

Chapter 1

LONG-LASTING EFFECTS OF LSD ON NORMALS

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INTRODUCTION

THIS is a report of a study intended to measure personality, attitude, value, interest, and performance changes resulting from the administration of LSD to normals. Several investigators using LSD with humans in nontherapy experiments have observed that some of their subjects report various lasting effects attributable to the drug experience (6, 12, 21); and, of course, the recent controversy over the nonmedical use of LSD has given rise to numerous claims and counterclaims in this regard.

In the experiment, subjects were male graduate students who volunteered for a paid experiment without prior knowledge of its nature. A large battery of psychological tests was administered prior to a series of three, 200 μ g LSD sessions, and again at intervals of two weeks and six months following the third session. The hypothesized postdrug personality changes include those most commonly reported in questionnaire evaluations: 1) lower anxiety, 2) attitude and value changes, primarily characterized by greater introspection, less defensiveness, aggression, and rigidity, less materialism and competitiveness, and greater tolerance towards others, 3) increased creativity, and 4) enhanced interest and appreciation of music and art.

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PROCEDURE

Selection of Subjects

The subjects were initially given the MMPI for screening, the Myers-Briggs Type Indicator (15), and Aas's Hypnotic Susceptibility (1) for matching experimental and control groups. A subsequent interview dealt, in part, with the subject's experience, knowledge, and attitude in relation to LSD and other hallucinogens. During this interview, they were told that the experiment involved the use of drugs and they might or might not receive LSD.

Of the 155 subjects tested and interviewed (December, 1964), 12 per cent were quite knowledgeable regarding LSD; 15 per cent had never heard of it, and the remainder had only casual knowledge. Fourteen per cent were enthusiastic at the possibility of receiving LSD in the sense that they hoped to acquire personal insight or gain some other lasting benefit from the experience; 23 per cent expressed concern over the safety of LSD; the remainder were simply curious as to what the effects would be and had no expectations of lasting effects, either beneficial or detrimental.

Of the 155 subjects, 34 were disqualified—six for prior experience with peyote or LSD, and the remainder on the basis of doubtful MMPI profiles, psychosis in family, or presently being in psychotherapy. Of the 122 remaining, 25 withdrew because of concern over the dangers of LSD.

Table 1-I reveals some rather striking differences among subjects with positive, neutral, and negative attitudes towards taking LSD. The positive group consists of the six subjects with previous experience with peyote or LSD plus fourteen who were enthusiastic at the prospect of receiving LSD. The neutral group reacted routinely to questions about expectations. The negative group was made up of the twenty-five who withdrew plus eleven who were rated as fearful but did not withdraw for this reason.*

An analysis of variance shows that the three groups differ very

*Table 1-I does not include the twenty-eight persons disqualified for reasons other than previous use of peyote and LSD.

significantly with respect to hypnotic susceptibility and on two of the Myers-Briggs scales. The sensing-intuition scale contrasts the sensing person (LSD negative) who prefers conventional, factual, productive approaches, with the intuitive type who prefers theory, ideas, and intuition. The judgment-perception scale contrasts the J-type (LSD negative) who likes his life well-structured—plans, organizes, makes lists, and schedules his activities in a systematic, orderly fashion to avoid the casual, uncertain, spontaneous world preferred by the P-type.

Of the MMPI clinical scales, the F scale, the psychopathic deviate and hypomania scales differentiated the three groups beyond the 5 per cent level of confidence. Other characteristics of the pro-LSD group were higher proportions of unmarried and non-church-attenders than were found in the other groups. Also, virtually all the students with marijuana experience are included in the pro-LSD group.

TABLE 1-1
PERSONALITY DIFFERENCES BETWEEN STUDENTS WITH POSITIVE,
NEUTRAL, AND NEGATIVE ATTITUDES TOWARDS TAKING LSD

Variable	Positive N=20	Neutral N=71	Negative N=36	F Ratio on X ²
Hypnotic susceptibility (Aas) -----	33.6	29.8	26.8	8.3**
Myers-Briggs Type Indicator				
Extroversion-introversion ^a -----	96.3	98.7	103.1	0.6
Sensing-intuition -----	134.9	117.0	110.8	6.2**
Judgment-perception -----	119.1	102.4	87.6	7.6**
Thinking-feeling -----	97.7	90.3	87.2	1.4
MMPI T-scores ^b -----				
F-scale -----	55.0	53.5	51.8	3.1*
Psychopathic deviate -----	58.2	52.7	51.1	3.2*
Hypomania -----	60.2	56.9	53.0	4.4*
Per cent married -----	10	31	50	9.6*
Per cent attending church -----	0	17	25	5.8
Per cent who have tried marijuana ---	55	10	0	34.3**

* Significant beyond the .05 level.

** Significant beyond the .005 level.

^a Scores below 100 are in the extroversion direction, those above 100 in the introversion direction, and similarly for the other three scales.

^b The remaining MMPI clinical scales did not demonstrate significant differences.

Treatment Groups

There were three treatment groups of twenty-four each. The experimental group received 200 μ g LSD; one control group received 20 mg amphetamine (5 mg immediate and 15 mg sustained release); the other control group received 25 μ g LSD. Subjects were assigned to the groups on the basis of six matching variables: knowledge of hallucinogens, expectations (enthusiastic, neutral, fearful), experience with marijuana, hypnotic susceptibility score, sensing-intuition score, and judgment-perception score.

Testing and Preparation of Subjects

The main test battery was administered in two testing sessions during the week prior to the first drug session. Following the testing sessions, the subjects received a one-hour interview with the clinical psychologist who sat with him during the drug session. The psychologist attempted to establish rapport with the subject, allay anxiety, assure him that he would be well cared for, and that no surprises, tests, or other demands would be introduced during the drug session. Special effort was made to convey the notion that, for maximum comfort, he should adopt an attitude of relaxing and going-with the drug effect—to passively observe the effect without trying to control or direct its course. Questions were answered pertaining to safety of LSD, but no mention was made at any time during the experiment about possible personality or other changes resulting from the experience. The experiment was double blind during the preparation and until that point in the drug session at which there were sufficient symptoms to identify the drug given.

Conduct of Drug Session

The first session was given in groups of two; the second and third, in groups of four. There was no mixing of treatment groups within sessions and each subject received the same dosage at each of his three sessions. The drug sessions were held in a large, tastefully decorated room especially designed to enhance the drug experience. It contained couches, rugs, drapes, flowers, pictures, books, an aquarium, and art objects. Music was played throughout most of the session.

The psychologist sat in the background and did not initiate interaction unless support seemed necessary. The 200 μ g LSD group spent about 80 per cent of the session day lying quietly on the couch. By comparison, the amphetamine and 25 μ g LSD groups both spent about 40 per cent of the time lying quietly and the remainder talking or reading.

Subjects completed a checklist of drug symptoms and wrote a subjective report on the day following the session. We had hoped that the 25 μ g LSD group would experience enough auditory and visual changes to realize they had received LSD, and thus provide a more adequate control for prior expectations. However, with this sample, the dose size was too low for this purpose, and the 25 μ g LSD group reported fewer symptoms than the amphetamine group. Approximately 25 per cent of both control groups thought they might have received LSD on one or more of their three sessions. A synthetic marijuana-like compound would have provided a better control drug.

In the 200 μ g LSD group, six subjects withdrew after the first drug session, and a seventh was terminated by the experimenter. Of the six who withdrew, three would probably have continued, had they not been influenced to withdraw by wives or friends. The other three withdrew because of frightening anxiety reactions. The subject terminated by the experimenter had a prolonged unrealistic reaction involving some grandiose paranoid tendencies. Subjects who withdrew or were terminated were included in the follow-up testing.

RESULTS

The main test battery was readministered two weeks following the third drug session and again after six months. All seventy-two subjects completed the two-week testing—one each in the amphetamine and 25 μ g LSD groups did not complete the six-month testing. About two thirds of the tests were given in alternate forms. There were no systematic differences between the amphetamine and 25 μ g LSD group test results, and they have been combined into a single control group for purposes of comparison with the 200 μ g LSD group. Tables I-II to I-VII present the net differ-

ence between the mean change scores for the experimental and combined control group, *i.e.* $(E_{\text{postdrug}} - E_{\text{predrug}}) - (C_{\text{postdrug}} - C_{\text{predrug}})$. The mean predrug test scores for the total sample ($N=72$) are given in the left-hand column to provide information on the magnitude of the changes.

After the six-month follow-up testing was completed, a questionnaire was administered which dealt with the subject's subjective evaluation of the drug experiences and any lasting effects. Where appropriate, these data are provided for comparison with the change in test scores.

Anxiety Measures

At the six-month follow-up testing, 33 per cent of the two hundred μg LSD group subjectively reported lower anxiety and tension which they attributed to the drug experiences. The comparable percentages for the amphetamine and 25 μg LSD groups were 13 and 9. The tests of anxiety included two from Cattell's Objective-Analytic Anxiety Battery (20); the anxiety scale from the Holtzman Inkblot Test (10), and the galvanic skin response to five psychological stressors.

The two Cattell tests are Susceptibility to Annoyance, which measures the extent to which the subject states he would find various situations (e.g. crying children, traffic jams) annoying; and Embarrassing Circumstances, which measures the extent of embarrassment felt in situations such as telling a joke at which no one laughs. These two tests showed a significant drop after LSD in an earlier pilot study (12), but the results for the present experiment (Table I-II) do not show significant changes. Similarly, the Holtzman anxiety scale shows an insignificant rise at two weeks and a comparable drop at six months.

The stimuli for the galvanic skin response included a list of twenty words from Rapaport's word-association list (17), read at twenty-second intervals. Eight words were classified as traumatic (e.g. masturbate) and twelve as neutral (e.g. book). Subjects were asked to repeat words aloud. The second stimulus requested the subject to repeat a series of digit spans which started slightly beyond his ability (spans began at eight digits and went to ten). The

third stimulus requested the subject to give all the proper names he could think of ending in a given letter, such as "D." Both of these tasks were intended to produce embarrassment due to the subject's perceived poor performance. The digit-span task was adapted from a similar measure used by Thetford (22). The fourth stimulus involved mental arithmetic (continuing to add 8 to a given number). All stimuli were presented on tape.

For the words, response was defined as the maximum rise in skin conductance during the six seconds after presentation. The responses to the other three stimuli were defined as the maximum rise in skin conductance during the interval from initial presentation until the end of the task.

A square-root transform was applied to the measures of response to correct for skewness. Analysis of covariance was then employed to adjust for correlation between the level of response prior to presentation of the stimuli and the size of the response. Five separate analyses of covariance were employed: the mean response to the eight traumatic words, the mean response to the twelve neutral words, and the responses to the other three stimuli.

The mean responses for the five stimuli are shown in Figure 1-1. The mean response at the predrug testing tended to be substantially higher for the 200 μ g LSD group than that for the combined control group. This was due to chance, since, at the time of the predrug testing, neither the subject nor the experimenter was aware of the treatment-group assignment. The lack of agreement between the predrug levels of response in the experimental and control groups made the interpretation of the net difference between the predrug and postdrug responses for the two groups ambiguous, since the results could have been due to the differences in predrug level of response, as well as to the drug effect. For this reason, the mean predrug responses to the five stimuli were obtained for each of the forty-eight control subjects, and the twenty-four subjects with the highest mean response (over all five stimuli) were used to form a new control group (selected control).

Figure 1-1 shows the mean response prior to the covariance ad-

justment for the experimental and the two control groups.* The mean predrug responses for the selected control are fairly comparable to those for the experimental group.

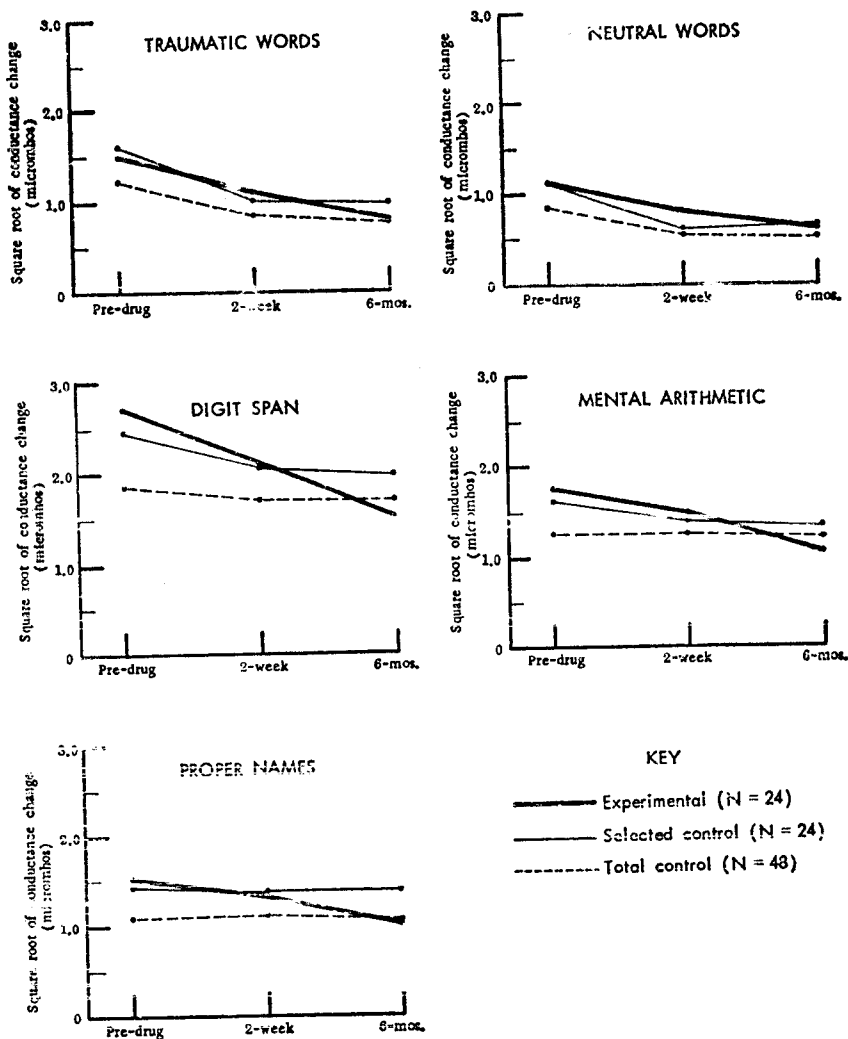


FIGURE 1-1. Mean predrug and postdrug measure of GSR.

*The data in Figure 1-1 are given prior to the covariance adjustment in order to compare the experimental means with those for the two control groups. The adjusted data results in slightly different values for the experimental means, depending on which control is used in the covariance analysis.

TABLE I-II
DIFFERENCES BETWEEN PREDRUG AND POSTDRUG
MEASURES OF ANXIETY AND STRESS

Measure	Mean Prescore N=72	Mean Net Change			
		2-week		6-month	
		$\frac{(E_2-E_1)-(C_2-C_1)}{}$	<i>t</i>	$\frac{(E_3-E_1)-(C_3-C_1)}{}$	<i>t</i>
Annoyance.....	18.9	-0.06	0.06	0.33	0.28
Embarrassment.....	14.2	-1.35	1.57	-0.53	0.54
Anxiety (Holtzman).....	5.9	1.75	1.77	-0.96	1.15
Galvanic Skin Response ^a	N=48				
Traumatic Words.....	1.45	0.07	0.37	-0.14	0.75
Neutral Words.....	1.03	0.04	0.28	-0.14	0.98
Digit Span.....	2.57	-0.27	0.91	-0.70	2.95*
Proper Names.....	1.39	-0.32	1.31	-0.50	2.05*
Mental Arith.....	1.66	-0.10	0.47	-0.35	1.64

^a Units are square root of conductance change, measured in micromhos.

* Significant beyond the .05 level of confidence.

Table I-II shows the net differences between the predrug and postdrug means for the experimental and selected control after the covariance adjustment. The net differences at the two-week follow-up are small and insignificant. At the six-month testing, however, $(E_{\text{post}} - E_{\text{pre}}) - (C_{\text{post}} - C_{\text{pre}})$ is consistently negative for all five stimuli, and the values for the "digit span" and "proper names" tasks are significant beyond the .05 level of confidence. Thus, the GSR results tend to support the hypothesis that the experimental group will show less emotional response to laboratory stress in the postdrug period.

Personality, Attitude and Value Measures

Table I-IIIa shows the percentage of subjects by treatment group who reported various subjective changes at the six-month follow-up. The instructions to this portion of the questionnaire read: "In the event you feel some changes have occurred in you as a result of your drug experiences, please check those items which are applicable. Check only those changes, if any, which have been

maintained until the present time." Table I-IIIb shows the net difference between the experimental and combined control groups for psychological tests intended to measure some of the variables covered by the questionnaire. The direction of change which is consistent with the hypothesis (and the questionnaire results) is shown in the right-hand column.

The Severity of Judgment Test is from Cattell's battery (20) and deals with the severity of judgment or punishment the subject would inflict for various infractions against legal or social authority. The Marlow-Crowne Social Desirability Scale is made up of items "defined by behaviors which are culturally sanctioned and approved, but which are improbable of occurrence" (5). It was intended as a measure of defensiveness or lack of realistic self-perception. The dogmatism scale was made up of items from

TABLE I-IIIa
PERCENTAGE OF SUBJECTS REPORTING PERSONALITY, ATTITUDE,
AND VALUE CHANGES AT SIX-MONTH FOLLOW-UP

Item	20 mg amphetamine N=23	25 µg LSD N=23	200 µg LSD N=24
1. Enhanced understanding of self and others.....	17	0	50
2. Greater introspection or reflectiveness.....	22	0	46
3. A tendency not to take myself so seriously.....	13	4	33
4. A greater tolerance toward those with opposing viewpoints.....	13	9	33
5. A less materialistic viewpoint toward life.....	4	0	29
6. A less egocentric viewpoint.....	4	0	12
7. Less competitive.....	4	0	17
8. Less easily disturbed by frustrating situations.....	9	0	38
9. More withdrawn.....	4	4	8
10. A tendency to feel depressed.....	0	0	0
11. More intense mood swings.....	4	0	21
12. A greater tendency to daydream.....	0	0	4
13. A feeling of greater detachment.....	4	4	25

TABLE 1-IIIb
DIFFERENCES BETWEEN PREDRUG AND POSTDRUG MEASURES OF
PERSONALITY, ATTITUDES, AND VALUES

Measure	Mean Prescore N=72	Mean Net Change				Pre- dicted Di- rection
		2-week		6-month		
		$\frac{(E_2-E_1)-(C_2-C_1)}{}$	t	$\frac{(E_2-E_1)-(C_2-C_1)}{}$	t	
Severity of Judgment.....	43.7	-1.17	1.02	0.15	0.14	-
M-C Social Desirability....	6.3	-0.92	1.44	-1.20	1.62*	-
Dogmatism.....	68.6	-0.58	0.23	3.98	1.42	-
Rosenzweig P-F (Con- structive Res.)	4.8	0.26	0.53	0.84	1.79*	+
Aphorism Test.....	267.2	5.89	1.27	7.04	1.29	+
Passivity (Ways-to-Live) ...	18.9	2.78	3.00**	0.86	0.83	+
Semantic Differential Use of Extremes (Self) ..	47.5	-1.59	0.78	-1.54	0.61	-
Use of Extremes (Ideal) ..	55.6	-3.74	1.23	-4.71	1.50	-
Social Desirability (Self) ..	134.3	-2.19	1.16	-3.63	1.23	-
Social Desirability (Ideal)	155.1	-2.49	0.98	-3.96	1.46	-
LSD Scale (Self)	89.6	1.38	0.70	0.83	0.46	+
LSD Scale (Ideal).....	92.6	3.19	1.57	0.56	0.30	+

* Significant beyond the .05 level of confidence (one-tailed test).

** Significant beyond the .01 level of confidence.

the California F Scale (2), Rokeach's Dogmatism Test (18), and Levinson's Traditional Family Ideology Scale (11).

The Rosenzweig Picture-Frustration Test measures the manner in which aggression is expressed (19). In the present application, it consists of fourteen cartoons depicting frustrating situations involving two persons. The statement made by one person is given and the subject is asked to fill in the response of the second person. The scoring was in terms of the number of constructive responses given.*

*The constructive score (C) is a combination of the *e*, *i*, and *m* factors of Rosenzweig, but with a change in emphasis, such that the C responses are considered to show the respondent's willingness to assume the initiative in working out a constructive solution to the frustrating situations.

The amporism test consisted of a card-sort of ninety-eight items which subjects placed into seven piles on the basis of increasing meaningfulness. Scoring was based on four judges' rankings of aphorisms most likely and least likely to increase in meaningfulness subsequent to the administration of LSD. Aphorisms dealing with the importance of self-knowledge, overcoming egocentrism, mystical orientation, and a passive philosophy were generally scored positively by the judges; those advocating an active, materialistic, practical approach scored negatively.

The passivity measure is derived from Morris's Ways-to-Live Test (14).** It indicates a preference for "quiet receptivity, contemplation, and humble obedience," as opposed to "group action, progress through realism, and physical interaction."

The semantic differential test utilizes bipolar trait ratings of self and ideal self. An example: humble —: —: —: —: —: —: —: proud. There were thirty-eight such pairs, each rated for both self and ideal self. Three scores were obtained: 1) the sum of the absolute deviations from the middle, or neutral category, 2) a social desirability scale measuring the extent the subject rated self or ideal self in a socially desirable direction on pairs such as good-bad, sane-insane, and 3) an "LSD scale" made up of pairs such as lenient-severe, intuitive-rational, and laissez-faire-ambitious.

The results for the above tests are shown in Table I-IIIb. The direction of change tends to agree with the subjective reports given in Table I-IIIa, but the magnitude of the changes is generally small. Considering the semantic differential results as a single test, seven out of seven test results change in the predicted direction at the two week follow-up, and five of seven at six months. The passivity measure is significantly higher beyond the .01 level of confidence at the two-week testing, but the gain is not sustained at six months. At the six-month testing, the Marlowe-Crowne measure of social desirability (defensiveness) shows a significant drop, and the constructive response measure from the Rosenzweig Picture-Frustration Test demonstrates a significant rise; both be-

**Obtained by summing ways 9, 11, and 13 and the complements of ways 5, 6, and 12 (see [16] for a factor analytic justification of this scoring).

yond the .05 level on a one-tailed test. The results for the scales from the semantic differential test are all in the predicted direction, but none of the net changes is significant.

Aesthetic Sensitivity

The most frequently reported change in the experimental group on the six-month questionnaire was "a greater appreciation of music" (62%). Forty-six per cent responded similarly with respect to art. These subjective evaluations were supported by certain behavioral changes shown in Table 1-IVa. The increase in number of records bought, time spent in museums, and number of musical events attended in the postdrug period was significantly greater for the experimental group.*

Three art scales were administered in an attempt to measure any increase in aesthetic sensitivity as indicated by increased agreement with preferences of artists and other art experts; Bulley (4), Graves Design Judgment, (8) and Barron-Welsh (3). A fourth test consisted of a card-sort of fourteen classical and fourteen impressionist prints (high scores indicate a preference for the latter). In addition, a rating of aesthetic value was obtained for the Draw-a-Person pictures.

The results are shown in Table 1-IVb: The five measures all show small, insignificant net increases at the two-week testing, but are inconsistent in direction at six months. The one significant change is a decrease in aesthetic rating of the DAP for the experimental group at the six-month testing. Thus, the results of these art tests do not indicate that the increase in aesthetic appreciation and activities is accompanied by an increase in sensitivity and performance.

Creativity Measures

At the six-month testing, 25 per cent of the 200 μ g LSD group felt that the drug experience had resulted in enhanced creativity

*The behavioral results are in response to the question, "When comparing the nine months since your first drug session with the immediately previous period of the same length, have you bought (more, about the same, fewer) records, etc.?" Results are simply in terms of behavior, irrespective of whether it is attributed to the drug experience.

in their work, as compared to 9 and 0 per cent for the amphetamine and 25 μ g LSD groups respectively. Table I-V gives the results for seven tests of creativity. The first four are from Guilford's Battery of Divergent Thinking Abilities, and measure fluency, flexibility, and originality (9). Also employed, are Mednick's Remote Association Test (13), ratings of originality for the Thematic Apperception Test, and ratings of imaginativeness for the Draw-a-Person Test. The first five tests were administered in alternate forms.

TABLE I-IVa

PERCENTAGE OF SUBJECTS REPORTING CHANGES IN AESTHETIC SENSITIVITY AND BEHAVIOR AT SIX-MONTH FOLLOW-UP

Item	20 mg amphetamine N=23	25 μ g LSD N=23	200 μ g LSD N=24
Greater appreciation of:			
Music.....	9	4	62
Art.....	4	0	46
Bought more records.....	13	4	42
Spent more time in museums.....	26	22	56
Attended more musical events.....	9	9	42

TABLE I-IVb

DIFFERENCES BETWEEN PREFDRUG AND POSTDRUG MEASURES ON ART SCALES

Measures	Mean Preference N=72	Mean Net Change			
		2-week		6-month	
		$\frac{(E_2 - E_1) - (C_2 - C_1)}{}$	t	$\frac{(E_3 - E_1) - (C_3 - C_1)}{}$	t
Bulley Art Scale.....	15.1	0.62	1.13	0.54	0.68
Graves Design Judgment.....	17.5	1.31	1.11	1.40	1.33
Barron-Welsh.....	48.6	4.64	0.83	-1.08	0.21
Classical-Impressionist Pref.....	58.6	0.79	0.50	-1.25	0.62
Aesthetic Rating of DAP.....	5.4	0.17	0.63	-0.64	2.43*

* Significant beyond the .05 level of confidence.

The results are equally divided in terms of direction of change, and none is significant.* Thus, these tests provide no evidence of increased creativity for the experimental group.

TABLE 1-V
DIFFERENCES BETWEEN PREDRUG AND POSTDRUG
MEASURES OF CREATIVITY

Measure	Mean Prescore N=72	Mean Net Change			
		2-week		6-month	
		$\frac{(E_2-E_1)-(C_2-C_1)}{}$	t	$\frac{(E_3-E_1)-(C_3-C_1)}{}$	t
Associational Fluency-----	10.9	-1.04	1.10	-1.02	1.24
Alternate Uses-----	9.4	1.23	1.80	1.36	1.93
Plot Titles-----	10.4	-1.33	1.44	0.07	0.08
Hidden Figures-----	6.8	0.54	0.89	0.31	0.66
Remote Associations-----	4.7	-0.04	0.07	-0.33	0.61
Originality (TAT)-----	2.6	-0.56	1.27	-0.48	0.93
Imaginativeness (DAP)-----	5.1	0.33	0.92	0.21	0.61

Projective Tests

Tables 1-VI and 1-VII present the results for the Holtzman Ink-blot Test and the TAT. The Holtzman was given in three alternate forms of thirty cards each. The TAT consisted of six cards repeated at each of the three testings (Cards 1, 2, 3BM, 6BM, 13MF, and 16).

The Holtzman was scored for the twenty-two standard scales (10). There were no significant net changes at the two-week testing; at six months, the experimental group showed significant net increases on the "human" and "barrier" scales. While the number of significant changes is no more than would be expected by chance for this number of scales, it is interesting to note that

*The test of "spontaneous flexibility" (Alternate Uses) shows net increases for the experimental group which are significant beyond the .05 level for a one-tailed test at both the two-week and six-month follow-up. However, considering the lack of consistency in direction of change for the remainder of the tests, and the fact that an earlier pilot study did not support a prediction of increase for the Alternate Uses Test (12), a two-tailed test is considered more appropriate.

Fisher and Cleveland's interpretation of an increase in the barrier score is in accord with the lower GSR response to stress at six months, as shown in Table I-II (7). They report that decreased penetration scores or increased barrier scores or both are "related to such personality variables as level of maturity and toleration of stress." According to Rorschach's theory, the human movement response score is also interpreted as a measure of maturity.

The TAT was scored for a number of variables which were selected to roughly parallel the personality factors measured by the tests in Table I-III. The results shown in Table I-VII show small changes with inconsistent direction.

Personality Correlates of Reactions to LSD

The psychologist who attended the drug sessions ranked the 200 μ g LSD group on three dimensions: 1) overall impact or intensity of reaction, 2) integrativeness and personal insightfulness (as opposed to confused, defensive, or minimal reaction), and 3) extent subject was anxious or threatened by the experience. The rankings were made without knowledge of test results and were based on the attendant's observations during the session, and the symptom checklist and subjective report provided by the subject.

Table I-VIII shows some of the correlations between these rankings and the test scores. Also shown, are the correlations between these tests and the sum of the subject-reported drug symptoms, as well as the subjective reports of lasting effect obtained after the six-month follow-up testing. The results for hypnotic susceptibility and the Myers-Briggs' Sensing-Intuition and Judgment-Perception scales are consistent with those shown in Table I-I. These scales differentiate persons with positive, neutral, and negative attitudes towards taking LSD, and they are also positively correlated with intensity of the drug reaction. Persons who report naturally occurring hypnotic-like experiences, are oriented towards ideas and intuition, and prefer to live an unstructured life tend to react more strongly to LSD. Those who prefer a more practical and orderly life tend to have less intense reactions.

The correlations for the art scales show that there is some tendency for persons scoring high on aesthetic sensitivity to have

TABLE I-VI
DIFFERENCE BETWEEN PREDRUG AND POSTDRUG MEASURES
ON HOLTZMAN INKBLOT TEST

Scale	Mean Prescore N=72	Mean Net Change			
		2-week		6-month	
		$\frac{(E_2-E_1)}{(C_2-C_1)}$	<i>t</i> ^a	$\frac{(E_3-E_1)}{(C_3-C_1)}$	<i>t</i> ^a
Reaction Time (Sec)-----	18.1	2.99	1.75	0.80	0.45
Rejections-----	0.2	0.00	--	-0.13	--
Location-----	14.4	0.84	0.41	1.52	0.55
Space-----	0.9	-0.06	--	-0.19	--
Form Definiteness-----	54.5	-2.96	1.21	0.36	0.20
Form Appropriateness-----	25.2	1.02	0.91	1.52	1.27
Color-----	4.2	-1.77	1.63	-1.06	1.20
Shading-----	0.6	-0.38	--	0.13	--
Movement-----	22.8	0.71	0.31	1.40	0.62
Pathognomic Verbalization-----	5.2	0.46	0.29	-0.81	0.65
Integration-----	1.0	-0.77	--	-0.06	--
Human-----	14.8	3.06	1.89	3.33	2.37*
Animal-----	17.0	-0.11	0.08	1.00	0.66
Anatomy-----	3.0	0.04	0.06	-0.06	0.09
Sex-----	1.1	0.57	--	0.35	--
Abstract-----	0.1	0.55	--	0.25	--
Anxiety-----	5.9	1.75	1.77	-0.98	1.15
Hostility-----	8.1	0.64	0.68	0.31	0.36
Barrier-----	5.6	-0.54	1.06	1.31	2.56*
Penetration-----	3.1	-0.54	0.93	0.48	0.82
Balance-----	0.1	-0.04	--	0.00	--
Popular-----	6.0	-0.07	0.11	0.63	0.93

^a Where *t*-ratios are not listed, the scale scores were too small for statistical treatment.

* Significant beyond the .05 level of confidence.

more intense and insightful LSD reactions and to be less threatened.

The aphorism test and a passivity score derived from the Morris's Ways-to-Live Test tend to correlate positively with in-

TABLE 1-VII
DIFFERENCE BETWEEN PREDRUG AND POSTDRUG MEASURES
ON THEMATIC APPERCEPTION TEST

Scale	Mean Prescore N=72	Mean Net Change			
		2-week		6-month	
		$\frac{(E_2-E_1)}{(C_2-C_1)}$	<i>t</i> ^a	$\frac{(E_3-E_1)}{(C_3-C_1)}$	<i>t</i> ^a
Reaction Time (Sec)-----	13.4	0.63	0.31	-1.16	0.53
Length of Response (Lines) -----	11.6	-2.43	2.03*	-1.02	0.67
Needs or Content					
Affiliation-----	2.5	0.25	0.63	0.19	0.42
Passive Aggression-----	2.3	0.21	0.59	0.40	1.01
Active Aggression-----	1.4	0.23	0.86	0.19	0.64
Achievement or Competition----	2.0	0.04	0.14	0.23	0.67
Nurturance-----	0.6	0.15	--	0.02	--
Succorance-----	0.6	-0.17	--	-0.12	--
Sex-----	0.8	-0.06	--	-0.23	--
Following Instructions-----	7.6	-0.50	0.84	0.44	0.81
Organization-----	5.0	-0.21	0.30	0.62	1.01
Originality-----	2.6	-0.56	1.27	-0.48	0.93
Outcome (optimism) -----	7.0	0.52	0.83	0.50	0.83
Empathy-----	6.9	-1.02	1.89	0.06	0.11
Protagonist-----	6.5	-0.23	0.30	-0.90	1.16
Philosophical Content-----	1.2	0.04	0.12	-0.02	0.05

^a Where t-ratios are not listed, the scale scores were too small for statistical treatment.

* Significant beyond the .05 level of confidence.

tensity of LSD reactions, and also with subjective reports of lasting effect. Both of these scores measure preference for a reflective, self-understanding, nonegocentric value orientation.

The use of extremes for self-description in the semantic differential, the severity of judgment and the dogmatism tests tend to be negatively correlated with intensity of LSD reaction. These tests measure rigidity and a preference for a controlled, well-defined environment. Persons scoring high on these measures tend to limit *both* the impact and the threatening aspects of the LSD experience.

TABLE 1-VIII
PERSONALITY CORRELATES OF LSD REACTIONS

Measure	Reactions of 200 µg group; N=24				
	Drug Symptoms (S)	Impact (E)	Insight (E)	Threat (E)	Lasting Effect (S)
Hypnotic Susceptibility (Aas) ----	.50*	.53**	.16	.22	.18
Myers-Briggs Type Indicator					
Extroversion-Introversion	-.43*	-.14	-.31	.05	-.25
Sensing-Intuition	.39	.38	.35	-.13	.41*
Judgment-Perception	.06	.51*	.26	.18	.25
Thinking-Feeling	.00	.07	-.02	.01	.06
Composite (S-N J-P, Aas) a	.40*	.59**	.35	.06	.35
Art Scales					
Bulley Art Scale	-.02	.48*	-.09	.16	.06
Graves Design Judgment	.13	-.11	.43*	-.14	-.04
Barron-Welsh Art Scale	-.04	.07	.09	-.30	.00
Classical-Impressionist Preference	.36	.13	.40*	-.36	.32
Aphorism Test	.31	.40*	.44*	-.08	.54**
Passivity (Ways-to-Live)	.43*	.32	.28	-.04	.37
Semantic-differential (use of extremes-self)	-.29	-.39	.10	-.58**	.00
Severity of Judgment	-.40*	-.58**	.18	-.41*	-.25
Dogmatism	-.25	-.36	-.30	-.13	-.33

* Significant beyond the .05 level of confidence.

** Significant beyond the .01 level of confidence.

a Obtained by summing the ranks for the sensing-intuition, judgment-perception, and hypnotic susceptibility measures.

Subjective Reports of Change

Some of the results of the questionnaire administered after the six-month testing have already been described. One portion included items identical to those used by other investigators to examine subjective reports of LSD-induced change in subjects who either volunteered for an LSD experiment or received the drug in psychotherapy (6, 12, 21). Table 1-IX provides a comparison of the three treatment groups in the present study on these items, plus the results from four previous studies. The drug experience

descriptions of the 200 μg LSD group are fairly comparable to the previous questionnaire results, although they are not as strongly enthusiastic, as indicated by the response to the item, "The greatest thing that ever happened to me," and by impressions obtained a subsequent interview.

The data reported in Table 1-X are the results of an attempt to obtain a summary appraisal of the drug experiences and their effects. Of the twenty-four experimental subjects, the numbers reporting none, moderate, and pronounced lasting effects were ten, ten, and four. The comparable results for the amphetamine and 25 μg LSD groups were twenty, three, zero and twenty-three, zero, zero respectively.

CONCLUSION

The results pertaining to the differences between the predrug and postdrug test scores should be considered as exploratory in nature. The number of statistically significant differences between the experimental and control groups are not grossly inconsistent with the hypothesis that they arose from chance—considering that twenty-two tests were administered, some of which had multiple subscales, and all tests yielded two difference scores.

One of the more suggestive results is the significant drop in the galvanic skin response to stress situations for the experimental group at the six-month testing. This finding is especially interesting, since it is a physiological measure and therefore more suitable for experimental control than are many of the psychological tests.

The postdrug results for the personality, attitude, and value tests are generally consistent with the hypothesis, as well as the subjective reports of change, although the amounts of change are typically quite small. There is some evidence of a more introspective and passive orientation accompanied by a less defensive attitude in the experimental group. The subjective reports of increase in aesthetic appreciation were supported by behavioural activities, but there was no evidence of enhanced performance on the art tests. Similarly, there was no tendency for improvement on the postdrug measures of creativity.

TABLE I-IX
FOLLOW-UP DESCRIPTIONS OF DRUG EXPERIENCE: CURRENT, AND FOUR PRIOR STUDIES ^a

Item	Current Study (%)			Previous Studies (%)			
	N=23 20 mg amphet- amine	N=23 25 µg LSD	N=24 200 µg LSD	Ditman ^b N=74 100 µg LSD	Janiger ^c N=194 170 µg LSD	Savag ^d N=96 150 µg LSD ~ 300 µg Mescaline	McGlothlin ^d N=15 200 µg LSD
A pleasant experience-----	74	43	71	72	66	83	60
Something I would like to try again--	70	52	58	66	74	83	87
An experience of great beauty-----	13	0	79	66	--	81	67
A religious experience-----	0	0	33	32	24	83	27
An experience that has been of lasting benefit-----	9	4	50	50	58	83	--
The greatest thing that ever happened to me-----	0	0	17	49	--	73	60
An unpleasant experience-----	0	0	17	19	32	33	20
An upsetting experience-----	0	0	12	18	--	--	20
An experience of insanity-----	0	0	25	7	--	13	7
A disappointing experience-----	17	39	4	7	--	1	--

^a Responses are to the question, "Looking back on your drug experiences how do they appear to you now?" Responses were on a four-point scale: not at all, a little, quite a bit, and very much. This table gives the percentage of subjects responding in the last two categories.

^b See reference 6.

^c See reference 21.

^d See reference 12.

TABLE 1-X
SUMMARY APPRAISAL OF DRUG EXPERIENCES
AT SIX-MONTH FOLLOW-UP

<i>Item</i>	<i>20 mg amphetamine N=23</i>	<i>25 µg LSD N=23</i>	<i>200 µg LSD N=24</i>
<i>Best Single Description of Drug Experiences</i>			
1. Boring-----	0	9	0
2. Pleasant but otherwise uneventful--	57	78	4
3. A rather interesting experience-----	30	13	17
4. A very dramatic and interesting experience-----	13	0	71
5. Unpleasant and disturbing-----	0	0	3
<i>Best Single Description of Aftereffects of Drug Experiences</i>			
1. No particular effects either dur- ing or after-----	39	65	0
2. While the drug sessions were in- teresting at the time, I did not observe any lasting effect-----	30	30	21
3. There were some apparent changes shortly after the drug ses- sions, but these effects rapidly disappeared-----	17	4	21
4. There have been some lasting ef- fects such as appreciation for mu- sic or conceptual insights gained during the drug sessions-----	13	0	42
5. The drug experiences have had a rather pronounced lasting effect on my personality-----	0	0	17

The findings relating personality variables to attitudes towards, and response to, the taking of LSD are much more definite. As would be expected, persons who place strong emphasis on control generally have no taste for the experience and tend to respond minimally if exposed. Those who respond intensely tend to prefer a more unstructured, spontaneous, inward-turning (though not socially introverted) life.

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