

This Month's Special Section
LSD, STP, and Marihuana

Chronic Users of LSD: The "Acidheads"

BY K. H. BLACKER, M.D., REESE T. JONES, M.D., GEORGE C. STONE, PH.D.,
AND DOLF PFEFFERBAUM

Twenty-one paid volunteers who were chronic users of LSD were interviewed and participated in a series of cognitive and perceptual tests and EEG studies. Among other observations derived from both interviews and testing, the authors noted that the group shared a set of magical-mystical beliefs and profound nonaggressive attitudes, as well as a unique sensitivity to certain types of sensory stimulation. The authors suggest that the beliefs and attitudes of the group may have arisen as learned consequences of frequent, intense LSD experiences in susceptible individuals.

THE INGESTION of LSD produces profound alterations in an individual's subjective world(8). We have some knowl-

edge of the concomitant physiological and psychological events(16), and we know that such experiences in susceptible individuals can lead to psychosis requiring psychiatric hospitalization(6, 10, 12). We also know that perceptual distortions and emotional storms continue to occur in individuals long after the ingestion of the drug(15, 19).

We know little, however, about the effects of continued and frequent use of this drug or about the effects of the continued production of this intense state of altered consciousness, strong affect, and distorted reality. Examination of these phenomena may not only offer us an opportunity to gain further knowledge of the mind and its workings but can also provide us with information concerning a drug whose name, if not its effects, has produced great social furor.

We studied 21 chronic LSD users. Our subjects, chosen on the basis of their history of use of LSD, were paid volunteers who lived in the community. They were not psychiatric patients. Each subject agreed to come to the Langley Porter Neuropsychiatric Institute for a day of interviews and tests.

Drug, social, and psychological histories were obtained in two 45-minute interviews. Cognitive testing, perceptual testing, and electroencephalographic studies filled the remaining hours. One subject was admitted to the research ward for a six-week period for observation and testing. Fifteen of the subjects were restudied after a six-month interval. No subject ingested LSD within 48 hours of the test sessions.

Read at the 124th annual meeting of the American Psychiatric Association, Boston, Mass., May 13-17, 1968.

Drs. Blacker, Jones, and Stone are with the Langley Porter Neuropsychiatric Institute, 401 Parnassus Ave., San Francisco, Calif. 94122, where Drs. Blacker and Jones are assistant professors of psychiatry and Dr. Stone is associate professor of medical psychology. Mr. Pfefferbaum is a medical student, University of California School of Medicine.

This work was supported by Public Health Service grants FR-66-35 from the Division of Research Facilities and Resources, National Institutes of Health, MH-21754 and MH-32904 from the National Institute of Mental Health, and contract NONR 2931 from the Office of Naval Research.

The electroencephalographic studies were done by Dr. Charles L. Yeager. The authors acknowledge the assistance of Dr. David Stockford, Mr. Paul Soloff, and Mrs. Sandra Farncroft in contacting and obtaining the cooperation of the subjects.

Electroencephalographic Studies

Clinical electroencephalographic recordings were read independently by two experienced electroencephalographers, one of whom was unaware of the clinical condition. Reading independently, they agreed on 70 percent of the records. Of the initial 21 records, one was read as abnormal by both readers. Five others were rated as abnormal by one or the other reader. Such an incidence of abnormal EEGs is not unusual in a group of young adults.

Twelve of the subjects were retested six months later. Of these 12 records, three were read as abnormal by both readers and three others were read as abnormal by one or the other reader. Although there was an increase in the percentage of abnormal records in the restudied subjects, there was no relationship between continued LSD ingestion and changes in the clinical EEG.

The abnormal records were characterized by poor organization, high amplitudes, and increased fast and slow activity. They were compatible with either drug effect or central nervous system dysfunction.

Each record was analyzed by the frequency analyzer of Grey-Walter¹(23, 24) and the period analyzer of Burch²(4, 5). The frequency analyzer of Grey-Walter stores the voltage for a given frequency band present in a ten-second epoch. At the end of each successive epoch, the condensers are discharged into a system that transcribes the energy in the form of a histogram. The period analyzer converts all voltage gradients into constant amplitude square waves, measures only zero crossings, and holds the information for the same predetermined ten-second epoch. The resulting total counts from the frequency analyzer reflect both the frequency and the amplitude of activity within a given frequency band, while the total counts from the period analyzer are determined by the

number of waves within a given band and the amplitude is ignored.

Subsequently, the digital output from the analyzers was processed by an IBM 360/50 computer. The data were averaged over frequency bands and time (100 seconds) for a representative sample from each subject. In this manner total counts, a summation of the number of waves in each of the conventional EEG frequency bands (delta, theta, alpha, and beta) during a 100-second epoch, were obtained(25).

The computer analyses of the EEG recordings from the left occipital region, occiput to vertex, were compared with data obtained in a similar fashion from a group of 63 male psychiatric inpatients at the U.S. Naval Hospital (average age, 25; range, 17-44), primarily characterological disorders, and a second group of 25 unselected normal volunteers (average age, 32; range, 19-58). Comparisons of the mean energy in each frequency band as determined by the period analyzer and the frequency analyzer were made by an analysis of variance technique.

The values for the Navy and the normal groups were similar on each measure except for the presence of increased fast (beta) activity in the Navy group as measured by the period analyzer. The Navy group was significantly different ($p < .01$) from both the normal and the LSD group in the amount of beta activity present (figure 1). The outstanding feature of the data is an increased abundance of energy in all four frequency bands in the LSD group as measured by the frequency analyzer at the left occipital recording site. These values are significantly different ($p < .01$) from the values of both the Navy and normal groups, which are similar to each other (figure 2).

Perceptual Studies

Visual Evoked Response

Visual evoked response amplitude-intensity functions were obtained from eight of the subjects using a technique described by Buchsbaum and Silverman(3). A cold cathode light source filling the subjects' visual field provided the visual stimulus. Light

¹The commercial name for the Grey-Walter frequency analyzer is the Burden neurological instrument (BNI) low frequency analyzer.

²The commercial name for the Burch period analyzer is the bio-physical research instrument (BPRI).

FIGURE 1
Comparisons of Mean Energy in Each Frequency Band as Determined by the Period Analyzer
(Analysis of Variance)

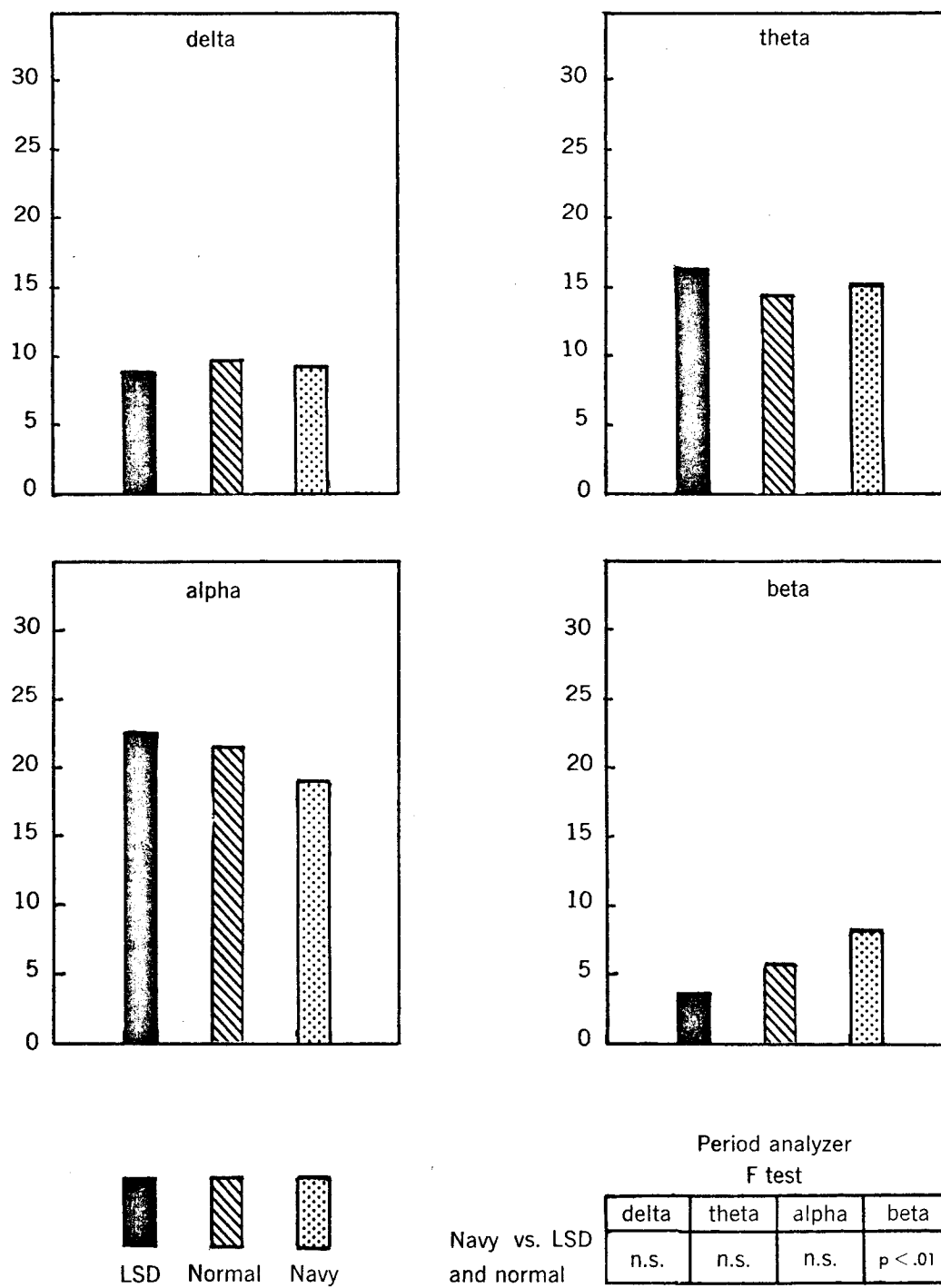
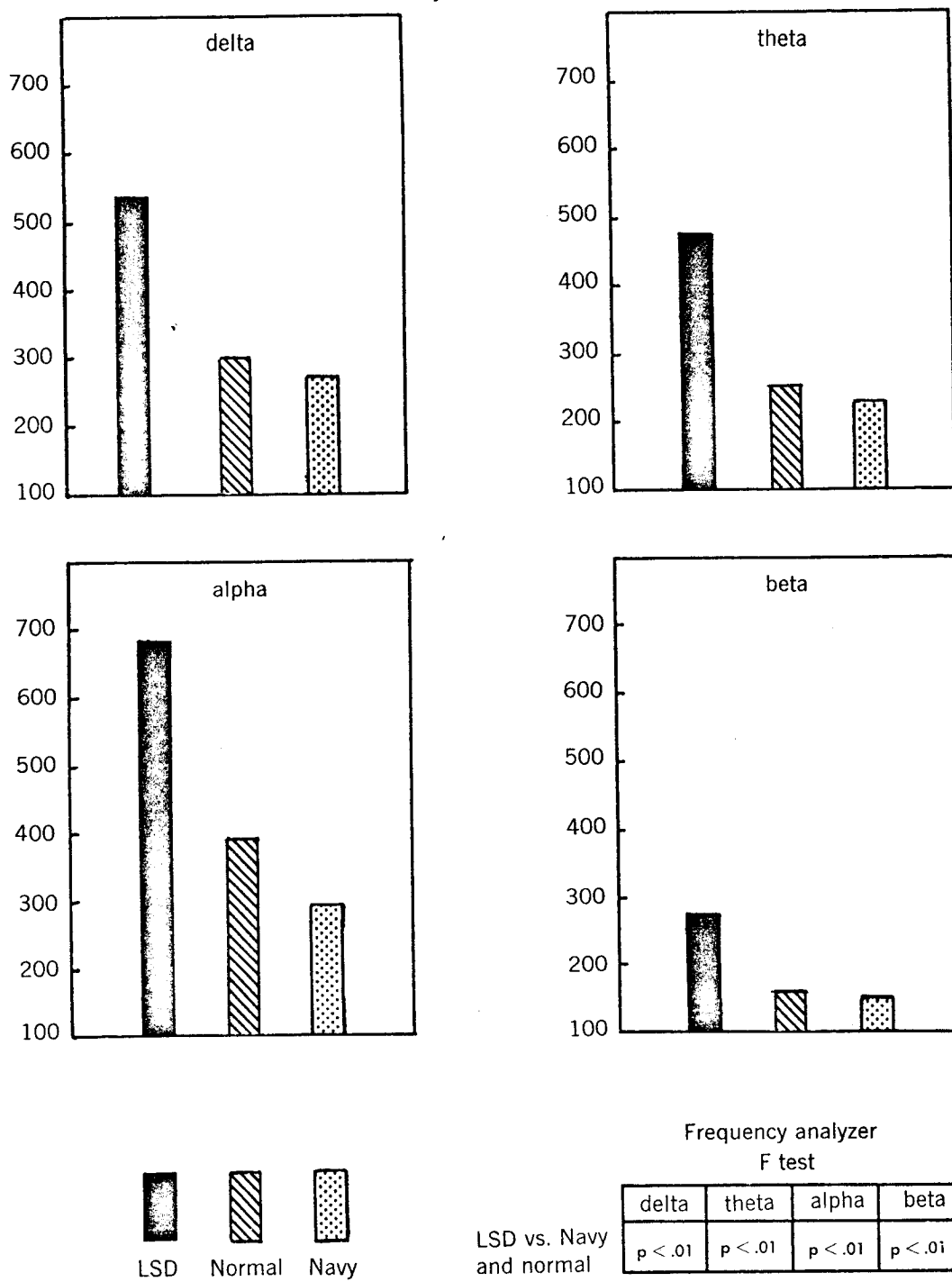
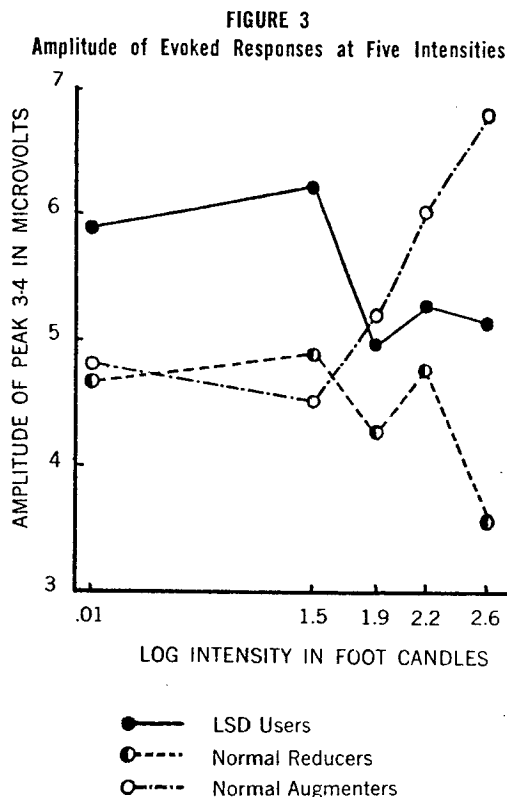


FIGURE 2
Comparisons of Mean Energy in Each Frequency Band as Determined by Frequency Analyzer
(Analysis of Variance)





flashes, five milliseconds in duration and presented one every two seconds, were used. Five stimulus intensities ranging in brightness from 3 to 410 foot-candles were presented in balanced blocks of 32 of the same intensity. A total of 96 stimulus presentations of each brightness were summed using a Mnematron CAT 300 computer.

The LSD group showed increased amplitudes (figure 3) at peak 3 and 4 at the dimmer intensities, as compared with a control group of 16 normal volunteers ranging in age from 19 to 25 ($.05 < p < .10$). The LSD group also had decreased latencies at peak 3 and 4 at all intensities ($p < .01$).

Kinesthetic Figural Aftereffects Task

The Kinesthetic figural aftereffects (KFA) task was administered using the technique described by Buchsbaum and Silverman(3). It involves simultaneous size estimations of a standard and comparison bar before and after stimulation obtained by rubbing test bars.

The KFA task can be considered a peripheral measure of perceptual style, and the visual evoked response a central measure of perceptual style. Both measures are sensitive to the manner in which sensory input is controlled. Individuals who reduce stimuli as measured by the peripheral KFA task also reduce stimuli as measured by the shape of the visual evoked response(3).

The correlation between these two measures for our control group ($r = .73$) was significant ($p < .01$). In our LSD group, unlike the normal group, there was no association between the peripheral and the central measures. The correlation between these two measures in the LSD group was an insignificant $-.05$.

Auditory Evoked Response

Using ten subjects (which included the eight tested with the visual evoked response measure) average auditory evoked responses were obtained in the manner described in our previous studies(13). The subjects were asked to remain alert and seated with their eyes open watching their EEG displayed on an oscilloscope. They were asked to ignore the tones. Four sets of forty 600 Hz tones and forty 1000 Hz tones were presented in a haphazard order. The EEG was recorded from a vertex to a left ear electrode. The difference in wave form between the two resulting averaged evoked responses was measured by the product moment correlation between 400 corresponding points on the two evoked responses.

We have shown that the two-tone auditory evoked response is correlated with the degree of thought disorder present in psychiatric patients. The group of LSD users had a mean two-tone evoked response correlation of .964, with a range of .931 to .982. This is not significantly different from our normal value of .970. On the auditory evoked response, and in contrast to the visual evoked response data, there were no amplitude or latency differences between the LSD user group and the control group. Therefore, on this measure the LSD users do not demonstrate the characteristics of schizophrenic patients, nor did they differ from a normal population.

Cognitive Studies

Elementary intellectual capabilities were investigated with a series of tasks that required rapid response to visual stimuli of varying color, form, and complexity. The tasks were performed on a console where five display cells presented stimuli in a horizontal row. The subjects responded by pressing on transparent panels that covered these stimulus cells or by pressing on another single response panel with no stimulus behind it, which was placed two inches below the row of five.

Two task formats were used. In the matching task, a block of 12 trials began with a simple stimulus in the cell at the far left. Pressing the lower single response panel caused the sample to disappear and four comparison stimuli to appear in the panels on the right. The subject was required to press the response panel that covered the stimulus in which the relevant attribute was the same as in the sample.

Response latencies were recorded to the nearest millisecond and punched on paper tape. A correct response caused the comparison stimuli to be replaced by the sample for the next trial. An incorrect response was recorded but produced no change in the stimulus display.

In the oddity task, a block of trials began with a frame in which no stimulus information was presented. When the subject pressed the lower panel, four stimuli appeared in the four right panels. Three of the stimuli were the same on the relevant attribute and one was different. The task was to press the odd stimulus as rapidly as possible.

In another series of tasks two levels of complexity of form stimuli were used in the matching format. The number of comparison stimuli was varied to obtain an estimate of perceptual speed separately from response speed.

Interpretation of the results of these tests is complicated by great variability within the group of LSD users. Some of them performed as well as any of our normal subjects; others appeared to be deviant. But the deviance of a few subjects is a phenomenon that is difficult to demonstrate statistically in that it requires a large normative population.

In terms of over-all speed, then, and a variety of subdivisions of the information-processing capabilities, our results indicate that heavy LSD usage is compatible with normal performance but that a number of our LSD users were slow.

Two special patterns of deviance deserve comment. One subject who had used LSD a great deal between contacts showed a marked change in the pattern of his scores, although his over-all speed did not change appreciably. Specifically, he became relatively poorer in matching compared to oddity responses to stimuli with irrelevant components. In this respect his performance became more like that of young children and like that of the single patient (with Korsakoff's syndrome) that we have tested.

A second deviant pattern was seen in three cases. These subjects tended to respond relatively slowly in the oddity task, particularly when form stimuli were the basis for response. We view this pattern as resulting from difficulty in coping with a sudden onslaught of information. We have also observed this pattern in two psychotic female psychiatric patients. We are inclined to think that this unusual pattern is not due to drugs.

Interviews

The average age of the subjects, 13 men and eight women, was 20; the youngest was 15; the oldest was 27. Twenty were Caucasian; one was Chinese. Four were married, but none lived with their spouses. Ten were from middle-class and ten were from upper-middle-class socioeconomic backgrounds. Nine were Protestant; six were Jewish; five were Catholic; one was Buddhist. Eighteen were high school graduates. Two had graduated from college. Ten were employed but only one, a trained artist, planned to continue to work at his present occupation.

The pattern of drug use in these subjects was remarkably similar. All had used marihuana before using LSD. The men were introduced to marihuana at an average age of 16, the women at 19. The subjects had liked marihuana, found the psychological effects interesting, and four to six months later, often at a time of emotional stress,

had begun to use LSD(9). The average number of reported ingestions for the group was 65, the most 300, the least 15. The drug was usually taken with friends present, rarely in isolation.

A smattering of other psychotomimetic drugs—peyote, mescaline, psilocybin, DMT, morning glory seeds, STP, nitrous oxide, and assorted mushrooms—had been used by most subjects. The experience with these drugs never approached the frequency or the intensity of the LSD use. All had tried amphetamines orally and three of the women had used methamphetamine intravenously for brief periods. At the time of the initial interviews none were using amphetamines, and 19 of the 21 said they had never used them heavily. Barbiturates, alcohol, and narcotics were not used by these subjects.

They were a remarkably homogeneous group in their attitudes and showed only minor variations in their appearance. Their physical condition appeared good. Their dress was casual to sloppy, mod to hippish in nature. Their clothes were clean. Hair styles were of varying length and with various degrees of grooming, but generally clean. Curious, intense, troubled by both internal and social stresses, they spoke openly and intelligently. They were interested, relaxed, and cooperative subjects and the research personnel responded warmly to them.

Several had unusual facies. Their faces looked like those of old men and women. The facial muscle tone looked droopy, washed out, or flattened. The curves or lines of youth seemed absent. Three had unusual gestures or mannerisms. The gestures seemed uncoordinated and poorly timed. Often they were more expansive, "looser," than usual in hand and body speech punctuation. Sometimes the individual seemed to find himself in the midst of a gesture not knowing quite how he got there. Occasionally he seemed to recognize what he was doing, then tone it down for awhile only to have it escape again several minutes later.

Four complained about a particular type of memory disturbance. They said they were no longer able to pull out facts when they wanted to. Daily memory for details was

difficult for them. They described lapses or blank spots in their stream of associations. Three had difficulty in organizing their thoughts and talking clearly. Each would begin a thought, pause, often after a preposition, and begin another incomplete sentence. In this fashion they would wander about a particular point, but were unable to define or clarify issues. In addition to this wandering and pausing, their concepts seemed vague, and their placement and organization of words unusual.

Often they spoke of increased sensitivity to colors and to people's gestures and postures. One said the environment was colored by dots of colors, "discrete dots like in the funny paper strips." Another said that even when he was not on LSD, he was on the verge of experiencing perceptual distortion. He could look at objects or at people and see what ordinary individuals saw. However, if he relaxed his attention or control he could see a face, for example, melting or turning into plastic or oil.

Most spontaneously described a frightening LSD experience. The "bum trip" usually began in the context of anger. Under such conditions familiar scenes changed into frightening, weird perceptions. To one individual, angry with an obnoxious friend, victorian buildings became ugly, dirty, and crumbling. Simultaneously she felt someone was going to attack and hurt her.

Another reported that he had ingested the drug in his room while he was angry with his mother. Initially the "trip" had been beautiful, and then it exploded. He became very frightened. He thought he could hear monsters coming up the stairs. He was convinced that they were coming through the door, would surround him, and eat him. One subject saw monsters coming at him. One felt she was in the midst of enemy airplanes.

Two of the subjects' attitudes or beliefs stood out because of their intensity and because of their unusual nature, at least in our society. The chronic users themselves attributed their attitudes to their frequent intense LSD experiences. This assertion was supported by our observations in the follow-up interviews—the length of hair, degree of personal grooming, and intensity of belief was directly related to the number

of LSD ingestions reported during the intervening six-month period.

All of the subjects were very passive individuals, the men particularly so. All, in one form or another, stressed that anger was very bad and that they were peaceful. Several carefully avoided "stepping on insects," because it showed disrespect for life to do so. This attitude seemed to permeate every aspect of their lives. They did not play competitive games. Each individual was supposed to do his own "thing" and to gain his own inner satisfaction. There was a deemphasis of any form of competition, a denial of any possible pecking order, and a purposeful negation of the possession of materials.

Over half held naive, almost omnipotent beliefs(21). One believed that thoughts can set fires miles away. Others believed that one can read another's mind and that inanimate objects such as trees, tables, or books, for example, react to their emotional surroundings. Statements like the following were made frequently: "A cigarette will not go out if people are arguing." "A desk will react to any kind of violence in the room."

Many were interested in astrology and cosmology and felt they had the power to be mediums. Such ideas were held as fundamental tenets of their view of the world. For example, one subject who espoused, at every opportunity, beliefs in mysticism and cosmology lived on a research ward for six weeks. During one approximately half-hour period of extreme emotional stress occasioned by a quarrel between the subject and a nurse, the subject changed her intellectual statements about cosmology. She said her nurse and attending physician were, in fact, creatures from another planet. No amount of information altered her belief. After the stress was relieved, she returned to making her former intellectual comments regarding the probability of life on other planets and of communication between worlds.

Discussion

We found these chronic LSD users to be suprisingly similar in their backgrounds and to hold in common a number of unusual beliefs. They reported increased sensitivity

to stimuli, and we found that on a visual evoked response measure they differed from a control group in their sensitivity to and in their organization of stimuli. Some of the EEG findings and some of the behavior seen in the interviews were suggestive of minimal brain damage but the evidence for this remains scattered and inconclusive, particularly in the absence of data from neurological examinations and conventional psychological testing.

We found several abnormal EEG records in which the findings were compatible with either drug effects and/or CNS dysfunction. Some of the subjects' behaviors and appearance were suggestive of CNS dysfunction. In one subject who continued to use the drug heavily, there was a deterioration in his performance pattern on the cognitive tests suggestive of organic damage. On the other hand one of our subjects maintained an A average in junior college while ingesting LSD on most weekends.

Also, we found no relationship between the clinical readings of EEG change in two sets of records, summer '67 and spring '68, and reported drug ingestion during the intervening six-month period. Computer analyses of these latter records are not yet completed. Our findings are inconclusive regarding the question whether LSD ingestion produces known forms of CNS damage.

Comparison of the computer analysis of the EEGs of the LSD group, a normal group, and a Navy group disclosed that the LSD group had increased abundance of energy in all four bands as measured by the frequency analyzer. This finding is probably related to the increased amplitudes present in the records of the LSD users and is probably also related to our observation that these subjects seemed more able to relax and ignore the external environment in the test setting than ordinary laboratory subjects. This explanation would fit with Kamiya's(14) observation that when individuals alter their state of consciousness the amplitudes of their EEG waves change. It would also account for the finding that more fast activity, usually associated with anxiety, was present as measured by the period analyzer in the records of the Navy group. It would seem that

we have an electroencephalographic description of a relaxed LSD user and an anxious, "up tight" straight patient.

Alternative explanations are possible for these findings. One is that the findings are totally independent of the subjects' chronic use of LSD. This explanation, stated simply, is that they had to be different or unusual in order to repeatedly ingest a powerful unknown substance. It can also be argued that the findings observed in chronic LSD users are merely those present in schizophrenics who have incidentally ingested LSD, since the nature of the beliefs in chronic LSD users and schizophrenics is similar. We have, however, observed important distinctions between the two. The chronic users, unlike schizophrenics, are involved with people and skilled interpersonally. In addition, their values on the two-tone auditory evoked response measure are similar to those of normals rather than schizophrenics. The clinical picture of unusual beliefs, relatively intact interpersonal relationships, and cognitive abilities suggests that these subjects are more similar to individuals usually termed eccentric than to individuals diagnosed as schizophrenic. A third possible explanation of their beliefs is that they reflect the social stress of our time(1).

Speculations

The profound nonaggressive attitudes and magic-mystical beliefs seen among LSD users have been described by others(2, 11, 20, 22). Our observations suggest that these beliefs may arise as learned consequences of frequent, intense LSD experiences in susceptible individuals. Before ingesting LSD our subjects were passive individuals, angry with their parents and with their own inabilities. Their personality characteristics were similar to the passive, introverted college students studied by McGlothlin(18). After frequent ingestions they were passive and internally oriented, perhaps more so, and similar in many respects to Ditman's(7) group 1.

Sensory input or sensory modulation is affected in the acute LSD state(16). The individual experiences an increased awareness of colors, sounds, textures, etc. The

stimuli seem brighter, louder, or fluffier. Occasionally, sensory crossing occurs. Sounds, for example, may affect visual images. The jangling of a telephone can turn a quiet, restful patterned image of pink and grey into a visual field of jarring green. Transpositions across various conceptual levels occur more readily. Thoughts may be seen as pictures; feeling or emotions may appear in the visual or cognitive system as artistic or poetic creations.

Emotional coldness may be experienced as images of icebergs or may appear in the thinking processes as metaphors. LSD also alters some of the basic reality-organizing and testing systems of the mind. The sense of time is altered and the individual's awareness of himself as a separate entity from the world around him is affected. At times he can no longer discriminate internal mental events from external events.

Given this altered state of mind, what one experiences depends on one's personality structure and on the type of emotional pressure present. If the emotion is love, one's images would reflect this emotion. The images and sensations might consist of tender scenes from childhood or religious themes. The diffuseness of one's self-boundaries accentuates the experience and one would perceive oneself, as the acid-head would say, as an inseparable part of a universe of love, a "bag of love."

If the emotion is anger or hate, the result would be images and sensations of anger or hate magnified into nightmarish proportions and experienced in an altered state of consciousness in which one is part of a world of blackness populated by horrible, primitive, cannibalistic creatures. One's anger would be turned into images of demons who attack and destroy their creator. As in a dream there would be no clear definition of self from the surroundings—no beginning, no end. The resulting nightmare of one's anger is a "bum trip."

We suggest that these intense cognitive and affectual experiences act as powerful reinforcers, gradually shaping an individual's thinking, beliefs, and behavior. Experiences with affects such as hate and anger are strongly punished. Belief in magic or in one's own omnipotence is increased by the frequent subjective experience of controlling

the external world with one's thoughts. As Freedman(8) described it, such individuals are "confronted with the coexistence of two compelling and contradictory orders of reality—with the interface of belief and the orderly rules of evidence."

Both observations, the extreme passivity or avoidance and denial of aggressive impulses and the increased omnipotence or belief in magical thinking, can be ascribed as arising from an alteration in the ego's critical facilities, in its ability to test reality. These alterations are perhaps reflected in the perceptual changes. Phenomenologically, the components of both superego and id seem to have been reified or concretized as a result of the intense experiences. The abstract "thou shalt not" of the superego is transformed into attacking monsters or swords. The infantile wishes of the id are transformed into magical powers capable of performing miracles, or moving mountains, or of enveloping everything into one world of love and warmth. Consequently, the resultant personality structures are more child-like, in a descriptive but not a pejorative sense.

If LSD causes the perceptual alterations observed in these subjects and if it also plays a major role in the production of their beliefs concerning aggression and magic, then it follows that the repeated administration of this drug in a medical setting could be a useful agent for some types of individuals. Lorenz(17), in his analysis of intraspecies aggression, argues that derivatives of man's aggressive instinct play a crucial role in the organization of man's social behavior. Aggression provides a motivating force for intimate relationships, a force that, as psychiatrists, we sometimes observe to interfere with social function. Lorenz points out, however, that with the elimination of aggression

... the tackling of a task or a problem, the self-respect without which everything that a man does from morning till evening, from the morning shave to the sublimest artistic or scientific creations, would lose all impetus; everything associated with ambition, ranking order, and countless other equally indispensable behavior patterns would probably also disappear from human life.

This sounds remarkably like behaviors the chronic LSD users described. If LSD can alter aggressive derivatives, it would follow that the drug could, depending on dosage, frequency, and type of individual, be used as a powerful therapeutic agent or as an agent to dissolve biological bonds necessary for human social organization.

Summary

We studied 21 subjects, each of whom had ingested LSD an average of 65 times. This group was found to be different from nondrug groups on several EEG measures. Using a computer analysis of their EEGs, we found an increased abundance of delta, theta, alpha, and beta activity. Such findings could be related to the presence of drug within their systems, to central nervous system dysfunction, personality factors, or to the subjects' attitudes during the EEG recording sessions. There was no increase in the expected number of clinically abnormal EEG records in these subjects. When the records were read using usual clinical criteria, several records were judged to be poorly organized and showed increased fast and slow activity of the type that may be related to the effects of drugs but is also frequently found in other individuals in this age group.

EEG evoked potential studies of electrical response to specific stimuli were also done. On a measure which has been found to be sensitive to intellectual disorganization in schizophrenia, the auditory two-tone evoked potential, this group showed no abnormality. They also appeared normal, although perhaps slow, on visual information processing tasks. However, on visual evoked potential procedures they gave evidence of being uniquely sensitive to low intensity stimulation and, in contrast to non-LSD-using groups, there was no relationship between their evoked responses to visual stimuli and their subjective response to the intensity of tactile stimuli. They seemed to modulate and organize sensory input in a different fashion.

In the interviews these LSD users were found to hold unusual beliefs about aggression and magic. Before taking the drug

they had been middle- and upper-middle-class youths apparently holding conventional beliefs. Passive, frustrated, angry with their parents and their own life situations, they began to use the drug, often in a conscious attempt to alter their unpleasant emotions. It is not completely clear what role the LSD experience played in their subsequent behavior and beliefs.

We suggest that the repeated intense emotional experiences arising out of the use of LSD provided a special learning environment which may have given rise to their unusual beliefs. We also want to emphasize the personality factors and the social climate in which they lived as well as the taking of drugs. All were important, and untangling the complex effects of the predrug personality, the drug experience itself, and the social milieu is a difficult and perhaps impossible task.

REFERENCES

1. Adler, N.: The Drug Scene as a Neo-Gnostic Social Movement, presented at the Institute on the Use of Non-Narcotic Drugs by University Students, Southern Illinois University, Grafton, Ill., June 28, 1967.
2. Brickman, H. R.: The Psychedelic "Hip Scene": Return of the Death Instinct, *Amer. J. Psychiat.*, to be published.
3. Buchsbaum, M., and Silverman, J.: Stimulus Intensity Control and the Cortical Evoked Response, *Psychosom. Med.* 30:12-22, 1968.
4. Burch, N. R.: Automatic Analysis of the Electroencephalogram: A Review and Classification of Systems, *Electroenceph. Clin. Neurophysiol.* 11:827-834, 1959.
5. Burch, N. R., Nettleton, W. J., Jr., Sweeney, J., and Edwards, R. J., Jr.: "Period Analysis of the Electroencephalogram on a General-Purpose Computer," in Tolles, W. E., ed.: *Computers in Medicine and Biology*, Ann. N. Y. Acad. Sci. 115:827-843, 1964.
6. Cohen, S., and Ditman, K. S.: Prolonged Adverse Reactions to Lysergic Acid Diethylamide, *Arch. Gen. Psychiat.* 8:475-480, 1963.
7. Ditman, K. S., Tietz, W., Prince, B. S., Forgy, E., and Mass, T.: Harmful Aspects of the LSD Experience, *J. Nerv. Ment. Dis.* 145:464-471, 1968.
8. Freedman, D. X.: On the Use and Abuse of LSD, *Arch. Gen. Psychiat.* 18:330-347, 1968.
9. Frosch, W. A., Robbins, E., Robbins, L., and Stern, M.: Motivation for Self-administration of LSD, *Psychiat. Quart.* 41:56-61, 1967.
10. Frosch, W. A., Robbins, E. S., and Stern, M.: Untoward Reactions to Lysergic Acid Diethylamide (LSD) Resulting in Hospitalization, *New Eng. J. Med.* 273:1235-1239, 1965.
11. Grof, S.: Tentative Theoretical Framework for Understanding Dynamics of Psychotherapy, presented at the Psychotherapeutic Congress, Chicago, Ill., June 1966.
12. Hensala, J. D., Epstein, L. J., and Blacker, K. H.: LSD and Psychiatric Inpatients, *Arch. Gen. Psychiat.* 16:554-559, 1967.
13. Jones, R. T., Blacker, K. H., and Callaway, E.: Perceptual Dysfunction in Schizophrenia: Clinical and Auditory Evoked Response Findings, *Amer. J. Psychiat.* 123:639-645, 1966.
14. Kamiya, J.: Conscious Control of Brain Waves, *Psychology Today*, April 1968, pp. 57-61.
15. Kleber, H. D.: Prolonged Adverse Reactions from Unsupervised Use of Hallucinogenic Drugs, *J. Nerv. Ment. Dis.* 144:308-319, 1967.
16. Klee, G. D.: Lysergic Acid Diethylamide (LSD-25) and Ego Functions, *Arch. Gen. Psychiat.* 8:461-475, 1963.
17. Lorenz, K.: *On Aggression*. New York: Harcourt, Brace & World, 1966.
18. McGlothlin, W., Cohen, S., and McGlothlin, M. S.: Long Lasting Effects of LSD on Normals, *Arch. Gen. Psychiat.* 17:521-532, 1967.
19. Rosenthal, S. H.: Persistent Hallucinoses Following Repeated Administration of Hallucinogenic Drugs, *Amer. J. Psychiat.* 121:238-244, 1964.
20. Smith, D. E.: personal communication.
21. Stubblebine, J. M.: Health Hazards of the Hippies, presented at the Langley Porter Neuropsychiatric Institute staff conference, November 1967.
22. Ungerleider, J. T., Fisher, D. D., Fuller, M., and Caldwell, A.: The "Bad Trip"—The Etiology of the Adverse LSD Reaction, *Amer. J. Psychiat.* 124:1483-1490, 1968.
23. Walter, W. G.: "Intrinsic Rhythms of the Brain," in Field, J., Magoun, H. W., and Hall, V. E., eds.: *Handbook of Physiology*, section 1, Neurophysiology. Washington, D. C.: American Physiological Society, 1960.
24. Walter, W. G.: "Technique-Interpretation," in Hill, D., and Parr, G., eds.: *Electroencephalography: A Symposium on Its Various Aspects*. New York: Macmillan Co., 1963.
25. Yeager, C. L.: The Application of Frequency and Period Analysis in Fundamental Psychiatric Syndromes, read at the 42nd anniversary congress of the Pan-American Medical Association, Buenos Aires, Argentina, November 1967.