## **Original Contributions**

# Sensory-Specific and Fractional Disorders of Recent Memory in Man

## I. Isolated Loss of Visual Recent Memory

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 Two patients who lost, in isolation. visual recent memory following bilateral posterior cerebral artery infarctions are described. Tactile, verbal, and nonverbal auditory recent memory functions were preserved in both patients. Based on computerized tomography scans and behavioral and anatomical data in monkey, isolated loss of visual recent memory in man is best understood as a bilateral disconnection syndrome between the striate cortex and the structures in the medial temporal lobe that are involved with recent memory. The possible existence of two other sensory-specific disorders of recent memory, tactile and auditory, is postulated, and the clinical relationship of prosopagnosia, achromatopsia, and spatial disorientation to visual recent memory loss is discussed.

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It is usually assumed and occasionally demonstrated that patients with loss of recent memory have a multimodal disturbance that affects verbal and nonverbal audition, somesthesia, and vision (personal observations in four patients).<sup>1.2</sup> In its purest form, attention, immediate recall, remote memory, calculations, problem solving, social graces, language functions,

ty of Texas Health Science Center, Dallas. Reprint requests to Department of Neurology, perception, and standard IQ test results are normal despite the loss of recent memory.<sup>3.4</sup> The underlying lesions causing permanent recent memory loss are bilateral and usually involve either the medial temporal lobes<sup>5.6</sup> or the medial dorsal nuclei of thalamus and medial mamillary bodies.7 Recent memory loss has also been observed following a strictly unilateral left medial temporal lobe infarction, but there is evidence to suggest that the disturbance may be transient.<sup>8.9</sup> The typical bedside method of diagnosing recent memory loss is by verbally testing the patient's knowledge of recent events and verbally testing his ability to retain a short story or a few words after verbally distracting him from the task for approximately three minutes. Tactile, nonverbal auditory, and visual recent memory functions are not routinely assessed.

During the last two years, I have evaluated the conditions of five patients with unusual and profound recent memory disturbances limited to either a specific sensory modality (vision) or confined to one half of the body (unilateral tactile). This report and a companion article to be published subsequently in the ARCHIVES<sup>10</sup> will describe these patients, define the methods for examining sensory-specific and fractional disorders of recent memory and offer anatomical interpretations to help explain the existence of these rather startling syndromes. This first report will discuss sensory-specific disorders of recent memory based on the cases of two patients who had isolated loss of visual recent memory on examination.

### **REPORT OF CASES**

CASE 1.-A 36-year-old left-handed man was examined two years after he had suffered a cerebral vascular accident. On Feb 6, 1974, the patient suddenly lost the ability to read, recognize objects, and perceive colors, although he was able to see. Initially he was thought to be hysterical, but within 12 hours a left hemiparesis, a left hemianopsia, and a confusional state developed. A physical examination performed on admission of the patient to the Great Lakes Naval Regional Medical Center was normal. On neurological examination, the patient was confused and had an anomic aphasia. A left homonymous hemianopsia, a left-sided ataxic hemiparesis, and left-sided sensory extinction to bilateral simultaneous stimulation were also observed. The EEG was disorganized and slowed in the right posterior quadrant. Nuclide brain scan, lumbar puncture, cerebral angiography, and pneumoencephalography were normal.

Soon after discharge, in April 1974, the patient's confusional state, anomia, and alexia resolved. Within a year he began attending a local college. The major problem he noted, besides a complete inability to recognize faces, was severe spatial disorientation. In order to find his way around the college campus or to walk to and from school, he was constantly forced to consult maps and written notes or to "verbally

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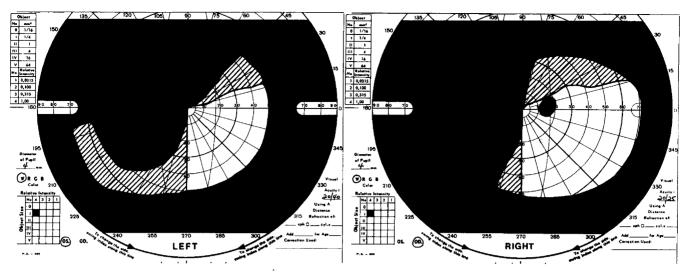


Fig 1.—Visual field examination by Goldmann perimetry (case 1). Hatched areas indicate portions of visual field where movement could be seen but not test light being turned on or off.

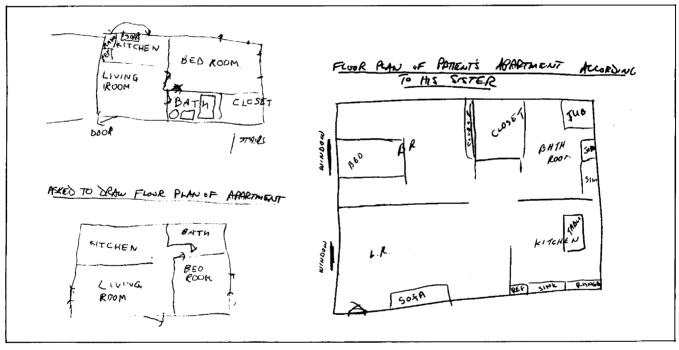


Fig 2.-Two drafts by patient 1 of floor plan of his apartment (left). Accurate floor plan drafted by his sister (right) for comparison.

memorize" routes. For example, he knew the route from his apartment to the college and back only because he had memorized the names of the various cross streets and the proper right and left turns. When he was assigned to a particular seat in a classroom, he would record its row and rank; otherwise he could never find it again. Despite these difficulties, he was able to maintain a "C" average.

The patient was admitted to the Dallas Veterans Administration Hospital in November 1976. His past medical history was remarkable for migraine headaches and congenital (partial) color blindness. A physical examination performed at this time was normal. He was alert, awake, and cooperative. Immediate recall, recent and remote memory (tested verbally), similarities, proverb interpretations, right/left orientation, map directions, map reading, geographic knowledge, two- and threedimensional constructions, calculations, dressing, and finger recognition were normal. There were no disturbances of affect, judgment, insight, or mood. Language testing demonstrated intact spontaneous speech, repetition, comprehension, reading, and writing. Visual naming and tactile naming in the right and left hands were normal. There was no ideomotor apraxia. The only deficits found on testing of higher cortical function were (1) a total inability to recognize the faces of family, friends, and famous people, with preserved ability to match pictures of the same face taken at different photographic angles; (2) a severe inability to recognize and name colors that could not be explained by the patient's congenital color blindness; (3) complete inability to sort colors that varied only in hue (tested by the Farnsworth-Munsell 100-Hue Test); and (4) severe spatial disorientation that proved to be secondary to (5) a profound loss of recent

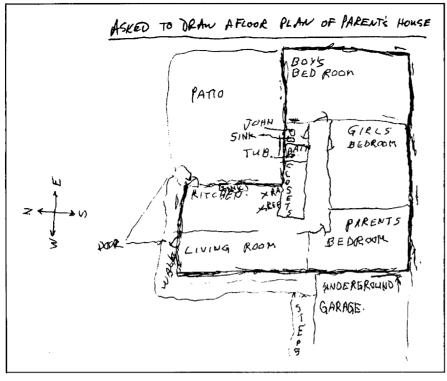


Fig 3.—Draft by patient 1 of floor plan of his parents' house. According to sister, drawing was accurate. Note correctly drawn relationships of north, west, south, and east.

visual memory (see "Special Tests and Observations").

There was a dense left homonymous hemianopsia and a partial right superior quadrantanopsia (Fig 1). Depth vision, tested with the Titmus Stereo Test, was normal. Except for mild loss of sensation to pinprick on the left side of the face, cranial nerve function was intact. Motor strength was normal, but there was marked ataxia of limbs on the left side on intention, with hyperreflexia and Babinski's sign present on the left. The patient had no difficulty in accurately reaching for objects in space and did not have signs compatible with simultaneous agnosia. The sensory examination was normal and included testing for graphesthesia, two-point discrimination, touch localization, bilateral double simultaneous stimulation, and stereognosis. Station and gait were unremarkable.

Special Tests and Observations.-Spatial Orientation .- The patient had no difficulty in moving through his environs. He did not appear or act as though he were blind. Nevertheless, he was never able to learn the spatial organization of the neurology wing during the entire month he spent in the hospital. He was able to find his room only because he had verbally remembered the room number and would literally follow the numbers down the corridors. Yet when given verbal or written directions or a map of the neurology wing, he had no problems in negotiating a route. Furthermore, when asked to construct a map of the neurology wing, he was able to do this task if allowed to walk through the ward but was unable to do it from memory.

According to his sister, the patient also appeared spatially disoriented in the threeroom apartment where he had been living for six months. In striking contrast, however, when he stayed at his parents' house, in which he grew up, there was no observable difficulty with spatial orientation. The underlying defect causing the patient's disorientation proved to be a profound and isolated loss of visual recent memory.

Visual Recent Memory.-In terms of verbal, nonverbal auditory (tested with noises and melodies), and tactile recent memory, the patient had no demonstrable difficulties. He was able to remember verbatim a short story with 15 pieces of information even at 48 hours after narration and easily recognized objects with distinct but nonverbalizable tactile features, based only on tactile discrimination, after a three-minute verbal distraction. When recent visual memory was tested, however, he demonstrated an absolute deficit.

If the patient was shown a relatively nonverbalizable object or line drawing, he was unable to choose it visually from among four similar objects or drawings after a three-minute verbal distraction. If he was able to verbalize sufficiently a description of the object or drawing, he did better on this test. For example, when shown a pen, and then shown a pen, pencil, comb, and chalk after a three-minute verbal distraction, he always chose the pen. When the pen was displayed with three other pens, however, he was unable to choose the correct pen. When he was brought into a room and shown where different objects were located, such as a clock, a door, a light switch, and an examining table, if he closed his eyes and was verbally distracted for one minute, he could not accurately localize these objects in space. Furthermore, when asked to draw a floor plan of his present apartment, he made two attempts, neither of which was correct (Fig 2). This was in distinct contrast to his precise drawing of a floor plan of his parents' house (Fig 3).

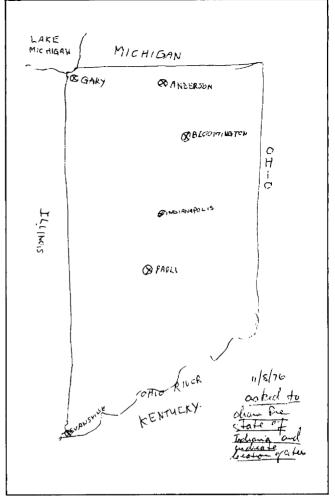
Immediate visual recall was tested by giving the Graham-Kendall Memory-for-Designs Test in standard format." His score was a perfect 15 out of 15. (This test is given by showing the subject a card with a geometric line drawing for 5 s and then having him draw the figure immediately after the card is removed.) To test for remote visual memory, he was asked to draw the Statue of Liberty, the Eiffel Tower, a map of Indiana (the state in which he grew up), and a face (Fig 4), in addition to a floor plan of his parents' house (Fig 3). All of these drawings were done reasonably well. He had no trouble in naming or identifying visually a multitude of objects presented to him, which also provided evidence that his remote visual memories were intact.

Computerized Tomographic (CT) Scan.-A CT scan done in October 1975 revealed bilateral medial occipital lobe infarctions (Fig 5). The right-sided infarction involved the entire medial occipital lobe, with inferior extension into the deep occipital white matter. The left-sided infarction involved the inferior portion of the medial occipital lobe, with extension into the posteriorinferior temporal lobe, just inferior to the occipital horn. The medial, anterior, superior, and lateral temporal lobes were not involved by the lesion. In terms of clinicopathologic correlations, the dense left homonymous hemianopsia, the partial superior right quadrantanopsia, the prosopagnosia,12 and achromatopsia13 were easily accounted for by the bilateral lesions. One could also assume from the distribution of the infarctions that both the right and left inferior longitudinal fasciculi were destroyed, since these white matter bundles are located just inferior to the occipital horn and optic radiations in the occipital lobes.14

The patient's profound difficulty with spatial orientation could not be attributed to any elementary loss of visual, visual-spatial, or geographic functions. It was clearly the result of his isolated loss of visual recent memory that prevented him from committing to memory visual but not verbal information concerning his environment. Therefore, he could not visually recognize places where he had been in the recent past but was able to negotiate routes by using verbal or written clues, such as maps. His permanent spatial disorientation was similar to what a normal person first experiences in a new environment, the difference being that a normal person will eventually build up sufficient



Fig 4.—Left, Drawings by patient 1 of Eiffel Tower, Statue of Liberty, and face. Right, Patient's map of Indiana. Geographical relationships on map are correct, except Bloomington should be between Indianapolis and Paoli, and Anderson should be closer to Indianapolis.



visual recent memories to become spatially oriented without resorting to maps or other clues. The seemingly paradoxical observation that the patient was oriented in his parents' house but not in his apartment is readily understandable, since he had full access to his remote visual memories. However, the difficulty in recognizing faces, causing a profound prosopagnosia, could not be attributed to his visual recent memory disturbance, since the deficit affected both recent and remote visual memories for faces.

CASE 2.—A 77-year-old right-handed man was examined on the neurology service at Parkland Memorial Hospital in May 1978 because of a change in behavior. In late fall of 1977, the patient had had an episode of confusion that the family described as failure to visually recognize people, buildings, and places that should have been familiar to him. Apparently he was not blind, although he did bump into things on his left side. The patient eventually complained that his vision was blurred, and he was discovered to have a left homonymous hemianopsia. In mid-February he was hospitalized and diagnosed as having suffered a cerebrovascular accident, as shown by cerebral angiography that demonstrated a spastic right posterior cerebral artery with missing terminal branches. After discharge the family noted that the patient had difficulty finding his way around town and in his house. He also did not visually recognize people whom he had met within the last few years, although he had no trouble recognizing people he had known for many years. When told the names of the people he could not visually recognize, however, he instantly knew who they were.

The physical examination was normal. The patient was awake, alert, and cooperative, but affect was slightly inappropriate due to mild irritability. Attention and immediate recall were intact. Recent and remote memories, tested verbally, and tactile recent memory, tested in both the right and left hands, were normal. Calculations. similarities, and proverb interpretations were done with some hesitancy. He demonstrated poor insight into his illness. Knowledge of map directions and Texas geography, right/left orientation, dressing abilities, and finger recognition were intact, but two- and three-dimensional constructions were poor due to partial left-sided visual neglect. Language evaluation was normal except for mild difficulty in naming parts of objects. Facial recognition was intact for family and famous people but severely compromised for new faces, such as hospital physicians and nurses. He was able, however, to remember the names of his physicians verbally, despite a total inability to recognize them visually.

The only abnormalities on cranial nerve testing were a dense left inferior homonymous quadrantanopsia and a partial left superior quadrantanopsia. In the preserved portions of the left superior quadrant, visual recognition of objects and words (tested tachistoscopically) was lost, but detection of movement was not (Fig 6). Motor, reflex, and sensory examinations were normal except for mild decrease in vibration sensibility in his toes. The patient had no difficulties in accurately reaching for objects in space and did not have signs compatible with simultaneous agnosia.

Special Tests and Observations.-Spatial Orientation.-The patient never acted or appeared to be blind when walking through the neurology ward, although he would occasionally bump into things on his left side. Despite spending six days in the hospital, he was never oriented to the configuration of the neurology ward. Furthermore, he was unaware that there was a bathroom in his room unless the door to it was kept open. This particular problem could not be accounted for by his left visual field disturbance, since the bathroom was located in his right visual field as he looked out of his room into the hallway. He could not draw a floor plan of the neurology ward or his home because of his difficulty with constructions, yet he was able to follow verbal directions in negotiating a route through the neurology ward.

Visual Recent Memory.-The Graham-Kendall Memory-for-Designs Test could not be used to evaluate the patient's immediate visual recall because one of the requirements of the test is that the subject must make drawings of the figures shown to him. To test immediate visual recall, the patient was shown a relatively nonverbalizable object and immediately asked to choose that object from among four other similar but visually different objects. He had no difficulty with this test on four separate trials. However, if the test was administered with a three-minute verbal distraction time between object presentation and choice, he did not make a correct choice in four trials. On the fifth trial the verbal distraction was shortened to 10 s, and he again failed to identify the correct object. On the other hand, his remote visual memories appeared intact. He could accurately describe the location of various cities in Texas, the Eiffel Tower, and the Statue of Liberty, and he had no difficulty in visually recognizing a multitude of objects. Although he was not able to recognize visually the faces of the ward personnel, he had no problems in recognizing the faces of his family or pictures of famous people. Thus the patient demonstrated a profound and isolated loss of recent but not remote visual memory that could not be accounted for by any elementary perceptual problem or by a defect in immediate visual recall.

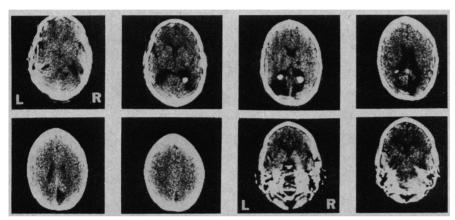


Fig 5.—Computerized tomographic scan in case 1. Upper four panels and two left lower panels are horizontal sections; two right lower panels are coronal sections. Lesion is bilaterally prominent and involves most of right occipital lobe and inferior left occipital lobe. Coronal sections confirm that anterior temporal lobes were spared. Arrowhead in first upper left panel points to right superior cerebellar infarction; arrowhead in third from left lower panel points to right temporal lobe.

CT Scan.-A thin-section CT scan with sagittal reconstructions was done on April 22, 1978 (Fig 7). There was a right medial occipital lobe infarction that extended laterally and anteriorly to the occipital horn and a small, poorly defined infarction deep in the left occipital lobe just posterior and inferior to the occipital horn. The temporal lobes were not involved by the lesion. Cortical atrophy and mild hydrocephalus ex vacuo were present. In terms of clinicoanatomical correlations, the left visual field defects were easily accounted for by the lesion, and one could also assume that the right and perhaps the left inferior longitudinal fasciculi were injured.

One month after discharge the patient was again extensively examined. He appeared to have regained his visual recent memory function, as he no longer demonstrated spatial disorientation in new environments and on formal testing did not show any evidence of a visual recent memory disorder. The left visual field deficits remained unchanged.

**COMMENT.**—As in case 1, the patient demonstrated an isolated loss of visual recent memory on formal examination that easily accounted for his spatial disorientation in new environments. However, this could not explain the family's observation that the patient appeared somewhat disoriented in the house and town he had lived in for most of his life. I suspect that his route-finding difficulties in these situations resulted from his visual neglect of the left side of space rather than a problem with remote visual or topographical memories.

Unlike the patient in case 1, this patient did not have prosopagnosia or achromatopsia. Thus these two syndromes should not be considered a necessary clinical accompaniment of

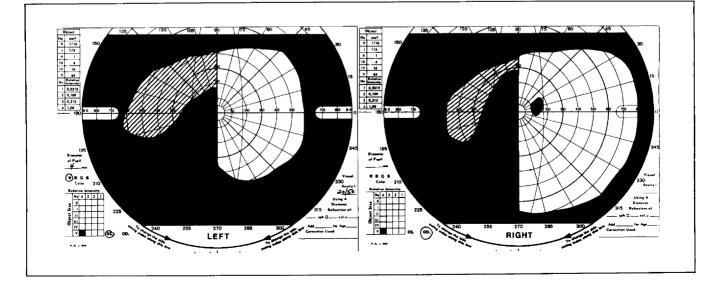


Fig 6.—Visual field examination by Goldmann perimetry (case 2). Hatched areas indicate portion of visual field where movement could be seen but not objects or words presented tachistoscopically.

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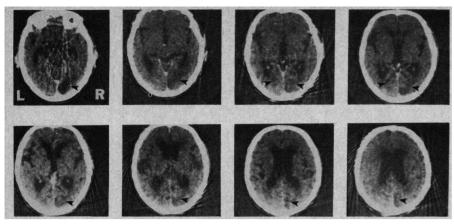
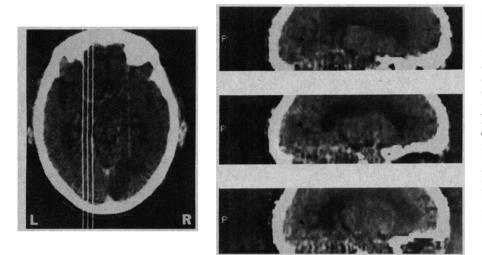


Fig 7.—Computerized tomography (CT) scan in case 2. Horizontal sections; bottom, sagittal reconstructions. Sagittal reconstructions are arranged from top to bottom to correspond to lateral, middle, and medial cuts indicated in horizontal CT cut. Arrowheads help define extent of infarction. Lesion involves most of right occipital lobe and small area of deep left inferior occipital lobe (see sagittal reconstructions).



isolated visual recent memory loss. Since the difficulties experienced by this patient with facial recognition involved only visual recent memory, the diagnosis of prosopagnosia can be excluded.

The last point to be made regards the use of standard psychological tests in certain clinical situations. In this patient, if I had tried to assess his immediate visual recall with the Graham-Kendall Memory-for-Designs Test<sup>11</sup> or even with the Benton Revised Visual Retention Test,<sup>15</sup> his scores would have been abysmal because of his severe problems with constructions. I might have incorrectly concluded, therefore, that his immediate visual recall was poor, and the diagnosis of visual recent memory loss would have been missed.

#### COMMENT

To establish clinically that an isolated visual recent memory distur-

bance exists in a patient, it must be demonstrated that the patient has (1) no intrinsic problems with visual perception, (2) no aphasic disorder that could interfere with testing, (3) intact immediate visual recall, (4) intact remote visual memory, and (5) no loss of tactile, verbal, or nonverbal auditory recent memories. I believe that the two cases presented here meet these criteria and amply illustrate the methods and pitfalls for testing the functions listed above. If the presence of a retrograde amnesia can be established for visual events occurring prior to the ictus, then the above criteria for diagnosing a loss of visual recent memory would be complete. In case 1, this particular phenomenon could not be established; in case 2, however, there was good evidence that the patient had a retrograde visual amnesia, since he could not visually recognize people he had met in the recent past, prior to the onset of his illness.

As far as I have been able to determine, these cases are unique in the clinical literature, although I do not believe that they are necessarily rare. For instance, in Meadows' reviews of prosopagnosia12 and achromatopsia13 and in a review of prosopagnosia by Hécaen et al,<sup>16</sup> many of the patients described in the literature were noted to have spatial disorientation. Some of the authors clearly defined the cause for their patient's spatial disorientation-visual neglect of a portion of space,<sup>16</sup> or primary loss of topographical memory with17 or without18 elements of visual agnosia-but none tested for, or established the presence of, a loss of visual recent memory. In the patient with prosopagnosia described by Aptman et al,19 mention was made of a visual memory disturbance, but insufficient details were furnished to determine the exact nature of this disturbance. (For example, I recently examined a patient with prosopagnosia who had spatial disorientation in new, but not old. environments. She had full fields on Goldmann perimetry testing. On tachistoscopic evaluation, however, she had a complete inability to recognize objects, words, and colors that were flashed into her left visual field, and a marked deficit of immediate visual recall in her right visual field. Thus her "visual memory disorder" was due to an immediate recall problem and not a recent memory disturbance.)

Since the distribution of lesions known to cause prosopagnosia<sup>12</sup> and achromatopsia<sup>13</sup> is similar to the distribution of lesions encountered in the presented cases, some of the patients described with these disorders could well have had visual recent memory loss as a cause of their spatial disorientation. The patient in case 1 is an excellent example: he had prosopagnosia but did not have any of the symptoms usually associated with the known causes of spatial disorientation<sup>20</sup>-neglect of a portion of space,<sup>20,21</sup> loss of former geographic knowledge,20.22 posttraumatic Korsakoff's syndrome,23 defective visual and motor localization of objects in space.<sup>20,24</sup> defects in immediate visual recall (defective short-term memory for spatial localization),20 and simultaneous agnosia.20

Scotti<sup>25</sup> has described a patient with spatial disorientation in new, but not old, environments. He related this disorder to a (recent) topographical memory disturbance but unfortunately did not specifically examine the patient's visual recent memory functions. Patterson and Zangwill<sup>23</sup> have

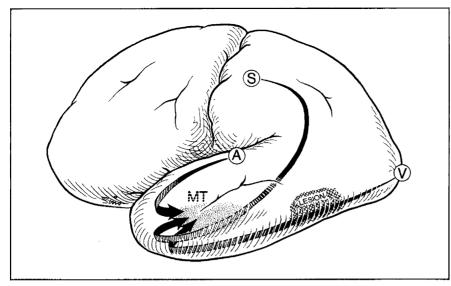


Fig 8.—Highly schematic illustration showing separate anatomical routes taken by somatosensory, auditory, and visual information when coursing to medial temporal lobes. If bilateral lesion disconnects visual cortices from medial temporal lobes, isolated loss of visual recent memory occurs. If bilateral lesion disconnects somatosensory cortices from medial temporal lobes, isolated loss of tactile recent memory should occur. Parallel inferences can be made for auditory system. Key to Figure is as follows: S, somesthetic cortex; A, auditory cortex; V, visual cortex; MT, medial temporal lobe.

studied spatial disorientation in patients with posttraumatic Korsakoff's syndrome. The resolution of spatial disorientation in these patients often occurred prior to recovery of their recent memory function. Recent memory, however, was assessed only by verbal tasks. I suspect from the cases presented in this report that spatial disorientation in patients with posttraumatic or other causes of multimodal recent memory loss is the result of their visual recent memory disturbance. Thus, if Patterson and Zangwill<sup>23</sup> had followed their patient's visual recent memory functions instead of their verbal recent memory functions, a better correlation might have been found (see case 3 in the companion article<sup>10</sup> for further elucidation of this point).

The animal studies concerned with the Klüver-Bucy syndrome and its components are most helpful in understanding the anatomical basis for isolated loss of visual recent memory. As noted by Klüver and Bucy,26 monkeys with bilateral temporal lobe ablations demonstrate psychic blindness, hyperorality, and hypoemotionality. In addition, these animals lose the ability to learn new tactile,27 visual,28 and auditory<sup>28</sup> discriminations. It was subsequently discovered by Chow,<sup>29</sup> and by Mishkin<sup>30</sup> and Mishkin and Pribram<sup>31</sup> that bilateral removal of the inferotemporal cortex in monkeys produced a striking disturbance in the ability to learn new visual discriminations with-

out the other components of the Klüver-Bucy syndrome. Furthermore, the ability to learn new tactile<sup>32</sup> and auditory<sup>33</sup> discriminations was preserved in these monkeys and, most important, the visual discrimination problem was shown to be secondary to a loss of visual recent memory.<sup>28,34</sup> Horel and Misantone<sup>35</sup> then reasoned that if the longitudinally running fibers of the temporal lobe, which contain the cortical connections between occipital and inferotemporal cortex,36 were transected bilaterally in monkeys, the ability to learn new visual discrimination should be lost, since the visual cortices would be disconnected from the temporal lobes. This is, in fact, what they found after bilateral transverse white matter cuts were placed in the basolateral portions of the posterior temporal lobes. Thus the lesions served to prevent visual information from gaining access to the inferotemporal cortices, which in turn connect via the entorhinal cortices to the neuronal structures in the medial temporal lobes that are known to be imperative for recent memory function in both monkey<sup>30</sup> and man.<sup>1</sup>

It is of great interest, then, that in addition to their medial occipital lobe infarction(s), both patients described here had bilateral lesions involving the deep basal white matter in the occipital and posterior temporal lobes, wherein course the inferior longitudinal fasciculi. These white matter tracts are thought to carry visual

information between the occipital and temporal lobes in man.14 In case 1, the deep inferior occipital lesions seen on CT scan were bilaterally severe, which probably accounted for the patient's profound and persistent loss of visual recent memory. In case 2, the deep white matter lesion in the left inferior occipital lobe was seen to be small and spotty on CT scan, which could explain why the patient was eventually able to recover visual recent memory function. Therefore, the anatomical basis of this syndrome in the cases discussed here seems best explained as a disconnection between the patients' uninjured visual areas and the temporal lobes. Since visual information could no longer be processed by the medial temporal lobes, a loss of visual recent memory resulted. The patients did not manifest disturbances involving remote visual memory or immediate visual recall, since neither of these functions are dependent on the temporal lobes.<sup>1</sup> Auditory and tactile recent memories were preserved because the lesions presumably did not cause the somatosensory and auditory cortices to become disconnected from the medial temporal lobes. This assumption is anatomically possible, since the primary receiving and associational areas subserving these sensations lie in divergent areas of the cerebral cortex, and their connections to the temporal lobes must take, by necessity, separate routes (Fig 8) (see references 30 through 33 and 36 through 38 for anatomical support of this point in monkey). If the above reasoning is correct, it would logically follow that appropriate bilateral lesions in man, causing the auditory or somatosensory cortices to become disconnected from the medial temporal lobes, would give rise to other forms of sensory-specific disorders of recent memory (Fig 8). In fact, sensoryspecific auditory and somesthetic learning disturbances, presumably the result of sensory-specific recent memory loss, have already been observed in monkeys following bilateral anterior/superior temporal<sup>28</sup> and posterior parietal<sup>32,39</sup> lesions, respectively.

#### CONCLUSION

The patients described in this report illustrate and establish that a sensory-specific disorder of recent memory can exist in man. From an anatomical point of view, isolated visual recent memory loss is best explained by the disconnection theory,<sup>40</sup> since the lesions seen on CT scan did not appear to involve those structures usually associated with recent memory functions. The animal studies concerning the Klüver-Bucy syndrome lend strong support to the given anatomical explanation for the occurrence of isolated loss of visual recent memory in man. In the companion article in a subsequent issue of the ARCHIVES, patients who have unilateral losses of tactile recent memory are described and the syndromes of fractional disorders of recent memory discussed.

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### CORRECTION

**COLUMNS TRANSPOSED.**—In the article titled "Clinical Significance of Periodic EEG Patterns," published in the January Archives (37:15-20, 1980) the columns on page 17 were transposed. The material found in the last two columns on the page (directly under the figures) should have been at the top of the left-hand column on that page and the material now at the top of the left-hand column should have followed.