

Hallucinogenic drugs: perils & possibilities

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THERE ARE many ways that drugs can influence mood, thought and behavior. The extent to which these effects, actual or potential, are employed to exercise a function defined as *control* relates to the pharmacology of the drug, the social context of its use, and the variability of both subjective and behavioral reaction to it.

An outline of categories defining drug employment in human affairs is shown below. Additional categories could easily be specified.

Categories of Drug Employment

I. Remediation. The drug is used in an attempt to restore normal function, under conditions of disease, disorder or discomfort.

A. *Medical.* Usually prescribed or administered by a health professional.

B. *Nonmedical.* Self-administered, or provided by a nonprofessional, but nevertheless *intended* as a medicament.

II. Task Enhancement. Drugs can be

used to improve performance under various conditions. Amphetamine, for example, is helpful briefly to overcome the effects of fatigue. Its use in dietary regimens might be seen in the same way. Local anesthetics have been employed for diverse purposes, from permitting injured athletes to play, to permitting normal copulation in males prone to premature ejaculation. In another context, there are Indian laborers in the high Andes who habitually chew the coca leaf while working, and will not work without it.

III. Alteration of Learning.

A. *Enhancement.* Certain drugs (e.g. glutamic acid) in the past were thought to enhance learning ability.

B. *Inhibition.* Another substance, puromycin, blocks certain types of protein synthesis in neurons and thus prevents learning from taking place. While it has not yet been used to produce selective amnesia in man, the implications of its dramatic effectiveness should be noted.

C. *State-dependent learning.* Learning acquired under the influence of a certain drug is only (or, at least, most effectively) retrieved when the subject resumes that state. This phenomenon has been identified with several substances in

man; we now possess preliminary laboratory data to show that marijuana intoxication in man demonstrates the state-dependent phenomenon.

IV. Reinforcement of Behavior.

A. *Positive.* Drugs that produce pleasant effects have been proved effective as reinforcers of desired behavior under a variety of conditions. They may also reinforce related or conditional behaviors. In man, a clinical example would be the positive desire for intravenous injections, even of saline, by old main-lining addicts.

B. *Negative.* The opposite also obtains. A well-known use of this effect is the aversion therapy of alcoholism.

V. **Recreation.** This is well-known, and need not be extensively reviewed here. Alcohol is probably the most universally employed recreational drug.

VI. Exploration of the Self.

A. *By others.* The use of sodium amytal or sodium pentothal in narcosynthesis is now well-known. Given intravenously, the "truth serum" may cause the subject to reveal things previously concealed even from himself. Other substances that cause disinhibition—ranging from alcohol to LSD—have been deliberately administered to cause individuals to reveal things about themselves. Stimulants were used by Chinese captors during prolonged forceful interrogation (sometimes improperly called "brainwashing") of American flyers during the Korean war, to elicit confessions of germ warfare. In this case it was sleep deprivation that caused impairment of personality function and increased suggestibility; the drugs merely enhanced the captors' ability to keep the prisoners awake.

B. *By self.* Employment of drugs for self-understanding has a great appeal. Dumas did it; Coleridge did it; so did Aldous Huxley. Along with the sense of self-revelation that drugs can produce, there is also often a corollary feeling of enhanced creativity, a release of the im-

agination. Through exploration of the inner world there may come a sense of great comprehension of the entire universe, comparable to the spontaneous variety (of the same experience) called "cosmic consciousness" by Bucke.

The hallucinogens appear to be unusually powerful in this effect, probably because of the period of enhanced sensation that marks the early part of intoxication, and also because of the relatively good recall of the experience. However, similar experiences can be elicited in a number of other ways, from meditation to hypnosis. Persons going under gas anesthesia often have a brief moment of immense self-revelation, and high fevers may have the same effect.

VII. Symbolic Representation.

A. *Of willingness to take risks.* Often seen in grab-bag drug-taking by youngsters. Works equally well with known substances, as long as they are thought to be dangerous.

B. *Of maturation.* Use of certain drugs can represent a child's readiness to function as an adult, if adults use the drug in question, or similar drugs. Getting drunk is a traditional rite of passage, especially to prove manhood. Many youthful takers of barbiturates and amphetamines have parents who use them too.

C. *To defy prohibitions and controls.* Characteristic of—but not limited to—adolescents and young adults.

D. *To belong.* Peer pressures are enormously powerful, and can easily induce drug-taking (as well as almost any other behavior).

E. *Of cultural transition.* This involves more than mere rebellion; the drug use symbolizes entering a new way of life, and casting off the old. LSD exemplified this function during the early days of the Green Rebellion, and was extolled by Leary and others as the key to the process of "turn on (take the drug), tune in (develop new awareness), drop out (assume a totally different mode of ex-

istence)." Of course, LSD was credited with facilitating this process, not only through self-revelation, but also through its power to dissolve old inhibitions, fears, or "hang-ups."

VIII. Mystical or Religious Ceremonies. Drugs have played a role in such ceremonies since the earliest records of human affairs, going back to ancient Egypt. Alcohol is commonly employed, from the wine of the Jewish and Christian ceremonies to the *tesguino* of the Tarahumara Indians. The peyote cult of the Native American Church is discussed below. Leary's League for Spiritual Discovery still has a few followers, but LSD and other hallucinogens are also employed in private mystical contexts by a great many individuals in the counter-culture.

IX. Adjuncts to Interpersonal Manipulation.

A. *Blackmail*. (Depends on legal situation, reputation of victim, etc.)

B. *Addiction*. (Supplier manipulates the addict.)

C. *Kidnapping*. (Drug renders victim helpless.)

D. *Manson-ism*. (Strong-willed psychopath manipulates suggestible acid-heads.)

E. *Narc-ism*. (Police or narcotics agents force drug users to become informers.)

F. *Counter-intelligence*. (Agent puts LSD in victim's beer, gets him to defect; agent paralyzes victim with anectine, gets him to tell all; etc.)

G. *Others*. (Supply your own.)

X. Adjuncts to Social or Political Policy.

A. *Weakening the adversary*. There have been many battles won because soldiers were taken by surprise when drunk. George Washington won such a victory. However, the corruption of whole armies, or whole countries, by drugs is presently being discussed. China, with its history of victimization by British commercial interests through the use of

opium, was accused of pushing cheap hashish and heroin to weaken the American military force in Vietnam. Whether or not this is true, the potentiality exists for using drugs in this way.

B. Internal Control

1. *Through prohibition*. The mechanisms necessary for controlling drugs provide leverage for other types of control. An example would be the selective application of drug laws permitting immediate search, or "no knock" entry, against selected components of the population such as members of certain minority groups or political organizations.

2. *Through supply*. This method, foreseen by Huxley in *Brave New World* (1932), has the governing element employing drugs selectively to control the population in various ways. While a country that requires maximum effort from its total work force (e.g. China today) must take stern measures to eliminate all drug abuse, a more affluent nation can afford to tolerate large numbers of drug-users in various circumstances.

To a large extent the numerous rural and urban communes, which provide great freedom for private drug use, are actually subsidized by the society: through parental remittances, welfare and unemployment payments, and benign neglect by the police. In fact, it may be more convenient and perhaps even more economical to keep the growing numbers of chronic drug-users (especially of the hallucinogens) fairly isolated, and out of the labor market with its millions of unemployed. The communards with their drugs are probably less trouble—and less expensive—to society if they are living apart, than if they were choosing one of the alternative modes of expressing their alienation such as those employed by the New Left.

The foregoing categories provide a certain frame of reference against which the problems created by any group of drugs can be studied. The hallucinogens

presently comprise a moderate but significant portion of the total drug problem in Western society. Certainly no colloquium on control of behavior through drugs would be complete without considering them.

The Hallucinogens

Hallucinogenic drugs are substances that, administered in pharmacological doses (not toxic overdoses), create gross distortions in perception without causing loss of consciousness. These distortions frequently include hallucinations. Such compounds also are likely to exert profound effects on mood, thought and behavior. These may resemble the disturbances seen in naturally occurring psychoses. Some hallucinogens have been termed "psychotomimetic" or "psychotogenic" on this account.

Scientists and clinicians have sometimes deliberately taken these compounds as a means of enabling themselves to empathize better with severely ill psychiatric patients. Also, in experimental psychopathology, it has been hoped that the study of chemically induced model psychoses would lead to a better understanding of phenomena found in clinical practice. Meanwhile, certain therapists have welcomed Osmond's term, "psychedelic," or mind-realizing, to describe the seeming effect of these substances to expand perceptual and experiential horizons. This orientation has led to the use of certain hallucinogens (especially LSD) for the treatment of a variety of patients with alcoholism, rigid personality patterns, frigidity, etc.

The psychological changes produced by these chemicals have sometimes been described as a "loosening of ego structures," "dissolving of ego boundaries," or "disrupting of ego defenses." Such changes may include the experiencing of thoughts, feelings, and perceptions that are usually unconscious or repressed: that is to say, ordinarily outside the individ-

ual's awareness. Persons who are unusually suggestible, emotionally labile, or usually unaware of their own reactions and the reactions of others, may become quite disturbed under the influence of such drugs. Feelings of transcendence of ordinary experience, and distortions in time and space perception, are also often reported.

Over the past 15 years an increasing number of people have been taking various hallucinogenic substances (marijuana, hashish, lysergic acid diethylamide [LSD], psilocybin, mescaline, dimethyltryptamine), frequently acquired through illegal channels and employed without medical supervision, in order to participate in special group experiences with cult-like characteristics, or to satisfy other, more private desires. While these experiences are often recalled by the participants with great enthusiasm, the unintoxicated observer finds little in the way of verbal or nonverbal communication to account for the joyous sense of communion so often described.

Not infrequently (especially with LSD) a severe emotional disturbance can accompany the intoxication. This is referred to by psychedelic aficionados and hippies as a bad trip. On rare occasions such bad trips lead into persistent psychotic syndromes (e.g. prolonged delirious reactions, catatonic excitements, stupors) following the administration of these substances. Furthermore, chronic use of drugs like hashish and LSD may gradually produce major personality changes, often marked by passivity, habit deterioration, and diminution of the highest integrative mental functions. Such a chronic user is often called a "head."

Most of the hallucinogens affect electrical activity of the central nervous system by shifting it toward an alert or arousal pattern. Cortical alerting patterns are consistently found with active congeners, but these are apparently dependent on intact lower brain stem cortical connections, while non-psychotogenic congeners can

produce an alerting effect even with these connections severed, thus suggesting action at the level of midbrain or higher subcortical sites. Persistent hippocampal electrical changes, resembling those seen in the orienting response, have been found with low dosage of LSD. Winters has described a continuum of reticular-cortical excitability from arousal to excitatory-occlusive blocking and disorganization under the influence of certain excitatory drugs, with staring and hallucinatory-like posturing of experimental animals during the maximum drug effect.

These observations conform with the general proposition that the combination of cortical arousal and impaired or distorted information input produced by LSD leads to emergent awareness of ongoing information processing by the brain (the so-called preconscious stream), which is then appreciated by the individual in experiences ranging from fragmentary images to well developed scenarios. The combination of LSD's effects as a sensory poison (it alters retinal cell excitability and electro-chemical activity at the sensory synapses) and as a cortical arouser, may well account for its hallucinogenic characteristics.

Biochemical research in the area of mechanisms of action of the hallucinogens has been growing, but consistent correlates have not yet been established. This may, in part, be because one is dealing with a large number of biochemical phenomena, perhaps different for each drug in spite of similarities in their induced behavioral changes. In addition, the theoretical biochemical models being explored are not easily integrated with behavioral models; the clinician is more likely to feel comfortable when considering formulations from neurophysiology. Such words as "alerting" and "arousal," which appear to have meaning in both the physiological and behavioral realms (even though they may refer to both related and nonrelated phenomena) are not

as available in current neurochemical theory.

A number of the hallucinogens apparently undergo metabolic conversions to more active compounds in the body. Recent studies on enzymes and urinary metabolites suggests that 6-hydroxylation converts the indole alkylamines to psychoactive metabolites. Mescaline apparently is less active than the products of its oxidative deamination, the trimethoxyphenylethanol and -aldehyde. Psilocybin is hydrolyzed to psilocin quite rapidly. The significance of the oxy and hydroxy metabolites of LSD has not yet been evaluated.

The major theme in research on the biochemical mechanisms of the action of hallucinogens centers around their effects on various postulated neurohormones, including 5-hydroxytryptamine (5-HT or serotonin), norepinephrine, dopamine, histamine, acetylcholine, and a brain polypeptide called "substance P."

The pharmacological screening techniques for potential psychotomimetic drugs include check lists of behavior changes covering such items as aggressivity, excitement, and sociability. More standardized criteria for effects on animal behavior include performance tests like rope-climbing and pole-walking; activity levels in an activity wheel; blocking of learned avoidance responses and depression of positive instrumental responses; indicators of emotionality such as urination and defecation in a strange environment; copulation time; and changes in body temperature, because some psychotomimetics produce hyperthermia.

Psychotogenic substances have also been found to affect such behaviors as web-spinning patterns in spiders and swimming patterns in Siamese fighting fish. Of course the most sensitive and pertinent technique for evaluation of these substances is the response of the human experimental subject. Care must be taken to control for placebo and mental set or suggestive effects. Other

efforts to get at these phenomena in man include questionnaires, interviews, and observations by trained observers.

There are four major chemical classes of hallucinogens: the indole alkaloid derivatives, the piperidine derivatives, the phenylethylamines, and the cannabinols.

Indole Alkaloids

Tryptamine derivatives. The simplest of these substances is tryptamine, which has no hallucinogenic effect. However, N, N-dimethyltryptamine is found, together with bufotenine, in the Caribbean cahobe bean, chewed by certain natives to produce religious visions, and in the seeds of the domestic morning glory plant, which are sometimes chewed to produce hallucinatory experiences in the United States.

The hydroxylated N, N-dimethyltryptamines are also active. Among these are the 4-hydroxy (psilocin) and its phosphorylated derivative (psilocybin, found in the ritually employed hallucinogenic mushroom *Psilocybe mexicana* of southern Mexico), the 5-hydroxy (bufotenine, originally isolated from the skin of toads); its more active 5-methoxy derivative; and the 6-hydroxy-N, N-dimethyltryptamine.

Dimethyltryptamine is psychotogenic at 1 mg. per kilogram levels (administered intramuscularly); effective dosages of the others vary. Psilocybin and psilocin produce effects in doses of 4 to 8 mg. in man. A recent addition to the tryptamine family is -methyltryptamine, which has been shown to be effective at a dosage level of 20 mg. in man.

Harmine, harmaline, and ibogaine. A drug with a three-ring aromatic system (harmine) and its related dihydro derivative (harmaline) are isolated from shrubs and used by South American Indians to produce hallucinatory states. The indole alkaloids with a larger ring structure in-

clude ibogaine, used by African natives to remain motionless for as long as two days while stalking, but producing confusion, drunkenness, and hallucinations if taken in large doses.

Lysergic acid diethylamide (LSD). The ergot alkaloids were originally isolated from a grass and rye fungus and were thought to be responsible for the convulsions, mental confusion, and gangrenous changes in the lower limbs associated with the periodic outbreaks of St. Anthony's fire caused by infected rye in the Middle Ages. All ergot alkaloids can be hydrolyzed to lysergic acid, and various derivatives of this compound have been developed. The diethylamide was synthesized by Stoll and Hofmann in 1938; in 1943 it was discovered by Hofmann to be a potent hallucinogen.

LSD is more than 8,000 times more potent on a dosage basis than mescaline. Less than 0.3 gm. has caused death in status epilepticus of a 7,000 pound elephant. This remarkable substance is by far the most potent psychotogenic agent known, effective at levels as low as 1 microgram (0.000001 gm.) per kilogram of body weight in man. Originally used experimentally to produce an artificial psychosis lasting several hours, it became widely employed during the late Fifties and early Sixties as a psychedelic agent by a variety of practitioners. Soon it became the basis for a cult of sorts, was hailed by Dr. Timothy Leary and others as the key to a new life style, and then was extensively distributed by a lively underground black market to a wide variety of customers in all walks of life.

Prolonged psychopathological reactions to LSD (that is, lasting more than 24 to 48 hours) are usually viewed as latent psychiatric disorders precipitated or exacerbated by the drug experience. The clinician who sees a certain number of these casualties may well develop a profound mistrust of the drug. Its unpredictability is second only to its extraordinary potency.

Piperidine Derivatives

Both belladonna—and stromonium—containing anticholinergic compounds, such as atropine, scopolamine, and hyoscyamine, have been known for centuries to produce delirious reactions with hallucinations. Cocaine, belonging to the same family, may produce hallucinations and thought disorders if taken in toxic doses, but this is rarely seen. These agents are perhaps not properly termed hallucinogens (as previously defined) because the effects depend on overdosage. However, a number of compounds have been synthesized and tested recently in which the substituted glycolic acid side chains are *meta* instead of *para* to the nitrogen of the piperidine ring. These changes have resulted in a large series of psychotogens including 1-methyl-3-piperidylcyclopentylphenylglycolate (the most powerful) and Ditran (the best known). These compounds can cause delusional thinking, disorientation, and hallucinations.

Another recently synthesized piperidine derivative that has generated much interest is Sernyl. Originally it was thought to be an analgesic or an agent which prevented sensory impulses from reaching nerve centers. Subsequently its effects in lower doses were found to mimic the primary signs of schizophrenia (including flattened affect, thought disorder, and emotional withdrawal) without the secondary signs, such as delusions and hallucinations. This was considered to be due to a peculiar effect on the sensory synapses.

More recent work has led to other reports of behavioral aberrations induced by Sernyl, including phenomena resembling those resulting from sensory deprivation.

Phenylethylamines

Mescaline is the most significant member of this group. It is trimethoxyphenylethylamine, named mescaline after the

Mescalero Apaches, who developed the cult of peyotism. Mescaline is the major active component of the buttons from the peyote cactus *Lophophora williamsii*. Today peyote buttons are chewed by Indians of a number of tribes in the southwestern United States to induce hallucinatory states in their religious rituals.

Mescaline must be administered in high dosage to achieve a full effect. The experience is usually ushered in by 1 to 3 hours of flushing, vomiting, cramps, sweating, and other autonomic phenomena, followed by several hours (to days in some cases) of visual hallucinations (often colorful), depersonalization, and distortions of time.

The remarkable sensory and introspective effects of mescaline have long fascinated psychopathologists: both S. Weir Mitchell and Havelock Ellis reported from personal experiences with it more than 70 years ago. Aldous Huxley, in his *Doors of Perception*, described mescaline intoxication as providing a "voyage to the Antipodes of the mind."

Amphetamines. Another phenylethylamine group, the amphetamines, should be mentioned in passing, although the therapeutic and addictive properties of these sympathomimetic amines differentiate them from the true hallucinogens. Chronic administration of large amounts of amphetamine may result in a psychosis with delusions, hallucinations, and dangerous behavior, accompanied by distortions in reality testing. Sleep deprivation, due to the drug's analeptic effects, may contribute to the syndrome. Such reactions usually remit promptly upon withdrawal of the amphetamine, although treatment (including phenothiazine medication) may be required.

Adrenochrome. A trihydroxyindole called adrenochrome (an oxidation product of adrenaline) has been reported by some workers to be hallucinogenic in intravenous dosages of 0.5 mg. Based on these reports (including the supposed discovery of the presence of increased

amounts of this and related metabolites in body fluids of psychiatric patients), an adrenochrome theory of schizophrenia was advanced by Hoffer and Osmond. More recent studies have failed to confirm the proposition that adrenochrome is an autogenous psychogenic substance. However, other more elaborate work on the role of biogenic amines in the human brain may yet prove to be of significance in the search for hallucinogenic or psychogenic substances related to errors of metabolism in man.

Cannabinols

Although they have been well known since ancient times as perceptual distorters, the members of this physically active drug family are perhaps not properly defined as hallucinogens. Called hashish, bhang, kif, marijuana, and various other names, these hemp-derived alkaloids produce excitation, vivid imagery, euphoria, and occasionally depression and social withdrawal. More major effects, such as disorientation and true hallucinations, usually occur only with overdosage or prolonged use. The smoking of marijuana (the most active agent of which is tetrahydrocannabinol, or THC) in cigarette form ("sticks" or "joints") has now become quite common in the United States, especially among young people (who call it "weed," "pot," "tea," "grass," or "Mary Jane"). Recent surveys at major American universities indicate that substantial majorities of the student population had used marijuana at least once during the previous year. Several recent books, and the report of the President's Commission, have made all the pertinent facts about marijuana readily available.

THC has been shown to produce an LSD-like reaction in higher doses, clearly marking it as hallucinogenic. Some tolerance to THC apparently may develop if it is used in large amounts over a long period of time. Nevertheless,

while the issue of marijuana is often discussed under drug addictions, it is not truly an addicting substance. Nevitt Sanford once commented, "Only an uneasy Puritanism could support the practice of focusing on the drug addicts (rather than on our five million alcoholics) and treating them as a police problem instead of a medical one, while suppressing harmless drugs such as marijuana and peyote along with the dangerous ones." On the other hand, it cannot be denied that some antisocial activities include marijuana intoxication as an accompaniment, and that many addicts to substances like heroin—and many of those who now use LSD—started out by using marijuana.

Nevertheless there are those, such as John Kaplan and Lester Grinspoon, who believe that marijuana should be legalized and made available freely on a commercial basis, like alcohol, for those who wish to use it. With the phenomenal spread in the use of marijuana now taking place in the United States, this issue has become increasingly important. Less well appreciated is the degree to which marijuana is used by some groups to control the emergence of hostile feelings that are contrary to the groups' value systems. This social psychopharmacotherapy is frequent in the communes, and is spreading.

LSD presents a somewhat different problem, one of importance to medicine and to society. The use of LSD is not decreasing as much as is commonly thought, in spite of stringent restrictions upon its distribution. It is easily synthesized from commercially available starting materials and a definite demand still exists.

It would be an oversimplification to say that all those who are involved in LSD use of one kind or another are necessarily motivated by a pathological desire to withdraw from reality. The experience is too variable and too complex for such an explanation to hold true; contacts with many LSD users convince

the observer that their motives range widely. These motives may include an adventuresome desire to seek new experiences, a craving for shared forbidden activity in a group setting to provide a sense of belonging, a manifestation of adolescent and post-adolescent rebelliousness, a simple search for sexual opportunities, a genuine attempt to achieve greater self-understanding and self-fulfillment, the exercise of a truly mystical bent in persons with a philosophical orientation inclined toward the transcendental, and, as Blum has described it, the search for fulfillment of a private utopian myth.

In addition, of course, there is the inevitable variety of clinical psychiatric patients who are searching for treatment or relief through the use of chemicals. Their desire may be related not only to a magical hope for cure (enhanced by the reputation of a substance as mysterious and extraordinary as LSD) but also to a very understandable human wish for a short cut to therapeutic insight, with considerable saving of time, money, and suffering.

The physician may be tempted in some cases to go along with the subject's request for one or more treatments with LSD (if, when, and where it is still in use). Before yielding to this temptation, however, he would do well to remember that there are other therapeutic maneuvers, such as hypnosis and the Amytal interview, which have been employed to bypass conscious resistance or temporarily modify ego structure, and for which there were once high hopes indeed. Although valuable, these methods have in the long run been found to be of limited general application. There is also a growing impression that repeated large doses of LSD in certain individuals may lead to apparently irreversible personality changes. Whether it is related to some poorly understood "biochemical scarring," or to the dangers of overexposure to one's own primary process (normally unconscious) ideation, remains

to be seen. Blacker's studies of acid heads suggests that the personality changes are, at least in part, organic.

LSD therapy has been tried for alcoholism, narcotic addiction, homosexuality, criminal behavior, various neurotic symptoms, psychoses, and resistance in psychotherapy. However, it remains one of the most uncertain of drugs. This uncertainty, in addition to the rare but disturbing prolonged psychotic reactions, has led to serious questions about its usefulness in treatment and makes its place in the psychopharmaceutical armamentarium dubious to say the least. Yet the possibility remains that certain individuals may benefit from controlled psychotic-like experiences in which primary process information floods the awareness to produce a self-realizing effect. Therefore, careful clinical research on the therapeutic potentialities of hallucinogens should continue.

The use of hallucinogens in control of behavior is even more speculative. I have endeavored to suggest where they might relate to the ten listed categories of drug employment. Under the right conditions, or in certain contexts, there are possibilities in almost every category. The great unpredictability of response to most of the known hallucinogens probably limits the likelihood of their regular employment for control of behavior. However, new hallucinogens may soon be synthesized. That could be another story.

REFERENCES

- Abramson, H. A., ed. *The Use of LSD in Psychotherapy*. New York: Josiah Macy, Jr. Foundation, 1960.
- Allen, J. R., and West, L. J. "Flight from Violence: Hippies and the Green Rebellion." *American Journal of Psychiatry* 125 [3] (1968), 364-70.
- Barr, H. D., Langs, R. J., Holt, R. R., Goldberg, L., and Klein, G. S. *LSD: Personality and Experience*. New York: Wiley-Interscience Division of Wiley & Sons, 1972.
- Barr, H. L. *Impairments of Cognitive Functioning Under LSD*. Presented at Confer-

- ence on Drug Usage and Drug Subcultures at Asilomar, California, 1970.
- Barrios, A. A. "An Explanation of the Behavioral and Therapeutic Effects of the Hallucinogens." *International Journal of Neuropsychiatry* 1 [6] 1965, 574-92.
- Benusiglio, D., Kosviner, A., Pixner, S., Stimson, G., and Zacune, J. *Soft, Hard and Psychedelic: A Pilot Study of the Non-addicted Drug User*. London: London School of Economics, 1967.
- Blum, R. H. *Society and Drugs*. San Francisco: Jossey-Bass, 1969.
- Calef, V., Gryler, R., Hilles, L., Hofer, R., Kempner, P., Pittel, S. M., and Wallerstein, R. S. *Impairments of Ego Functions in Psychedelic Drug Users*. Presented at Conference on Drug Usage and Drug Subcultures at Asilomar, California, 1970.
- Crumpton, E., Frank, I. M., Hochman, J. S., Lomax, P., McGlothlin, W. H., and West, L. J. "The Marijuana Problem." *Annals of Internal Medicine* 73 [3] 1970, 449-65.
- DeBold, R. C., and Leaf, R. C., eds. *LSD, Man and Society*. Middletown, Conn.: Wesleyan University Press, 1967.
- Efron, D. H., ed. *Psychotomimetic Drugs*. New York: Raven Press, 1970.
- Efron, D. H., Holmstedt, B., and Kline, N. S., eds. *Ethnopharmacologic Search for Psychoactive Drugs*. Washington, D.C.: U.S. Government Printing Office, 1967.
- Farber, S. M., and Wilson, R. H. L., eds. *Man and Civilization: Control of the Mind*. New York: McGraw-Hill, 1961.
- Freedman, D. X. "On the Use and Abuse of LSD." *Archives of General Psychiatry* 18 (1968), 330-47.
- Freedman, D. X., "A Psychiatrist Looks at LSD." *Federal Probation* (June, 1968).
- Goode, E. "Marijuana and the Politics of Reality." *Journal of Health and Social Behavior* 10 [2] (1969), 83-94.
- Goode, E. "Multiple Drug Use Among Marijuana Smokers." *Social Problems* 17 [1] (1969), 48-64.
- Grinspoon, L. *Marijuana Reconsidered*. Cambridge, Mass.: Harvard University Press, 1971.
- Hoffer, A., and Osmond, H. *The Hallucinogens*. New York: Academic Press, 1967.
- Kaufman, J. D., Allen, J. R., and West, L. J. "Runaways, Hippies and Marijuana." *American Journal of Psychiatry* 126 [5] (1969), 717-20.
- Keeler, M. H. "Formal Psychological Deficits Produced by Psilocybin." *Psychopharmacologia* (in press).
- Keeler, M. H. "Similarities and Differences in Set and Attention Between the Psilocybin Reaction and Schizophrenia." *International Journal of Neuropsychiatry* 3 [5] (1967), 434-8.
- Keeler, M. H., and Kane, F. J., Jr. "The Use of Hyoscyamine as a Hallucinogen and Intoxicant." *American Journal of Psychiatry* 124 [6] (1967), 852-4.
- Marijuana: A Signal of Misunderstanding*. First Report of the National Commission on Marijuana and Drug Abuse. Washington, D.C.: U.S. Government Printing Office, 1972.
- McGlothlin, W. H., and West, L. J. "The Marijuana Problem: An Overview." *American Journal of Psychiatry* 125 [3] (1968), 370-8.
- Meyer, R. E., ed. *Adverse Reactions to Hallucinogenic Drugs*. Washington, D.C.: U.S. Government Printing Office, 1969.
- Tart, C. T. *On Being Stoned*. Palo Alto, Cal.: Science and Behavior Books, 1971.
- West, L. J., *Hallucinations*. New York: Grune & Stratton, 1962.
- West, L. J., Pierce, C. M., and Thomas, W. D. "Lysergic Acid Diethylamide: Its Effects on a Male Asiatic Elephant." *Science* 138 [3545] (1962), 1100-03.

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Veatch's discussion rounds out and summarizes for the area of psychoactive drugs the more general problems of new technologies of behavior control. Given the advent of technological agents with dramatic benefits in some cases, unsuspected dangers in others, poorly understood mechanisms, and unanticipated temptations to power, how shall these agents be controlled?

It is by no means clear, however, even after these papers, where the controls should lie. It is not even clear the controls should be formalized. At one point in the conference discussion, in fact, it was agreed by all that all drugs should be made available on demand, the only disagreement arising over whether and how far the public should be educated about the effects of drugs first. Like most agreements this one was evanescent, and we are left with the problem. These essays, however, go far to clarify the contours of that problem.

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