A case of visual disorientation

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Visual disorientation may occur in patients with visuo-spatial agnosia and is often associated with bilateral lesions of the occipito-parietal region. Holmes (1918), reporting six such cases due to war injury, defined visual disorientation as an affection of the power of localizing the position in space and the distance of objects by sight alone. Disturbance of visual orientation in these patients was demonstrated by their inability to touch accurately objects held in their field of vision; the inability to recognize the relative positions of two objects; and difficulty in judging distances or in recognizing the size of objects by sight alone. In addition, disturbance of ocular movements was demonstrated by difficulty in fixating stationary objects and in following moving ones. There was also difficulty with convergence and absence of the blink reflex to menace. In four of his patients, he described the presence of visual inattention throughout the visual field demonstrated by their inability to see more than one object at a time. The concept of impairment of visual attention had been adduced by Bálint (1909) to explain the visual defect whereby observation is limited to a single object irrespective of its size. It has been suggested (Ettlinger, Warrington, and Zangwill, 1957) that impairment of the appreciation of spatial characteristics of vision will lead to this form of attention defect.

Stengel (1944) described a case of visual disorientation with associated Gerstmann's syndrome. His patient was able to see generally one and rarely two of several objects at a time. When this defect is particularly pronounced, it may resemble very closely the syndrome described as simultanagnosia (Wolpert, 1924). The original description of this condition combines a spelling dyslexia with difficulty in picture interpretation. Kinsbourne and Warrington (1962 and 1963) have described this syndrome as characterized by an inability to identify more than one form at a time, an interval being required before another can be identified. Associated defects of visual space perception and of eye movements are absent.

Hitherto most cases with visual disorientation have resulted from focal injury produced by missiles. The condition here presented followed parturition. This is an unusual case to be seen in peace time,

especially when uncomplicated by the widespread cerebral damage which so often confuses the syndrome. There are many points of resemblance to the case described by Luria (1959) under the heading 'Disorders of "simultaneous perception"'. The distinction between visual disorientation and simultanagnosia is important since the evidence is that lesions in different situations are responsible.

CASE REPORT

S.G., aged 32, was delivered of her fifth child in May 1963 in Calcutta. The history obtained from her in November 1963 was as follows. She was quite well until seven days post-partum when she developed severe biparietal headache which recurred with increasing severity during the next five days. She became increasingly drowsy and, on the tenth day, complained of blindness. She was unable to walk and her speech was hesitant. She made mistakes in grammar and had difficulty in finding the correct word. Her eyes were examined but no local cause for her blindness found.

Two days later, her sight began to recover, but the peripheral visual fields were severely constricted. Colour vision was present in the recovering field. It is clear that visual space perception was impaired then as she attempted to reach out for a coat hanger on the other side of the room and to place a glass on a table well beyond her reach. Both legs were very weak as was her left arm. During the succeeding weeks she noticed that she often forgot to dress the left side of her body. Her speech and all her symptoms, other than those associated with visual disturbance, improved rapidly.

On admission in November 1963, she stated that she was unable to see properly but had difficulty defining the defect. She said that she could neither see all of a group of objects nor appreciate their relationship to each other. Often she could not see all the detail of what she was looking at but was quite unable to say what she was missing. She said that after fixating an object and having examined it for sufficiently long, details would appear which she formerly had not seen. The size of what she was looking at did not affect her difficulties, although she thought that brightness of illumination made some difference. Estimation of size by appearance was impossible but differentiation by touch was immediate. She could appreciate movement but was uncertain whether it was towards or away from her and she had great difficulty in judging distance. Reading was quite impossible. Individual letters or syllables could be seen but would

FIG. 1. Visual fields to 3/300 and 20/2000 white. Visual acuity: right 6/12, left 6/6 (1 November 1963).

then be 'lost' and another letter, often at some distance from the original one, would appear.

Her only other symptom was that her left foot felt slightly numb and heavy. Her speech, she thought, was probably completely recovered.

She is right handed. In conversation, she did not fixate accurately the face of the person to whom she was talking. She moved about the room cautiously, fearful of colliding with objects or people which, she said, 'loom up before I can avoid them'.

On neurological examination, the findings were an inferior homonymous altitudinal hemianopia (Fig. 1) with some constriction of the peripheral visual fields. To confrontation, she would more frequently ignore a finger moved in the left upper quadrant than in the right. The blink reflex to menace was absent. Corrected visual acuity was 6/12 on the right and 6/6 on the left; the right eye had always been 'weak'. Eye movements are considered later. Appreciation of pain was impaired in the left leg and to a lesser degree in the left side of the trunk. Sensory inattention to pin prick could be demonstrated below the left knee but temperature and vibration sense were normal and two points were appreciated at 0.5 cm. on the fingers and 3 cm. on the soles. Sensory localization was very accurate. Stereognosis in the left hand was normal.

There was no detectable abnormality of speech nor any defect of body image, finger agnosia, dyscalculia, or right-left disorientation. At no time did she have any difficulty in finding her way about the ward and she was able to describe the ward plan accurately. Topographical memory was normal.

General medical examination revealed no abnormality. Blood pressure was 120/75 mm. Hg.

INVESTIGATIONS The electroencephalogram showed a symmetrical alpha rhythm which blocked normally on

visual attention. There was a bitemporal abnormality consisting of frequent medium and high voltage episodes of mixed waveform more marked on the right. Radiographs of the skull and chest were normal. the Wassermann reaction was negative and the haemoglobin was 92%.

Eye movements She was able to look to right and left on command. When, however, she attempted to shift her gaze either spontaneously or on command to an object in the peripheral visual field, localization of gaze was inaccurate and she would then have to 'scan' with her eyes before fixing on the object. She was unable to follow a moving object with her eyes, tending to 'lose' it and then have to search with her eyes until it was located again. If, however, she fixed her gaze and the head was moved fixation was normal. There was no difficulty with convergence when the object was her own finger but some weakness of convergence on the examiner's finger.

Psychological testing On the W.A.I.S. verbal scale, her I.Q. was 108. Memory and retention were unimpaired. She had full insight into her deficiencies and made every attempt to overcome them.

Localization of objects There was a gross disturbance of localization in space by vision. When asked to touch or take hold of an object held in front of her, she would grope for it. The mislocalization in the coronal plane was generally towards the fixation point. She tended to overestimate the distance of objects within arm's reach, but if her arm came into contact with the object the necessary adjustment in the position of her limb was promptly made. There was no greater defect to one side than the other.

Distance judging She admitted that she found this task impossible both under test conditions and in her daily life. She never knew when she had reached the bottom of the stairs or the edge of a pavement. In general, she tended to underestimate distances. Relative distances of

objects seen was also faulty but this was very variable. At times, she would make gross errors yet frequently on repeat testing no abnormality could be demonstrated.

In tests of tactile space appreciation it was not possible to demonstrate any unequivocal disorder but she was slower than expected when counting pegs or recognizing solid letters by touch.

Picture interpretation When shown a picture and asked to explain and describe it she behaved in a manner reminiscent of cases with disorders of simultaneous perception. Thus, shown the 'telegraph boy' picture (Binet scale, Fig. 1), the patient first pointed out the cap labelled 'G.P.O.' then saw and described the handlebars and the telegram, then noticed the car to the right of the picture, and finally appreciated that the telegraph boy was waving 'to something—presumably the car'. It took her nearly a minute to derive this amount of information from the picture. Until her attention was drawn to it, she failed to notice that the bicycle wheel had come off and so she was unable to interpret the picture. Similar results were obtained with four other pictures.

She described how, every day at her friend's house, she passed a picture that she had seen for the first time after the onset of her disability. After three months, she was still discovering new details which had formerly escaped her and she was only just becoming able to recognize the meaning of the situation represented.

There was no achromatopsia or prosopagnosia.

Reading She was so handicapped over reading that, apart from occasionally and laboriously spelling out a single word such as a newspaper headline, she did not attempt it. She would first have difficulty in finding the beginning of the page and even when her finger was placed on the first word, there was delay in her bringing her gaze on the correct point. Usually the first syllable was then immediately and accurately read out. It was rare for her to proceed beyond the first five or six letters. She used to pause, turn her head, and then lift up the page to examine it closely. When asked her difficulty, she used phrases such as, 'I can't see this next word' or 'it is all jumbled together'. When exhorted to persevere, she made guesses at words from a single letter or syllable. Consequently, mistakes were numerous and little sense made of even the shortest sentence. If she came to the end of a line, she was unaware of this and would search beyond

the margin for further print. It was quite impossible for her to locate the start of the next line. If she were shown a page with one monosyllabic word on it she had little difficulty in reading it. Four months later when she had recovered to some extent, reading became possible if the lines of writing were widely spaced but, even then, it was a laborious task with many mistakes. When she had succeeded in reading a word, there was no difficulty in understanding its meaning. Reading figures presented the same difficulties but she never misread a single letter or numeral.

Writing Her writing was relatively unaffected (Fig. 2). She was unable to place it correctly on the page or to write along a line. She tended to write on the right side of the page, with the left margin becoming progressively wider. She frequently failed to cross t's and dot i's and when this was pointed out, she was unable to locate the relevant letter. There were no mistakes of spelling or grammar.

Praxis She was able to carry out complicated commands correctly. She made mistakes in imitating movements only where vision was necessary. She could recognize and use objects correctly. There was no apraxia for dressing. Constructional tests revealed a severe defect. She sometimes succeeded in copying correctly a simple design such as a triangle in matchsticks but she failed with more complicated designs with matchsticks or blocks. When asked to describe the relative positions of the objects she was attempting to copy, she was unable to do so, nor could she say which object overlapped another. She was generally able to say with accuracy what lay to the right or left, above or below, but when asked what lay furthest to one side she made mistakes.

She stated that she found laying the table a very difficult task. She could not tell either the relationships of the knife, fork, or spoon to each other nor how many implements she had already laid. She had to feel the spoons in order to distinguish large from small.

In tests of drawing, she explained her difficulty by saying, 'as soon as I lift my pencil from the paper I can't see what I have drawn and have to guess where to put the next detail'. Thus the features of a face lay partly beyond the outline of the face, and the drawing of a bicycle was 'exploded' (Fig. 3). She was quite unable to locate the centre of a circle or bisect it into two equal halves

Mary had a little lamb

Its fleece was white
as snow

FIG. 2. Specimen of the patient's writing.

FIG. 3a.

FIG. 3b.

FIG. 3c.

FIG. 3. Patient's attempt to draw (a) a face, (b) a bicycle, (c) a house.

vertically or horizontally. When asked to trace a path between two lines a centimetre apart, she repeatedly crossed one or other line and complained that she kept 'losing' them.

Counting identical objects was impossible for her. Even counting matchsticks and touching each in turn, she missed some and counted others twice. Her performance in this task was not improved if the objects lay in a straight line. When two diagrams were presented briefly, she very frequently reported only one of them. This was irrespective of whether they lay one above the other or side by side. Overlapping diagrams even in different colours were correctly reported. Connecting the two diagrams by a line resulted in her reporting both objects correctly more frequently.

She had no difficulty in imitating rhythms, and could recognize and hum simple tunes. She could localize the direction of sound quite accurately.

Tachistoscopic tests (Dr. E. K. Warrington) A brief visual presentation of black test forms on a white background was given by means of a Dodge type tachistoscope. Her threshold for discrimination of a dot or letter stimulus was 4 msec. which is normal. Dot counting was grossly impaired even at 1,000 msec. Simple geometrical figures were recognized at durations of 50 or 100 msec. Silhouette drawings were, however, only recognized at long exposures of 1,000 msec. Simultaneous form perception was tested according to the procedure of Kinsbourne and Warrington (1962).

The results were as follows:

Exposure Duration (msec.)	One Letter	Two Letters
50	2 out of 8	3 out of 16
100	0 out of 8	3 out of 16
500	0 out of 8	1 out of 16
1,000	7 out of 8	15 out of 16

From this it appeared that there was no greater defect of appreciation of two letters than one. Word recognition on tachistoscopic presentation was four out of 12 at 100 msec. and eight out of 12 at 1,000 msec. This is poor but not grossly impaired.

DISCUSSION

This patient demonstrated a severe impairment of visual space perception. There were also features of Balint's syndrome, disturbance of attention for visual stimuli, and impaired ability to execute coordinated eye movements in response to visual stimuli.

Among the constituent features of cases with visual disorientation, difficulty in finding one's way about and impairment of topographical memory generally occur. As Critchley (1953) has noted, these disorders belong to one category of 'spatial agnosic' defects. Their absence in this patient confirms how completely her disabilities were confined to the visual-spatial sphere.

Constructional apraxia in patients with visual disorientation can probably be ascribed mainly to disordered visual-spatial appreciation. There is difficulty in analysis of the spatial relationships of the pattern to be copied. There may be some executive disorder in addition. Patients with true disorder of simultaneous form perception frequently have some constructional apraxia but this is usually only mild in degree.

Anatomically, it seemed that this patient had suffered a bilateral parieto-occipital lesion. The defect in the minor hemisphere was probably greater than that in the dominant one in view of the slower recovery of use in the left arm and leg and the residual sensory signs. While many of the patients with visuo-spatial agnosia reported have had bilateral lesions, McFie, Piercy, and Zangwill (1950) and Ettlinger *et al.* (1957) have shown that this syndrome may occur with right-sided posterior cerebral lesions in right-handed individuals.

Describing a case with a very similar disorder, Luria (1959) concluded that his patient was only able to perceive one of a number of visual items presented simultaneously. He suggested that it was on the basis of previous experience that the patient combined several stimuli into a single configuration. But an alternative explanation is preferable. Once a single object has been perceived by these patients,

their visual perception of other objects is impaired or obliterated and this is quite independent of impairment of spatial orientation. Similarly, attention to detail may lead to loss of perception of an object as a whole. In these patients, the attention defect throughout the field of vision may be of such a degree that to clinical testing the individual may appear to be unable to perceive more than one object simultaneously irrespective of its size. In this way, in reading and picture interpretation, they may imitate very closely cases with simultanagnosia—as indeed did the patient here described.

It has been suggested (Kinsbourne and Warrington, 1962) that in simultanagnosia there is a slowing of the rate at which visual percepts may be registered. 'At some point in the perceptual process, there is a "filter" permitting the passage of no more than one percept at a time. It may be that in patients with disordered simultaneous form perception there is relative block at the filter.' If this is an accurate assessment of simultanagnosia, the defect must be acting at a different level in the nervous system and involving more than perceptual defect alone as would seem to be occurring in visual disorientation. Furthermore, in visual disorientation, when carefully tested, the time taken for visual perception is unaltered, as has been demonstrated by these tachistoscopic studies; whereas, in simultanagnosia speed of visual perception is greatly slowed. In this patient, even at short exposure durations, two letters were as often appreciated as one. This is incompatible with a diagnosis of simultanagnosia.

The associated features of disordered visual localization and ocular movement in a patient presenting with visual defect of this kind serve to distinguish visual disorientation from simultanagnosia. The evidence is that simultanagnosia is associated with lesions in the anterior part of the left occipital lobe whereas the lesion in visual disorientation is often bilateral or in the non-dominant hemisphere in the parieto-occipital region.

SUMMARY

A case of visual disorientation is presented. This patient showed this defect in relative isolation from associated neurological defects. The points of similarity between visual disorientation and simultanagnosia are discussed and the distinguishing features described. This distinction is important since there is evidence that lesions in different sites are responsible.

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