the point of approval with recommendations for funding. I have been told by NIH administrators that in any normal year at least two of my three pending applications would probably have received an award.

Countless man-hours have been expended in routing and reviewing these now moribund proposals, and, in addition, many applicants have been hosts to site-visit teams.

All this effort will have been lost as of 30 June, when applications will be administratively withdrawn. I propose that, in the interest of saving the government the time and expense of receiving and reviewing new submissions and to save the precious time of research investigators, study sections, and site-visit teams, all approved applications for fiscal year 1973 remain in competition during fiscal year 1974 and a moratorium be instituted on all new grant applications until the approved applications have received appropriate awards or are withdrawn by either party for other reasons.

CHARLES COLBERT

Radiological Research Laboratory, Wright State University Research Institute, Inc., Dayton, Ohio 45431

Acknowledgment

We would like to acknowledge the following omission in our report "Tremor and involuntary movement in monkeys: Effect of L-dopa and of a dopamine receptor stimulating agent" (23 Feb., p. 816). The involuntary movements in normal monkeys were described by Sassin *et al.* (*1*). We have used their terminology in part to describe involuntary movement in monkeys with ventromedial tegmental lesions.

MENEK GOLDSTEIN

ARTHUR F. BATTISTA

New York University Medical Center, New York 10016

References

1. J. F. Sassin, S. Taub, E. D. Weitzman, *Neurology* **21**, 403 (1971).

Acupuncture, Hypnotism, and Magic

Tsung O. Cheng's letter (9 Feb., p. 521) does not clarify the modus operandi of acupuncturual analgesia (the correct term). I have performed numerous painless major and minor surgical procedures including obstetrical deliveries—many *without* analgesia or anesthesia. For want of a better term, I called the method "hypnosis" (*1*).

Acupunctural analgesia, a praiseworthy method, can best be understood within the paradigm of contemporary conditioning theory (*2*). Scientists here and in China have not stressed the effect of shaping and modifying behavior of the masses by the sociopolitical reward inducements referred to in Mao Tse-tung's *New Thought Directives*. This is a kind of operant conditioning that readily brings about compliant behavior without overt cooperation being necessary. Such compliance accounts for the broad spectrum of psychobiologic experiences leading to well-known placebo responses.

Also not fully recognized is that no one knows where suggestibility ends and hypnotizability begins. Contrary to Cheng's statements, animals can be hypnotized, or more correctly develop tonic immobility, when held in restraint (*3*). This is referred to as the "still reaction" or the "immobility reflex." The immobility reflex is also induced by fear, which leads to catalepsy and subsequent anesthesia. Therefore the argument that animals are unable to read Mao's Little Red Book or that they are not susceptible to placebos is invalid.

My explanation for acupunctural analgesia is that the Chinese have rediscovered the effectiveness of preconditioning, autogenic training, yoga breathing exercises, and a form of "suggestion in slow motion—hypnotism" (*2*). These methods allay the fear and apprehension of selected patients and raise the pain threshold. In the environment in which acupunctural analgesia is used, it is obviously the method of choice.

James Esdaile (*4*) performed many formidable surgical procedures in India at the turn of the last century with mesmeric anesthesia. It now appears that magnetism, the precursor of hypnotism, has been replaced by "needleism."

WILLIAM S. KROGER

Institute for Comprehensive Medicine, 9735 Wilshire Boulevard, Beverly Hills, California 90212

References

1. W. S. Kroger, *Clinical and Experimental Hypnosis* (Lippincott, Philadelphia, 1963).
2. ———, *Amer. J. Psychol.*, in press.
3. F. A. Volgysi, *Hypnosis of Man and Animals* (Williams & Wilkins, Baltimore, 1966).
4. J. Esdaile, *Hypnosis in Medicine and Surgery* [Reprint of *Mesmerism in India* (1846)] (Julian Press, New York, 1957).

1) The King of Pontus dabbled in medicine and defrauded Europeans with mithridate and theriac.

2) The Khedive of Egypt promoted the sale of Egyptian mummy as a medicine.

3) Mao Tse-tung ordered doctors at Peking Union Medical College to administer spinal anesthesia to patients (using cocaine analogs) before they were rolled into the operating room, where newsmen were told that the anesthetic was acupuncture.

J. F. McCLENDON

Route 1,
Norristown, Pennsylvania 19401

State-Specific Sciences

Tart's provocative article (16 June 1972, p. 1203) on altered states of consciousness proposes that different states of consciousness are related to different rule systems of mental functioning. A new approach (or new paradigm in a Kuhnian sense) is implied which suggests that we look for differences in the set of rules that the various states of consciousness offer. Perhaps the first priority would be to establish whether altered states of consciousness have the far-reaching effects that Tart suggests. Do they really alter the psyche in its most profound sense by changing the very foundation of its system of logic, or do they merely produce variations at some more superficial, say, sensory, level?

If we give Tart his point and assume that the change is profound, then several consequences follow, some of which may be problematical. For example, Tart assumes that communication between states of consciousness is possible. A scientist, he says, could pass judgment on a theory developed in one state of consciousness (SoC 1) while he occupied another (SoC 2). But could he? Imagine that a certain mathematician in SoC 2 discovers a proof of Fermat's last theorem. He now slips back into SoC 1. Suppose that, in strict Gödel fashion, Fermat's last theorem is undecidable in SoC 1. If the mathematician wants to relish the beauties of his proof he must slip back into SoC 2, since the proof is not possible, hence nonexistent, under the system governing SoC 1. Perhaps SoC 1 and SoC 2, since they belong to the same experimental milieu, merge into SoC 3. The difficulty here is that SoC 3 might possibly be governed by a system of logic based on contradictory premises. (One can imagine all sorts of neurotic behaviors issuing from the failure to keep two conflicting states of consciousness separated.)

All of this points to the following consequences. If altered states of consciousness produce fundamental changes in the sense used here, then (i) the states may merge, perhaps resulting in more subjective confusion than that produced by either state taken singly, or (ii) the states would remain noncommunicative, and one would have to pass from one state to another in order to savor the knowledge that the systems had to offer. Alter-states might offer predictability but not intuitive understanding—a situation acceptable to the pragmatist perhaps, but not to the esthete.

On the other hand, altered states of consciousness may have only a superficial effect, reaching, say, no further than the level of sensory or perceptual interpretation of physical stimuli. This is perhaps close to what mathematical logicians call metalanguage, or the use of one language (one system of symbols) to talk about another. Consider the following thought experiment: Identical twins with identical backgrounds of experience are subjected to two different states of consciousness. We arrange matters so that the sensory (perceptual?) experience in both states are the same. Will the inferences, the intuitive or subjective impressions of reality, be quite different to the two observers? An answer in the affirmative would give us reason to establish state-specific sciences. This would not be a trivial finding, for if we had access to even a finite number of different logics, then our intellectual powers would be increased by several orders of magnitude. On the other hand, if altered states of consciousness affected only sensory interpretations (metalanguages), then the various systems of subjective inferences would not be fundamentally altered, and different systems of science for different states of consciousness would be redundant.

THADDEUS M. COWAN

Department of Psychology,
Kansas State University,
Manhattan 66506

Scientific endeavor from its beginning has been committed to a rational explanation of human experiences and activities, and of events and phenomena in our environment. Scientists may thus be expected to explore and to seek rational explanations of all aspects of human consciousness, as Tart proposes.

Such rational explanations, both of ourselves and of our environments, tend to be in terms of physics and chemistry, since these scientific disciplines have optimum measurable precision. For biology, this was manifestoed in 1847, to include consciousness, by Carl Ludwig, Emile Dubois-Reymond, and Hermann von Helmholtz. The results, allowing for time, have been amazing. There seem to be no pressing reasons to turn to any other way of approaching altered states of consciousness scientifically, as proposed by Tart. His "state-specific sciences" imply an esoteric in-group of specialists with an unintelligible jargon who would tend to indulge themselves in emotionally oriented irrational speculation.

Guidelines for scientific effort are generally agreed upon by scientists. They seem to be adequate for the rational exploration and explanation of such altered states of consciousness as sleep, meditative trances, and drug-induced hallucinations. Tart's proposals, however sincere, add merely confusion, fallacious reasoning, and semimystical hope to the orderly, though slow, scientific process of reaching tentative explanations and understandings of how our complex brains function. Irrationality is incompatible with scientific endeavor, except as a phenomenon to be explored rationally.

CHAUNCEY D. LEAKE

Department of Pharmacology,
School of Medicine,
University of California,
San Francisco 94122

Lest fuzzy-headed chemical adventurers think Tart's article provides them with excuse for availing themselves of effortless entertainment, let me recite a little story in the style of a fable which carries nature's eternal message of "no free meals."

A wild pig deep in the jungle of Africa had it made. Being omnivorous in a land where nature is prodigal, he had a nearly endless assortment of fruits, nuts, roots, and even truffles with which to titillate his senses. A wonderful supply of incongruous input (*1*) available with only a small expenditure of effort. In season he received atmospheric messages from female pigs which further added to his state of delight. The other animals of the jungle bothered him very little, as he had sharp hooves and strong tusks. There was, nevertheless, the threat of lions, but his senses, attuned to the real world in which he lived, kept him informed of the lion situation and so