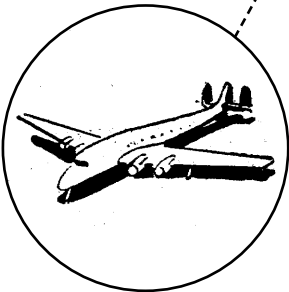
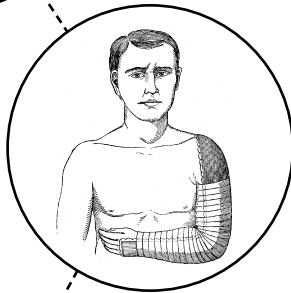
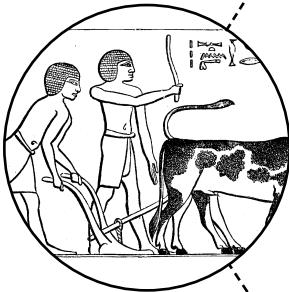


The Physical Control of the Mind

1 - Natural Fate Versus Human Control: The Process of Ecological Control

A decisive step in the evolution of man and in the establishment of his superiority over other living creatures was his gradual achievement of **ecological liberation**.



...we should accept the fact that the existence of man, together with all attributes and creations, including his own ecological liberation and domination, is actually and inescapably the result of natural fate. Man did not invent man. Because of the development of wings as the result of biological

evolution, we cannot claim that birds have liberated themselves by the pull of gravity by flying in the air in defiance of natural laws.

Birds fly, and man thinks. No conscious efforts were ever made to design—or modify— the anatomical structure of his brain.



All words by **Dr. Jose M.R. Delgado, M.D.** a Professor of Physiology at Yale University in 1950. Delgado's research was funded by Foundations' Fund for Research in Psychiatry, United States Public Health Service, Office of Naval Research, United States Air Force 657 1st Aeromedical Research Laboratory, NeuroResearch Foundation, and Spanish Council for Scientific Education.

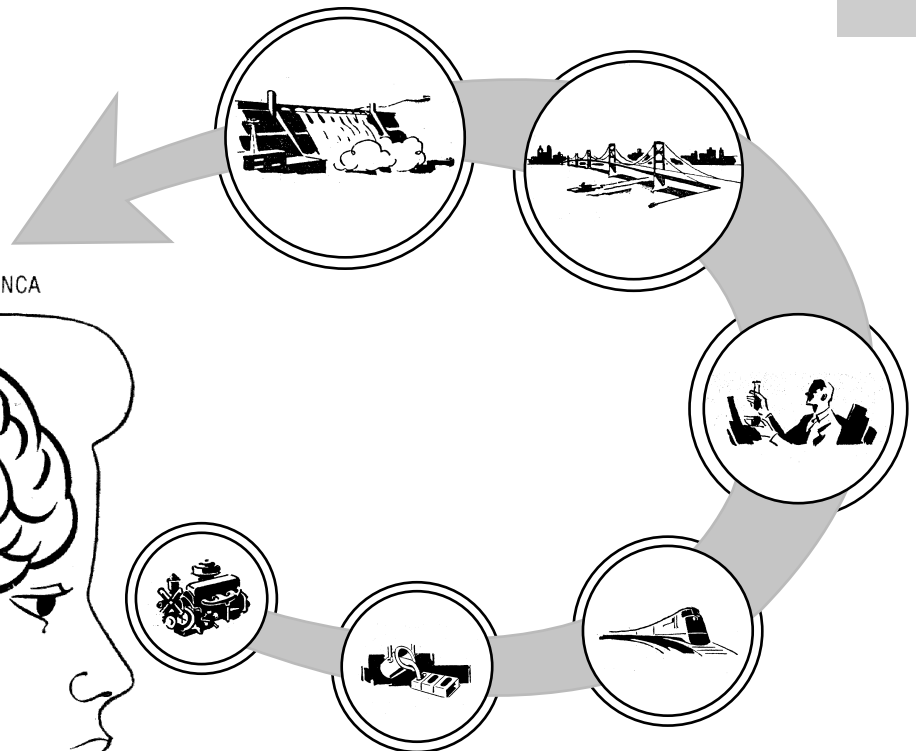
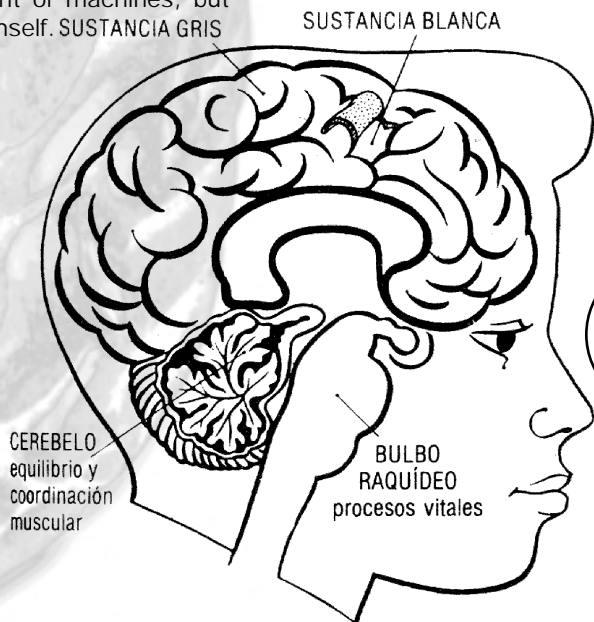
Freedom of Choice & Awareness –

If we were cognizant of the factors influencing our behaviour we could reject many of them and minimize their effects on us. The result would be a decrease in automatism and an increase in the deliberate quality of our responses to the environment.



Accumulation of Power –

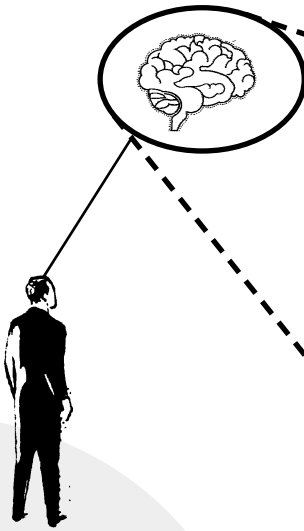
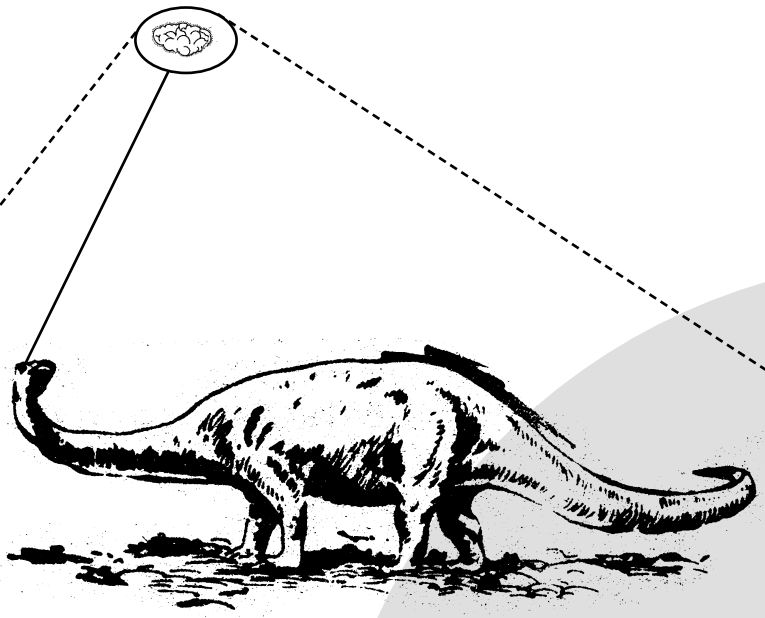
The application of human energy to the control of natural forces is continually increasing, and perhaps it is time to ask if the present orientation of our civilization is desirable and sound, or whether we should reexamine the universal goals of mankind and pay more attention to the primary objective, which should not be the development of machines, but of man himself. SUSTANCIA GRIS



The Imbalance Between Material & Mental Evolution -

The contrast between the fast pace of technological evolution and our limited advances in the understanding and control of human behavior is creating a growing danger.

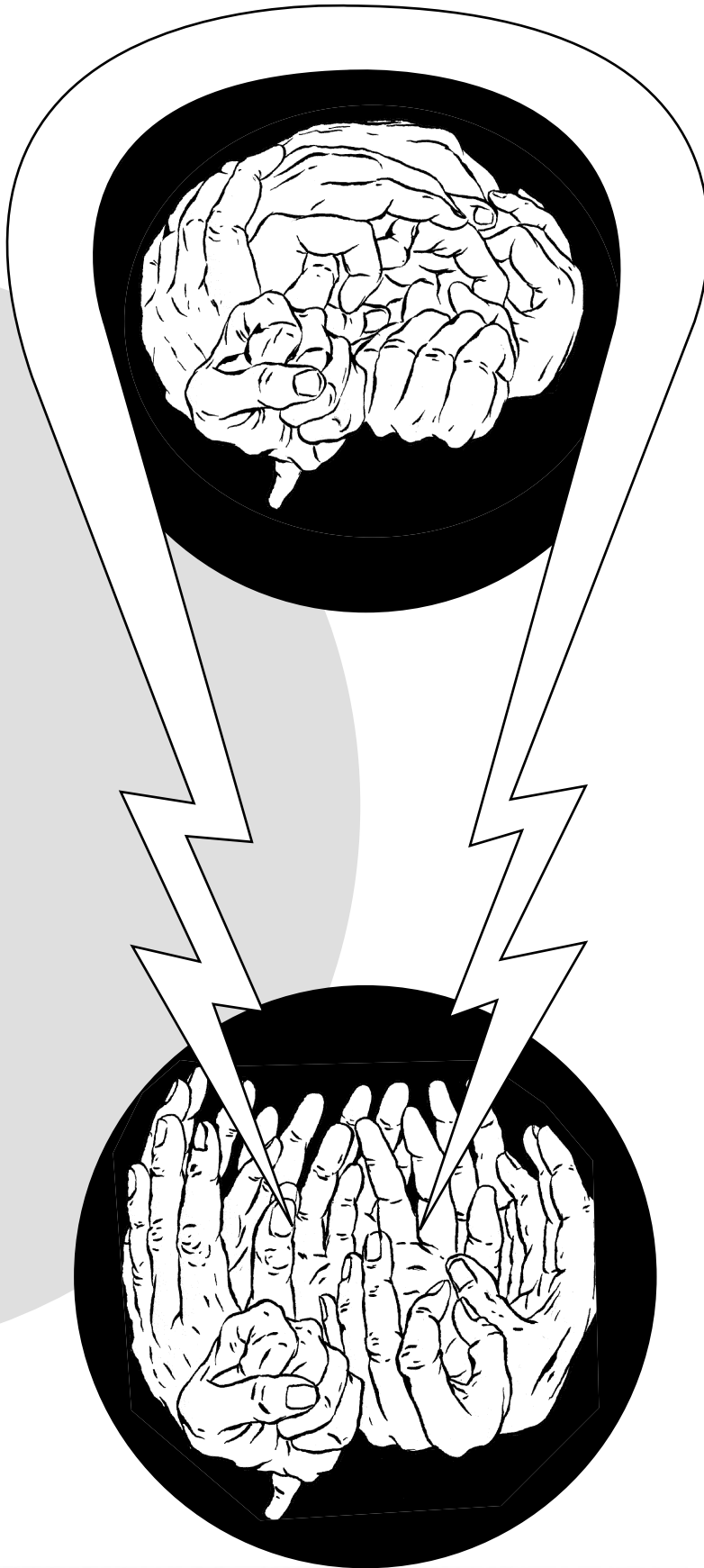
The fate of [dinosaurs] may have symbolic value for twentieth century civilization, which is also attempting to direct tremendous potential with disproportionately small brains.



Mental Liberation & Domination -

We now possess the necessary technology for the experimental investigation of mental activities, and we have reached a critical turning point in the evolution of man at which the mind can be used to influence its own structure, functions, and purpose, thereby ensuring both the preservation and advance of civilization.





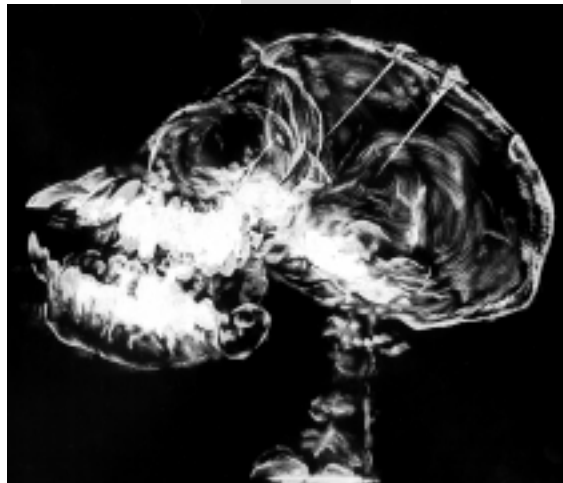
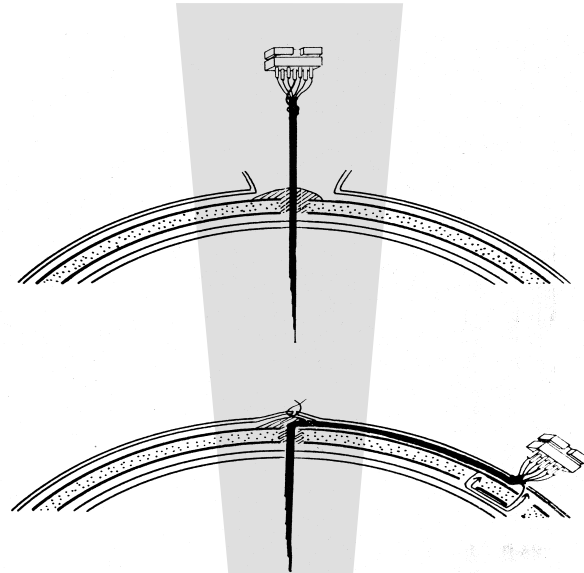
The Brain and Mind as Functional Entities -

In my opinion, without stimuli (or without the brain), the mind cannot be recognized. Because of the dependence on sensory inputs, both at the birth and throughout adult life, the mind may be defined as the intracerebral elaboration of extracerebral information. **The basis of the mind is cultural, not individual.**

Autonomic and somatic functions, individual and social behaviors, emotional and mental reactions may be evoked, maintained, modified, or inhibited, both in animals and in man, by electrical stimulation of specific cerebral structures. The question to answer **is not whether but how** the application of a crude train of messageless electricity may result in the performance of a highly refined and complicated response.

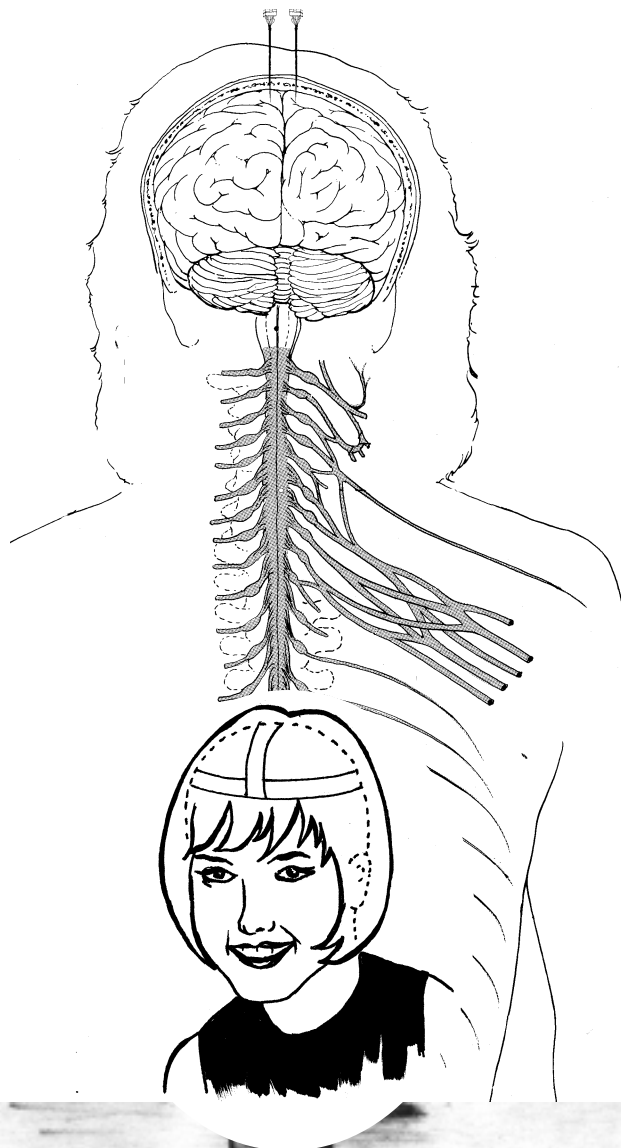
Implantation of Electrodes in Animals -

Through a small opening in the skull, the shaft is introduced down to a predetermined depth and is secured with dental cement at the point where it passes through the skull. Then the upper portion of the shaft is bent over the bone surface and secured again a short distance away, and the terminal socket is exteriorized on the head. Each contact of the socket corresponds to a determined point in the depth of the brain which is accessible merely by plugging in a connector, a procedure as simple as connecting any electrical appliance to a wall outlet.



Judged by the absence of abnormal electrical activity, the reliability of effects evoked by **Electronic Stimulation of the Brain (ESB)**, and the consistency of thresholds of excitability through months of experimentation, the electrodes seem to be well tolerated. Some of the monkeys have had electrodes in their heads for more than four years.





Electrodes in the Human Brain-

In general several assemblies of fine electrodes with a total of twenty to forty contacts are placed on the surface and/or in the depth of the brain, with the terminal connectors exteriorized through the scalp and protected by a small head bandage (see Figure 4). In some cases the electrodes have remained for nearly two years with excellent tolerance.

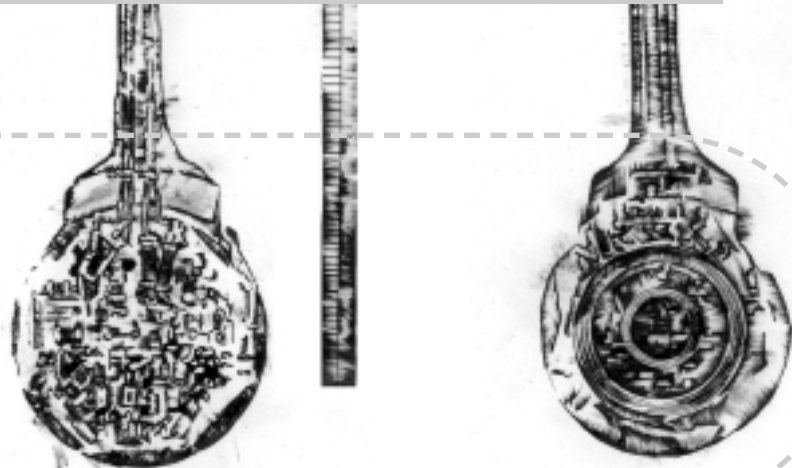
Some women have shown their feminine adaptability to circumstances by wearing attractive hats or wigs to conceal their electrical headgear, and many people have been able to enjoy a normal life as outpatients, returning to the clinic periodically for examination and stimulation.



Figure 4

TWO WAY RADIO COMMUNICATION WITH THE BRAIN

...it is already possible to equip animals and human beings with minute instruments called "stimoceivers" for radio transmission and reception of electrical messages to and from the brain in completely unrestrained subjects.



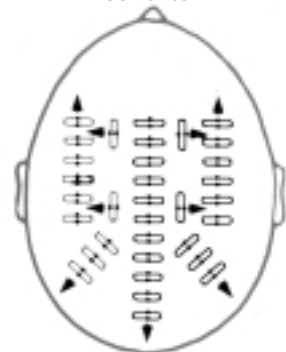
In animals, the stimoceiver can be studied without disturbing their spontaneous relations within the group. **Behavior such as aggression can be evoked or inhibited.** In patients, the stimoceiver may be strapped to the head bandage, permitting electrical stimulation and monitoring of intracerebral activity without disturbing spontaneous activities.



It is reasonable to speculate that in the near future the stimoceiver may provide the essential link from man to computer to man, with a reciprocal feedback between neurons and instruments which represents a new orientation for the medical control of neuro-physiological functions.



Fears have been expressed that this new technology brings with it the threat of possible unwanted and unethical remote control of cerebral activities of man by other men, but as will be discussed later, this danger is quite improbable and is outweighed by the expected clinical and scientific benefits.



ELECTRICAL STIMULATION IN THE BRAIN

Depending on its location, electrical stimulation of the brain is able to evoke not only simple responses but also complex and well-organized behavior which may be indistinguishable from spontaneous activity.



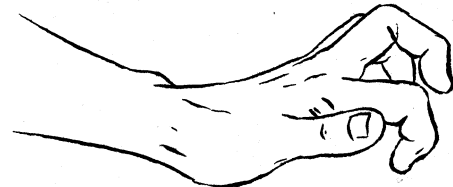
Figure 13

Radio stimulation of Lady in another red nucleus point 3 millimeters away produces only the simple response of yawning. If the monkey was sleeping, brain stimulation was less effective.

The most common effect obtained by electronic stimulation of the human brain is a simple motor response such as the contraction of an extremity.



A.



B.

When the patient was warned of the oncoming stimulation and was asked to try to keep his fingertips extended, he could not prevent the evoked movement and commented, "I guess, Doctor, that your electricity is stronger than my will."

Vocalizations have been obtained by stimulation of the motor area in the precentral gyrus and also of the supplementary motor area in both hemispheres. The response usually consists of a sustained or interrupted cry with a vowel sound which occasionally has a consonant component.



THE SYSTEMS FOR PUNISHMENT AND REWARD

J.P. III-68

The perception or expectancy of pain can be frightening, and in some cases when ESB produced localized or generalized discomfort, patients have expressed concern about continuation of the exploratory procedures. In addition to the natural fear of possible discomfort, there may have been a component of primary anxiety which would be difficult to evaluate.



In one of our female patients, stimulation of a similar area in the thalamus induced a typical fearful expression and she turned to either side, visually exploring the room behind her. When asked what she was doing, she replied that she felt a threat and thought that something horrible was going to happen. This fearful sensation was perceived as real, and she had a premonition of imminent disaster of unknown cause.



A typical example was J.P., a charming and attractive 20-year-old girl with a history of encephalitis at the age of eighteen months and many crises of temporal lobe seizures and grand mal attacks for the last ten years. During depth explorations, it was demonstrated that crises of assaultive behavior similar to the patient's spontaneous bursts of anger could be elicited by radio stimulation of contact 3 in the right amygdala. A 1.2 millampere excitation of this point was applied while she was playing the guitar and singing with enthusiasm and skill. At the seventh second of stimulation, she threw away the guitar and in a fit of rage launched an attack against the wall and then paced around the floor for several minutes, after which she gradually quieted down and resumed her usual behavior.

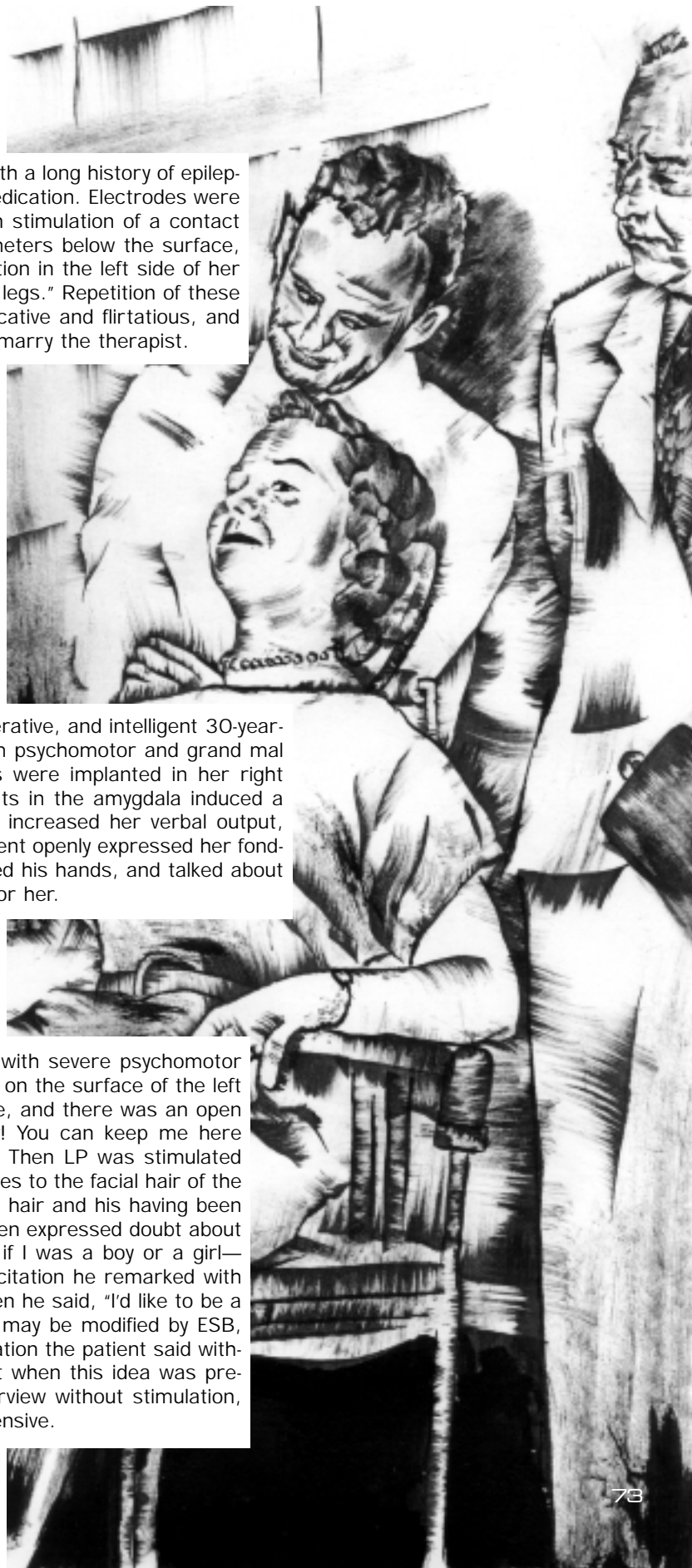
Telemetric recording of electrical activity of patients shown in Figure 4. The location of the electrodes was: Channel 1: amygdaloid nucleus; Channel 2: posterior optic radiation. A: spontaneous activity; B: activity during stimulation; C: activity during recovery. The activity in Channel 1 was more prominent when the patient was in a state of fear or rage.

Pleasure is not in the skin being caressed or in a full stomach, but somewhere inside the cranial vault.

The first case was V.P., a 36-year-old female with a long history of epileptic attacks which could not be controlled by medication. Electrodes were implanted in her right temporal lobe and upon stimulation of a contact located in the superior part about thirty millimeters below the surface, the patient reported a pleasant tingling sensation in the left side of her body "from my face down to the bottom of my legs." Repetition of these stimulations made the patient more communicative and flirtatious, and she ended by openly expressing her desire to marry the therapist.

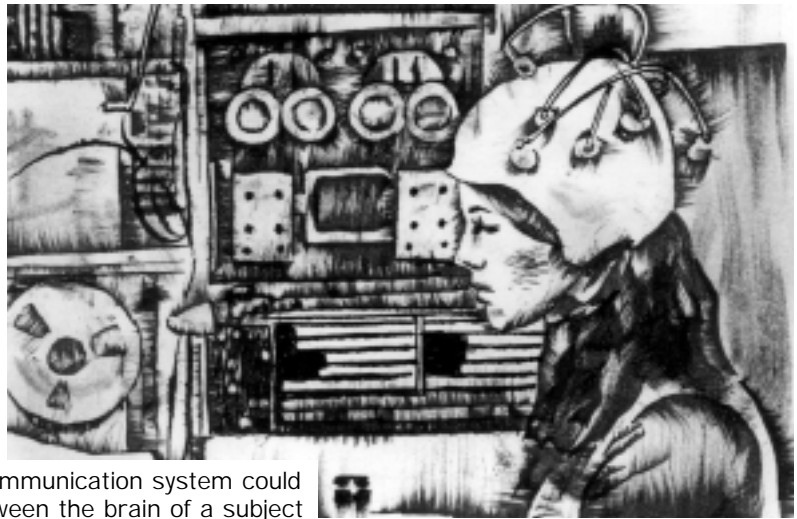
The second patient was J.M., an attractive, cooperative, and intelligent 30-year-old female who had suffered for eleven years from psychomotor and grand mal attacks that resisted medical therapy. Electrodes were implanted in her right temporal lobe, and stimulation to one of the points in the amygdala induced a pleasant sensation of relaxation and considerably increased her verbal output, which took on a more intimate character. This patient openly expressed her fondness for the therapist (who was new to her), kissed his hands, and talked about her immense gratitude for what was being done for her.

The third case was A.F., an 11-year-old boy with severe psychomotor epilepsy. After six excitations, point LP located on the surface of the left temporal lobe was stimulated for the first time, and there was an open and percipitous declaration of pleasure. "Hey! You can keep me here longer when you give me these; I like those." Then LP was stimulated again, and the patient started making references to the facial hair of the interviewer and continued by mentioning pubic hair and his having been the object of genital sex play in the past. He then expressed doubt about his sexual identity, saying, "I was like thinking if I was a boy or a girl—which one I'd like to be," Following another excitation he remarked with evident pleasure: "You're doing it now," and then he said, "I'd like to be a girl." The balance between drive and defense may be modified by ESB, as suggested by the fact that after one stimulation the patient said without apparent anxiety, "I'd like to be a girl," but when this idea was presented to him by the therapist in a later interview without stimulation, the patient became markedly anxious and defensive.



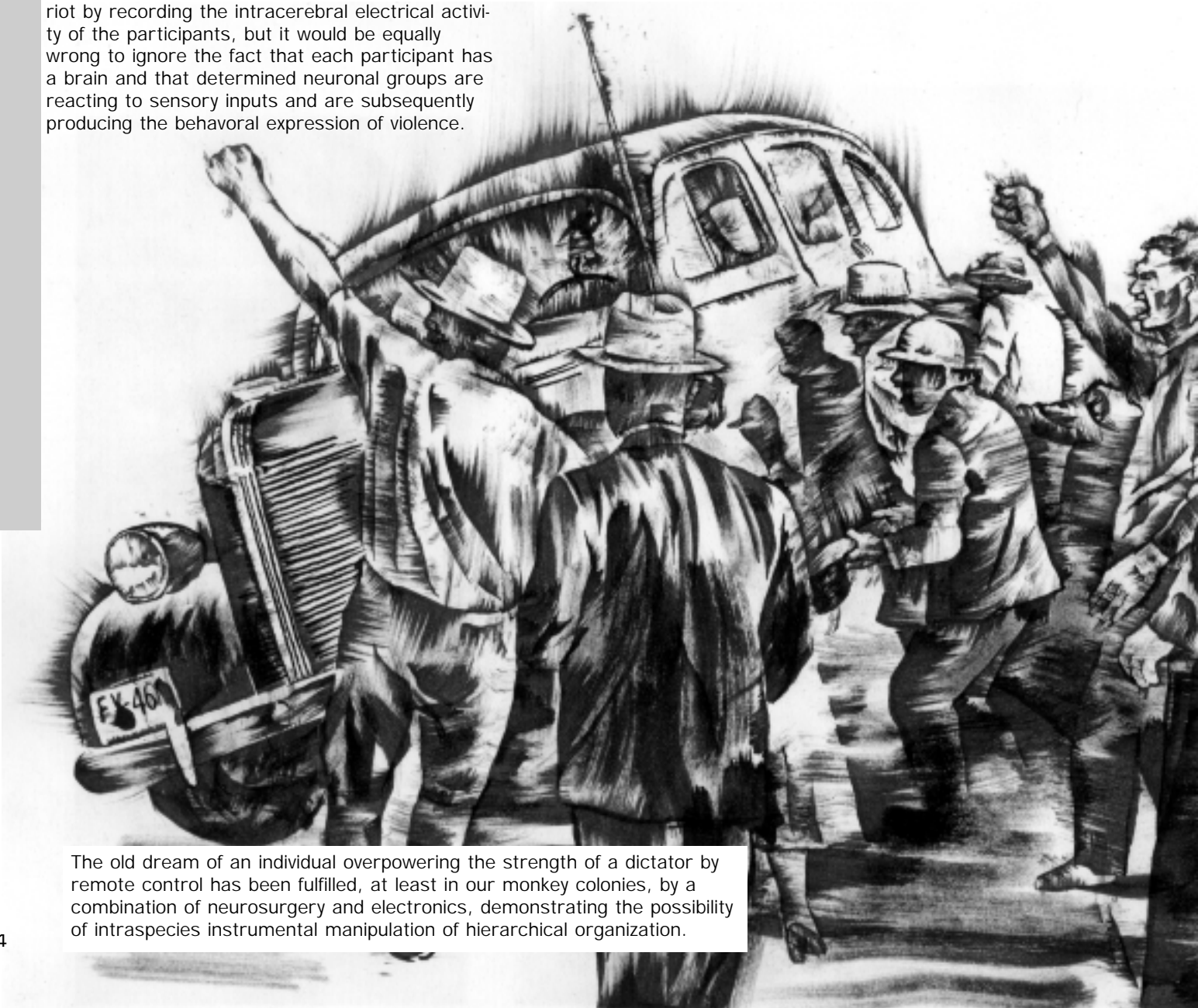
of the brain
of the contact
g: anterior optic radiation; Chan-
ontaneous bursts appearing in
the patient was psychologically

We may conclude that ESB can activate and influence some of the cerebral mechanisms involved in willfull behavior. In this way we are able to investigate the neuronal functions related to the so-called will, and in the near future this experimental approach should permit clarification of such highly controversial subjects as "freedom," "individuality," and "spontaneity" in factual terms rather than in elusive semantic discussions.



A two-way radio communication system could be established between the brain of a subject and a computer. Certain types of neuronal activity related to behavioral disturbances such as anxiety, depression, or rage could be recognized in order to trigger stimulation of specific inhibitory structures.

It would be naive to investigate the reasons for a riot by recording the intracerebral electrical activity of the participants, but it would be equally wrong to ignore the fact that each participant has a brain and that determined neuronal groups are reacting to sensory inputs and are subsequently producing the behavioral expression of violence.



The old dream of an individual overpowering the strength of a dictator by remote control has been fulfilled, at least in our monkey colonies, by a combination of neurosurgery and electronics, demonstrating the possibility of intraspecies instrumental manipulation of hierarchical organization.

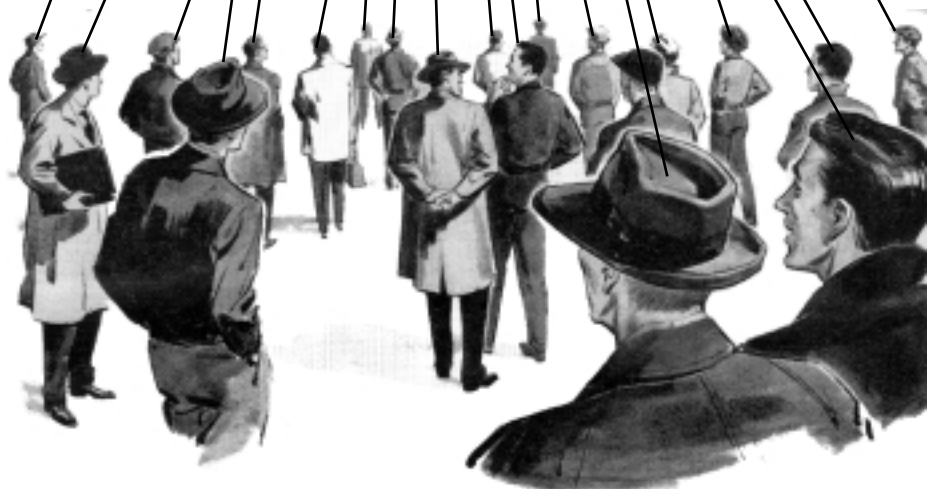
ETHICAL AND SOCIAL CONSIDERATIONS

The balance between social duties and individual rights is decided not by the individual but by customs and laws established by the group.

When important medical information can be obtained with negligible risk and without infringing on individual rights, the investigator has the duty to use his intelligence and skills for this purpose. Failure to do so represents the neglect of professional duties in some way similar to the negligence of a medical doctor who does not apply his full effort to the care of a patient.

Human health has improved in a spectacular way precisely because official agencies have had the knowledge and the power to influence our personal biology, and it should be emphasized that health regulations are similar in dictatorial and in democratic countries.

A knife is neither good nor bad; but it may be used by either a surgeon or an assassin. Science should be neutral, but scientists should take sides. The mind is not a static, inborn entity owned by the individual and self-sufficient, but a dynamic organization of sensory perceptions of the external world, correlated and reshaped through the internal anatomical and functional structure of the brain.



We are now on the verge of a process of mental liberation and self-domination which is the continuation of our evolution. I want to emphasize that human happiness is a relative value and depends as much on mental interpretation as on environmental reality. The direction of the colossal forces discovered by man requires the development of mental qualities able to apply intelligence not only to the domination of nature but also to the civilization of the human psyche.