



Understanding Voices

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Experts See Mind's Voices in New Light

By ERICA GOODE, Excerpt from New York Times:
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It was just one voice at first, loud and male, coming from the ceiling, saying, "Hi, John," calling him by name as if they were buddies. But after a while, the voice, which he came to know as the "evil genius," urged him to steal other people's brain cells and told him that he had a cancerous tumor in his head.

Eventually, other voices joined in, maybe 50 of them, male and female, yelling "as loud as humans with megaphones," John recalled, from the moment he awoke in the morning until he fell asleep at night, cursing or ordering him to kill himself or, once, when he picked up a ringing telephone, screaming in chorus, "You're guilty! You're guilty!"

"It was utter despair," John said. "I felt scared. They were always around."

Auditory hallucinations are a hallmark of schizophrenia: 50 percent to 75 percent of the 2.8 million Americans who suffer from the illness hear

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voices that are not there. Like John, whose schizophrenia was diagnosed in 1981 and who spoke on the condition that he not be identified, many people with schizophrenia spend years pursued by verbal tormentors as relentless as the furies of Greek mythology. Suicide is sometimes the result, death seeming the only escape from unending harassment.

Yet psychiatrists who study schizophrenia have traditionally shown little interest in the voices their patients hear, often dismissing them as simply a byproduct of the illness, "crazy talk" not worthy of study.

Recently, however, a small group of scientists has begun studying auditory hallucinations more intensively. Aided by new brain imaging techniques, they have begun tracking such hallucinations back to abnormalities in the brain, finding that certain brain regions "light up" on brain scans when patients are actively hallucinating. And the experts are listening far more carefully to what patients say about their hallucinatory experiences.

The research has led to new theories of what may cause such bizarre alterations in perception and has spawned at least one promising new treatment: the delivery of low-frequency magnetic pulses to areas identified by the brain scans seems to quiet, at least temporarily, the voices of patients who have not found relief through standard treatment with antipsychotic medications.

Ultimately, the researchers say, knowing more about what causes auditory hallucinations may help them understand more broadly the mechanisms that underlie schizophrenia and other psychotic illness.

"These are critical, core experiences that really constitute what having schizophrenia is all about," said Dr. Ralph Hoffman, a psychiatrist at Yale who is studying the magnetic stimulation treatment, called transcranial magnetic stimulation or T.M.S.

In research described in a recent issue of Archives of General Psychiatry, Dr. Hoffman and his

colleagues found that schizophrenic patients who received 132 minutes of the magnetic stimulation over 9 days showed a significant reduction in auditory hallucinations compared with control subjects given a dummy treatment. Half of the subjects in the study experienced a return of their symptoms within 12 weeks, though in some cases, the hallucinations remained at bay for up to a year. All the patients were also taking antipsychotic medication.

Schizophrenic patients describe voices that not only talk to them but talk about them, haranguing, insulting and sometimes provoking them to hurt themselves or to perform other actions. In many cases, the hallucinations become more intense when the patient is under stress.

In a study of 200 patients with schizophrenia and other psychotic illnesses, Dr. David L. Copolov, director of the Mental Health Research Institute of Victoria in Melbourne, Australia, and his colleagues found that 74 percent said they heard voices more than once a day. More than 80 percent described the voices as "very real," rather than "dreamlike" or "imaginary," and 34 percent experienced the voices as coming from outside their heads (38 percent said they came from both inside and outside their heads and 28 percent from inside only).

A small minority of the patients said the voices they heard were always or almost always supportive and positive in tone. But more than 70 percent described them as always or almost always negative. Dr. Hoffman of Yale said some of his research subjects heard voices intermittently, but others heard them continuously, the only respite coming when they slept. One patient who committed suicide described her voices as "a constant state of mental rape," Dr. Hoffman said.

Nicole Gilbert, 37, received a diagnosis of schizophrenia in 1985. For years, she said, she could not read anything because her voices "would tell me that it was about me." "They would say things to try to make me believe that I was Jesus," she recalled.

"Then they would torture me and say: `We're just

joking. You're so stupid, how could you believe this?' "

Ms. Gilbert, who is much recovered and is now a case manager at a mental health agency in California, said the voices seemed so real that she could not believe it when her friends told her she was hallucinating.

The findings of studies using brain scanning techniques like positron emission tomography (PET) or functional magnetic resonance imaging (M.R.I.) underscore how persuasive auditory hallucinations are to those who experience them. When patients are hallucinating, areas of the brain involved with auditory perception, speech, emotion and memory show increased blood flow, indicating greater nerve cell activity.

"These people are not just crazy; they're telling you what their brains are telling them," said Dr. David Silbersweig, an associate professor of psychiatry at Weill Medical College of Cornell University who has studied hallucinations with brain-imaging. Still, studies so far have come up with differing patterns of brain activation. For example, both Dr. Hoffman's group and a team led by Dr. Philip McGuire, a professor at the Institute of Psychiatry in London, found heightened activity in Broca's area, a region of the frontal lobe involved with speech perception and processing. But Broca's area was not identified in Dr. Silbersweig's research or in a study by Dr. Copolov that will be published soon. The precise areas of the brain's temporal and parietal lobes that show activity during hallucinations also differ from study to study.

The discrepancies are difficult to interpret and reflect the imprecision of even advanced technology in capturing highly complex brain processes. The data are further clouded because the high costs of scans limit the size of most studies.

But the disparity in the findings has also led to different theories about how hallucinations arise.

Schizophrenia typically strikes in adolescence or early adulthood. Extensive research over the last

few decades has indicated that the brains of people with the illness differ in significant ways from those of healthy people. Experts agree that schizophrenia stems from a combination of genetic predisposition and unknown environmental influences. What everyone who studies hallucinations agrees on is that schizophrenic patients misperceive signals generated inside the brain.

But scientists are still debating what is being misinterpreted and how this occurs. Dr. Copolov, for example, suggests that the "voices" patients hear are really fragments of auditory memories "that come to consciousness fused with emotional content" and are then incorrectly evaluated as originating from an outside source.

The fact that in some studies the hippocampus and other brain structures known to be involved in memory retrieval are active during hallucinations is consistent with this theory, Dr. Copolov said. Other researchers, including Dr. McGuire of the London institute, have argued that what is misperceived is internal speech - the running dialogue most people engage in while thinking. In schizophrenia, in this view, a mechanism that normally distinguishes between internal and external speech breaks down.

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Dr. Hoffman has a slightly different theory. In schizophrenia, he suggests, a loss of gray matter may intensify the link between Broca's area, involved in speech production, and Wernicke's area, responsible for speech perception.

In the normal course of affairs, Dr. Hoffman said, Wernicke's area receives information from a variety of nearby brain areas and distant structures like Broca's. But in schizophrenic patients, who in imaging studies show a loss of gray matter in the superior temporal lobe containing Wernicke's, the signals sent from more local regions may be knocked out or greatly decreased. If so, Dr. Hoffman suggests, the signals coming from Broca's may then become more salient, bombarding Wernicke's area with internally generated words and phrases that are in some way interpreted by Wernicke's as external speech.

Dr. Hoffman noted that transcranial magnetic stimulation applied to Wernicke's area appeared to suppress hallucinations in some schizophrenics. "My view is that in schizophrenia it is not just inner speech or an acoustic memory that is misinterpreted," Dr. Hoffman said. Instead, he said, patients "are actually having perceptual experiences that have the same clarity and vividness of external speech."

Dr. Hoffman's research team is now using M.R.I. scanning with each research subject to determine which brain regions are active when the subject is hallucinating, and then delivering stimulation to that area.

But whatever the research on magnetic stimulation yields, it is already helping some of the 25 percent of hallucinating patients whose voices are not stopped by antipsychotic drugs.

"Just stimulating in a single site appears to have a significant impact," Dr. Hoffman said.

Other experts call the results impressive.

In the treatment, an electromagnetic coil shaped like a Figure 8 is held to the patient's head. The coil produces a quarter-size magnetic field that is then rapidly turned on and off, inducing an

electrical field in the cerebral cortex's gray matter. Scientists do not know exactly how the treatment works, but they believe it dampens the reactivity of neurons, an effect that is then passed on to other connected brain regions.

Unlike electroshock therapy, long used for severe depression, transcranial magnetic stimulation does not induce seizures at the levels used in the studies and has a far more selective effect on the brain. Nor does the treatment appear to have the serious side effects, like memory loss, of electroshock therapy.

The most common side effect, Dr. Hoffman said, is mild contractions of the scalp that some patients find uncomfortable. Also, in contrast to electroshock, patients receiving the magnetic stimulation remain awake, unsedated, through it. John, who participated in Dr. Hoffman's research last summer, said the procedure did not bother him. "This thing kind of taps on your head every second and it's not intrusive," John said. He said his voices got "smaller and not as loud" after treatment, but they did not go away entirely, and the improvement lasted only six months.

Without a full cure in sight, John said he has developing his own tactics for fighting the hallucinations, which persist despite the medications he takes. He talks back to them in his head, he said, and criticizes them when they criticize him. Between his own efforts and the treatments, John has made much progress. He now attends school, has his own apartment, goes out with friends and has a girlfriend. "I wanted to try to make the voices my friends, but I found out later that that is not realistic," John said. "I was kicked around by them for a long time. Now, if they start bothering me, I just kick them around instead."

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