

## Brain waves in psychiatric patients

Although schizophrenia and manic depression are two of the major categories of psychiatric illness, psychiatrists are often hard pressed to diagnose patients with these diseases accurately. Usually they take a pattern of behaviors in a patient into consideration before they arrive at a diagnosis.

Now Charles Shagass, a psychiatrist-neurophysiologist at the Eastern Pennsylvania Psychiatric Institute in Philadelphia, has found that brain wave patterns in schizophrenics differ from those in manic depressives. He believes that these distinctions might eventually offer psychiatrists an additional tool by which to accurately diagnose psychotic patients. They may also prove of value in establishing animal models for schizophrenia and manic depression. Shagass's results are in press with *NEUROPSYCHOBIOLOGY*.

The pattern of spontaneous electrical waves emitted by the surface of the head is known as the electroencephalogram (EEG). The pattern of waves produced in the brain in response to electrical stimulation of a nerve in the body is known as somatosensory evoked potentials. Several scientists, including Shagass, had studied EEG's or evoked potentials in psychiatric or healthy subjects. Although study of these waves revealed a number of differences between psychotic and healthy subjects, they were not satisfied with the differences. Then Shagass acquired data that led him to believe that the relationships between EEG's and evoked potentials might be more meaningful than the individual waves, and he decided to test for this possibility.

His subjects included 90 psychiatric patients, both schizophrenic and manic depressive, and 43 healthy persons or persons with minor personality disturbances (neuroses). Subjects were electrically stimulated at the median nerve of the wrist. The evoked potentials emitted by their brains as a result of this stimulation were fed into a computer. Then the subjects' EEG's were recorded for 10 minutes and put in a computer.

With the help of the computer, Shagass analyzed from each patient, the amplitude, frequency and variability in time of the EEG and the amplitude of the evoked potential and the variation of the amplitude with different strengths of stimulus. As Shagass hoped, the ways in which the two kinds of measurements were related were not identical for the various clinical groups. The patient groups differed from the healthy subjects in certain characteristic ways.

For example, although the healthy subjects had a smaller evoked potential when the EEG was more variable, the schizophrenics had a larger evoked po-

tential when the EEG was more variable. Large amplitude evoked potentials were associated with high amplitude EEG's in healthy subjects, whereas the reverse was true in neurotic patients. In schizophrenics, high amplitude variability in EEG's was accompanied by high amplitude evoked potentials, but in healthy persons, high amplitude variability in EEG's was accompanied by small amplitude evoked potentials. In healthy subjects, those persons whose evoked potential amplitudes increased most when stimulus strength was increased tended to have the lower amplitude EEG's. In contrast, among the manic depressives, those who showed the greatest evoked potential amplitude increases tended to have the highest amplitude EEG's. And so on.

Shagass believes that these findings have a rational basis. "Psychiatric diag-

nosis rarely depends on a single parameter of behavior," he says. "It is based upon behavioral patterning. In a parallel way, it seems reasonable to suppose that pathological behavior patterns, if related to electrical signs of brain activity, would more likely be associated with deviant patterns of electrical signs than to deviant single signs. At a more speculative level, one may propose that the normal relationships between electrical brain events reflect the action of central regulatory mechanisms, whose functioning is impaired in association with mental illness."

Shagass is the first to admit that his results must be confirmed because of the large number of variables and relatively small numbers of subjects. If they are, then sophisticated, quantitative examination of the electrical activity of the brain, which can be picked off the top of the head without hurting a patient, might well eventually prove to be a new diagnostic tool for mental illness. □

## A troubling abort of a Soviet flight

Another frustrating chapter in the saga of the Soviet Union's Salyut space stations opened and closed on the same day last week—with possible implications for the joint Apollo-Soyuz mission scheduled for July. Cosmonauts Vasily Lazarev and Oleg Makarov took off in a Soyuz spacecraft to visit the previously launched (and previously visited) Salyut 4 station, but they never made it. Only moments after liftoff, while the launching rocket's upper stage was still trying to accelerate the spacecraft to orbital speed, the "rocket's movement deviated from the preset values," reported the Soviet news agency Tass. Instead of going on to orbit, the crew capsule was detached from the rocket and returned safely to earth.

The space station had been occupied for part of January and February by Soyuz 17 cosmonauts Aleksei Gubarev and Georgi Grechko (SN: 2/15/75, p. 102), but that had been only the second completely successful mission in a troubled series of attempted Soyuz-Salyut matings (SN: 1/18/75, p. 39). Last week's launching had been predicted well in advance by Western observers, noting that after the Soyuz 17 crew had left there were two changes in the space station's orbit, presumably commanded from the ground in order to realign its path with the launch site for a revisit.

The Tass announcement of the mission's failure (atypical for the Soviet space program, even after the fact) said only that "an automatic device produced the command to discontinue the flight . . . and detach the spaceship for return to earth." The craft

touched down, however, at Gorno-Altai, little more than 100 miles from the Mongolian border, giving rise to the speculation that during its ascent, the rocket had shifted southward from an intended path over Siberia, and the mission was terminated rather than risk suborbital flight over Chinese soil.

Konstantin Bushuyev, Soviet technical director for the upcoming Apollo-Soyuz mission, called his NASA opposite number, Glynn Lunney, two days after the unscheduled landing, and reported that the troublesome rocket was an older, less refined booster than the one to be used in July. ". . . The failure is still being analyzed," said Lunney after the call, "but he positively assured us that it will not affect our joint program or the July 15 launch date. He said there is no suspicion about systems that are common in the old and modernized ASTP version of the booster." Bushuyev also maintained that the ASTP version, an "up-rated" rocket with greater weight-carrying capability, "has been used successfully in previous flights."

Well and good, but the political potential of the Apollo-Soyuz mission has caused both sides to blow their trumpets so loudly that even brief delays will show up in headlines—perhaps, according to some NASA officials, as reflections on the "guilty" nation's technological competence. "I told him that I wanted more details on the problem," Lunney says, "and he agreed to provide that to me by telegram after their analysis is developed further." In May, with barely two months to go, Lunney and Bushuyev meet again in Moscow. □