

CHARACTERIZING THE PSYCHOLOGICAL STATE PRODUCED BY LSD¹

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2 studies, involving 69 male inmates of an experimental penal institution, investigated the psychological states produced by LSD as compared with amphetamine and placebo controls. A number of scales on a newly developed subjective drug-effects questionnaire significantly differentiated the groups. This instrument was further used to identify 3 qualitatively different subjective states produced by LSD (moderately euphoric, dysphoric, and ambivalent). New techniques for exploring the perceptual and vocal components of emotional change were also applied. These techniques further elucidated the quality and possible origin of the psychological states produced by LSD. The results (which indicate the presence of highly intense but contradictory emotions) were interpreted in the light of a current theory of emotion and Bartlett's concept of "effort after meaning."

There has been a great deal of interest over the years in LSD and a very large volume of research on its psychological effects. The literature ranges from clinical descriptions of the psychological states produced (e.g., DeShon, Rinkel, & Solomon, 1952; Hoch, Cattell, & Pennes, 1952; Savage, 1952) through more systematic and objective studies of the effects of LSD on such aspects of functioning as cognition (Aronson, Watermann, & Klee, 1962; Levine, Abramson, Kaufman, & Markham, 1955; Silverstein & Klee, 1958), perception (Aronson, Silverstein, & Klee, 1959; Krus, Wapner, Freeman, & Casey, 1963; Leibert, Wapner, & Werner, 1957), and psychomotor performance (Abramson, Jarvik, & Hirsch, 1955; Kornetsky, 1960; Krus & Wapner, 1962; Landis & Clausen, 1954). Several researchers have also

begun to look more systematically at the nature of the subjective experience itself (Abramson, Jarvik, Kaufman, Kornetsky, Levine, & Wagner, 1955; Linton & Langs, 1962).

Despite this volume of research, however, the total experience produced by LSD still eludes complete comprehension. Descriptions of the state have ranged from that of Hoffman and the earlier investigators (e.g., Rinkel, DeShon, Hyde, & Solomon, 1952; Stoll, 1947) in which the toxic psychotic or schizophrenic-like qualities of the experience were emphasized to the more recent reports of mystical or transcendental states (Savage, Terrill, & Jackson, 1962). The range of states described is partly a function of dosage, but a great deal of influence has also been attributed to the role of nondrug factors in determining the quality of the experience (Cole & Katz, 1964; DiMascio & Rinkel, 1963; Hyde, 1958; Unger, 1963). The personality of the S, his preparation or set prior to the experiment, as well as the setting in which the drug is given, are all presumed to play a role in shaping an S's LSD experience. Thus, the problems of determining the actual effects of the drug itself and of unraveling the bases for these very unusual states are further complicated. The influence of these

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diverse factors and the failure to adequately control them in much of this research have led to the current confusion concerning the effects produced by LSD.

The first step in attempting to understand the nature of the experience should be the objective delineation of the psychological components, with special emphasis on the effects of the drug on the emotions. The available research literature does not indicate that the psychological states which are produced have been as carefully and unemotionally described or analyzed as they could be, or that the appropriate methods for their study have generally been applied. For example, the drug was usually not tested in a situation in which suggestion and previous knowledge of effects were controlled, and, although contrasted frequently with a placebo, its specificity has generally not been examined by comparing its effects with that of other similarly acting drugs, for example, drugs which also elevate mood. Further, the attempt to understand how a drug is capable of producing mystical states and profound alterations in consciousness appears to require an experimental approach which provides the conditions under which the early stages and the development of such states could be studied.

The present studies were designed to investigate, with the use of appropriate and adequate controls, the development and components of LSD-produced psychological states. A major problem was that of selecting and developing techniques for measuring these states.

If a drug results in unusual emotional, perceptual, and cognitive effects—effects which are not familiar—then it is likely that traditional techniques will be limited in helping to understand or to delineate these effects. An early review of the use of standard psychological procedures in the study of LSD is instructive here (Katz, 1959); little new information was provided by the standard techniques despite the fact that it was clear to all observers in research of this type that the drug was producing some very strange effects. Except for the work at the University of Maryland Psychiatric Institute (Klee, 1963), little has been added to the information in this area in recent years. Further,

the conventional approaches to quantifying the subjective aspects of drug effects, that is, the usual symptom questionnaire and mood scales, did not speak the language of these effects, except in those cases where special-purpose questionnaires were constructed for use in LSD studies (Abramson, Jarvik, Kaufman, Kornetsky, Levine, & Wagner, 1955; Linton & Langs, 1962).

The conventional methodological approach to the study of drug effects can, however, be broadened and improved. The present authors have tried to do this by taking advantage of the attempts of others to articulate the effects of LSD-type drugs, by trying to describe and document what they have observed themselves, and by applying new methods to the study of the perceptual and verbal behavioral components in order to provide a more complete picture of the psychological states which are produced.

METHOD

In order to accomplish the aims of the research, it was extremely important to control for the influence of nondrug factors and to provide a situation in which the development of the LSD state could be adequately studied. Because of the special difficulties in controlling for such factors in LSD research, it was necessary to develop an experimental situation in which: (a) Ss were not familiar with the effects of the drug; (b) the drug was one of several drugs administered to different Ss (drugs which have very different effects, e.g., stimulation, sedation, etc.) so that a given S could not predict which he would be receiving; (c) a comfortable "safe" setting was provided, but the preparation was neutral; (d) the administered drug dosages were modest, sufficient in size to permit the characteristic effects of the drug to appear, but not so overwhelming that it was not possible to apply a broad range of psychological methods to their study.

Subjects

The two studies to be described took place at the Patuxent Institution, a treatment center in Maryland for emotionally unstable criminal offenders. The Ss were paid volunteers of at least dull-normal intelligence (WAIS IQ range, 80–125; average IQ, 102) and of sixth-grade educational level or above. All were screened psychiatrically to eliminate potentially psychotic or severely disturbed individuals. The Ss were between the ages of 21 and 40 and were sampled from the more "normal" segment of the prison population. Although the sample was similar to those used in many basic studies of drug effects, generalizations from the results have to be qualified somewhat by the nature of the population.

There is obviously no ideal population for delineating the psychological effects of drugs; the members of this particular group were selected because they did not evidence any severe psychiatric disturbance, and because of their lack of familiarity with the expected effects of LSD.

Design

In the first study, an *S*, once he was screened and had volunteered to participate, was randomly assigned to one of four treatments: 50 μ g of LSD, 15 mg. of amphetamine, 50 mg. of chlorpromazine,² and placebo. The conditions were double blind, so that neither *S* nor the several observers knew initially which treatment had been administered to a particular *S*, although the observers knew which drugs were involved in the study. The second study was similar to the first, but the chlorpromazine condition was eliminated, and there were some revisions of methodology based on experience from the first study. In the first study, there were 11 *S*s in each of the four treatment groups; in the second study, there were 12 *S*s in each of the three treatment groups.

Procedure and Experimental Setting

Following screening, all potential *S*s were interviewed by the project coordinator, a psychologist, who instructed them as to the nature of the study. During this interview, *S*s had the choice of volunteering or not volunteering for the study. They were told that the purpose of the study was to investigate the physical and psychological effects of several drugs, that the drugs were not new, but that more information was desired about their specific effects. It was emphasized that the drugs were safe under the dosages administered, that a physician would be checking on their condition throughout the day, and that they would stay in the hospital for routine observation the night after the drug study.

It was explained that the effects of the various drugs would range from mild to moderately strong depending upon the drug and how each person reacted to the drug. Also, *S*s were informed, "Some effects might be pleasant, others might be uncomfortable, and other effects might be quite different than you've had before." In the course of the interview, *S*s were encouraged to ask questions about the study and to tell the coordinator what they had heard from previous study *S*s. If an *S*, based on his knowledge of previous *S*s' reactions, seemed to have specific expectations, these were discussed with him, and he was told again that several different drugs were being used and that a number of different reactions were possible. The instructions were intended to reduce the likelihood that *S* would enter the experiment with any strong specific expectations.

²The use of chlorpromazine is related to the method-development aims of the project, and these results will not be reported here.

Each *S* was run on a separate day, and he was seen on that day by a psychiatrist, a psychologist, and the project coordinator. Before administration of the drug, the psychiatrist and psychologist administered the base-line physiological and psychological tests. The psychiatrist briefly reiterated the instructions previously given to *S* by the coordinator. All drugs were then administered orally. Amphetamine, chlorpromazine, and placebo were given in capsule form with water; in the case of LSD the drug was in the water and the capsules were placebo. An hour later, testing was resumed and was repeated at specified intervals throughout the day. Observational ratings were made of *S*'s behavior by the coordinator, psychiatrist, and psychologist at specified times before and after drug administration.

It should be emphasized that, in the instructions given *S*, in the atmosphere of the room, and in the interactions of the staff with *S*, an attempt was made to create a pleasant, but neutral, atmosphere, in which specific expectations on *S*'s part would be at a minimum. In order to avoid a strictly experimental, impersonal approach, the coordinator kept in frequent touch with *S* throughout the day and tried to maintain a friendly, supportive relationship. The staff seemed successful in creating an unthreatening milieu, in which an *S* felt free to report what he was experiencing. The majority of *S*s did not seem to have strong specific expectations and apparently believed that several different reactions were possible. No *S*, either before or after participation in the study, indicated that he knew what drugs were being used.

Experimental Measures

In addition to the newly designed methods, several conventional procedures for measuring drug response were included in the study. The physiological measures used were standard for this type of experiment and included measures of blood pressure, body temperature, and pupillary changes. The results of these will not be reported here except to note that expected effects in these areas, particularly with regard to the characteristic pupillary changes associated with LSD, were clearly in evidence. A set of rating scales was used for recording observations of *S*'s mood and behavior. This observational rating instrument was based on the format of the Clyde Mood Scale (Clyde, 1963) and included adjectives to represent the various factors of that scale. In addition, several adjectives more specific to LSD effects (e.g., suspicious, mood inappropriate, mood fluctuating) were also included.

The new methods used for characterization of the psychological states produced by LSD will now be described.

Subjective Drug Effects Questionnaire (SDEQ). This instrument was developed to meet some of the shortcomings of subjective questionnaires previously used in drug research. The work with LSD has made it especially clear that (a) questionnaires have to include many new items involving unusual effects; (b) in order to determine the specificity of

TABLE 1
SUBJECTIVE DRUG EFFECTS QUESTIONNAIRE (SDEQ)

I. Empirical scales: Based on cluster analysis of items	
General response scales	Specific scales
A. Cognitive and psychomotor 1. Improved: thinking enhanced, speech and movements quickened, and time sense improved (12)* 2. Impaired: thinking impaired, movements slowed, time sense altered (7) B. Bodily and feeling 3. Relaxed, happy, light, controlled (12) 4. Jittery, tense, hard to talk, less controlled (11) C. Control 5. Fear of loss of control (7) 6. Feelings of increased control and good functioning (5)	D. Feelings 7. Dizzy, excited, silly (5) 8. Dreamlike, floating (4) 9. Dreamy, giddy (5) 10. Upset, unhappy, asocial (5) 11. Sober, serious (3) 12. Peaceful, sociable (3) E. Perceptual 13. Sensory and perceptual sharpness (6) 14. Detachment and unreal quality to perceptions (6) 15. Altered perception of self and others (3) F. Somatic 16. Weak, sick (6) 17. Sluggish, stuffy, feeling of pressure (7) 18. Sympathetic arousal and increased sensitivity (6) 19. Parasympathetic arousal (4)
II. A priori scales: Based on hypothesized effects of drugs	
20. Increased awareness (6) 21. Decreased awareness (6) 22. Increased control (3) 23. Decreased control (7) 24. Ambivalence (67) 25. Euphoria (34) 26. Dysphoria (47)	

* Number of items is in parentheses.

a particular drug, it is necessary to ask about effects not necessarily expected with that agent; (c) it is necessary to control for suggestion in the wording and in the manner in which the items are presented. The questionnaire which was developed for this study was designed to cover most possible changes in the thinking, feeling, perceptual, and somatic areas which occur as a function of the effects of the major classes of drugs. In order to minimize the role of suggestion, the format of the questionnaire allowed an S to endorse a particular effect and/or its opposite, and the order of presentation of these opposing effects was random.

Scales which describe the various facets of subjective response have been developed through an empirical clustering procedure, using a modification of the B-coefficient method (Holzinger & Harman, 1941).³ The clusters are based on an analysis of the relationships among items when each S was at his peak response (i.e., the time when he endorsed the largest total number of items on the questionnaire). In addition to the empirical scales, a number of

scales were developed which are based on the hypothesized effects of various drugs, particularly LSD, derived from the authors' experience in pilot work and the experience of others. Examples of these are feelings of decreased control, ambivalence, and euphoria-dysphoria. The empirical and a priori scales are presented in Table 1.⁴

Picture Rating Technique. The second new method in the study is the Picture Rating Technique. This method has its antecedents in Bartlett's (1932) "method of description" and is based on the hypothesis that internal changes in emotional state should result in changes in the individual's perception of the people around him. It was designed to assess the extent to which changes in mood are reflected in an individual's perception of the mood of others. The pictures were drawn from a larger group provided by Campbell (Campbell & Burwen, 1956). Three alternative sets of 10 pictures were developed, balanced for age, sex, and the "likability" of the faces in the photographs. The S describes each of the series of photographs of people on a list of adjectives, selected to cover basic mood factors that have been identified in previous psychometric studies of subjective mood states (Clyde,

³ The authors gratefully acknowledge the assistance and consultation of B. K. Radhakrishnan, Biometric Laboratory, George Washington University, in providing the modified computer program for this analysis.

⁴ A more detailed description of the development of this technique is in preparation.

1963; Nowlis & Nowlis, 1956). A scoring system was developed which permits the profiling of the individual's perceptions of others, for example, the extent to which others appear "friendly," "fearful," "sad," etc. Thus, the use of projective stimulus material was combined with a quantitative system for dealing with the dimensions of mood. Early studies, without drugs, indicated modest relationships between personality characteristics and the tendency to perceive in certain directions and between mood states as reported on the Clyde Mood Scale (Clyde, 1963) and perceived mood, for example, between felt "jitteriness" and perceived "jitteriness." These findings support the basic validity of the approach.

Verbal and vocal behavior scales. A third set of results to be reported is derived from the application of a set of verbal and vocal behavior scales to the measurement of emotional change. In addition to using previously developed measures of verbal behavior (both temporal and content), a set of scales for rating changes in vocal qualities has been developed in the course of this research, based on the idea that changes in affect are reflected in changes in the quality of the voice. Verbal samples taken before and during the drug experience were rated on a number of semantic-differential-type scales. The vocal aspects of speech were isolated for these ratings by the use of a filtering technique developed by Soskin (Soskin & Kauffman, 1961) in which frequencies above a particular point are greatly attenuated; this method eliminates the intelligibility of speech while retaining many voice characteristics. Each sample was rated by two research assistants with MA-level training in psychology, and the scores used were the means of the ratings of these two raters. This method of rating vocal aspects of speech is discussed more fully in a paper by Waskow (1967).

RESULTS

In the results to be reported, two somewhat distinct approaches have been applied to the analysis of the effects of LSD. The first is designed to delineate the specific subjective effects of LSD, by contrasting them with those which occur simply as a function of taking a drug (the placebo condition), and with those which occur with an agent which is similar to LSD with regard to elevating mood (i.e., amphetamine). This type of analysis cannot, however, delineate the qualitatively different psychological states which may be experienced by different individuals given the same drug. In the second type of analytic approach, an attempt is therefore made to identify the patterns of subjective response which are produced. This is followed by an analysis of the correlates of

TABLE 2
COMPARING LSD TO AMPHETAMINE AND PLACEBO ON THE SDEQ^a

I. LSD > Placebo	
More significant**	Less significant*
2. Impaired cognitive and psychomotor functioning	3. Relaxed, happy, light, controlled
4. Jittery, tense, hard to talk, less controlled	5. Fear of loss of control
7. Dizzy, excited, silly	13. Sensory and perceptual sharpness
8. Dreamlike, floating	16. Weak, sick
9. Dreamy, giddy	21. Decreased awareness
14. Detachment and unreal quality to perceptions	23. Decreased control
15. Altered perception of self and others	24. Ambivalence ^b
18. Sympathetic arousal and increased sensitivity	25. Euphoria
26. Dysphoria	
II. LSD not significantly different from amphetamine in either period ^c	
	1. Improved cognitive and psychomotor functioning
	3. Relaxed, happy, light, controlled
	6. Feelings of increased control and good functioning
	13. Sensory and perceptual sharpness
	20. Increased awareness

^a Univariate analyses at 1½ hours and 3½ hours (N = 33, Study I only).

^b Based on analysis of frequency with which it occurred throughout the day.

^c LSD significantly exceeds amphetamine in at least one period on scales in I which are not included in II, with the exceptions of Euphoria, Dysphoria, Decreased Awareness, and Decreased Control.

* $p < .05$ in at least one postdrug period.

** $p < .01$ in at least one postdrug period.

these "states" in the behavioral, perceptual, and verbal behavior areas.

Analysis of Specific LSD Effects

For the first type of analysis, groups were compared on each scale of the SDEQ taken at approximately 1½–2 hr. postdrug, the time at which peak effects occurred for most Ss, and at 3½ hr. postdrug. This analysis is based on data from the first study. Differences between groups were analyzed by *t* tests except in cases of extreme heterogeneity of variance, where Fisher exact-probability tests were substituted.

The picture one derives from comparing LSD with placebo on the SDEQ, as in Table 2, is that of a drug which produces a diverse range of effects in the cognitive, somatic, perceptual, and feeling areas. These effects, rather than resulting in a consistent or rational pattern, instead produce a somewhat confusing mixture of positive and negative components. The Ss appear to feel relaxed and happy, but also jittery, tense, dizzy, excited, dreamlike, and giddy; to report their thinking impaired and their movements slowed, but their senses and perception sharpened; to perceive themselves as detached and their world unreal; to perceive others in an altered way; to feel that they have less control of themselves and to fear the loss of further control. They report a number of feelings to be occurring at approximately the same time which would appear to the rational observer as opposed and contradictory.

It is clear from this analysis that, if one were to evaluate LSD only on variables which were expected to occur with a stimulating or mood-elevating agent, the drug would appear to be a euphoriant. In the broader framework provided by the SDEQ, it appears to induce both euphoric and dysphoric effects. The comparison with amphetamine indicates that LSD can appear as stimulating as amphetamine, yet, on those factors which are most associated with the energized, confident feeling of a good stimulant, for example, feelings of increased control and improved cognition and psychomotor performance, amphetamine actually exceeds LSD.

In viewing the LSD effects which have been separated out in this analysis, it is a little hard to believe that they could be occurring together in the same people. Prior research on LSD has indicated that the effects are wavelike or cyclical, so that over the course of 6-8 hr. the mood of Ss may show considerable fluctuation. This wavelike nature of the effects would in part explain the above findings which appear to be contradictory. However, although the authors' observations confirmed the presence of wave-like effects in many Ss, it was also clear in the pilot work that certain of the opposing effects, particularly as regards mood, were

actually occurring in the same people at the same time. On the basis of these observations, a way of quantifying this phenomenon from subjective reports was developed. The measure is called *ambivalence*: the extent to which feelings and experiences which are opposed to each other occur simultaneously or almost simultaneously in Ss.⁵ Having observed and then demonstrated that this phenomenon does occur more frequently under LSD than under placebo or amphetamine, the authors view it as a major characteristic of the LSD experience. Its centrality as a phenomenon will become clearer in the discussion of the other study results.

Although most LSD Ss experienced, to some degree, the specific effects which have been described, it was obvious, also, that Ss were not reacting uniformly with regard to their overall pattern of response to either LSD or amphetamine. The next question to be considered, then, was whether qualitatively different, but identifiable, subjective states were produced in different Ss at that point in time when most Ss were at their peak response. Also, in order to increase understanding of these psychological states and to define them more fully, correlates in other areas of functioning were analyzed. These included changes in observed behavior, in perception of others, and in speech.

Identification of Subjective States

From inspection of the data in the first study, different patterns of effects among Ss were clearly discernible. In attempting to identify any general patterns which may be represented in the data, the three authors independently sorted Ss into groups based on the similarity of their profiles of subjective effects. The authors concentrated on the pattern of relationships which existed among five general response scales on the SDEQ (cutting across somatic, feeling, cognitive, and control factors)⁶ and used the specific scales as a secondary source of data for clari-

⁵ The S received a score of 1 on the ambivalence scale each time he endorsed two apparently contradictory items, for example, feeling relaxed and tense, head feeling heavy and light.

⁶ These scales were comprised of more items than the specific scales and, as would be expected, provided more range and more discrimination among Ss.

ifying or confirming the existence of a particular pattern. It was revealed that only one of the specific scales, a feeling scale, was given much weight in the pattern analysis. By focusing on the levels and the relationships among these six dimensions, it was possible to separate out three general patterns which occurred with LSD and two with amphetamine. The ease with which these groups could be distinguished is reflected in the fact that all three authors, although sorting cases independently, came close to an identical breakdown of Ss into the groups outlined here.

One group which stood out very clearly in the LSD condition was composed of Ss who scored quite high on the relaxed, happy, peaceful, and improved cognition scales, but had relatively low scores on jittery, tense, fear of loss of control, and impaired cognition. A group in the amphetamine condition reported a pattern similar to this LSD group, but with markedly lower scores on some of the negatively toned scales. Another, very small, group of LSD Ss had similarly high scores on the positively toned scales, but scored very high on the negatively toned scales as well. A third group (of both LSD and amphetamine Ss), although not quite as distinct as the others, had higher scores on the negatively toned scales than they did on the positively toned ones. Thus, three main patterns of response were found in the first study. The Ss in the second study were then categorized according to this breakdown with few problems. The placement of only one or two of these Ss was at all equivocal. All drug-state comparisons are based on a combination of Study 1 and Study 2 Ss.

The three states produced by LSD are, then, a *moderately euphoric state* in which the extent of the relaxed, happy, peaceful, and improved cognition scores exceeds the jittery, tense, fear of loss of control, and impaired cognition aspects. The reverse is true for the *dysphoric state*. It should be noted, however, that, despite the presence of strong dysphoric elements, for example, jittery, tense, fear of loss of control, there still exists a moderate level of the happy, relaxed feeling, just as the moderately euphoric state contains some jitteriness. Neither of

these states is, therefore, clearly euphoric or dysphoric—they only lean more strongly in these directions. On the other hand, the *ambivalent state*, of which there are four cases, is more euphoric *and* dysphoric than is either of the other two states. The ambivalent state also exceeds the other two states on almost all of the factors which delineate the specificity of the LSD reaction. In short, it appears to represent the most extreme and most emotional of the states produced, and the reaction closest to that which is usually reported as occurring under higher doses of LSD.

The pattern of the amphetamine *euphoric* Ss is similar to that of the moderately euphoric LSD group, but manifests less jitteriness and more feelings of control and better functioning, and seems clearly stimulated and euphoric. The small group of amphetamine *dysphorics* is presented only for purposes of comparison. Their dysphoria is again more consistent than that which is found in the more contradictory LSD dysphoric group. The placebo *neutral* group is composed of those Ss who did not receive an active drug and did not subsequently report any subjective changes.

The patterns for each state, with mean scores on all relevant scales, are presented in Table 3. The a priori scales, euphoria, dysphoria, and ambivalence, which are also included in the table, were examined after the identification of the patterns and clearly support the differentiation of the states. The total number of Ss included in the drug-state comparisons is 40.⁷

Behavioral, Perceptual, and Speech Correlates of Subjective States

How are these subjective states manifested in the individual's behavior, perceptions, and manner of communicating? The authors were

⁷ The 2 LSD and 12 amphetamine Ss omitted from this analysis had such mild or indistinct reactions that they could not be categorized into drug states; there were, for example, no clearly dysphoric amphetamine Ss in Study 2. Placebo Ss who had even mild reactions were excluded from the drug-state comparisons, since the purpose of including a placebo group in the analysis was to provide a "neutral" control against which the characteristics of the emotional states could be contrasted.

TABLE 3
SUBJECTIVE STATES PRODUCED BY LSD, AMPHETAMINE, AND PLACEBO:
PATTERNS OF RESPONSE ON THE SDEQ

Treatment	Subjective state	N	Mean scores on dimensions used for identifying patterns						A priori scales		
			Im- proved cogni- tion	Relaxed, happy	Peace- ful, sociable	Im- paired cogni- tion	Jittery, tense	Fear of loss of control	Eupho- ria	Dys- phoria	Ambiva- lence
LSD	Moderately euphoric	8	5.25	7.38	2.13	2.63	2.25	.88	41.51	11.89	3.34
	Dysphoric	9	2.33	5.44	.89	5.00	7.33	4.00	18.98	38.48	7.12
	Ambivalent	4	7.25	7.50	3.00	4.50	8.00	4.25	46.11	40.03	20.97
Amphetamine	Stimulated or euphoric	8	9.00	10.13	2.63	2.63	1.00	.88	54.78	12.77	5.80
Placebo	Dysphoric	3	.67	.67	.67	2.67	5.33	2.00	4.92	26.59	.45
	Neutral	8	.13	.63	.00	.38	.38	.25	3.64	5.87	.00

aware that the names given these states were somewhat oversimplified and not entirely accurate as descriptions. Through a study of the correlates of the states, it was expected that the nature of these experiences would become clearer.

Each group in the following analysis will be compared with a placebo group which did not respond with any subjective changes. The description of the results will also emphasize comparisons among the LSD states and between the LSD and amphetamine euphoric states. The latter comparison is of special interest because it would appear from the analysis of the subjective effects that the two states are quite similar. Yet it was clear even in those data that this similarity was very probably a superficial one.

Table 4 presents the patterns of behavior of these groups on variables derived from the

set of observational rating scales. Each variable is based on one or two adjectives, rated on 4-point scales. Scores used are means of the ratings of two observers, the psychologist and psychiatrist. The variables selected are those which can be rated reliably and are relevant to the subjective states delineated. The different states were compared (with the exception of amphetamine-dysphoria) on each of these scales by means of *t* tests or Fisher exact-probability tests. The conclusions which can be drawn from these comparisons are limited, of course, by the size of the groups, but several things are fairly clear.

The LSD groups are more like each other in some very distinctive aspects of manifest behavior than they are like any of the other conditions, despite their differences in subjective emotional tone. They are strikingly more giggly, and their moods are seen as more

TABLE 4
SUBJECTIVE STATES PRODUCED BY LSD, AMPHETAMINE, AND PLACEBO:
PATTERNS OF OBSERVED BEHAVIOR

Treatment	Subjective states	N	Clear thinking ^a	Happy ^a	Afraid, apprehensive ^b	Suspicious ^b	Giggly ^a	Mood fluctuating ^a	Mood inappropriate ^a
LSD	Moderately euphoric	8	45.00**	52.50*	33.75*	35.00	47.50**	41.25**	47.50**
	Dysphoric	9	37.22**	41.12	38.88**	38.88	42.44**	40.00**	38.88**
	Ambivalent	4	46.25	55.00*	33.75	32.50	52.50**	52.50**	52.50**
Amphetamine	Stimulated or euphoric	8	50.62	45.00	31.25	27.50	23.75 ^c	27.50 ^c	21.25 ^c
Placebo	Dysphoric	3	53.33	33.33	38.33	33.33	23.33	30.00	30.00
	Neutral	8	53.10	35.00	25.00	27.50	22.50	21.25	21.25

^a Observations made at approximately 2½ hours postdrug.

^b Observations made at approximately 1½ hours postdrug.

^c Significantly different from the LSD euphoric condition at $p < .01$.

* Significantly different from the placebo condition at $p < .05$.

** Significantly different from the placebo condition at $p < .01$.

fluctuating and inappropriate than are any of the other states. They are also seen as cognitively less clear and generally more afraid and apprehensive. On observed happiness, however, only euphoric and ambivalent Ss significantly exceed the placebo group. Where there might have been some difficulty in distinguishing the LSD euphoric state from the amphetamine euphoric on the basis of subjective data, it is clear that they are very different groups from the standpoint of manifest behavior. The amphetamine group, except for the mood-fluctuating variable, is not overtly very distinguishable from the placebo neutral group. Some differences in the observable behavior of the three LSD states (e.g., greater fear and suspiciousness and less clear thinking and happiness of dysphoric Ss and greater mood fluctuation of ambivalent Ss), although not reaching significance, are consistent with the distinction of the three subjectively different states. In general, however, although the internal states of the LSD groups appear to be quite different, the manifest behavior of these groups is not as clearly distinguishable.

When one turns to the results of the perceptual and the verbal data, the problems in analysis become more complicated. The measures are still in an experimental stage, and the small number of Ss in each group and the extent of their variability on the predrug scores limit the types of analyses which can be carried out. Attempts were made to take into account any differences in initial levels in interpreting results.

Only a few of the predrug group means for the picture ratings were significantly different from each other. In order to partially control for these differences, change scores were used in the analysis of these results, and differences between pairs of states were evaluated by *t* tests on these change scores.

When the several LSD states are compared with the placebo neutral state, as in Figure 1, it can be noted that the euphoric group appears to move in the direction of perceiving others as more friendly and less hostile and suspicious. The pattern of change is similar for the dysphoric group, but the contrast between these factors, the friendly and hostile, is less marked. The most striking changes are

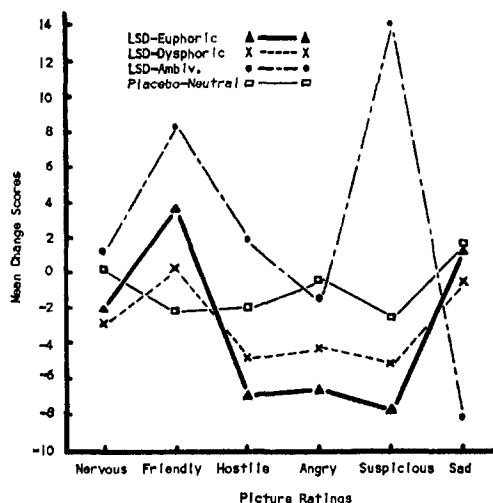


FIG. 1. The three LSD states and the placebo-neutral state: patterns on picture-rating variables. (Decreases, predrug to drug state, are indicated by negative values; increases, by positive values.)

noted in the ambivalent group, where Ss' tendency to move in the direction of perceiving more friendliness and more suspiciousness is quite pronounced. The extent of perceived suspiciousness is significantly greater ($p < .05$) than that for each of the other LSD groups, and the sheer amount of overall change is quite striking. The emotionality and the contradictoriness—that is, the perceiving of both positive (friendly) and negative (suspicious) elements—are consistent with the picture presented in the subjective data.

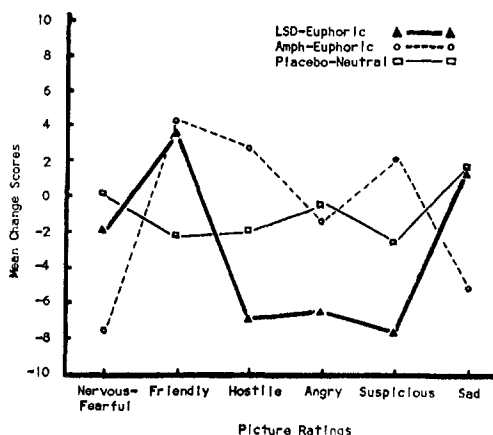


FIG. 2. The two euphoric states and the neutral state: patterns on picture-rating variables.

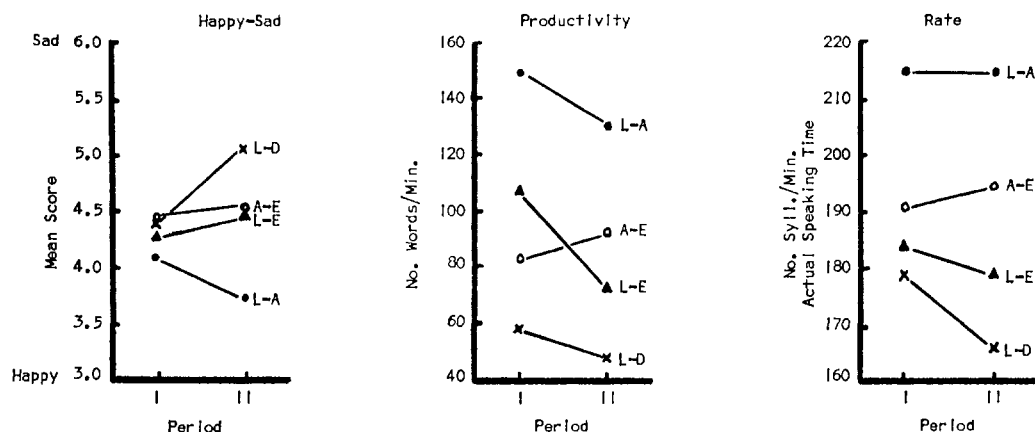


FIG. 3. Subjective states produced by LSD and amphetamine: speech measures. (L-E = LSD euphoric, L-D = LSD dysphoric, L-A = LSD ambivalent, A-E = amphetamine euphoric. Period I is predrug; Period II is about 2 hours postdrug. N for L-A = 4; N for the remaining states varies between 6 and 9.)

In Figure 2, the two euphoric states are compared. The amphetamine state, although having an increase in perceived friendliness in common with the LSD condition, appears to be quite distinct in its overall pattern. There is a significantly greater decrease in perceived fearfulness as compared with placebo ($p < .05$), and slight increases in perceived hostility and suspiciousness in contrast to the decreases noted with LSD (differences between amphetamine and LSD on hostility, $p < .05$). The tendency for amphetamine to result in the perception of more "aggressiveness" in the environment is something which was found in an overall comparison of the drugs in this study. The meaning of the results with the picture rating technique is not completely clear at this point, but these subjective states appear to result in relatively distinct patterns of perception (except for the LSD dysphoric) and contribute to an understanding of the various psychological states.

The speech of Ss experiencing distinctively different emotional states might also be expected to differ along a number of dimensions. The verbal samples elicited in this study have been subjected to several different types of measurement, but only three of the most relevant measures will be presented here. These are the temporal measures of amount of speech produced and rate of articulation and the vocal rating on a bipolar

scale of happy-sad. The comparison of the three LSD states and the amphetamine euphoric state on these measures is presented in Figure 3. (Although all groups were also compared with placebo-neutral Ss, this group is not graphed, but will be mentioned where relevant.)

The happy-sad ratings are most relevant to the emotional states that were produced. The LSD ambivalent group was the only one to move in the direction of sounding happier on the drug, while the LSD dysphoric group sounded most sad (although differences were not significant—using t tests between pairs of drug states—with these small N s). The amphetamine and LSD euphoric groups fell between the others, as did the placebo group, and did not differ from each other. These findings may make most sense if one thinks of the happy-sad ratings as reflecting, at least in part, the extreme stimulation and emotionality of the ambivalent group, rather than simply the usual concept of happy. Euphoric Ss, who were happy in a quieter, less excited way, were thus heard as similar to placebo Ss on this dimension.

The interpretation of the results on the temporal measures is more complicated. Although the emotional states are differentiated in the same general way on both of these measures in the postdrug period, they already differ markedly on these measures predrug. Thus, the differences one sees among the four

states on these variables seem to be characteristic of Ss who experience these states—before as well as during the actual drug experience. LSD ambivalent Ss talk a great deal and very rapidly, while LSD dysphoric Ss speak little and slowly (differences between ambivalent and dysphoric in productivity and rate, $p < .01$, $p < .05$, respectively, as indicated by t tests in both periods). Euphoric Ss again fall between. Although the meaning and correlates of productivity and rate of speech have been found to differ in different experimental situations (Mahl & Schulze, 1962), they might be thought of as reflecting amount of arousal and excitation, what has been called an “outgoing emotionality.”

The results suggest that productivity and rate, differing both before and during the drug, may reflect a more permanent attribute of Ss, while the happy-sad dimension may be more responsive to transient emotional states such as those brought about by drugs. Thus, ambivalent Ss in this study appear to be higher both in their general level of emotionality and in the increased arousal due to the drug.

DISCUSSION

As noted in the introduction, this study was designed so that it might be possible to observe the effects of LSD in their very early stages. An understanding of how the more complicated conceptual reactions occur should be facilitated by a clearer picture of the basic psychological effects on the organism. The new methods provided a fairly comprehensive picture of the components of the response and the several emotional states which were experienced by the Ss. These results will be integrated later in this section in an attempt to characterize the three states produced. The reported findings do not, however, completely document some unusual effects occurring in the early stages of the LSD reaction, which were observed in this study and which deserve comment. The nature of these unusual effects, which relate primarily to the quality of the emotional experience, contributes to an understanding of the complex psychological states which are produced.

The most striking effect was the tendency for very intense emotions to occur in some Ss

without any apparent outside stimulus and, initially, without any cognitive component or counterpart; for example, “I feel like I’m angry—I feel very angry—but I know that I have no reason to be, yet I’m getting angrier by the minute”; “I feel like something funny has happened—everything seems funny, but I don’t know why.” These effects have relevance to certain theoretical notions current in the field concerning whether a complete emotion can exist, or be experienced, without an appropriate cognitive counterpart. Schachter and his associates have proposed, on the basis of their research (Schachter & Singer, 1962), that it is not likely that complete emotions exist in the absence of a conceptual component; when S is aware that the physiological arousal is due to a drug, he is not likely to have an “emotion.” Zubin and Katz (1964), in reviewing further evidence on the problem, have tended to support this theory. Careful observation of human Ss under LSD makes one question whether this is, in fact, the case. Several Ss, experiencing the usual signs of physiological arousal associated with LSD, reported what appear to be very strong emotions, prior to attaching to them any label or conceptual component and despite the fact that they were aware of the source of the arousal.

Thus, highly intense emotions, sometimes competing ones, which are initially free of situational and cognitive factors appear to be produced by LSD. These mixed emotional states, which create possibly new but confusing experiences for S, provide the substrate for many other things to occur in the perceptual and the cognitive spheres. This aspect of the total experience is an important one and may have implications for explaining the more elaborate mystical and conceptual reactions reported elsewhere. An attempt to integrate this quality of the experience with the other major perceptual, cognitive, and sensory phenomena will be made at the end of this section. But first it is important to review how these intense and diverse emotions are subsequently defined by Ss. The emotional states which result are, as expected from previous research with LSD, not uniform

among Ss. They were effectively differentiated by the new methods employed. In characterizing these three states, the findings obtained with the various methods will be integrated and the states differentiated from those produced by another somewhat similarly acting drug.

1. The *moderately euphoric* LSD state is characterized by feelings of elation, cognitive and psychomotor improvement, some feelings of jitteriness and tension, but little or no fear of loss of control. To observers, Ss in this state appear happy, giggly, and a little afraid with inappropriate and fluctuating mood. Their perceptions are characterized by a tendency to see others as more friendly and less hostile, angry, and suspicious. Their vocal behavior is not very different from that of placebo Ss. The elated state of euphoric LSD Ss appears to be qualitatively different from that of amphetamine euphoric Ss, who report feeling even more confident, relaxed, and happy, see more improvement in their cognitive and psychomotor performance, and report almost no jitteriness. LSD euphoric Ss, however, appear happier to observers than amphetamine Ss, probably due to the greater expression of emotion by LSD Ss as seen in their laughter and fluctuating and inappropriate mood.

2. The *dysphoric* LSD state is characterized by feelings of jitteriness and tension, a fear of loss of control, feelings of impaired cognition and psychomotor performance, and also some seemingly contradictory feelings of relaxation and happiness. Behaviorally, these Ss appear less cognitively clear and more afraid and suspicious than other LSD Ss. Although they manifest some of the same giggleness and fluctuation of mood as do other LSD Ss, they are seen as less happy. Their perceptions of others are similar to those of placebo Ss. Their voices sound sadder, and they talk less and more slowly than do any other Ss. Thus, the dominant mood of fear and depression appears to override any positive feelings experienced by these Ss.

3. *Ambivalent* Ss are without doubt experiencing the most intense and most striking of the LSD states. On both positive and negative features, they generally report the greatest response: most relaxed, happy and so-

cialable, but also most jittery, tense, and fearful of losing control. They are seen by observers as the happiest of Ss and as the most extreme in their giggleness and fluctuating and inappropriate moods. In their perceptions they are again ambivalent, seeing both more friendliness and suspiciousness in others. Their own voices sound happier. Their extreme emotionality is also expressed by their speaking a great deal and very rapidly. The quality of the euphoria that they experience is, to an even greater extent than was true for LSD euphoric Ss, strikingly different from that of amphetamine Ss. While the latter appear highly stimulated, LSD ambivalent Ss are much more than stimulated; their strong sense of well-being, coupled with feelings of decreased control, gives rise to a state of exhilaration or marked elation. In all ways, these Ss appear most emotional, and, although their elation might be the most impressive element, they tend to experience and to express strong, opposing emotions and perceptions.

This characterization of the three states highlights the differences in the direction and intensity of the emotional experiences and in the nature of cognitive and perceptual phenomena experienced by LSD Ss. Despite these individual differences in quality and pattern of reaction, it is clear, also, from the analysis, that most of the LSD Ss experienced, to some degree, all of the basic phenomena which differentiated LSD from placebo and amphetamine. These relatively uniform effects (see Table 2) were produced in a controlled setting in which Ss were unfamiliar with the effects of the drug and in which there was a careful and fairly successful attempt at controlling and neutralizing expectations. Given these conditions, the basic effects must be traced in major part to the drug itself. The appearance of the different patterns of response is, on the other hand, most probably related to nondrug factors.⁸

In turning to the question of how, at the height of an LSD experience, profound alterations of consciousness and elaborate conceptualizations may develop, it will be useful to review the basic phenomena shared by most

⁸ The relationship of personality variables to drug response will be dealt with in another paper.

LSD Ss and to consider the implications of a psychological state in which the following occur:

1. Very strong but opposing emotions occurring approximately at the same time, emotions which may not have a cognitive counterpart.

2. A feeling of being out of control of one's emotions and thoughts.

3. A feeling of detachment from the real world.

4. A feeling of perceptual sharpness, but at the same time perceptions of the outer world as having an unreal quality.

5. The perception of the world and others as "friendly" but "suspicious."

This assemblage of competing emotions and perceptual counterparts and the general intensity of the reaction would appear to create a very bizarre experience for most individuals in our culture to undergo—and one which may not easily be assimilated or integrated into previous experience.

It raises the question much considered in the past in psychology of how human beings actually come to terms with new, strange, highly charged experiences. Frederick Bartlett's (1932) theory held that when human beings are confronted with experiences which are not comprehensible to them in terms of previous experience they are driven to find meaning—sometimes any meaning—and the more awesome the experience, the more quickly they will evolve some rational construction.

In such a context, it seems reasonable to expect that nondrug factors—setting, suggestion, previous experience, "personality"—would come into play and help to shape the final pattern of response. Although these nondrug factors are thus likely to contribute to the meaning which is finally attributed to the experience, the elements of the new experience seem to be largely due to the unusual effects of the drug itself.

One of the most dominant aspects of the experience, then, appears to be the contradictoriness and intensity of the basic somatic, emotional, and perceptual effects which occur in the early stages of the LSD reaction.

This ambivalent emotional and perceptual state might very well provide the basis for similar paradoxical phenomena which have been reported to occur later at the conceptual level. Although this sequence of effects does not completely explain the bases for the profound and paradoxical states of consciousness which have been described so vividly in the literature, it may contribute to one's understanding of where and how these very unusual experiences begin.

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