

A Shocking Story

Behavior researchers claim that increasing emphasis on ethics may halt necessary work

by Robert J. Trotter

José M. R. Delgado shocked the world when he shocked a charging bull and brought it to a sudden stop. By remote control Delgado stimulated electrodes implanted in the brain of the bull and was able to stop or start its aggressive charge. With this dramatic demonstration, 10 years ago, Delgado vividly displayed the possibilities of electrical stimulation of the brain (ESB).

But the technique was not designed to stop charging bulls. Delgado and his co-workers at the Yale School of Medicine worked with cats and monkeys and learned to produce definite changes in eating, sleeping, fighting, playing and sex behavior. When applied to humans, ESB was able to evoke such feelings as fear and friendliness, pain and pleasure.

In a recent case, for instance, Delgado implanted electrodes in the brain of a young man whose left arm had been paralyzed in a car accident. The injury was causing intractable pain and the man was becoming hostile. When

neither drugs nor physical therapy helped, brain surgery was considered. The plan was to destroy an area of the man's brain that was responsible for the sensations of pain. Instead, the man was sent to Delgado. Electrodes were implanted and a radio-control stimulator was set between the patient's skull and the skin at the top of his head. Stimulation of one of the electrodes, as Delgado puts it, "evoked a long-lasting alleviation of pain and concurrent improvement of the patient's formerly hostile behavior." After more than one year, the patient is doing well and the subcutaneous instrumentation is comfortable and reliable. The patient will not even have it removed for fear that the pain will return.

Pain relief is just one possibility for the use of ESB on humans. "In the future," says Delgado, "micro-miniaturized computers may be implanted underneath the teguments to provide 'on demand' stimulation of specific neuronal pools without disturbing ongoing behavior. By brain stimulation it is possible to give light to the blind, sound to the deaf, to stop epileptic attacks, and to induce pleasure and friendliness in human beings."

The same instrumentation that electrically stimulates the brain can also be used to inject chemicals into the brain. By controlling the electrical and chemical makeup of the brain, Delgado hopes even to control schizophrenia.

Such research, however, will not be done in the United States. After more than 20 years at Yale, Delgado has taken his research to Spain where he is chairman of the medical school of the Autonomous University of Madrid. Two weeks ago in New York, Delgado explained some of the reasons for his move. He was speaking at an international symposium on the relevance of the animal psychopathological model to the human, sponsored by the Kittay Scientific Foundation of New York.

"The brain drain goes backward," said Delgado. For years the availability of research funds attracted scientists to the United States. Now Delgado says he has been forced to leave the country because he could no longer get enough funding to continue his very expensive research. Speaking cautiously, Delgado said his requests were turned down for other than scientific reasons. It is a matter of record at the National Institutes of Health, which funded much of Delgado's work, that his most recent requests were refused because the neuropsychology review committee did not agree that his approach was scientifically sound. It has been said, for instance, that Delgado emphasizes technical development at the expense of more theoretical work on the mechanisms of various brain structures in human behavior.

Naturally, Delgado feels that his work is scientifically sound. He implied that he lost his funding because of the controversial nature of his work. The source of the concern, he says, may be traditional taboos and attitudes that hold the brain to be the inviolable material of the mind, of the individual personality and of freedom. Also, there is the fear that ESB "could introduce the nightmare of mass control of man, overriding and overpowering individual self-determination," notes Delgado.

Similar fears surround the use of psychosurgery or brain surgery to control human behavior, and last week the National Institute of Mental Health issued a report that calls for strict controls on such procedures. The report does not speak directly to the ethical issues but says instead that psychosurgery should be regarded as experimental and should be closely monitored. The rigorous controls would apply only to federally funded work, but because such funding is necessary to much medical research (as in Delgado's case) the effect will be to stop at least temporarily almost all psycho-



By stopping the bull, Delgado dramatically demonstrated the potential power of electrical stimulation of the brain.

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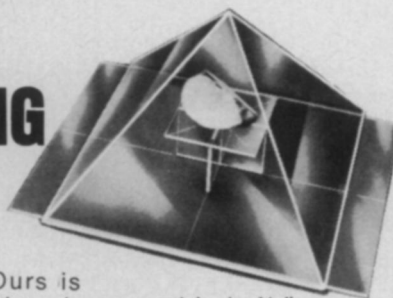
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surgery in the United States.

Delgado says ESB does not destroy brain tissue as psychosurgery does. And he considers the fears of mass control to be fantasies. ESB, he says, can only trigger pre-established behavioral mechanisms and responses. It cannot send ideas or instruction into the individual's brain. Someone, for instance, might be stimulated to speak but not to speak a specific language. "ESB may evoke well-organized behavior, or it may influence emotional reactivity by triggering stored formulas of response," Delgado says. "But it cannot change personal identity, which depends on past experience." To demonstrate this, Delgado showed films of monkeys that were stimulated in the so-called aggression center of the brain. In this situation a dominant male was made to attack its subordinates (which it does anyway), but it could not be made to attack its mate. In another experiment, aggression was stimulated in a caged animal. When the same animal was set free in a monkey colony in Bermuda, the stimulation did not result in aggression. The stimulated animal became hyperactive, but rather than attack other animals, it went off by itself. So pure aggression can't really be induced, says Delgado. The monkey was still able to take in and process environmental information and direct its hyperactivity accordingly.

Delgado says the brain has a psychostat like a thermostat. It consists of a number of controls that can be turned up or down, but it does not have the ability to produce behaviors that do not already exist.

Delgado was not the only researcher present at the Kittay symposium who has been having trouble with research funding. Samuel Corson, who has been doing research in another controversial area—hyperkinesis (SN: 4/6/74, p. 224)—has lost much of his funding. Edward F. Domino has been studying the possible role of hallucinogens in schizophrenia. His work is done at the Lafayette Clinic and the University of Michigan Medical School. But these two institutions have been involved in a controversial court case on the use of psychosurgery (SN: 5/12/73, p. 310). Since the publicity on the psychosurgery case, funds for research involving humans have almost dried up. Domino has lost the \$250,000 a year that was supporting his work. "You can't even get a blood sample from a schizophrenic patient anymore," he complained. "If scientists aren't supported," says Delgado, "they will have to continue their work in other countries." But what may be even more important, says Domino, is that an overreaction because of ethical concerns may result in thousands of people not getting the help they need. □