereoscopic quality during most of this time, but she was always aware which was the true and which the persistent, false image. Clinical examination was normal. An interictal EEG showed a well-organised symmetrical 10 to 12 Hz alpha rhythm, with rare sharp forms and some episodic theta activity in the left temporal leads. During drowsiness sharp forms and irregular theta activity became more prominent. Hyperventilation induced...
bursts of delta activity which were often most marked in the left temporal leads. The patient's mother, and her maternal grandfather and great grandmother also had epilepsy. Her mother's seizures characteristically began with an aura of a noise like waves, and her EEG showed a left temporal discharge. Her mother had not experienced palinopsia or other visual disturbance during the seizures.

**Discussion**

Disturbances of visual perception are a characteristic feature of temporal lobe epilepsy. These usually take the form either of a transient distortion of visual experience, for example, macropsia, or a change in its intensity. Visual hallucinations—that is, visual impressions occurring without an external stimulus—are a less common manifestation of epilepsy (King and Marsan, 1977). Penfield and Perot (1963) noted visual hallucinations as part of a seizure in only 41 of 1132 patients; in 21 of these patients visual hallucinations formed the sole manifestation of the seizure, but visual perseveration was not recorded in any of them.

The two patients described here experienced repeated episodes of visual perseveration of fairly short duration. Both patients saw an image of the real external world which persisted for several minutes without distortion of colour or form before gradually fading. As it faded, the image of the external world appeared with gradually increasing clarity, seen superimposed through the perseverated image. This phenomenon cannot be classified as a hallucination, since the perseverated experience was an image of the real world, nor was it a recurrence of a remembered visual experience. Further, it was not a formless primary epileptic experience, although, in both patients, its association with other clinical and EEG features of temporal lobe epilepsy clearly indicate that it was a symptomatic manifestation of a temporal lobe seizure. Psychogenic elaborations or fantasies can be excluded by these clinical and EEG features, and there were no associated symptoms of migraine, a disorder which has rarely been implicated as a cause of palinopsia (Klee and Willanger, 1966). In both patients visual perseveration was a major feature of the temporal lobe seizure, rather than an aura or part of a postictal confusional state. In case 1 a left temporal ischaemic lesion was suspected in view of the EEG features and the history of myocardial infarction and shock, but in case 2 a diagnosis of idiopathic epilepsy was made. Thus in both these patients there was EEG evidence of a posterior temporal lesion. In all the previously reported cases there were large temporo-occipital or parieto-occipital infarcts, tumours, or traumatic lesions (Bender, 1963; Bender et al., 1968). In most of these reports, including Robinson and Watt's (1947) patient, and Holmes' (1931) case of occipital arteriovenous malformation, visual perseveration occurred in association with hemianopia. However, the visual fields were normal in the two patients described here.

Visual perseveration may arise either in the retina or in the brain itself. Bender et al. (1968) compared the features of these two forms of after-images. The intensity and duration of a retinal after-image is related to the intensity and duration of the initial visual stimulus. Retinal after-images appear larger than visualised against a far, rather than a near surface, are positive against a dark ground but negative against a light ground, may be revived by sudden blinking, and appear to move in the direction of active eye movements (Bender et al., 1968). In most cases, as in both the patients described above, perseverated or recurrent images of cerebral origin have not shown these characteristics but exceptions have been reported (see Kinsbourne and Warrington, 1963; Bender et al., 1968). These overlapping features of retinal and cerebral visual perseveration illustrate the cerebral elaboration which inevitably accompanies any unusual visual experience (Gregory, 1966). Visual perseveration of cerebral origin has been compared (Kinsbourne and Warrington, 1963; Bender et al., 1968) with the prolonged sensory after-sensations to pinprick or touch which occur in patients with parietal lesions (Critchley, 1953). Kinsbourne and Warrington (1963) concluded that visual perseveration represented an enhancement of the normal process of visual after-image formation, perhaps as a result of the release of cortical visual systems from their normal inhibitory influences.

In common with others, Bender et al. (1968) regarded visual perseveration and recurrence of an image as similar phenomena and referred to both as palinopsia. However, this term literally refers only to recurrence of an image, and these phenomena are probably of different causation. Sudden unexpected recurrence of a visual image some time after the initial visual stimulus is not an uncommon experience in normal subjects after periods of prolonged or intense visual experience or study, for example among artists or students. In this instance there is little doubt that the recurrent image is of cerebral origin. A similar phenomenon, eidetic imagery, occurs in certain people able to recall complex visual images at
will, as part of an exceptional visual memory capacity. In Luria's (1969) report of such a person these visual images later became uncontrolled, returning at inappropriate times. These inappropriate images interfered with normal memory and eventually led to breakdown of personality. Thus recurrence of a visual image represents inappropriate recall of an image from the store of visual memories, while visual perseveration results from failure of extinction of a visual image from consciousness. In both phenomena, as in some patients with visual hallucinations (Lance, 1976), the real world is perceived through the abnormal image. Visual perseveration may also be regarded as an abnormality of transfer of a visual image from consciousness to the visual memory store. The visual image thus persists in consciousness rather than being inhibited and, therefore, forgotten. The process of transfer from conscious experience to the memory store probably requires input to the temporal lobes from parieto-occipital cortex, the site of lesions in many of the reported cases (Bender et al., 1968). In temporal lobe epilepsy visual perseveration may occur because of transient interference in this process.

References