

Empirical Dimensions of LSD-25 Reaction

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There has been, thus far, virtually no exploration of an *empirical* basis of the patterning of subjective reactions to lysergic acid diethylamide (LSD-25). Previous studies have been limited to general descriptions of the drug's effects, and the rare attempts to group the various specific effects have been based on a priori clinical concepts¹ (reviewed elsewhere). Furthermore, the relationships between a given LSD-25 reaction and the personalities of the individuals who manifest that reaction have been neglected. This report presents data bearing on these unexplored areas.

The present attempt to differentiate empirically major dimensions of the LSD-25 reaction may be contrasted with previous studies which have presented clinical and, to some extent, systematic summaries of the separate aspects of the drug reaction. Only Salvatore and Hyde³ and our own previous report¹ were concerned with clusters of reactions, and in both instances a priori concepts were used to organize the findings. Salvatore and Hyde used as their measures ten groups of observable and subjective symptoms, with the groupings developed in advance from clinical expectations; they then clustered those symptom groups with similar patterns in time during the course of the drug day. This method yielded three clusters of symptoms which they then described and discussed.

Our own previous report¹ provided a detailed description of subjective LSD-25 effects on cognition, perception, affect, self-image, and the body. It also offered a grouping of drug effects into 17 a priori dimensions. Five temporal patterns emerged and those symptoms with similar time curves were described and discussed. While these findings and those of others using similar techniques are valuable for a general study of the altered state produced by LSD-25,

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they are limited in a number of ways. Such studies offer no data on which aspects of the drug reaction actually occur together in the same people. Because of this, there is no opportunity to explore relationships between symptoms with dissimilar time patterns, in particular which early symptoms are associated with any given later effect.

The present report describes the results of our attempt to investigate these issues in our own data. It will describe the four major symptom clusters that emerged from an empirical exploration of the subjective effects of LSD-25. It will then describe the relationships between each of these clusters and the experimenter's observations of the subjects' behavior while under the drug, and lastly, it will deal with the relationships between these clusters and a detailed assessment of the personality of each subject in his normal, nondrug state.

Method

1. *The Study As a Whole and the Questionnaire.*—The data reported here were obtained as one aspect of a larger study of the effects of LSD-25. That study and the questionnaire used to explore the subjective effects are described elsewhere¹ and so will be described only briefly here. The subjects were male professional actors between the ages of 21 and 42, paid volunteers. Each subject underwent a thorough personality assessment and was screened for psychotic trends before being accepted. A double-blind design was used, with 30 subjects receiving

100γ of LSD-25 orally and 20 subjects receiving a tapwater placebo; only the drug subjects are considered in the present report. The over-all study consisted of a series of test situations which explored perception, memory, imagery, cognition, and affective reactions. Testing continued throughout the eight hours of the experimental day (with additional testing on pretest and post-test days). Ratings of observable behavior were made immediately after each testing period.

The questionnaire was given four times during the experimental day, at approximately ½, 2, 5, and 8 hours after drug administration. It consisted of 74 items dealing with affect, cognition, perception, and various bodily effects; its construction and scoring are described elsewhere.¹ Each of the four questionnaire protocols was scored separately. In addition, an "Experimental Day" scoring was done for each subject; for this purpose, an item was considered to have been accepted if the subject acknowledged it on any of the four questionnaires. The "Experimental Day" scoring was used to derive the empirical scales presented here.

2. *The Derivation of the Empirical Scales.*—The questionnaire items had originally been grouped, on an a priori basis, into 17 subscales.¹ The first step in developing the empirical scales was to intercorrelate the subjects' scores on the a priori scales and perform a factor analysis. Four factors were obtained, and each subject was then scored for each of these factors, as a preliminary basis for forming the scales. Each item was then correlated biserially with each of the four factor scores, and this procedure placed most items unequivocally into single scales. The items so placed were then used to obtain new scores for each scale, and the items not yet placed were correlated with these scores. This process was repeated twice, adding items to the scales each time, until there were no more items that correlated highly with only one scale. As a final check, all items were

TABLE 1.—*The Four Empirical Scales: Intercorrelations, Reliabilities, and Average Acceptance*

		Empirical Scales			
		A	B	C	D
Items in Scale, No.		26	15	17	8
Average acceptance, % of items accepted by average subject at least once on drug day		51	35	58	42
Intercorrelation *	Scale A	(.90 †)	.51 †	.36 †	— .12
	Scale B	.51 †	(.86 †)	.24	.10
	Scale C	.36 †	.24	(.87) †	.45 †
	Scale D	— .12	.10	.45 †	(.83 †)

* The correlations in parentheses are odd-even reliability coefficients, corrected for attenuation by the Spearman-Brown prophecy formula.

† .01 level of significance, two-tailed test.

‡ .05 level of significance, two-tailed test.

TABLE 2.—Item Content of the Four Empirical Scales

Curve Type	% of Ss Accepting Item		
	At Peak	Exper. Day	
Scale A: 26 Items			
II	29	37	2. Have people looked different than they usually do?
Va	38	52	4. Do you find yourself talking about personal things you wouldn't usually talk about?
IVa	76	83	7. Have you felt occasionally that you have lost your sense of time?
Ib	21	28	9b. Have you found it easier than usual to move?
Va	48	58	11. Have you felt that certain things were especially clear to you or that you understood them better?
Va	29	45	12. Have you seen new connections between certain events or experiences that you hadn't seen before?
Va	33	37	13. Have you felt depressed or sad?
IIIa	31	55	15. Have you been especially happy?
II	53	68	16a. Have you been feeling silly?
II	45	58	16b. Have you been acting silly?
IVb	33	47	17. Have you been thinking about things you don't usually think about?
IVb	15	16	18. Have you felt like a child? if answered: in terms of <i>carefree, spontaneous, etc</i>
Va	36	48	20. Have you felt that under the drug you have acquired any new power or ability?
II	41	57	21a. Has time been passing faster than usual? <i>Yes or don't know</i>
IIIb	59	78	25. Has any particular thing fascinated you—held your attention so that you found it hard to leave it?
II	41	62	28. Have you lost control of your thoughts?
Va	52	57	29c. Have you been talking more than usual?
VI	28	32	31. Have certain objects or other things taken on meanings they never had before?
Va	52	68	32a. Have your thoughts been moving faster than usual at times?
IVa	17	32	35. Do you think that your judgment and ability to evaluate have been different from usual? if answered: <i>improved, better</i>
IVb	66	82	36. Is it hard to hold onto thoughts, ideas, or images—do they seem to get away from you when you try to catch them?
Ib	34	48	37. Have you felt like a different person at times?
Va	43	53	39. Has your mind been a blank at times, so that you have had no thoughts at all?
IIIb	28	43	41. Have you lost control over your emotions and feelings? if <i>elation</i>
IIIa	10	22	41a. <i>If so:</i> Have they taken possession of you? if <i>elation</i>
IIIa	45	72	44. Does one idea, thought, or image keep coming back again and again?
Scale B: 15 Items			
IVb	45	53	1. Have things felt unreal, as if you were in a dream?
II	28	35	3. Have objects or the things about you looked different in any way?
IIIb	41	60	8a. Have you felt that you have lost control over yourself?
Ib	7	10	18. Have you felt like a child? if <i>body felt small</i>
Vb	43	47	19. Have events or experiences seemed illogical or disconnected?
IVa	36	57	22. Have some things seemed meaningless to you?
IVb	14	15	28a. Have your thoughts taken possession of you?
IVb	7	13	28b. Does it feel as if someone else were controlling them (your thoughts)?
Vb	47	52	30. Has it felt that time has come to a standstill or stopped now and then?
Ia	12	18	34a. Does it feel as if someone or something else has taken over control of your body?
Va	17	22	41. Have you lost control over your emotions and feelings? if <i>fear</i>
Va	3	10	41a. <i>If so:</i> Have your emotions and feelings taken possession of you? if <i>fear</i>
IVb	24	30	42. Have you been seeing imaginary things?
IIIa	19	43	43. Have you felt as if some of what you have been doing is really not your doing at all?
Va	48	58	45. Are you unsure of how others are responding or reacting to you?
Scale C: 17 Items			
II	50	62	5. Have you felt somehow as if you were melting or merging into your surroundings?
IVb	12	25	6. Have you been thinking or talking a lot about your childhood?
IIIb	40	52	9a. Have you found it difficult to move?
IIIb	52	70	14. Has your body looked or felt strange in any way? if <i>body image change</i>
VI	21	23	18. Have you felt like a child? if answered in terms of <i>incapacity, helplessness</i>
Va	21	27	24. Have you felt like an old person?
Ia	34	48	26. Has it felt as if some part of your body was disconnected or somehow didn't belong to the rest of your body?
Va	47	57	29b. Have you found it hard to talk?
IVa	64	75	32b. Have your thoughts been moving slower than usual at times?
Ia	55	72	34. Have you felt at times that you have lost control over your body or that you might?

TABLE 2.—Item Content of the Four Empirical Scales*—Continued

Curve Type	% of Ss Accepting Item		
	At Peak	Exper. Day	
IIIa	74	88	46. Have you had any of the following physical sensations:
IIIa	36	52	a. Dizziness or grogginess?
IIIa	45	72	b. Numbness or tingling? if in <i>legs or feet</i>
IVa	28	40	d. Felt hot or sweating?
IIIa	64	87	e. Funny taste in your mouth? if <i>unpleasant</i>
IIIa	45	72	k. Felt weak physically?
IIIa	36	62	l. Body felt lighter or like it was floating in space?
			m. Body felt heavier?
Scale D: 8 Items			
Ib	29	47	8b. Have you felt that you might lose control over yourself?
Va	38	53	27. Have you been afraid or upset?
IVb	31	40	33. Have you felt angry or annoyed? if at <i>self</i>
Va	17	30	40. Have you been at all afraid that you might go crazy or lose your mind?
			46. Have you had any of the following physical sensations:
Va	17	23	f. Unusual or heightened smells or odors? if <i>unpleasant</i>
IIIa	47	63	g. Felt nauseous?
IIIa	38	50	h. Blurred vision or trouble focusing your vision?
IVa	17	28	j. Pressure or ringing in ears?
Correlates With:			
IVa	69	92	A,B,C
Va	53	60	—
IVb	31	40	—
IVa	40	58	A,C
IVa	38	55	(B)
IIIb	71	95	—
Vb	45	62	A,B
—	3	3	—
Vb	34	43	—
IIIa	55	72	A,B
IIIa	26	52	—
II	59	68	(D)
IVa	53	63	(C,D)
IVb	53	72	A,B
Not in Any Scale: 14 Items			
			10. Have you found it hard to concentrate on the tasks being given you?
			21b. Has time been passing slower than usual?
			23. Have you felt as if you were standing aside and watching yourself?
			29a. Have you felt you would rather not talk?
			33. Have you felt angry or annoyed? if directed <i>externally</i>
			35. Do you think that your judgment and ability to evaluate have been different from usual? if <i>worse</i>
			38. Have you felt that you were withdrawing from reality or losing your hold on the real world?
			41b. Does it feel as if someone else were controlling your emotions and feelings?
			46. Have you had any of the following physical sensations:
			b. Numbness or tingling? in <i>face or head</i>
			b. Numbness or tingling? in <i>hands or arms</i>
			b. Numbness or tingling? in <i>body or trunk</i>
			c. Chills or a cold feeling?
			i. Mouth dry or less saliva than usual?
			47. Do you find that while you are answering a question you tend to forget what the question was?

correlated again with each of the four scales * and four items dropped out, presumably because later additions caused the scales to drift away from them.

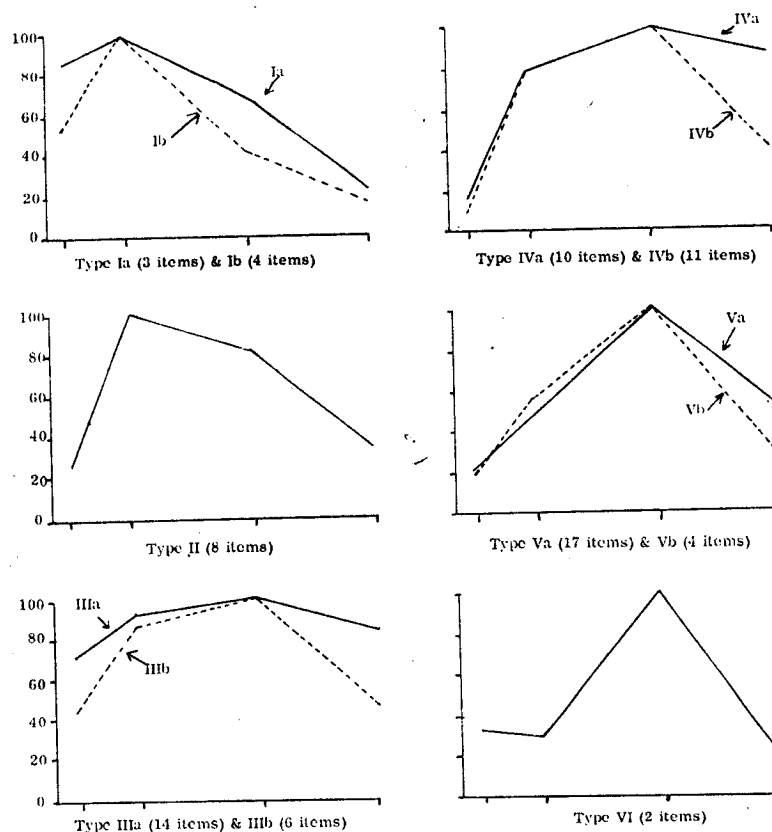
The four scales thus constructed were labeled A, B, C, and D; they contain 26, 15, 17, and 8 items respectively. Their intercorrelations, reliabilities, and average acceptance on the "Experimental Day" scoring are given in Table 1, and their content is given in Table 2. Table 2 lists 14 additional items that either did not correlate highly with any scale or correlated equally with more than one scale.

Table 2 also indicates the course followed by each item over time. The items differ in their patterns of onset and decay over the eight-hour period, and these patterns fall into six main types, some of which

* In correlating an item with its own scale, the item itself was removed from the scale total in order to avoid artificial inflation of the correlation coefficients.

have subdivisions. They are presented in the Figure, where the curves for all items are made comparable by assigning a value of 100 to the level of acceptance achieved by each item at its maximum point. The proportion of subjects accepting each item at this maximum point is given in Table 2; from this, the actual time curve can be derived approximately. Finally, Table 2 includes the proportion of subjects accepting each item at any time during the experimental day.

The initial definition of the empirical scales through factors based on a priori scales raises the question of the extent to which the final scales were molded by the a priori scales. This issue is basic to any contention that the empirical scales provide important information about the nature of the LSD-25 reaction that cannot emerge when preconceived groupings of items are used. The ideal, though much more laborious, procedure would have been to factor



the individual items, but there is evidence that such a procedure would not have yielded materially different results. In the first place, of the items in the a priori subscales that formed the initial basis for the four empirical scales, 60% ended up in the scale where they had originally been placed, 26% went into different scales, and 14% did not go into any scale. Secondly, a purely empirical set of 11 scales, based on each subject's highest single questionnaire rather than on his record for the entire day, was derived for another purpose. The present four empirical scales agree with that set of empirical scales to the same extent that they agree with the a priori scales. Thus, it seems likely that the moderate degree of similarity between the four empirical scales and the a priori scales indicates not primarily the influence of one on the other, but rather that the clinical concepts used to form the a priori scales often grouped reactions that do, in fact, occur in the same people. Table 3, which groups the items in the four scales according to the areas of functioning that were previously distinguished on an a priori basis, shows the extent of overlap between the two groupings. It also serves as a brief resumé of the kinds of effects that occur in each of the empirical scales and as an aid to their later interpretation.

The present four scales have been so refined and modified that they represent major dimensions of the LSD-25 experience that have high internal con-

sistencies and are distinct from each other. This can be seen in two ways. First, the reliability coefficients for each scale (Table 1) are much higher than the correlations between scales. Secondly, the biserial correlations of the 66 individual items with the scales in which they were placed (with the item removed from the scale in each case) have a median of .67, while the correlations of items with the three scales to which they do not belong have a median of .22. The correlations among scales show that, in spite of some statistically significant relationships, they are sufficiently independent to be interpreted separately, since none of the intercorrelations approaches the magnitude of the reliabilities. The two largest r 's are between scales A and B and between scales C and D; these relationships will be discussed below.

Before we describe and interpret the scales, we will present their correlates in overt behavior during the drug day and in nondrug personality, as a useful background for later discussion.

Results

1. *Correlates of the Scales.*—A. Overt Behavior: Throughout the experimental day, each experimenter, immediately after testing a subject, was to rate his behavior, mood,

TABLE 3.—Comparison of Item Placement in Empirical and A Priori Scales:

A Priori Scale	Empirical	
	A	B
I. Difficulty in thinking	28, 32a, 36, 39: lost control, faster, escaping, blank	28a: thoughts taken possession
II. Disturbance of time sense	7, 21a: lost time sense, faster	30: time at a standstill
III. Feeling inhibited, slowed down	39: mind blank	
IV. Feeling of loss of control	16b, 28, 36, 41, 41a, 44: silly and elated, over thought, thoughts escaping or recurring	8a, 28a, 41, 41a: have lost control, in general, over fear, possessed by thoughts, by fear
V. Ego-environment relationships		
A. Closer to environment	25: attention held	
B. Contact loss	7: lost time sense	1, 45: unreality, unsureness
C. Ego change, alienation	18, 37: carefree as child, like different person	28b, 34a, 43: outside force controlling thought, body, acts
VI. Distortions of visual perception	2: people look different	3, 42: objects look different, imaginary things
VII. Feeling less inhibited, opened up	4, 9b, 17, 21a, 29c, 32a: talking more freely, thinking more freely, ease of movement, time faster	
VIII. Meaning changes		
A. New meanings acquired	11, 12, 31: new meaning in objects, events, etc.	
B. Old meanings lost		19, 22: objects, events lose meaning
IX. Feeling of increased functioning	20, 35: new powers, judgment better	
X. Suspiciousness		28b, 34a, 45: thoughts, body being controlled, unsure of others
XI. Bodily effects		
A. Body image change		18: smaller, like a child
B. Somatic symptoms		
XII. Affect changes		
A. Positive affect	15, 16a, 16b: happy, feeling or acting silly	
B. Negative affect	13: sadness	

manner, and spontaneous verbalizations. Each subject was actually rated from 6 to 12 times by from four to eight different experimenters. Eighteen variables were rated on four- or five-point scales, and those with intercorrelations of 0.80 or more were combined, yielding 11 different measures. For each measure, the ratings given each subject during the day were averaged in order to obtain a single score. In the limited areas where the questionnaire items correspond to the behavioral variables, there is no basis for deciding which is more valid. Both the experimenters' ratings and the "self-ratings" of the questionnaire were taken at face value,

as independent data representing two different ways of evaluating the subjects' reactions to the drug.† The correlations between the empirical scales and the ratings of overt behavior are presented in Table 4.

B. Personality Measures: Each subject was given a variety of personality tests, including the Rorschach, the Thematic Apperception Test, the Wechsler-Bellevue, and the Minnesota Multiphasic Personality Inventory. In addition, at least two clinical inter-

† Correlations that have been computed between behavioral measures and questionnaire items (in those instances where the meanings overlap) show that agreement is substantial, though far from perfect."

With Content of Items Summarized

Scale	
C	D
32b: thinking slowed	
9a, 29b, 32b, 46m: hard to move or talk, thought slow, body heavy	
34: over body	8b, 40: might lose control, go crazy
5: merging into surroundings	
18, 24: helpless as a child, old	
6, 46-l: talk about childhood, body lighter	
5, 14, 24, 26, 46-l, m: body merg- ing, disconnected, old, light, heavy, other body image change	
46a, b, d, e, k: dizzy, legs numb, hot, unpleasant taste, weak	46f, g, h, j: unpleasant smells, nausea, blurred vision, ears ringing
24: depression of age	27, 33, 40: fear, anger at self, fear of insanity

views were held, and each subject wrote an autobiography. This material was used in two ways. First, a personality assessment of each subject was made either by one or by two staff members of the Research Center for Mental Health, who used all of the data just cited, but without reference to his behavior in the experiment. Each subject was rated on 144 personality variables covering broadly the areas of motives, defenses, thought processes, inner states, identity, and interpersonal behavior; we later reduced these to 93 measures by combining those variables that had high intercorrelations. Before we interpret the correlations of the

four empirical scales with these measures, we must establish that the number of significant correlations is greater than would occur by chance. Chi-square was used to compare the number of r 's at each level of significance with the number to be expected by chance.‡ Only scales B and C have, at each significance level, more assessment correlates than chance, and therefore only these will be interpreted. The correlates are presented in Tables 5 and 6, and are grouped according to content; within each group, they are arranged by size of correlation.

Although great care was taken to define each of the 144 assessment variables explicitly, the procedure has the drawback that different subjects were related by different people. The personality data were therefore studied in a second way: one person prepared diagnostic summaries for all subjects, based primarily on the Rorschach Test.§ Each summary identified the major and minor elements of a subject's character structure, his level of personality integration, and his most prominent conflicts, affects, and defenses. The correlations between these measures and the four empirical scales are presented in Table 7.

2. Interpretation of the Empirical Scales.

Scale A.: The items in scale A (Tables 2 and 3) can be grouped into three major areas of effect: (1) loss of inhibitions, elation and a subjective experience of things' speeding up, (2) loss of control over attention and thinking, and (3) a feeling of improved functioning, particularly the capacity to perceive new meanings (whether valid or not).

The scale A reactions with the earliest onset—ease of movement and elation—were from the first area. Later effects from this same area (becoming strong by two hours) were feeling and acting silly, time passing quickly, feeling carefree like a child, and a sense of losing control over the elated affect.

‡ Strictly speaking, this method would be valid only if the assessment measures were independent of each other. While they are not completely so, the correlations among them are rather low, with a median absolute value of .13.

§ Dr. I. H. Paul performed this analysis.

TABLE 4.—Correlations Between the Empirical Scales and Overt Behavior

Behavioral Observations	Empirical Scales			
	A	B	C	D
I. Regression: thought confusion, contact loss, regressive behavior, "open" verbalizations	.44 †	.80 *	.20	-.01
II. Visual distortions	.50 *	.78 *	.12	-.05
III. Inappropriate affect	.41 †	.52 *	.01	-.02
IV. Silliness-lability	.47 *	.66 *	-.03	-.25
V. Depression, vs elation	-.34 †	-.53 *	.14	.16
VI. Motility slowed, vs speeded	-.08	-.15	.27	-.02
VII. Withdrawn, vs gregarious	-.19	-.33 †	.29	.17
VIII. Anxiety, apprehension	.21	.50 *	.39 †	.41 †
IX. Bodily preoccupation and indications of bodily distortions	.29	.46 *	.45 †	.46 *
X. Hostility	.22	.11	.10	.29
XI. Suspiciousness	.29	.26	.30	.19
Total behavioral change	.45 †	.72 *	.22	.09

* Significant at .01 level, two-tailed test.

† Significant at .05 level, two-tailed test.

‡ Significant at .10 level, two-tailed test.

TABLE 5.—Personality Assessment Correlates of Empirical Scale B *

r	Thought Processes
.58	Thinks in a ruminative, circumstantial, overdetalled fashion; vacillates and hesitates over decisions
.49	Aggression pent-up and expressed in fantasy
.39	Introspective and sensitive to minimal cues
.38	Given to inferential thinking and primary process intrusion
	Submission vs Assertion
-.58	Strives to achieve status; needs to be admired, looked up to by others
.45	Suggestible and dependent on others to take initiative
.44	Submits to paternal figures, complies with their wishes
.43	Submits to maternal figures, complies with their wishes
.40	Lack of self-assertion; masochism and avoidance of difficulties
-.35	Goal-striving in the face of frustration
-.35	Independence (high score) vs dependence, (low score)
.32	Anticipates being exploited
.31	Needs to rebel, to reject and defy authority, conventional values and/or dogmatic standards (n Autonomy, Resistance)
	Defenses and Affects
.64	Undoing: compulsively acts so as to negate and magically annihilate a "sin" by expiation, ritualistic acts, etc
.42	Somatization: expresses anxiety and impulses somatically in the form of physical or physiological reactions
.36	Failure of defense: becomes disorganized and unadaptive under stress, feels helpless
.33	Lacks social poise and presence; becomes rattled and upset in social situations
.33	Experiences diffuse anxiety readily
.32	Orderly and thrifty
-.31	Seeks and enjoys sensuous and/or sensual experience (n Sentience)
	Sexual Orientation
.46	Is acutely aware of his sexual inadequacy (real or fancied)
.39	Suffers conscious guilt over heterosexual impulses, or fears loss of control over sexual impulses
-.34	Heterosexual (high score) vs homosexual (low score)
.31	Is worried by, or suffers conflict over, homosexual thoughts, fantasies, or behavior
	Identity
.37	Has a strong sense of identity with an ethnic group or national tradition
-.33	Ego-syntonic identity and values
-.33	Has an adequate amount of reasonable self-esteem; accepts and likes self

* Using a two-tailed test of significance, an r of .46 is at the .01 level of significance, an r of .36 is at the .05 level, and an r of .30 is at the .10 level.

TABLE 6.—*Personality Assessment Correlates of Scale C **

<i>r</i>	Submission vs Assertion
-.47	Independence (high score) vs dependence (low score)
.46	Suggestible and dependent on others to take initiative
.45	Submits to paternal figures; complies with their wishes
-.45	Goal striving in the face of frustration
.43	Conventional and other-directed judgments, and introjection as a defense
-.41	Strives to achieve status; needs to be admired, looked up to by others
.33	General passivity and passive resistance
.32	Submits to maternal figures; complies with their wishes
.30	Lack of self-assertion; masochism and avoidance
	Sexual Orientation
-.53	Heterosexual (high score) vs homosexual (low score)
.32	Is worried by, or suffers conflict, over homosexual thoughts, fantasies, or behavior
	Identity
-.43	Sees himself as unwanted and unloved
-.41	Tends to identify self with the outcast and social deviant
-.30	Constantly tries to reassure self by proving he is "all right," acceptable to others, or competent
	Affects and Defenses
-.53	Counterphobic and hypomanic: in the face of fearful situations and depressive feelings, takes active steps to control and cope with it
-.51	Seeks and enjoys sensuous and/or sensual experience (<i>n</i> Sentience)
.48	Bland and uncommunicative
.44	Failure of defense: becomes disorganized and unadaptive under stress, feels helpless
-.42	Narcissistic, with fluid affect
-.36	Is tense and restless
-.34	Often feels angry and impatient with himself
	Hostility and Threat
-.45	Hostile relationships, verbal aggression and resentment
-.40	Oversensitive to challenge and threat
-.37	Hostility toward paternal figures and men in general
-.33	Anticipates being exploited
.31	Aggression pent-up and expressed in fantasy
	Thought Processes
.34	His thinking shows much evidence of naivete
-.31	Is curious about people, prying into others' affairs, fond of gossip and finding out the lowdown

* Using a two-tailed test of significance, an *r* of .46 is at the .01 level of significance, an *r* of .36 is at the .05 level, and an *r* of .30 is at the .10 level.

These effects remained relatively strong through the latter part of the drug day.

Loss of the ability to control attention first appeared as a kind of "fascination effect": the subject's attention was involuntarily held by some object, thought or image. These effects were strong at one-half hour and remained strong throughout the day. By two hours, a substantial number of subjects reported that they had lost control of their thoughts, found it hard to hold onto thoughts or images, and had lost their sense of time (the latter two were the most frequently reported effects in the scale). A later onset was

shown by a different, but related, group of items. These included talking more than usual, sometimes about things the person would not usually talk about, and the experience that thoughts were moving faster than usual. These effects were at about half their peak level by two hours, and were strong only at the five-hour period. The same pattern was shown by the feeling that the mind was blank.

The reports of having reached new insights and heightened powers of perception and understanding were preceded by the subject's feeling that he himself was differ-

TABLE 7.—Diagnostic Summary Correlates of the Empirical Scales*

Diagnostic Summary	Empirical Scales			
	A	B	C	D
Character Structure:				
Obsessive-compulsive	.13	.20	.03	.10
Inhibited obsessive-compulsive	-.46 †	-.42 ‡	-.22	-.02
Hysteria	.29	.15	-.11	.12
Narcissistic	.44 ‡	.08	.30	-.15
Schizoid	.15	.19	.57 †	.11
Level of Integration of Personality	.08	.02	-.19	-.16
Affects:				
Anxiety	-.07	-.17	-.08	-.14
Depression	-.21	-.10	-.05	-.13
Emotionally labile	-.09	-.34	-.35	-.40 §
Defenses and Other Features:				
Isolation	.51 §	-.12	.22	-.29
Intellectualization	.19	.01	.37	.49 §
Denial	-.30	.08	-.17	.61 ‡
Projection	.20	.18	-.65 ‡	-.11
Phobic	.60 ‡	.61 ‡	.27	-.07
Counterphobic	.36	.61 ‡	.14	.03
Regressive, passive-dependent	.47 ‡	.46 §	-.01	-.02
Guarded, defensive	-.37	-.39 §	-.04	.39 §
Exhibitionistic	-.17	.03	.16	.37
Egocentric	.16	.40	.43	.20
Aggressive conflicts	.01	-.01	-.71 †	-.10
Total No. of Defenses Noted	.27	.34 §	.18	.41 ‡

* Product-moment r was used for Character Structure, Level of Integration, and Total No. of Defenses. All other r 's are biserial, with dichotomies ranging from 13/17 to 5/25. As a result, the magnitude of r necessary to reach a given P -value varies. Each dimension of character structure was given a score of 3 if it represents the subject's character type, 2 if it is a major component overlaying some other character type, 1 if a minor component, and 0 if absent.

† Significant at .01 level, two-tailed test.

‡ Significant at .05 level, two-tailed test.

§ Significant at .10 level, two-tailed test.

ent. Inquiry disclosed that this feeling (which was evident at one-half hour, reached its peak at two hours and declined markedly thereafter) did not mean that he felt like someone else, but rather that he felt "fresher," "more mature," or "more me." This perception of change in the self was followed closely by an altered perception of others, not in the sense of physical distortion, but rather in experiencing others "clearly, more vividly," or "seeing people in terms of their essence." This effect reached a peak at two hours and was still strong at five hours. In a related area of experience, subjects reported that their judgment was improved and that they were thinking about things they do not usually think about (most often, self-understanding and the meaning of childhood experiences); these effects were close to a maximum by two hours and persisted at a fairly high level throughout the day.

The items that reflect more explicitly an awareness of changes in the meaning of experiences, better understanding, seeing new connections between experiences, and the development of new powers had a later onset than the effects cited above, becoming marked only at the five-hour period, with a sharp decline thereafter. The temporal progression of reactions within scale A suggests that the subjective experience of having developed new insights represents the culmination of this set of reactions. Descriptively, subjects felt more astute and more perceptive. One reported, for example, "connections between things in my life and things in the tests, childhood recollections are clear to me now." Some subjects experienced a heightening of perception not only in the sense of understanding, but a sensory alteration as well: colors and sounds became more

vivid. They saw new and personal meanings in the objects around them and in test stimuli. The personal meaning, however, did not have a paranoid quality (a crucial difference between scales A and B).

The item with the latest onset in scale A was the report of sadness, which was described as a reaction to the insights these subjects felt they had acquired. The sadness had a mellow, rather than a despondent quality, eg, "after philosophizing I would feel depressed, the bitter-sweet qualities of life."

The scale A effects can be summarized and conceptualized in terms of alterations in certain ego functions: (1) reduced control over affect, (2) impaired control over the distribution of attention, and (3) an expansive feeling. The scale includes alterations in both the self-experience and the mode of experiencing the outside world. The reactions in scale A are, of course, in some ways reminiscent of a manic psychotic reaction, but a detailed study of the similarities and differences between the LSD-induced reaction and the psychoses is beyond the scope of the present report.

Table 4 shows that high scores on scale A are significantly associated with the total amount of behavioral change observed over the drug day. The specific aspects of behavior where the changes are concentrated confirm the content of the subjective scale: subjects with high scores were visibly more regressed, as shown by confusion of thought, loss of contact, childish behavior, and open (ie, not guarded) verbalizations; they gave evidence of visual distortions, and their affect was more inappropriate than other subjects', with evidence of silliness and elation. Scale A, however, unlike the other three scales, was not associated with observed anxiety or bodily concern.

Table 7 shows that, in their predrug personalities, subjects with high scores on scale A tended to be diagnosed as narcissistic or as having features of narcissistic character disorder (given to acting out) and were notably lacking in inhibited obsessive-com-

pulsive tendencies. They tended to make defensive use of regression and a retreat to a passive-dependent position; they were phobic, but did not use counterphobic defenses.

The scale A reaction is in keeping with these personality features. The person with a narcissistic character disorder is egocentric, emotionally labile, histrionic, has a low anxiety-tolerance, acts out and avoids anxiety-producing situations often through denial. Our findings suggest that people of this general type deal with the alterations produced by the drug with defensive maneuvers analogous to those they normally use: further regression, manic-denial maneuvers, and heightened egocentricity. In contrast, the rigid controls of the inhibited obsessive-compulsive person limit his reacting to LSD-25 with scale A phenomena.

Scale B.: The items in scale B have the lowest rate of acceptance of those in any scale; they are the least common aspects of the reaction to LSD-25 that emerged as a group from the item analysis. The content of scale B (Tables 2 and 3) pertains to feelings of unreality, experiences losing their meaning, perceptual distortions, the experience of having lost control over a number of functions, and a feeling of being controlled by outside forces.

While the items vary somewhat in their patterns over time, scale B as a whole had the sharpest curve of any scale. Its manifestations at a half hour after taking the drug were minimal; they approached their peak level at two hours, reaching it at five hours when the other aspects of the drug effect were also maximal, and then dropped off markedly by eight hours. The earliest manifestations of scale B were the subject's awareness of losing control of himself, his feeling that his actions were "not his doing at all," his unsureness about the reactions of others towards him, and his impression that his body was controlled by outside forces. These effects were more frequent by two hours, and were joined by feelings of un-

|| These diagnostic terms are taken from Schafer.⁴

reality, of time's standing still, of things' being meaningless and events illogical, and reports of visual distortions (both altered appearances of real things and imagined percepts).

Paralleling the general time curve, but much less frequently reported, were the experiences of loss of control over fear or anxiety, sometimes to the point of being possessed by these emotions, of being possessed by thoughts and having them controlled by someone else, and of feeling small, like a child.

The subjects' explanatory comments shed further light on the meaning of scale B. The most frequent reactions, as cited above, represent an overwhelming of the self, so that the person's own thoughts and feelings seem foreign to him and he feels he has lost control over his own functioning. Subjects became aware of a reduction in their hold on external reality, which became drained of meaning and assumed a dreamlike quality. The observing self became dissociated from the experiencing self: "it's as if someone else is chewing my food"; experiencing became fragmented: "a pause between sentences, filled with time, seemed unending." One subject felt split into three identities: "the grinning imp" who could enjoy physical pleasures, the one who denied them, and "the rational me." Some subjects reported that they felt a physical regression to an infantile state; two felt curled up, "womb-like," while others reported feeling small or talking baby talk.

These derangements in the experience of the self and of the environment were associated with paranoid phenomena. The same subject would first report that "things are meaningless" and later state "everything has meaning." Implicit meanings were read into a variety of situations that puzzled these subjects. They wondered about "things the experimenters do, closing the door, shuffling papers, arranging the tape machine." There were fantasies about the experimenters' malevolent motives. The experience of having lost control over thoughts, emotions, or

body led to delusional ideas: "Oh, yes, somebody must have control of them, I'm sure." As reported elsewhere,² it was just such reactions that were most often consciously suppressed while they were occurring under the drug and then, in some cases, reported for the first time in the recall of the drug experience the next day.

The visual distortions included some apparent hallucinations, but "imaginary interpretations of real things" were more common, such as images seen in the folds of the curtains. Some of the experiences were frightening while others were pleasant; a few were extensive dramatic scenes.

Since scales A and B implicate many of the same areas of functioning and, as already noted, they are related statistically,[†] it is helpful to compare them (Table 3). The loss of control in scale A pertains primarily to affect, attention, and ideation; while in scale B there is a more general and pervasive loss of control that seems to involve the whole self. In scale B only, this experience is extended to the idea that someone or something else is controlling these functions. The changed relationship with the environment in scale A is that of seeing new meanings in it, while in scale B loss of meaning and loss of contact with the environment are experienced. The self-experience in scale A is one of increased competence accompanied by elation and an inner sense of acceleration that pertains to thoughts, actions, and the passage of time itself; in scale B it is one of inadequacy, uncertainty, fragmentation, and impairment, accompanied by fear and a sense that time was stopping. Primary process thinking is much more evident in scale B than in scale A.

The reactions represented in scale B were associated with striking changes in overt behavior (Table 4). High-scoring subjects showed the regression, visual distortion, and inappropriate affect including silliness and elation that were associated with scale A,

[†] It may be that scale B represents an extreme extension of scale A effects (see further on in text, where this is discussed).

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but to a much more marked degree.[#] In addition, they showed anxiety and bodily concern, and they were rated as gregarious (or seeking contact) rather than withdrawn. The failure of scale B to correlate with overt manifestations of suspiciousness, despite the paranoid ideation evident in the scale itself, suggests that such material was often successfully concealed.

The diagnostic summaries (Table 7) reveal that subjects with high scores on scale B tend to use many different defenses and, in particular, tend to regress readily to a passive-dependent position. They exhibit both phobic and counterphobic features. In contrast, those persons with an inhibited obsessive-compulsive character structure and those who tend to be guarded or defensive had low scores for scale B.

The personality assessment correlates (Table 5) clarify this picture. Subjects with high scores on scale B are given to primary process and inferential forms of thought (ie, biased and arbitrary reasoning, often seeking hidden meanings). They express aggression in fantasy rather than action. They are poorly defended, becoming disorganized and helpless under stress, and they tend to experience anxiety both in social situations and without visible cause. They express anxiety through somatic channels and attempt also to bind it through compulsive magical acts, such as undoing. They also think obsessively and are orderly. These subjects have a serious disturbance in identity that is most evident in the sexual area; they feel sexually inadequate and guilty about both heterosexual and homosexual impulses and are, in fact, likely to be overtly homosexual.* Along other lines,

[#] All of the significant correlations between the behavioral measures and scale A become negligible when the correlation between scales A and B is partialled out. In other words, the behavioral changes cited in the preceding section are true of high-scorers on scale A only when they also have high scores on scale B. This is not true of the personality correlates derived from the Rorschach, which hold for scale A high-scorers regardless of their scores on scale B.

* The sample includes an unusually large proportion of homosexuals, both overt and latent.

they are described as suggestible and dependent, submissive to parental figures, lacking in self-esteem, unassertive, and not likely either to seek status or to be persistent in their goal-striving. Their submissiveness alternates with defiance, suggesting conflict in this regard.[†]

The findings again indicate a clear relationship between predrug personality and drug reaction. Subjects who are likely to show scale B effects are those who come to the experiment with a severe disturbance of identity, a tendency toward primary process modes of communicated thought, a passive masochistic orientation, and a susceptibility to anxiety. Under the drug, these characteristics are accentuated, leading to a scale B reaction: further fragmentation of their identity, a regression to more primitive modes of thought, and a heightening of passivity and anxiety.

Scale C.: The items in scale C (Tables 2 and 3) deal primarily with alterations in the body image and a generalized inhibitory effect, both physical and mental. These reactions, particularly the bodily effects, have both the highest experimental-day frequencies and the earliest onset of any group of items; they dominate the initial stages of the reaction to LSD-25. The first scale C effects to appear were dizziness, weakness, bodily lightness, and a feeling of losing control of the body. Also manifest early, but somewhat less frequent, were changes in body image such as the feeling that parts of the body did not belong, feeling heavy, the sensation of merging into the environment, numbness in the legs, difficulty in moving, and feeling hot or sweating. This group of reactions reached a maximum by two hours and was maintained at close to that level throughout the entire eight hours. The only bodily effect with a late onset was an unpleasant taste (eg, metallic or dusty), or an unpleasant awareness of no taste at all.

Some examples of the body-image changes reported are: "A feeling of heaviness and

[†] Scale B also has an r of .46 ($P < .01$) with Wechsler-Bellevue IQ; no other scale is related to IQ. High-scorers have a mean IQ of 131, low-scorers a mean of 122.

lightness at the same time, as if there were two of me, one pressing against the other"; "The whole bottom part doesn't belong to the top part." These alterations were *not* usually accompanied by reports of experienced anxiety, an interesting aspect of this scale. It is unlikely that the anxiety was wholly defended against by these somatic means, since the experimenters rated high-scorers on this scale as anxious. A difficulty in self-awareness seems most likely.

The scale C effects that did not directly involve the body had a later onset than the bodily effects. Most prominent in this group were the experiences of slowed thinking and talking, which were reported largely in terms of impaired motility and feelings of depletion. Feeling old and experiencing the helplessness of a child were both ways of expressing the total effect of this scale, for example, "old and feeble, or like a baby, because I couldn't move." It may be on this basis that thoughts about childhood occurred.

The observable behavioral effects associated with high scores on scale C were limited to anxiety and bodily concern (Table 4).

The diagnostic summaries (Table 7) show that subjects with schizoid trends tended to have high scores on scale C, while subjects who use projection as a defense and who have conflicts about aggression had low scores. The picture is filled out by the assessment measures (Table 6). The most prominent group of correlates reflects the passivity and unassertiveness of those scoring high on scale C. Such subjects are suggestible, dependent, and passive, submitting to parental figures. They tend to be other-directed, conventional, unassertive, and masochistic. In the face of frustration, they give up. They show a general failure of defenses under stress and are particularly unlikely to fight back with counterphobic or hypomanic measures. Their effect is bland; they do not seek sensuous experiences and are neither tense nor angry with themselves. Their thinking is naive, and they have little curiosity about others. They also manifest homosexual trends and have conflicts about them. The picture of passivity and bland-

ness is reinforced by the fact that they show little hostility (what hostility there is emerges primarily in fantasy) or fear of exploitation and do not see themselves as unloved or as outcasts.

Once again, the reactions that appear in the empirical scale seem on the whole to be an extension of the usual characteristics of the subjects showing those reactions. In the case of scale C, the subjects' passivity, inactivity and feelings of depletion under LSD-25 are all exaggerations of the usual personalities of these subjects.

The role and meaning of the body image changes in scale C may be clarified by contrasting scales B and C. Both scales involve changes in the self and the personality correlates of both center on passivity. The crucial personality difference is in regard to aggression: subjects whose passivity is sadomasochistic, associated with inner turmoil and a tendency to use primitive modes of thought are high on scale B (loss of contact and control, with feelings of being controlled from without), while subjects whose passivity is well-accepted and associated with blandness and little conflict about aggression experience the body image changes and inhibitory effects of scale C.

Scale D.: The items in scale D (Tables 2 and 3) include the explicit reports of anxiety, the fear of losing self-control or going crazy, and a group of related physical symptoms. While the reactions in this scale were less frequent than those in scale C, they also had comparatively early onset. Reports of nausea and blurred vision ‡ were common

‡ The presence of the symptom of blurred vision in scale D suggests that this scale may be associated with the pupillary dilation that is a characteristic effect of LSD-25. We find that the average diameter of the pupil during the experimental day has a correlation of .41 ($P < .05$) with scale D, and, of its correlations with the other scales, only the r with scale C (.34) reaches the .10 level. The biserial r 's between pupillary dilation and the individual items in scale D, however, reveal an unexpected fact. It does not relate significantly to blurred vision ($r = -.07$) or any of the other physical symptoms in the scale, but it is significantly related to two emotional symptoms, being afraid or upset ($r = .46$) and anger with the self ($r = .47$).

by one-half hour and continued at a fairly high level throughout the day. By the second hour, there were reports of being on the verge of losing control, of anxiety, of anger with the self and, less frequently, the fear of going crazy. Ringing or pressure in the ears and unpleasant odors were reported least often.

A prominent feature of this scale is the feeling of being on the verge of losing control. § As one subject put it: "On the threshold of loss of control of the body and possibly also of the mind." The subjective anxiety and the physical symptoms may either be concomitant reactions on different levels or causally related; we have no basis for evaluating this issue.

The observable changes in the behavior of subjects with high scores on scale D (Table 4) consisted of marked overt anxiety and concern about their bodies. Furthermore, the few subjects who actually vomited after taking the drug had high scores on scale D ($P < .01$, t -test, compared with other subjects).

The diagnostic summaries (Table 7) show that the subjects with the highest scores on scale D tend, normally, to be guarded and defensive, not emotionally labile, and to use many defenses, particularly denial and intellectualization. The personality assessment, though not yielding enough significant correlates to warrant confident interpretation, supported this picture by indicating that these subjects do not experience anxiety readily and are not fluid in their expressions of affect. The incomplete picture that we have of these subjects suggests that they are people who resort to many defenses in order to avoid experiencing anxiety. Their guarded position suggests that their defenses are brittle and their use of denial suggests that they resort to primitive defenses under stress.

Scale D effects, therefore, appear to be the result of the impact of LSD-25 on persons with extensive but easily pierced de-

fenses against anxiety. When the drug threatens these defenses, such people experience intense anxiety, centered on the fear of losing control, and certain somatic symptoms.

3. *Relationships Among the Scales.*—The correlations among the scales (Table 1) show that they fell into two pairs: A-B and C-D. When a 2×2 scatter plot is made of scale A scores against scale B scores (with a high score on either scale defined as acceptance of half or more of the items in that scale), it appears that of the 18 subjects with high scores on scale A, 8 are also high on scale B, while 10 are low on scale B; of the 12 subjects with low scores on scale A, however, only 1 has a high score on scale B. Thus, a high reaction to the items on scale A is a necessary but not sufficient condition for a strong scale B effect, that is, a strong scale A effect can occur with or without a strong scale B effect, but a strong scale B effect is unlikely to occur if the scale A reaction is weak. A similar relationship obtains between scales C and D, although it is not quite as marked: of 17 high-scorers on scale C, 7 score high on scale D while 10 do not, but only 1 of the 13 subjects with low scale C scores had a high score on scale D.

These findings suggest that the reactions represented by scales B and D are possible, but not inevitable, extensions of the scale A and scale C reactions, respectively. In spite of the differences in content between scales B and D, they have two important similarities: both involve the issue of loss of control, and both are associated with unpleasant affect.

The linkage between scales A and B is further shown by the fact that their behavioral and diagnostic correlates are similar. || What, then, determines whether a subject who experiences the expansive effects of scale A will go on to experience the impairment and primary process thinking of scale B? It seems likely that personality characteristics play an important role, but we can

|| The few personality assessment measures that did correlate with scale A tended also to be ones that correlated with scale B.

§ Note that item 8b ("... felt that you *might* lose control...") is in this scale, while item 8a ("... felt that you *have* lost control...") is in scale B.

offer only limited data bearing on this question. Examination of the diagnostic summaries of selected subjects shows that high-scorers on scale A who *did not* score high on scale B are particularly likely to use the defense of isolation and to have greater conflicts about aggression. Those subjects high on scale A who *did* develop the scale B reaction lack the defense of isolation and are more likely to be phobic; they also had a somewhat stronger scale C reaction of body image change.

Scales C and D resemble each other in their preponderance of somatic reactions. If we consider only subjects with a strong scale C reaction, we find that the better integrated subjects in this group, with obsessive-compulsive and narcissistic features and evidence in their Rorschachs of anxiety, phobic, and counterphobic trends *do not* develop the fear of losing control that is the crux of the strong scale D effect. The subjects who *do* experience the scale D reaction tend, in contrast, to be more poorly integrated; to have hysteric features; to be inhibited, guarded, and defensive; and they are more likely to use denial and intellectualization as defenses.

Comment

The primary purpose of this report is to present a method for studying empirical clusters of LSD-25 effects and to demonstrate that these effects are related to pre-drug personality, in that they appear to be an outgrowth of the particular person's usual defenses, style of thinking, character structure, and controls. The techniques used here have permitted only a rather general post hoc integration of the LSD-25 reaction and the pretest personality data; these relationships should be studied more fully, and predictions from personality to drug effect should be made and tested.

The question of the general validity of these scales should be studied with different samples of subjects. Of particular interest is whether the same four clusters would emerge again, or whether they reflect the unique nature of our (admittedly unusual)

sample. The broad finding that there is consonance between pre-drug personality and drug reaction should be verified with future samples. If so, we might expect a different distribution of drug effects in a group of subjects with a different distribution of personality characteristics and, possibly, the emergence of additional clusters of drug effects corresponding to personality components that are not well represented in the present sampling of subjects.

One limitation of this study should be noted. Since our focus was largely on the state of consciousness itself, the questionnaire contains no direct references to sexual feelings or fantasies (though these did at times emerge) and permits only a limited exploration of aggressive feelings. There is therefore too little information for the study of the vicissitudes of drives, and future studies should fill this gap.

The manner in which the somatic reactions fell into the scales is of interest. Scales A and B related to only one "physical" effect ("numbness in the hands or arms," not placed in either scale; Table 2), although scale B abounds in identity changes and feelings of loss of control. Scale C, which is characterized by changed body image and inhibitory effects, also includes dizziness, numbness, sweating, weakness, and unpleasant taste, while scale D, which includes subjective anxiety and fears of losing control, also includes nausea, blurred vision, pressure in the ears, and unpleasant odors. The findings suggest that no LSD-25 effect is "purely physical" and that the somatic effects should be viewed as channels of discharge, expression, or defense that are selectively associated with particular drug-induced alterations. We hope to clarify the nature of this interaction by a forthcoming study of the reaction patterns of individual subjects and by an analysis of the somatic effects per se.

Summary

A 74-item questionnaire designed to explore the subjective effects of 100 γ of LSD-25 administered orally was used to study the

empirical clustering of the effects of the drug and led to the development of four scales. The experimenters' observations of the subjects' behavior while under the drug were compared with the four scales. In addition, a 93-item personality assessment and diagnostic summaries based on the Rorschach Test were used to explore the personality correlates of each scale.

Scale A consisted of loss of inhibitions (particularly over thinking), elation, and the subjective feeling of having developed new powers of insight. The pre-drug personalities of subjects scoring high on this scale emphasized features of narcissistic character disorder with poor controls and a tendency to regress. Scale B included loss of contact with the environment, depriving it of a sense of meaning, an impaired sense of identity, feelings of having lost control, and paranoid ideation. High-scoring subjects on this scale were passive and masochistic, had a weak sense of identity, and showed a tendency toward primary process thinking. Scale C contained body image changes, somatic symptoms, and inhibitory effects; it was

strongest in schizoid, passive subjects with poor defenses. Finally, Scale D included the fear of losing control, anxiety, and somatic effects; it was found in guarded and over-defended subjects.

We wish to thank our colleagues at the Research Center for Mental Health who participated in the larger study of which this is a part, particularly Robert R. Holt and George S. Klein.

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