

h. Neurol. Psychiat., 52:

lia of the dive reflex—A
of sudden death. Trans.
Ass., 192-200, 1964.

. A. and Grover, M. E.
ie circulatory and meta-
the oxygen-conserving
man. Trans. Ass. Amer.
54, 1965.

Vernadakis, A. Influence
activity. In Martini, L.
ds. *Neuroendocrinology*,
nic Press, New York,

J. Sur la sensibilité des
riers a l'hyperglycémie
tion de dextrose. C. R.
: 1400-1403, 1927.

LYSERGIC ACID DIETHYLAMIDE (LSD-25) AND SCHIZOPHRENIC REACTIONS

A COMPARATIVE STUDY

ROBERT J. LANGS, M.D.¹ AND HARRIET LINTON BARR, Ph.D.¹

There have been many attempts to compare the lysergic acid diethylamide (LSD-25) states and schizophrenic reactions, primarily in a clinical-descriptive and broadly theoretical fashion (5, 7-9, 11, 12, 14, 15, 27, 34, 36). Present day sophistication calls for more specific and experimental approaches to these syndromes in order to define their relationship more sharply, particularly as it concerns individual personality differences and the conceptualization of altered states of consciousness. The present paper reports an effort in this direction: we will describe, first, a comparison of responses to a questionnaire of subjective experiences by 30 experimental subjects under LSD-25 and 20 hospitalized schizophrenics and, second, the nondrug personalities of those LSD-25 subjects whose responses most resembled those from one group of the schizophrenics.

The literature in this area is vast and confusing; we can only note a few of the most relevant reports. Clinical-descriptive studies (1, 5, 10, 14, 31-33, 35, 36, 40) were abundant in the early years of LSD-25 research, and these studies indicated that the experiences reported by drug subjects grossly resembled the symptoms reported by schizophrenics, including disturbances in thinking, affect, perception, controls, body image and contact with reality (see Ludwig [26] and Mogar [28]).

Since both are "altered states," they

share many features; but since they differ in etiology, historical and chemical development, and social setting (to name but a few vital differences), they show specific differences. Both similarities and differences were great enough for some to consider the drug state a "model psychosis" (36) and for others to emphasize the discrepancies and to consider the two as unrelated, viewing the LSD state as a toxic syndrome (7, 34).

Specific experimental studies clarified these issues. Feinberg (12) and Malitz *et al.* (27) compared hallucinations in the two states; both found some similarities, but primarily striking differences, particularly their predominantly visual nature under LSD and auditory nature in schizophrenia. Horowitz (15), however, reported preliminary data suggesting common features in the visual hallucinations from both groups.

Results of a variety of psychological tests administered to subjects in the two states tended to be in keeping with the clinical trends (2, 6, 9, 16, 18-22, 29, 38, 39, 41, 42). In most, dysfunctions seen under LSD were in the direction of those seen in schizophrenia, but quantitatively and qualitatively dissimilar.

Sandison (34), in one of the few systematic, directly comparative clinical studies, used the observations of psychiatrists who rated persons in the two states on scales pertaining to cognitive, affective and other dimensions. Here too, while some similarities appeared, differences predominated. Recently, however, Bowers and Freedman (8) found striking similarities in subjective reports of feelings obtained from

¹ Research Center for Mental Health, New York University, 4 Washington Place, New York 10003.

This research was supported by the National Institute of Mental Health under Grant MY-3670.

We are indebted to Sandoz Pharmaceuticals for providing the LSD-25 used in this study.

patients in the early stages of acute schizophrenia and reports of the LSD experience.

These comparative studies leave much to be desired. Few of these researchers defined precisely the schizophrenic group or groups they were studying, nor did their discussions take into account differences within the schizophrenic syndromes. Likewise, the LSD responses were too often treated as unitary, and individual differences in responding to the drug were also largely ignored. Only a few investigators have explored the factors which predispose a subject to a schizophrenia-like response to LSD. Hoch (14) suspected that such reactions were more frequent in schizoid persons. Bercel *et al.* (6) found that Rorschach test protocols obtained under LSD that were excessively productive or notable for sexual disturbances correlated strongly with a paranoid type of drug reaction. Klee and Weintraub (17) found that mistrustful, complaining, fearful persons who often use projection as a defense had paranoid responses to LSD. In another vein, Sedman and Kenna (37), in a poorly controlled study, did not find LSD useful in detecting "latent schizophrenia," while Anastasopoulos and Photiades (3) found psychotic symptoms under the drug in 18 of 20 relatives of schizophrenics.

In our own previous studies (4, 23-25, 30), we related personality features to LSD responses and to the manner in which subjects recall the drug experience the next day. Different personality factors were found to be related to the appearance of specific symptoms under LSD, many of which parallel those seen in schizophrenic patients. Our empirical clustering of LSD effects revealed four dimensions, each with schizophrenia-like features, but none corresponding to accepted schizophrenic categories (23). To cite two examples, feelings of new insights occurred in our drug subjects along with elation and loss of inhibitions. This cluster of effects was most

prominent in subjects who were narcissistic, with poor controls; it was associated, on the other hand, under LSD with a disturbed sense of identity, feelings of having lost control, and paranoid ideation. This syndrome was seen primarily in passive, masochistic, poorly integrated subjects, who showed a proneness under stress to primary process thinking.

Mogar (28) and Ludwig (26) have recently discussed the complexities of the relationship between the LSD and schizophrenic syndromes, the former in terms of psychedelic phenomena and the latter in the context of altered states of consciousness. Our own findings, to which we now turn, bear on both these topics.

METHOD

The LSD-25 study and the questionnaire have been described in detail elsewhere (23, 24). To summarize, the subjects were 50 male actors between the ages of 21 and 42. Thirty received 100 μ g of LSD-25 and 20 a tap water placebo orally, in a double-blind study of the effects of the drug on perception, memory, imagery, cognition, and other ego functions. Each subject was screened with a battery of psychological tests and interviews. Although psychotic subjects were eliminated, 5 drug and 6 placebo subjects showed borderline features; the remaining subjects were on the normal-neurotic continuum.

The questionnaire was given first on the day before drug ingestion (pretest), and four times on the experimental day, at approximately 1/2, 2, 5, and 8 hours after drug administration. It consists of 74 items dealing with affect, cognition, perception and bodily effects.² Each protocol was scored separately; cumulative scores for

²These data were collected in 1959, when the effects of LSD were not as yet well known publicly. Subjects were not informed of the drug under study, although the questionnaire provided clues to anticipated effects. The reactions of our placebo subjects did not, it should be noted, simulate LSD reactions or syndromes (24).

were narcissistic, as associated, on LSD with a dis-easiness of having a feeling of ideation. This was primarily in passive, disgruntled subjects, under stress to

ing (26) have re-plexities of the LSD and schizo-phrenic in terms of and the latter in states of con-fusion, to which we are topics.

The questionnaire detail elsewhere the subjects were ages of 21 and of LSD-25 and, in a double-blind, of the drug on every, cognition, each subject was of psychological enough psychotic 5 drug and 6 borderline fea-tures were on the

even first on the (pretest), and at day, at ap-proximately 74 items on, perception protocol was five scores for

in 1959, when the LSD was known publicly. The drug under study provided clues as to our placebo and, simulate LSD

each subject, which include all items agreed to at any time during the experimental day, are used in this report. The total questionnaire score (total number of reactions reported) is a broad measure of the total drug effect.

The questionnaire items were subdivided in two different ways, to identify the particular aspects of the LSD-25 reaction that a given subject experienced. Each of the 16 *a priori* scales groups items that represent the same area of functioning (as conceptualized by the experimenters) and they are described by their titles. Each of the four empirical scales, on the other hand, was formed by grouping effects which were actually found to occur together in our LSD-25 sample, and thus they represent the major clusters of the drug reaction, empirically determined.

A second measure of the drug effect is based on the experimenters' observations of the subjects' reactions and behavior, which were rated throughout the day in terms of 11 dimensions. The scores used here were the averages of all ratings of each subject made during the day.

Two personality assessments were made of these subjects. The first consisted of ratings on 93 items referable to motives, defenses, thought processes, inner states, identity and interpersonal behavior. These ratings were based on clinical interviews, the Rorschach test, the Thematic Apperception Test, the Wechsler-Bellevue Scale and an autobiography. The second personality evaluation was based solely on the Rorschach test, and it identified the subject's character structure, level of personality integration, and prominent conflicts, affects and defenses. In addition to these, the Dynamic Personality Inventory (13) was given to all subjects.

The 20 schizophrenic patients were se-

³We are indebted to Dr. Robert W. Wildman, Chief Psychologist at Milledgeville State Hospital, and to his staff psychologists, who collected these data.

lected from Milledgeville State Hospital, Georgia.³ They were men between the ages of 21 and 36, and were matched for educational background with the actor subjects. All had attended college and their median educational level was 2 years of college. Though cultural backgrounds were not matched, many from both groups had rural upbringings. Ten patients were diagnosed as having paranoid schizophrenic reactions and 10 as having undifferentiated schizophrenic reactions (one with catatonic features). Most were subacutely ill and were seen within 2 months after admission; on the average, they were in their second hospitalization. Patients on medication received none for at least 4 days before the administration of the questionnaire. These patients were asked to report feelings experienced at any time during the day they were seen. Behavioral ratings were made by the experimenter at the same time.

RESULTS

Quantitative Findings

The main quantitative findings are presented in Table 1, where the questionnaire responses of all subject groups are compared (the different scales are made comparable by expressing all scores as the percentage of items accepted). The groups are ordered according to the percentage of questionnaire items accepted; the ordering was rather consistent across scales.

While the total questionnaire score and the *a priori* scales are self-explanatory, the empirical scales need definition. Scale A includes loss of inhibitions and elation, loss of control over attention and thinking, perception of "new" meanings, and feelings of improved functioning. Scale B includes the most psychotic-like effects: perceptual distortions, experiences of unreality and loss of meanings, and feelings that control over various functions has been lost and that outside forces are in control. Scale C

TABLE 1
Mean Percentage of Items Accepted by Patients and Subjects in Each Experimental Condition

	Pretest (N = 50)	Un- differentiated Schizo- phrenics (N = 10)	Placebo (N = 20)	Paranoid Schizo- phrenics (N = 10)	LSD-25 (N = 30)
	%	%	%	%	%
Total questionnaire.....	6	11	15	30	53
Empirical scales					
A.....	8	16	18	29	51
B.....	3	5	6	27	35
C.....	5	6	14	24	58
D.....	3	5	10	25	42
A priori scales					
I. Elation.....	8	8	25	23	61
II. Experiencing new meanings.....	7	40	23	47	45
III. Feeling of increased functioning.....	6	20	21	35	40
IV. Feeling less inhibited, opened up.....	10	15	22	29	49
V. Disturbance in time sense.....	8	15	18	30	60
VI. Difficulty in thinking.....	12	7	20	25	68
VII. Feeling of loss of control.....	4	6	7	28	53
VIII. Visual distortions.....	0	7	4	18	34
IX. Loss of contact.....	6	10	14	50	64
X. Ego change, alienation.....	3	5	5	28	29
XI. Loss of meanings.....	11	20	16	43	52
XII. Suspiciousness.....	6	17	13	38	34
XIII. Feeling inhibited, slowed down.....	8	7	20	23	60
XIV. Body image changes.....	2	4	12	14	50
XV. Somatic symptoms.....	4	6	18	29	64
XVI. Unpleasant affect.....	4	20	19	46	52

represents body image changes and both physical and mental inhibitory effects. Scale D consists of anxiety, fear of losing self-control or going crazy, and a group of associated physical symptoms.

PARANOID VS. UNDIFFERENTIATED SCHIZOPHRENIC PATIENTS

Paranoid patients accepted many more items than nonparanoids (total questionnaire score: 30 per cent vs. 11 per cent; $p < .02$).⁴ Paranoids were higher on all four empirical scales, with the difference most significant for scale B (.01 level). While scales C and D each differentiated at the .05 level, scale A reached only the .10 level, chiefly because the nonparanoid group accepted more items on this scale.

Paranoid patients also scored higher on all 16 of the *a priori* scales, significantly so on 8 (VI, VII, IX, X, XII, XIII, XV,

XVI). The content of these scales reflects impaired thinking and a generalized inhibition; impaired relationships to the environment, such as loss of contact and suspiciousness; ego changes; and loss of control over functioning, somatic symptoms, and affect disturbances.

UNDIFFERENTIATED SCHIZOPHRENICS VS. DRUG STUDY SUBJECTS

Comparison with pretest scores: The undifferentiated schizophrenics accepted somewhat more items than experimental subjects under *pretest* conditions, but the total score difference was significant only at the .10 level. The patient group was significantly higher (.05 level) on only three *a priori* scales: II, seeing new meanings in experiences; XII, suspiciousness; and XVI, unpleasant affect.

Comparison with experimental day scores: The undifferentiated schizophrenic patients' questionnaire responses bore vir-

⁴ All statistics are based on two-tailed probabilities.

Experimental Condition

Paranoid Schizophrenics (N = 10)	LSD-25 (N = 30)
%	%
30	53
29	51
27	35
24	58
25	42
23	61
47	45
35	40
29	49
30	60
25	68
28	53
18	34
50	64
28	29
43	52
38	34
23	60
14	50
29	64
46	52

tually no resemblance to those given by our LSD-25 subjects. They scored significantly lower on total score, all four empirical scales, and all but two *a priori* scales. Their scores were somewhat lower than those of the placebo group as well, but statistical significance was reached for only five of the *a priori* scales: I, VI, XIII, XIV, XV. These differences reflect the nature of the placebo reaction in our study, rather than the undifferentiated schizophrenic state, since they represent effects present to some extent in the former and relatively absent in the latter.

In summary, questionnaire responses obtained under the influence of LSD-25 are completely different from the responses of the undifferentiated schizophrenics. The number of items accepted by these patients is in the range of those accepted by our experimental subjects under non-LSD (pretest and placebo) conditions.

PARANOID SCHIZOPHRENICS VS. DRUG STUDY SUBJECTS

Comparison with pretest scores: The paranoid schizophrenics' responses exceeded those of the nondrugged subjects on the pretest day at the .01 level of significance in regard to total score, all four empirical scales, all but two *a priori* scales (I and VI) and on 41 of the 74 individual questionnaire items.

Comparison with experimental day scores: The mean total questionnaire score of the paranoid patients fell between that of the placebo and LSD-25 groups. The subscale means, however, followed a pattern of resemblance to the LSD-25 group for some, while others were closer to the placebo group. The paranoid patients were similar to the LSD-25 subjects, and significantly higher than the placebo group, on scales B and D, and on five *a priori* scales: II, IX, X, XII, XVI. On scales III and XI they also resembled the drug group, but the difference from placebo subjects did not quite reach significance. The patients resembled placebo subjects and were

significantly lower than drug subjects on scales A and C, as well as on 7 *a priori* scales: I, IV, V, VI, XIII, XIV, XV.

The paranoid schizophrenics' responses resembled those of our subjects under LSD-25, then, in regard to feelings of unreality, experiences of changes in percepts and meaning, feelings of losing control and of being controlled by others, anxiety and suspiciousness. In the other areas tapped by the questionnaire, such as elation, increase or decrease of inhibition, bodily symptoms, and disturbances of thinking and time sense, the reactions of these patients, although significantly greater than those of pretest subjects, only reached levels seen in our placebo subjects.

BEHAVIORAL OBSERVATIONS

When the 11 behavioral scales are summed for a measure of total behavioral deviation, the entire schizophrenic group is most similar to the LSD-25 subjects; the patients' behavior is more deviant than that of either the pretest or placebo subjects at the .001 level of significance.

Within the patient sample, paranoids tended to be more deviant than nonparanoids, but there was considerable overlap, as well as wide variation within each group, so that the overall difference between the two groups was not significant. This was also true for the 11 separate behavioral scales; only the difference for anxiety approaches significance (.10 level, two-tailed test). For all 20 patients, the total behavioral deviation score has an *r* of .52 with the total questionnaire score (.05 level; for LSD-25 subjects the *r* is .59, which is at the .01 level).

The two aspects of behavior on which the schizophrenics differed most from nondrug subjects were inappropriate affect and silliness; for both, schizophrenics' mean scores were similar to those of LSD-25 subjects. On two bipolar scales, elation-depression (.10 level) and motility (slowed vs. hyperkinetic; .01 level), the summed deviations from normal (i.e., midpoint) also indicated

These scales reflect a generalized in-relationships to the en- contact and sus-; and loss of , somatic symp-ces.

SCHIZOPHRENICS VS. DRUG

t scores: The un-es accepted some-experimental sub-ditions, but the-significant only-tient group was-level) on only-eing new mean-suspiciousness;

perimental day-ed schizophrenic-ponses bore vir-

that the schizophrenics most resembled the drug subjects. In regard to anxiety, as noted, the two types of patients differed: paranoids had even higher anxiety scores than did LSD-25 subjects, while non-paranoids were at the placebo level.

To summarize, the behavior of the schizophrenic patients was clearly different from that of the nondrugged subjects under pretest or placebo conditions. Like subjects under LSD-25, they exhibited deviations in motility and affect, silliness, and inappropriateness of affect; the paranoid patients were also overtly anxious. The patients did not, however, show in their overt behavior the regressive behavior, visual distortions, bodily preoccupations, hostility, and suspiciousness found in LSD-25 subjects.

Qualitative Findings

The comments made by the drug subjects and patients about their experiences were examined to determine whether acceptance of a questionnaire item had the same meaning for the two groups. The patient's comments were generally terse, while those of LSD-25 subjects ranged from minimal to elaborate descriptions.

The qualitative material indicated that the delusional trends, body image changes, and alterations in self-perception (e.g., feelings of being controlled, losing control, and being a different person) were similar in the two groups. Delusional thinking in the paranoid schizophrenics included feelings of being picked on and concern about the meanings of such things as lights, the movement of cars, and the actions of hospital personnel. In LSD-25 subjects, there were similarly phrased concerns about the actions of the experimenters, noises in the halls, and the behavior of strangers. Regarding body image, one patient described the feeling that his sex organs were shrinking and another that his whole body was getting larger or aching. Similarly, one drug subject felt prenatally curled up, another changed in size, and another that

his being was concentrated in the pit of his stomach. Some schizophrenics felt controlled by the staff or other patients, while drug subjects felt controlled by the drug, the experimenter, or their own alien thoughts.

Drug Subjects with Paranoia-like LSD-25 Reactions

The drug subjects were each scored on the extent to which the patterning of their *a priori* scale scores resembled the pattern found in the 10 paranoid schizophrenics. Eight drug subjects who had patterns similar to those of the paranoids were compared with the remaining LSD subjects. On the questionnaire, the paranoia-like LSD subjects (and the paranoids) were more likely than the other subjects to report alterations in their perception of the outer world (persons and objects seemed different and had new meanings, certain things became clear to them, things seemed meaningless, and imaginary experiences were reported) and changes in their experience of themselves (anger, depression, fear of going crazy or becoming uncontrollably anxious, feeling like a different person, feeling that they could judge things better). Their reports were relatively less likely to emphasize other kinds of changes in the self-experience, notably physical symptoms, body image changes, and fear of losing control of themselves.

On the preexperimental assessment of personality (Table 2), paranoia-like LSD subjects were found to be more anxious, manipulative, hostile with conflicts about aggression, depressed and self-punitive; to feel physically impaired, prone to a thought disorder, conflicted and confused in their identities; and likely to use projection as a defense. According to the Rorschach ratings, their personalities are poorly integrated and they are prone to use denial as a defense. On the Dynamic Personality Inventory, these subjects differed significantly from the others on 4 of the 7 scales related to "orality": they showed

ed in the pit of
shrenics felt con-
r patients, while
ed by the drug,
their own alien

Paranoia-like reactions

each scored on
sterning of their
bled the pattern
l schizophrenics.
d patterns simi-
s were compared
subjects. On the
a-like LSD sub-
were more likely
eport alterations
uter world (per-
fferent and had
gs became clear
eaningless, and
e reported) and
e of themselves
going crazy or
anxious, feel-
feeling that they
. Their reports
to emphasize
the self-experi-
mptoms, body
f losing control

assessment of
anoia-like LSD
more anxious,
conflicts about
self-punitive; to
prone to a
ed and con-
d likely to use
ording to the
personalities are
re prone to use
Dynamic Per-
subjects differed
on 4 of the 7
they showed

more oral aggression, verbal aggression, im-
pulsiveness, and flight from oral depend-
ence; they also tended to reject accepted
social standards and seek adventure.

DISCUSSION

Our findings demonstrate, as expected, that neither the LSD-25 state nor the schizophrenic state is a uniform syndrome, but rather that each may best be conceptualized as a syndrome-complex within which a variety of symptom pictures may be found. The undifferentiated schizophrenic reaction, as elicited by our questionnaire, in no way resembled the reactions to 100 gamma of LSD-25. The paranoid schizophrenic reaction, in contrast, resembled the average LSD response in some areas and not in others. When, however, we looked at the individual drug subjects, we found that about a quarter of the group developed an LSD syndrome quite similar, quantitatively and qualitatively, to that of the paranoid patients. In addition, some subjects in the LSD-25 groups reported symptoms often seen in schizophrenia (*e.g.*, hallucinations) which were not reported to any extent by the patients in this study.

The subjects who had a paranoia-like reaction to LSD-25 may be viewed as paranoid characters or persons vulnerable to paranoid and schizophrenic reactions under stress. Their nondrug personalities do, indeed, have paranoid features and the potential for a thought disorder. Klee and Weintraub (17) reported a similar relationship between a paranoid nondrug personality and a paranoid type of LSD-25 response. The drug response appears, then, to be an extension of preexisting tendencies, expressed openly in the altered state.

The present findings must be considered in context. First, the use of any questionnaire has limitations. Direct questioning about a subjective symptom or experience leaves the door open to error due to misunderstanding, lack of insight, or falsification (although a check against experi-

TABLE 2
Biserial Correlates of Paranoia-like LSD-25 Reaction Pattern with the Personality Assessment Scores

<i>r</i>	Item
	Affects and relationships
.62*	10. Is tense and restless
-.32†	-4. Affect well modulated, good-tempered (<i>i.e.</i> , they are <i>not</i>)
.35†	5. Relationships manipulative and demanding
.35†	13. Separation from, or rejection by, maternal figures has been or would be an important source of anxiety
	Hostility
.46*	14. Hostile relationships, verbal aggression, and resentment
.56*	15. Hostility toward paternal figures and men in general
.36†	16. Hostility toward maternal figures and women in general
.37†	17. Aggression pent up and expressed in fantasy
.39†	20. Needs to rebel, to reject and defy authority, conventional values, and/or dogmatic standards
	Aggression toward self
.52*	25. Sees himself as unwanted and unloved
.42†	23. Depression and self-abasement
.36†	24. Self-punitive, disillusioned
.41†	26. Has an unconscious body image as physically impaired, incomplete, or damaged
	Thought processes
.39*	45. Thinks in a ruminative, circumstantial, overdetailed fashion; vacillates and hesitates over decisions
.39†	50. His thinking and language tend to be expansive, flamboyant, and colorful
.31†	42. Given to inferential thinking and primary process intrusions
-.32†	-77. Shows ordinary, unremarkable reasoning (<i>i.e.</i> , does <i>not</i>)
	Identity, inner life, defenses, etc.
.40†	56. Identity diffusion and conflict
-.36†	-57. Ego-syntonic identity and values (<i>i.e.</i> , does <i>not</i> have them)
.32†	6. Projection and externalization
.32†	82. Thinks much about money and what he can <i>get</i> ; greedy or acquisitive

* .01 level, two-tailed.

† .10 level, two-tailed.

‡ .05 level, two-tailed.

menters' observations showed this to be minimal in the drug subjects). The patients in particular might be motivated to conceal symptoms in the hope of seeming well.⁵ Being asked to respond to a questionnaire in a face-to-face interview also encourages a reality orientation, thus limiting the report of certain extreme symptoms. The questionnaire used in this study was designed primarily to assess the cognitive and bodily effects of LSD-25, and it therefore failed to cover certain areas, such as drives, sufficiently. Thus, even though the paranoids and certain LSD-25 subjects responded similarly to the questionnaire, they may differ in regard to other symptom areas.

A second modifying factor in our results is related to the specific schizophrenic pathology in our patient sample, comprised mostly of subacutely to chronically ill persons. Schizophrenics in the initial phases of their illness, such as those studied by Bowers and Freedman (8), report a subtle type of symptomatology which is common in certain LSD subjects (so-called "psychedelic" symptoms [28]). The two acutely ill subjects in our sample (and several from whom we obtained protocols in another setting), however, reported florid symptoms with somatic and persecutory delusions and hallucinations which qualitatively extended far beyond anything reported by our LSD subjects (who, however, were constantly being tested and never given the "opportunity" for further regression; this too is another uncontrolled variable). As already noted, the subacutely ill paranoids, on the other hand, responded to the questionnaire in a manner indistinguishable from certain of our LSD subjects; while the chronic undifferentiated schizophrenics did not resemble any of the drug subjects. These data help explain why some have viewed

these two conditions as comparable while others see them as quite different. Precise formulation requires specific definition of all dimensions, including careful scrutiny of personality factors.

A central factor in the shifts in functioning and the subjective symptoms seen in LSD subjects and schizophrenics appears to be alterations in the state of consciousness (26). The criteria for an altered state are met by both schizophrenic groups and by all of our drug subjects. The individual differences in these manifestations in both the patient and experimental groups suggest a useful avenue for studying regressed states of all types. Personality factors related to the specific altered state developed under LSD by different subjects may well shed light on vulnerability to schizophrenic reactions. Further, studies of the alterations in functioning in the LSD state, particularly in light of the same subject's usual modes of reaction, may well clarify the nature of altered functioning seen in schizophrenics. Studies with LSD which keep these factors in mind offer a promising means of experimentally exploring these problems.

SUMMARY AND CONCLUSIONS

A questionnaire designed to measure the subjective effects of LSD-25 was given to 10 paranoid and 10 undifferentiated schizophrenic male patients. Their responses, as well as their observed behavior, were compared with those of 50 nonpsychotic male actors, experimental subjects, matched for age and education, 30 of whom had taken 100 μ g of LSD-25 orally and 20 of whom had taken a placebo. The undifferentiated schizophrenics had much lower questionnaire scores than the paranoids, and their responses did not resemble those of the drug subjects. The paranoid schizophrenics' responses resembled those of LSD-25 subjects in regard to feelings of unreality, loss of controls, changes in the meanings of experiences, and suspiciousness; they did not, however, exhibit the

⁵Since the undifferentiated schizophrenics' behavior was rated as deviant, although they reported few symptoms on the questionnaire, it may be that the questionnaire provides the least valid picture of this group.

comparable while it is different. Presumably specific definitions including careful factors.

The shifts in functional symptoms seen in schizophrenics appear to be the state of consciousness for an altered schizophrenic groups of subjects. The increased manifestations in experimental groups for studying re-types. Personality specific altered state by different subjects on vulnerability. Further, studies of functioning in the light of the same reaction, may well alter functioning studies with LSD in mind offer a experimentally explor-

CONCLUSIONS

ed to measure the LSD-25 was given to differentiated schizophrenics. Their responses, and behavior, were in 50 nonpsychotic mental subjects, and 30 of whom received LSD-25 orally and 20 intravenously. The undifferentiated had much lower scores than the paranoid, did not resemble those of paranoid schizophrenics, resembled those of normal subjects, and to feelings of fear, changes in the mood, and suspiciousness, however, exhibit the

body image changes and elation-related effects found in many of the drug subjects. Qualitatively, the comments of the paranoids and the drug subjects indicated that their reactions were of a comparable nature. About one-fourth of the drug subjects had a pattern of reactions very similar to those reported by the paranoid patients. The predrug personalities of these subjects were poorly integrated and had many features that suggest a potential for paranoia and a thought disorder.

It is concluded that schizophrenia and the LSD-induced state are each altered states of consciousness and syndrome-complexes with a particular range of symptoms. They overlap in certain areas of functioning and for certain people, and they also differ. The LSD-25 reactions of certain subjects are clinically comparable to certain forms of schizophrenic illness, and specific personality traits are a major factor in determining which drug subjects respond in this way. The study of functioning under LSD-25 may aid in the understanding of the functioning in schizophrenia and, possibly, other psychoses, as well as regressive states of all kinds.

REFERENCES

1. Abramson, H., Kornetsky, C., Jarvik, M., Kaufman, M. and Ferguson, M. Lysergic acid diethylamide (LSD-25): XI. Content analysis of clinical reactions. *J. Psychol.*, 40: 53-60, 1955.
2. Abramson, H., Waxenberg, S., Levine, A., Kaufman, M. and Kornetsky, C. Lysergic acid diethylamide (LSD-25): XIII. Effect on Bender-Gestalt test performance. *J. Psychol.*, 40: 341-349, 1955.
3. Anastasopoulos, G. and Photiades, H. Effects of LSD-25 on relatives of schizophrenic patients. *J. Ment. Sci.*, 108: 95-98, 1962.
4. Barr, H. L. Types of Reactions to LSD-25: A Person Cluster Analysis of Subjective Reactions and Behavioral Changes under the Drug. Presented at the Annual Meeting of the New York State Psychological Association, Grossingers, New York, May, 1965.
5. Berceel, N., Travis, L., Olinger, L. and Dreikurs, E. Model psychoses induced by LSD-25 in normals. I. Psychophysiological investigations, with special reference to the mechanism of the paranoid reaction. *A.M.A. Arch. Neurol. Psychiat.*, 75: 588-611, 1956.
6. Berceel, N., Travis, L., Olinger, L. and Dreikurs, E. Model psychoses induced by LSD-25 in normals. II. Rorschach test findings. *A.M.A. Arch. Neurol. Psychiat.*, 75: 612-618, 1956.
7. Bleuler, M. Comparison of drug-induced and endogenous psychoses. In Bradley, P., Deniker, P. and Radouco-Thomas, C., eds. *Neuro-Psychopharmacology*, pp. 161-165. Van Nostrand, Princeton, N. J., 1959.
8. Bowers, M. and Freedman, D. "Psychedelie" experiences in acute psychoses. *Arch. Gen. Psychiat.* (Chicago), 15: 240-248, 1966.
9. Brengelmann, J. Effects of LSD-25 on tests of personality. *J. Ment. Sci.*, 104: 1226-1236, 1958.
10. DeShon, H., Rinkel, M. and Solomon, H. Mental changes experimentally produced by LSD. *Psychiat. Quart.*, 26: 33-53, 1952.
11. Elkes, J. On the relation of drug-induced mental changes to the schizophrenias. In Bradley, P., Deniker, P. and Radouco-Thomas, C., eds. *Neuro-Psychopharmacology*, p. 166. Van Nostrand, Princeton, N. J., 1959.
12. Feinberg, I. A comparison of the visual hallucinations in schizophrenia with those induced by mescaline and LSD-25. In West, C. J., ed. *Hallucinations*, pp. 64-76. Grune & Stratton, New York, 1962.
13. Grygier, T. *The Dynamic Personality Inventory*, Banstead Hospital Management Committee, Sutton, England, 1955.
14. Hoch, P. The problem of schizophrenia in the light of experimental psychiatry. In Hoch, P. and Zubin, J., eds. *Experimental Psychopathology*, pp. 205-217. Grune & Stratton, New York, 1957.
15. Horowitz, M. The imagery of visual hallucinations. *J. Nerv. Ment. Dis.*, 138: 513-523, 1964.
16. Klee, G. Lysergic acid diethylamide (LSD-25) and ego functions. *Arch. Gen. Psychiat.*, 8: 461-474, 1963.
17. Klee, G. and Weintraub, W. Paranoid reactions following lysergic acid diethylamide (LSD-25). In Bradley, P., Deniker, P. and Radouco-Thomas, C., eds. *Neuro-Psychopharmacology*, pp. 457-460. Van Nostrand, Princeton, N. J., 1959.
18. Krus, D. and Wapner, S. Effect of lysergic acid diethylamide (LSD-25) on perception of part-whole relationships. *J. Psychol.*, 48: 87-95, 1959.
19. Levine, A., Abramson, H., Kaufman, M. and Markham, S. Lysergic acid diethylamide (LSD-25): XVI. The effect on intellectual functioning as measured by the Wechsler-Bellevue Intelligence Scale. *J. Psychol.*, 40: 385-395, 1955.
20. Levine, A., Abramson, H., Kaufman, M., Markham, S. and Kornetsky, C. Lysergic acid diethylamide (LSD-25): XIV. Effect on personality as observed in psychological tests. *J. Psychol.*, 40: 351-366, 1955.
21. Liebert, R., Wapner, S. and Werner, H. Studies of the effects of lysergic acid diethylamide (LSD-25). Visual perception of verticality in

- schizophrenic and normal adults. *Arch. Neurol. Psychiat.*, 17: 193-201, 1957.
22. Liebert, R., Werner, H. and Wapner, S. Studies in the effect of lysergic acid diethylamide (LSD-25). Self- and object-size perception in schizophrenia and normals. *Arch. Gen. Psychiat.*, 79: 580-584, 1958.
 23. Linton, H. and Langs, R. Empirical dimensions of LSD-25 reaction. *Arch. Gen. Psychiat.*, 10: 469-485, 1964.
 24. Linton, H. and Langs, R. Subjective reactions to lysergic acid diethylamide (LSD-25). *Arch. Gen. Psychiat.*, 6: 352-368, 1962.
 25. Linton, H., Langs, R. and Paul, I. Retrospective alterations of the LSD-25 experience. *J. Nerv. Ment. Dis.*, 138: 409-423, 1964.
 26. Ludwig, A. Altered states of consciousness. *Arch. Gen. Psychiat.*, 15: 225-234, 1966.
 27. Malitz, S., Wilkins, B. and Escover, H. A comparison of drug-induced hallucinations with those seen in spontaneously occurring psychoses. In West, C. J., ed. *Hallucinations*, pp. 50-61. Grune & Stratton, New York, 1962.
 28. Mogar, R. Psychedelic states and schizophrenia. Unpublished manuscript. San Francisco State College, 1967.
 29. Pauk, Z. and Shagass, C. Some test findings associated with susceptibility to psychosis induced by lysergic acid diethylamide. *Compr. Psychiat.*, 2: 188-195, 1961.
 30. Paul, I., Langs, R. and Barr, H. L. Individual differences in the recall of a drug experience. *J. Nerv. Ment. Dis.*, 140: 132-145, 1965.
 31. Rinkel, M. The psychological aspects of the LSD-psychosis. In Rinkel, M. and Denber, H., eds. *Chemical Concepts of Psychosis*, pp. 75-84. McDowell, Oblensky, New York, 1958.
 32. Rinkel, M., DeShon, H., Hyde, R. and Solomon, H. Experimental schizophrenia-like symptoms. *Amer. J. Psychiat.*, 108: 572-578, 1952.
 33. Salvatore, S. and Hyde, R. Progression of effects of lysergic acid diethylamide. A.M.A. *Arch. Neurol. Psychiat.*, 76: 50-59, 1956.
 34. Sandison, R. Discussion at fourth symposium. In Bradley, P., Deniker, P. and Radouco-Thomas, C., eds. *Neuro-Psychopharmacology*, pp. 176-182. Van Nostrand, Princeton, N. J., 1959.
 35. Savage, C. Variations in ego feeling induced by D-lysergic acid diethylamide (LSD-25). *Psychoanal. Rev.*, 42: 1-16, 1955.
 36. Savage, C. and Cholden, L. Schizophrenia and the model psychosis. *Quart. Rev. Psychiat. Neurol.*, 4: 405-413, 1956.
 37. Sedman, G. and Kenna, J. The use of LSD-25 as a diagnostic aid in doubtful cases of schizophrenia. *Brit. J. Psychiat.*, 111: 96-100, 1965.
 38. Silverstein, A. and Klee, G. Effect of lysergic acid diethylamide (LSD-25) on intellectual functions. *Arch. Neurol. Psychiat.*, 80: 477-480, 1958.
 39. Silverstein, A. and Klee, G. The effect of lysergic acid diethylamide on digit span. *J. Clin. Exp. Psychopath.*, 21: 11-14, 1960.
 40. Stoll, W. A. Rorschach tests under the influence of LSD. *Rorschachiana*, 1: 249, 1952. As summarized in Annotated Bibliography, Sandoz Pharmaceuticals, Hanover, N. J.
 41. Wapner, S. and Krus, D. Effects of lysergic acid diethylamide, and differences between normals and schizophrenics on the Stroop color-word test. *J. Neuropsychiat.*, 2: 76-81, 1960.
 42. Weintraub, W., Silverstein, A. and Klee, G. The effect of LSD on the associative processes. *J. Nerv. Ment. Dis.*, 128: 409-414, 1959.