PSYCHICAL PHENOMENA IN TEMPORAL LOBE EPILEPSY AND THE PSYCHOSES*

BY

SHAFICA KARAGULLA, M.D., M.R.C.P.Ed.
D.P.M.

*Department of Neurology and Neurosurgery, McGill
University and Montreal Neurological Institute*

AND

E. ELIZABETH ROBERTSON, M.B., F.R.C.P.Ed.
D.P.M.

*Royal Edinburgh Hospital for Mental and Nervous
Disorders*

The psychical phenomena which form part of the seizure pattern in certain cases of epilepsy may be said to represent a mental disorder in miniature, and for this reason their study may help us to understand the more complex and global mental disturbances found in the psychoses. We claim no originality for this suggestion, for it was made by Hughlings Jackson in 1875. And the Jacksonian epithet, "dreamy state," serves to remind us that Hughlings Jackson was one of the first to stress that psychical phenomena are just as much a manifestation of epileptic discharge as the more spectacular tonic and clonic contractions. Moreover, he was able to correlate such mental concomitants of epilepsy with a structural lesion—since in his famous case of Dr. Z, who suffered from "dreamy states," he and Colman (1898) demonstrated at necropsy a softening in the uncus of the left temporal lobe. These were some of the first stages in a long pathway which has led to present-day investigations into the psychical phenomena in temporal lobe epilepsy—investigations which will always be associated with the name of Dr. Wilder Penfield, of the Montreal Neurological Institute.

Hughlings Jackson and his contemporaries obtained their knowledge from clinical observation and interrogation of the patient during or after the seizure. This must always remain an essential preliminary to any investigation. The proof, however, that such abnormal mental experience is the product of epileptic discharge in the temporal lobe has come from electrical stimulation of the temporal lobe cortex in conscious patients. In particular it has come from the accumulated, carefully controlled, and correlated stimulations carried out in the last 30 years by Penfield and his associates (1941, 1950, 1954) during their operative procedures for the relief of epilepsy. These electrical stimulations are an essential part of the operative technique, their purpose being to delineate the epileptogenic focus, but probably no other routine operative technique arouses such strained suspense in the observer, who knows that at any moment the electrode may elicit from the patient a description of some sudden and compelling mental experience which cuts across his normal stream of consciousness. Thus, for the first time in history, man has been made to see visions and hear voices by means of the stimulating electrode and at the will of the surgeon.

The psychical phenomena which are produced by epileptic discharge in the temporal lobe or by cortical stimulation are many, and include hallucinations of vision, hearing, smell, taste, touch; illusions of distance, size, form, colour, motion, speed of sound and time;

disturbances in equilibrium and body image; alteration in thought and affect; disorientation for time, place, and person; disturbances in speech and automatism, the latter with its accompanying memory defects.

From all this bewildering variety we have had perforce to make a selection, and here we propose to illustrate but three, which have a special bearing on the psychoses, in particular on the disturbance in thinking found in schizophrenia.

Material

The cases of temporal lobe epilepsy presented here have been selected from the first 105 cases of a series studied by one of us (S.K.) under the direction of Dr. Wilder Penfield at the Montreal Neurological Institute since September, 1952. Sixty-eight had undergone one or more craniotomies. Nine of the total were tumours, two were cysts, and the remaining 94 were atrophic lesions of the temporal lobes.

The cases of psychoses were studied at the Royal Edinburgh Hospital for Mental and Nervous Disorders, between the years 1946 and 1954, under the direction of Professor Sir David K. Henderson.

The experiences which we describe and illustrate may be stated thus: (1) The experiencing of "thoughts"—such thoughts being either indefinite or formulated. (2) The hearing of "voices" within the mind or body or from a point external to the self. (3) The seeing of persons, objects, or scenes, which, again, may be perceived within the mind or at some point external to the self.

We later present the hypothesis that all these three are but variants of the same phenomenon—that they all represent abnormal derivatives of thought.

1. Evocation of "Thoughts" in Temporal Lobe Epilepsy

We first illustrate these experiences from cases of temporal lobe epilepsy. The first case is one in which "thoughts" occurred as part of the seizure pattern and were also reproduced on cortical stimulation. The "thoughts" so induced were not clearly formulated—they may be called "amorphous" thoughts.

Case 1

A.D. was a young man of 20 who had suffered from both major and minor epileptic seizures since the age of 16. E.E.G. examination revealed an extensive epileptic abnormality in the right temporo-parietal lobes. Before operation he described what he experienced during his seizures as "two thoughts coming together." He explained it thus, "It is something whatever I may be occupied with at present is overlapped or overjoined by another thought. This thought comes along, hits me and goes back, a reminder, but I cannot give a picture of what it reminds me. Something hits me and reminds me of something which hit me before; maybe that is why I think it is two thoughts." This mental experience was followed by a squeamish feeling in his stomach. He remained able to speak and understand throughout the minor seizures.

When, during operation, cortical stimulation was made at a point 6 cm. from the tip of the right temporal pole in the second temporal convolution, at a depth of 1 cm., the patient said, "My thoughts sort of bounced together for a second," but he added that this was not exactly similar to his experience during an attack. Three later stimulations, carried out at variable intervals at a depth of 2 cm. slightly anterior, reproduced, however, a change in thought identical with that which occurred during his attacks. During the first stimulation he said "the same two thoughts which come together"; and when the electrode was withdrawn he explained that one of those thoughts was concerned with what was happening at the present time, and the second thought was of something different, but what it was he could not recall. Stimulated a second time, he said, "This is it," and crossed his index finger over his third in an attempt to illustrate what he meant. When the electrode was withdrawn he was asked whether what he experienced was a memory; he said definitely, "No, it is the thought that crosses." Stimulated a third time, he said, "It comes again," and moved his fingers in

*Delivered at an open meeting of the Royal Medico-Psychological Association at the Royal Society of Medicine on November 3, 1954.

illustration, saying, "They mixed the thought." This was followed by a feeling in the stomach. This experience of "thoughts" identical to that which formed part of his seizure pattern was reproduced no fewer than three times by cortical stimulation. These evoked "thoughts" forced themselves on consciousness as something separate and distinct from the normal stream of thought of the patient, and were recognized by him as not clearly formulated.

In a second case, both epileptic discharge and cortical stimulation induced the experience of "rhythmic thoughts," which to the patient appeared at the time of their experiencing as fully formulated, although he could not later recall their content.

Case 2

W. S. was an intelligent man of 30 with a left temporal focus. His seizures were ushered in by a sensation in the left chest, and immediately thereafter he was aware that the sounds in his environment—for example, the machinery in his factory—became louder and faster. Human voices, however, did not change. At the same time he experienced "thoughts" coming into his mind—which he described as "rhythmic thoughts—as though I were thinking of something, maybe the rhythm of poetry or music: the rhythm is always the same. It feels familiar to me during the seizure, yet I cannot recall it afterwards." When asked if they were memories, he said, "No, they were like words or combinations of words." On another occasion he added that it was like thinking two things at once. At operation, the pattern of his seizure was best reproduced by stimulation at a point 1 cm. from the tip of the left temporal pole on the second temporal convolution. He was unable to speak during the actual moment of stimulation, but when the electrode was withdrawn he said, "That was something like an attack," and described the sensation in the left chest, and his awareness of "thoughts" entering his mind, the content of which he was unable to recall.

The clinical findings in this case are almost identical with those of a case reported as far back as 1876 by Dr. Coats, of Glasgow, in which the patient's fit was preceded by giddiness and a "peculiar thought." To quote Dr. Coats: the patient "cannot tell what the 'thought' is, yet it is confident that it is always the same. He always recognizes it at once when it occurs, and he tries to fix it in his memory, but he invariably forgets when the fit is over."

This induction of thoughts into the mind by cortical stimulation has occurred in other cases, and the stimulation points tend to be grouped around the second and inferior temporal gyri.

It is worthy of emphasis that these patients have difficulty in describing both the content of their induced thoughts and the manner in which they are experienced. This difficulty was well expressed by one intelligent patient, who tried in vain to describe the manner in which thoughts rushed into his mind during his seizures, and finally, in desperation, exclaimed, "It is like asking an artist to paint a picture of what roast beef smells like and he cannot do it." It seems only too probable that what we are asking of them is comparable to the impossible task of describing one sensation in terms of another.

How can we categorize this experience? In what group of abnormal mental phenomena can it be placed? We have of necessity to make use of such concepts as are at present available—although these are less than ideal—and so we would designate these intruding "thoughts" as hallucinations. There is no other word extant—although we hope in future that more precise terms will be formulated—which can cover this experience, whereby a thought, evoked either by epileptic discharge or cortical stimulation, apparently assumes a separate existence alongside the patient's own current of thought. Such separate existence would appear to be proved by the patient's ability to bring his powers of introspection to bear on it, and to describe it, however inadequately, during or after its occurrence.

Definition of Hallucination

According to the Oxford Dictionary, a hallucination is defined as "the apparent perception of an external object when no such object is present," and this placing of the hallucinatory experience outside the self is usually implied in the general usage of the term. It is a finding in psychia-

try, however, that when a patient says he "hears" certain words or phrases, that he "sees" certain objects or scenes, what he "sees" and "hears" has for him no external location, but is "heard" and "seen" in the mind. There exists to-day a disinclination to apply the term "hallucination" to these abnormal "internal" perceptions, yet the older French writers showed no such hesitation. Baillarger (1890) entitled them "psychical hallucinations" using the contrasting term "psychosensory hallucinations" to designate these abnormal *external* perceptions, which then, as now, were more generally accepted as constituting true hallucinations. Under this title "psychical hallucinations" Baillarger included not only these "alien" ideas which "come to" the psychotic patient in the form of "thoughts," but "voices" which he locates in the head or epigastrium. Ségla (1892) cites, with approval, this category of "psychical hallucinations" first demarcated by Baillarger, emphasizing its clinical authenticity. He himself coined the term "psychomotor hallucinations" to denote the "inner voices" experienced by psychotic patients—believing, in terms of the strict cerebral localization theories popular in his time, that such internal auditory hallucinations resulted from an excitation of the motor centre for speech. Older theories of causation need not concern us here—what is important is that these older writers clearly realized from their detailed clinical examinations that there were varying gradations in the patient's mode of experiencing hallucinations—particularly the so-called auditory hallucinations.

2. "Auditory" Hallucinations in Temporal Lobe Epilepsy

The following case illustrates the hearing of an inner voice *within* the head.

Case 3

W. D. was a youth of 18 who had had seizures for eight years. E.E.G. showed a shifting focus in both temporal lobes. He was bilingual, Afrikaans being his mother's tongue. His seizure pattern was a sensation in his head accompanied by a voice which spoke in Afrikaans, commanding or threatening him. He had a feeling of intense fear and finally lost consciousness. Asked where the voice came from, he said, "It was just in my head." The patient was aware that he could not speak while hearing this voice and felt that his tongue was stiff (a finding common among others who heard voices within the head). He said, "If I heard the voice I used to point to my head so that my parents would know I was going to have an attack." The voice spoke in short sentences which were accusatory or threatening, telling him "You do this" or "You do that," "You did something wrong." "Things," the patient added, "that I did *not* do wrong."

The next case illustrates the hearing of voices within the stomach.

Case 4

M. S. was a little boy of 7, with an eight-months history of epileptic seizures. E.E.G. showed a shifting focus in both temporal lobes. This boy described his experience during the seizure as "I have 'bumps' in my tummy, and I hear 'Do this, do that.'" Asked "Who says 'Do this, do that'?" he replied, "My stomach—I feel something talks in my stomach." On further questioning he said it sounded like a man's voice, but he did not recognize it as the voice of anyone he knew, and that he heard it only in his stomach. Asked whether he ever obeyed this voice, he replied, "I don't do what *he* says, I do what Mum says." To the question, "Do you think there is a voice in your tummy?" he answered, "Yes—I don't know how *he* gets in there." The commands "Do this, do that," were repeated a few times and were followed by automatism and loss of consciousness. This boy never heard the voice in the intervals between seizures.

This hearing of an inner voice giving unacceptable commands is, of course, typical of schizophrenia, but in both these cases this was a momentary experience, whereas in schizophrenia it tends to be a continuous process. We shall return to this later.

The fifth case illustrates the hearing of an external voice—that is, the experience comes within the commonly accepted definition of auditory hallucinations. (This case has already been reported by Penfield and Jasper (1954).)

Case 5

S. B. was a man whose seizures began at the age of 18, and E.E.G. showed a right temporal focus. The attacks first took the form of vertigo, but a year after their onset the patient, in addition to the vertigo, heard a voice calling his name, "Sylvere, Sylvere," and this was sometimes followed by loss of consciousness. Two years later the pattern again changed, and the aura consisted mainly of a feeling of nausea behind the mid-sternum. At operation, performed six years after the onset of seizures, and four years after the voice calling his name had ceased to be part of his seizure, cortical stimulation reproduced the following:

On stimulation at a point 5 cm. from tip of the right temporal lobe, in the first temporal convolution, the patient said, "Just like someone whispering or something in my left ear—it sounded something like a crowd." Warning without stimulation produced "nothing." When stimulation was made at a point 1 cm. posterior, he said, "Again someone trying to speak to me, a single person." When asked, he added, "Oh, a man's voice—I could not understand what he said." On stimulation at a point 5 cm. from tip of the right temporal lobe on the second temporal convolution, he said, "Someone calling me in my left ear 'Sylvere, Sylvere'—it could have been my brother."

Interesting features of this case are: (1) the hearing of a voice from the side opposite to the stimulation—that is, the phenomenon of lateralization; and (2) the reproduction, by cortical stimulation, of a certain auditory hallucination—to wit, the hearing of a voice calling the patient's name—four years after it had disappeared from the pattern of his seizures.

Penfield and Jasper (1954) have reported the reproduction of auditory hallucinations by cortical stimulation in many cases, and the stimulation points are found to be concentrated around the first temporal gyrus.

These five cases have been selected from many for this one reason—that the five represent a continuous gradation or a spectrum. The epileptic discharge has evoked successively "amorphous" thoughts, formulated or "crystallized" thought, an inner audible voice located in the head, a similar audible voice with an apparent location in the abdomen, and, finally, voices seeming to emanate from the external environment. Cortical stimulation reproduced both the experiencing of thoughts and the hearing of external voices.

Hallucinations in Schizophrenia

We believe that a more complex and less well defined gradation or spectrum can be illustrated in the hallucinations of schizophrenic patients. Here interrogation of the patients presents much more difficulty, for we have to probe beneath a superstructure of delusional misinterpretations and rationalizations to discover the patient's mode of perceiving such hallucinations.

Schizophrenic Thinking

In schizophrenia the patient is continually troubled by ideas which are presented to him independent of his volition. Some appear to him as though emanating from voices in his external environment. These, the commonly accepted auditory hallucinations, represent in our opinion but one gradation of this experience. The term "auditory hallucinations" cannot be made to cover all the modes of perception of this phenomenon, nor does it sufficiently stress its intricate nature, the intimate relationship which exists between it and the patient's own thought. We may illustrate briefly the range of qualitative difference seen in such hallucinations.

In some patients these alien ideas appear as "thoughts" differing only slightly in quality from the silent imperceptible flow of normal thinking. Secondly, they may erupt in consciousness as a formulated word or phrase, with or without some extrinsic quality which the patient describes in terms of known sensations. Patient S. F. said that she experienced "strong thoughts" or "thought forms" which she described as vibrating through her head. She added that the content of these strong thoughts was quite different from what she was thinking at the moment of their appear-

ance—for implicit in this and subsequent modes of experience is the rejection by the patient of these thoughts as his own.

The next gradation occurs when the hallucinatory words and phrases exhibit some kinaesthetic—or verbal—quality which enables the patient to experience them as soundless speech within the mind. I. H., an intelligent nurse of 30, described her mode of perceiving two voices within her mind as follows: "If I compared it to lip-reading, the formation of words without the sound, that is the clearest I can describe it." (There must surely be only a minimal difference in the experiencing of "strong thoughts" and "soundless voices.") This is borne out in a famous case, cited by Séglas, of a woman who said that what she heard in her mind was a "voice," and then corrected herself, adding, "No, I am explaining it badly; it is not a voice, it is a suggestion, it is a thought without sound, it is an internal voice which flesh and blood cannot understand—it is a mute voice.")

A further gradation is reached when the patient describes voices, still experienced within the mind, which have super-added to them some subtle quality of sound. W. F. described his experiencing of a voice within his head thus: "I don't actually hear it with the ear—it is not heard outside the head, but it has some sound quality within the head." (It was from this patient's spontaneous description that we borrowed the term "sound quality.") He could not further elaborate it. What seems reasonably certain is that this sound quality does not partake of the tone and timbre of the human voice. A. W. spoke of a "whisper in my head that goes on and on. I don't know where it gets the stamina." This internal voice with a quality of sound may also be experienced in other parts of the body—in the chest or abdomen, as is illustrated by the case of Y. Z., who was suffering from schizophrenia and believed that a certain Dr. T. was in her abdomen. When asked how she knew that, she replied, "I hear him speak and I feel him move." She gave as an illustration that while having a tub bath she heard Dr. T. cry out, "I am drowning." She told him "move up" and he did! This case is almost identical with that of the little boy (Case 4) who heard voices in his stomach as part of his seizure pattern.

The final stage is illustrated in the experiencing of voices which appear to the patient to emanate from his external environment. Some patients unhesitatingly liken these to actual human voices. But others do not display this certainty. They describe a far-away quality—a voice coming from a distance; or, conversely, if near at hand, they use qualifying phrases, such as "like a voice heard through a megaphone." It seems, therefore, that if an auditory component is present it does not always, even in external auditory hallucinations, simulate the tone and timbre of the human voice.

Schizophrenic patients, if carefully interrogated, may admit to experiencing not merely one but two or three of the several gradations above described. There are still further modifications of this phenomenon—for instance, all the patient's thoughts may become verbalized and appear to resound in his external environment—the so-called "echo de la pensée." This necessarily abbreviated account is nevertheless sufficient to indicate the close resemblance which exists between such hallucinations and those found in temporal lobe epilepsy. The "thoughts," the internal and external "voices," which form part of the seizure pattern in the above five cases of temporal lobe epilepsy find their counterparts among the admittedly more numerous and complex modes of abnormal perception illustrated for schizophrenia.

Syntax of "Auditory" Hallucinations

The form of syntax of hallucinations of thought and speech in schizophrenia is difficult, and often impossible, to elicit. It is common but not invariable for patients to describe them as consisting of brief phrases, commencing with pronouns of the second or third person—for example,

"You are," "He or she is," "You did," "Do it." We find striking analogues of these in two of the cases of temporal lobe epilepsy. Case 4 heard a voice in his stomach saying "Do this," "Do that." Case 3 heard a voice in his head saying "You do this," "You do that," "You did something wrong." "Things," the patient added, "that I did not do wrong." This case is of surpassing interest, since not only the syntax, but the content of the patient's hallucinations closely simulates that found in schizophrenia. Here we see evoked by epileptic discharge that specific quality of schizophrenic thinking to which later French writers have applied the term "bipolarity." The content of the hallucinations in schizophrenia tends to consist of ideas that are repugnant or terrifying to the patient, that are the polar opposite of what he himself would wish to think and do. Wherefore he feels constrained to counter them by denial or refusal, and only finally, when their continuous reiteration exhausts him, by acceptance. But acceptance does not terminate this intense mental argument, for new commands and incompatible ideas are evoked, which in their turn engender fresh tension. The patient with temporal lobe epilepsy (Case 3) experienced in episodic form a phenomenon which in schizophrenia may go on every minute, every hour, of waking life, rendering impossible single-minded concentration on all other subjects.

3. Visual Hallucinations

It has been shown that so-called "auditory" hallucinations may be experienced either within the mind or as emanating from the external environment. Visual hallucinations may likewise take the form of internal or external perceptions.

(a) In Temporal Lobe Epilepsy

The first gradation of abnormal visual experiencing is illustrated in what patients tend to describe as "flash-backs."

Case A (M. M.) has been reported by Penfield and Jasper (1954). The patient described what she experienced in some of her attacks thus: "Suddenly something flashes through my mind—it is a memory of something past; the experience may last only a few seconds, yet I feel close to that event in my life after it had occurred." She stressed the sudden appearance, brief duration, and extraordinary vividness of this mental image, which was quite different in quality from the ordinary mental pictures which are part of everyone's thinking. Here we have a visual hallucination experienced within the mind.

Case B also illustrates a vivid internal visual experience, with the additional interest of reflecting the patient's immediate interests.

A. R. (Case B) an Englishwoman of 29, was married to a Canadian butcher. She had recently received a photograph of her brother's grave in a military cemetery in Holland. During her seizures she saw, vividly etched on her mind, series of gravestones, rows of tulips, lines of lamb carcasses. She described her manner of experiencing these hallucinations thus: "They were inside my forehead. It was not as though outside on a screen. I did not actually see it in the room; it must have been a mental picture—it came to me without my own powers of direction . . . and it came suddenly." This patient had had seizures since the age of 8, but the induced visual imagery of graves, tulips, and lamb carcasses had only recently appeared as part of her seizure pattern. Her mental preoccupations dictated the content of her visual hallucinations although they played no part in their causation.

Cases C and D experienced visual hallucinations which conform to the accepted definition of hallucinations in that they were apprehended by the patient as though located in his external environment.

Case C is unusual in that it illustrates the transformation of thought into visual hallucinations at the moment of epileptic discharge. There exists a certain analogy between this experience and the "echo de la pensée" of schizophrenic patients, who say they *hear* their own thoughts. This patient *saw* his own thoughts.

D. C. (Case C), aged 16, had an extensive atrophy involving the temporal, parietal, and occipital lobes of the left hemisphere,

necessitating their complete resection. Since the age of 8 he had had frequent seizures without loss of consciousness. In the year preceding operation he had three major convulsions. He described what he experienced in these major attacks before losing consciousness. He fell down during the attack and tried to overcome it by mental effort, whereupon he was aware of all his thoughts transforming themselves into vivid external visual images. He was so terrified by this that he kept changing his thoughts, but each thought continued to transform itself into a visual image. For instance, he thought of fire-crackers, and suddenly these were seen in sunset colours of blue and mauve in front of his eyes located "about a block away," seeming to tumble down through the sky but never reaching him. Then he thought of a space ship, and it appeared as a pinkish-blue object, moving towards him, becoming smaller as it did so. He thought of maple trees in the playground, and saw them as though "upside down." (This curious anti-gravity positioning also occurred with a leptazol-induced seizure when he reported seeing the technician as though walking on the ceiling.) Finally, he thought of himself lying on the ground, and immediately saw an external pictorial image of himself, described thus: "The way I felt on the ground was the way I looked in the picture, but people were not around me. I was in different forms; I thought of something, then I saw it. I thought of myself, and then I saw myself the way I was thinking of myself." This occurred with his eyes closed, and the phenomenon disappeared when he opened his eyes, but he said that it was difficult and "unpleasant" to keep his eyes open.

The following case has been reported by Penfield and Jasper (1954).

A. B. (Case D), aged 32, an artist's daughter, had a right temporo-occipital focus. Both simple and complex visual hallucinations occurred as part of her seizure pattern. These included: (a) flickering lights seen in the left visual field. (b) Representations of famous paintings—Rembrandt's "Night Watch" and "Self Portrait." She also saw, as though in a picture, "Christ coming down from the sky." All these were two-dimensional and were seen in the left visual field, as if superimposed on the existing external environment. (c) A kitchen in the country, and she felt—although she did not see—herself there, with two boys running towards her. The kitchen and the boys appeared in three-dimensional form. Unlike *a* and *b*, this image was seen in both visual fields, and during its appearance the patient was blind to all else in her external environment.

(b) In Schizophrenia

Only brief reference can be made to visual hallucinations in schizophrenia. Generally accepted as being a less constant symptom than "auditory" hallucinations, they can on occasion assume predominance. All the visual phenomena described in temporal lobe epilepsy have been found in schizophrenia. There may occur in the latter disease many more varied and complex visual hallucinations. Bizarre hallucinations of parts of the human body are frequent. The patient may have a vision of the self—that is, autoscopic hallucination—but a somewhat similar phenomenon has been elicited in temporal lobe epilepsy (Case C). In temporal lobe epilepsy such hallucinations are an episodic occurrence, whereas in schizophrenia they are a constantly recurring experience; but in both they are of brief duration—"they come and go in a flash"—and in both they may be "seen" in the mind or in the external environment.

Basis and Unitary Nature of the Hallucinations Described

These psychical phenomena—or hallucinations—may be illustrated in the form of a spectrum at one end of which the hallucinatory experience is apprehended as "thoughts," and at the other end as visual or auditory images with an apparent location in the external environment. Intermediate are these visual and auditory abnormal perceptions—or hallucinations—which the subject experiences within his mind. The similarity which exists between these hallucinations in temporal lobe epilepsy and schizophrenia makes it difficult to avoid the inference that the latter disease is also based on some neurophysiological change, the nature of which is yet unknown.

We also submit that all these abnormal experiences are based on a single phenomenon, showing gradations in its mode of perception by the subject; or, in other words, that they all represent but different modes of perceiving abnormal derivations of thought. How, then, can we explain the various gradations? We think it is possible to do so by considering, in its simplest terms, the process of normal thinking.

Some part—the greater part—of normal *thinking* consists in the intangible, imperceptible linkage of elements which cannot be described in terms of known sensations. But there are superadded qualities in thinking which can be termed kinaesthetic and visual. Part of our thinking consists in the evocation of words and visual images. This is illustrated in the division of human beings into “verbalizers” and “visualizers.” It seems permissible, therefore, to assume that when some physical stimulus acts on certain areas of the brain to produce an abnormal thought—a hallucination of thought—such hallucination may present (a) as a thought—which forces itself on the attention of the subject, cannot be banished or superseded at will as in the manner of normal thought, but is nevertheless incapable of description in other terms than that of “thought”; or (b) as a visual or verbal image—of varying degrees of intensity, which the subject describes in terms of vision or hearing.

Summary

A comparison is made between certain hallucinatory phenomena or, more properly, the patient's mode of perceiving certain hallucinatory phenomena—in temporal lobe epilepsy and schizophrenia. The current popular definition of a hallucination, which implies the location of the abnormal perception external to the self, is criticized, and it is submitted that abnormal internal perceptions can also be included under the designation of hallucination. This designation, however, lacks precision, and it is hoped that in future more precise terms will be formulated to cover the many varieties of abnormal perception here illustrated.

Five cases of temporal lobe epilepsy are described in which epileptic discharge evoked respectively (a) ill-defined or “amorphous” thoughts, (b) formulated or “crystallized” thoughts, (c) a voice located in the head, (d) a voice located in the abdomen, and (e) a voice heard in the external environment. Cortical stimulation reproduced a, b, and e. Similar gradations in this type of hallucinatory experience, elicited from interrogation of patients suffering from schizophrenia, are briefly tabulated.

Four cases of visual hallucinations in temporal lobe epilepsy are described. In two of these the visual experience was apprehended within the mind of the patient, and in the third as superimposed on the external environment. (This last was reproduced by cortical stimulation.) In a fourth case the patient experienced the transformation of all his thoughts into vivid external images—“What he thought, he saw.” This bears a certain analogy to the phenomenon known as “*echo de la pensée*” found in schizophrenia.

It is submitted that these various gradations from “thoughts” to external auditory and visual hallucinations represent but different modes of perceiving abnormal derivatives of thought or hallucinations of thought. Since some part of normal thinking consists in the evocation of visual images and words, it is argued that a hallucination of thought may present either as a “thought” or as a visual or verbal image of varying degrees of intensity.

The finding that epileptic discharge and cortical stimulation can evoke gradations in hallucinatory experience

similar to those found in schizophrenia suggests that the latter disease may also have a neuro-physiological basis.

REFERENCES

- Baillarger, J. (1890). *Recherches sur les Maladies Mentales*, vol. 1. Masson, Paris.
 Coats, J. (1876). *British Medical Journal*, 2, 647.
 Jackson, J. H. (1875). *Selected Writings of John Hughlings Jackson*, edited by James Taylor, pp. 119 and 458. Hodder and Stoughton, London, 1931.
 — and Colman, W. S. (1898). *Brain*, 21, 580.
 Penfield, W., and Erikson, T. C. (1941). *Epilepsy and Cerebral Localization*. Thomas, Springfield, Ill.
 — and Jasper, H. (1954). *Epilepsy and the Functional Anatomy of the Human Brain*. Little, Brown, Boston.
 — and Rasmussen, T. (1950). *The Cerebral Cortex of Man*. Macmillan, New York.
 Séglas, J. (1892). *Des Troubles du langage chez les Aliénés*. Rueff, Paris.

CHRONIC PAIN IN THE RIGHT ILIAC FOSSA*

BY

S. H. WASS, M.S., F.R.C.S.

Surgeon, Guy's Hospital

Chronic pain in the right iliac fossa constitutes a common problem in all branches of medical practice. The correct management of the disorder depends upon careful clinical evaluation, and mistakes are easy to make. One common mistake is the tendency among many people to rush into the much abused diagnosis of a “chronic appendix” or, as the only alternative, to treat the patient as a “neurotic.” Either of these assumptions may lead to disastrous consequences, and to avoid such obvious pitfalls it is my practice to approach the problem of diagnosis by seeking the answers to three questions: (1) Is there an organic cause for the pain *apart from* the appendix? If not, (2) Is the appendix genuinely at fault? Or, (3) Is the pain of functional origin? This order of questioning has been chosen deliberately, because it often happens that the appendix is removed when some other cause for the pain is present, and because it too often happens that the appendix is removed without reasonable evidence that it is diseased. Functional affections, however, should always be considered last, because there can be no greater error than to stigmatize a patient “neurotic” when in fact organic disease is present.

1. Causes of Pain Apart from the Appendix

Let us first consider those organic causes of chronic pain in the right iliac fossa which are unconnected with appendicular disease. So that nothing of importance shall be omitted, it will be convenient to classify them on an anatomical basis.

(a) *The Caecum*.—There is no doubt that chronic pain in the right iliac fossa can arise in the caecum. It may be due to *gaseous distension*, when the area is tympanitic, gurgling is present on palpation, and excessive borborygmi are heard on auscultation of the abdomen. In older patients it must always be borne in mind that caecal distension may signify chronic intestinal obstruction due to a carcinoma of the pelvic colon, and every effort must be made to exclude this serious disease. *Loading* of the caecum with soft faeces, in association with constipation, may also cause chronic pain in the right iliac fossa; in these cases a characteristic doughy feeling is detected on palpation. Pain may also arise from caecal *spasm* accompanying general

*A lecture delivered to the Hendon Division of the British Medical Association on February 8, 1955.