

Chronic Hallucinogenic Drug Use and Thought Disturbance

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This study presents data gathered by standardized techniques of Rorschach evaluations of the thinking of hospitalized schizophrenic and nonschizophrenic drug abusers (mostly lysergic acid diethylamide [LSD]) compared to similar hospitalized psychiatric populations of nondrug users. The results showed a clear tendency for drug users regardless of diagnosis to have more signs of increased intrusion of primitive-drive material, higher penetration scores, and higher responsivity.

There were indications of conceptual boundary disturbance in the drug users although their scores on this variable were influenced by their increased responsivity. These select features of thinking and responsivity marked the drug users as different than other patients.

The length of drug use over time was more strongly related to these thinking disturbances than variety or amount of drug use.

Willing or not, the psychiatric profession has been drawn into the current "drug-youth culture." Not only have the hallucinogenic drugs raised many interesting theoretical and research possibilities, but they have, in large part, confounded the clinical picture of many patients.^{1,2} Clinically there are many tantalizing similarities between the acute effects of hallucinogenic drugs and an acute schizophrenic reaction. Bowers and Freedman³ have presented data suggesting that the experiential states during lysergic acid diethylamide (LSD) use have clear parallels in the experience of acute schizophrenics. Rinkel et al.,⁴ in 1952, demonstrated that normal subjects at the height of an acute LSD reaction manifested changes such as autistic thinking, decreased mental organization, contamination responses, and lack of logical thinking on the Rorschach test, all of which at times have

been associated with schizophrenics. Perhaps because of these pathologic findings during acute drug use there have been few planned experimental studies of the chronic use and subsequent long-term effects of these drugs. Most prospective studies have used a single dose of LSD.^{5,6}

The investigator is consequently primarily limited to self-selected populations that have voluntarily participated in the "recreational" use of these drugs. Exemplifying this type of study are those such as Welpton's⁷ who investigated, with psychological tests, ten chronic LSD users, and concluded that they manifested problems of sexual identity and dependency as well as regressing easily into the production of idiosyncratic responses; or of Glass and Bowers⁸ who presented three cases in which they felt the history of heavy hallucinogenic drug use was distinctly related to their psychosis. While these studies are of interest they usually have at least two major drawbacks: (1) the actual drugs used and their exact chemical composition is unknown and (2) the question of pre-existing psychopathology is also unknown. Most important, in these studies comparable samples of nondrug users are not used, making it difficult to know whether characteristics found in the research are really more frequent in, or related to, drug users.

With an awareness of these shortcomings, and with specific attention paid to variety and length of drug use, we have designed research to examine the possible differences in thinking in a group of drug using and nonusing psychiatric patients. Data were gathered on four distinct groups of patients: (1) 16 schizophrenic patients with a history of heavy drug use; (2) 28 schizophrenic patients without drug use; (3) 14 nonschizophrenic patients with heavy drug use (diagnosed as having personality disorders); and (4) 21 nonschizophrenic patients without drug use (diagnosed as having personality disorders). With this sample and the standardized cognitive tests we have em-

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played in previous research, we have attempted to answer the following questions: (a) are there similarities in thinking in schizophrenic patients without drug use as compared to nonschizophrenic patients with heavy drug use? (b) does the thinking of schizophrenic patients with heavy drug use differ from schizophrenic patients without drug use? (c) are there any specifics of thinking disturbance that might be attributed to drug use alone?, and (d) what is the relation of length and variety of drug use to thinking?

Method

The sample was drawn from consecutive admissions to the acute psychiatric inpatient service of the Yale-New Haven Hospital which has previously been described.^{9,10} Demographic data are reported in Table 1. A special rating scale was devised for drug use which was scored for length and quantity of drug use as follows: (a) the length of use (1 = 0 to six months, 2 = six months to one year, 3 = one to two years, and 4 = greater than two years); (b) intensity of hallucinogenic drug use (LSD, DMT, STP, etc) was scored as follows: 1 = no hallucinogenic drug use, 2 = one to four "trips," 3 = five to ten trips, 4 = 10 to 20 trips, 5 = > 20 trips; (c) frequency of marihuana use 1 = rare, 2 = monthly use, 3 = weekly use, and 4 = daily use for one to two week periods; (d) frequency of amphetamine use (rating scale same as for marihuana); (e) use of other drugs (glue-sniffing and heroin, etc). (The length of use scale (a) was applied to the hallucinogens, marihuana use, amphetamine use, and other.) A total score for hallucinogenic use combined hallucinogens, marihuana, and amphetamines. Table 1 reports the extent of drug use in the sample.

While the drug users were fairly definite about the amount of LSD-type drugs used (except in those with very heavy use) the amount of amphetamine and marihuana use was less accurately reported. In all cases the drug users, at one time or another, used all of these substances. LSD-type drugs were the most frequently used drugs, none of the drug use sample used either amphetamines or marihuana exclusively. So the data reported in this study represent people who have used primarily LSD-type drugs, who have also used amphetamines occasionally, and marihuana more frequently (Table 1).

The amphetamine use was primarily oral or, occasionally, intravenous, but three of the patients had intermittently used intravenous amphetamines on regular basis. Consequently, dosage, route of administration, and drug combinations effects may influence as an unknown variable the present findings and are considered further in the remainder of the paper.

All patients were administered the Rorschach test during the first week of admission. These protocols were scored with our scoring system for the indicators of possible thought disorder, grouped into scales. Many of these scales have been found to successfully differentiate schizophrenics from nonschizophrenics.^{11,12} They included a scale of: (1) thought quality (the adequacy of logical verbalization); (2) affect elaboration (the attribution of affect to the response); and (3) overspecificity (the overelaboration of the response often in personalized or idiosyncratic fashion). Other indicators from the Rorschach were very poor form quality or F-, contaminations, movement, color,¹³ and Fisher and Cleveland's scales for Barrier and Penetration.¹⁴

The diagnoses were made according to the criteria of the American Psychiatric Association's *Diagnostic and Statistical Manual* (ed 2) by two senior clinicians who had no knowledge of the Rorschach protocols although some knowledge of drug use was gained in the clinical interview. Patients were selected for this study on the basis of a clear schizophrenic diagnosis or clear nonpsychotic diagnosis (patients with latent or borderline schizophrenia, psychotic depressions, and organic disorders were excluded) and for

Table 1.—Drug Use

	Drug Users		Nondrug Users	
	Schizophrenic Patients (No. = 16)	Nonschizophrenic Patients (No. = 14)	Schizophrenic Patients (No. = 28)	Nonschizophrenic Patients (No. = 21)
Age (median yr)	20	18	20	24
Men	13	10	8	4
Women	3	4	20	17
Hallucinogens* (mean use)	3.8	4.2	0	0
Length of hallucinogen use*	2.6	2.3	0	0
Marihuana* (mean use)	3.5	3.1	0	0
Length of marihuana use*	2.5	2.6	0	0
Amphetamines* (mean use)	2.3	2.3	0	0
Length of amphetamine use*	2.5	2.6	0	0

* See text for definition of scale.

whom a reliable history of drug use or abstinence was available. The Rorschach protocols were scored by several psychologists who had no knowledge of diagnosis or drug use and who had previously established a high degree of interater reliability.¹¹

The data were analyzed in two ways: (1) responses on the Rorschach were grouped for the drug users and nondrug users and analyzed by analysis of variance and co-variance (controlling for productivity or number of responses) to determine effects of drug use and diagnosis and (2) with respect to individual Rorschach responses and type and extent of drug use.

Results

Drug Use and Diagnosis.—Productivity.—The number of Rorschach responses (R) obtained in the drug user group, regardless of diagnosis, was significantly greater. Although variation in R was restricted to a degree by the administration procedure (the instructions requested two to three responses per card) there was still significantly greater productivity within the drug user groups, possibly indicating increased associative activity in response to visual stimuli. Since R affects the expected incidence of other types of scores, whenever a significant difference between drug users and nonusers was obtained on a variable significantly correlated with R, an analysis of co-variance was performed to partial out the effects of varying R.

Disturbances of Form Level, Thought Quality, and Drive Content.—Table 2 presents the mean scores and tests of significance for the drug use and nondrug use groups on the various Rorschach variables. Of the formal properties ("very poor form," color and human movement scores), the schizophrenics show more "very poor form" responses (F-) than nonschizophrenics. Movement and color responses do not significantly differentiate the groups. In general, except for the measure of response productivity, drug users were not different from nondrug users on these formal aspects of Rorschach response (Table 2, part A).

The measures of *thought quality* and *overspecificity* we used^{11,12} indicated that drug users and schizophrenics both tended to show higher levels of these deviant verbalizations (Table 2, part B). However, these were significantly

Table 2.—Mean Scores and Tests of Significance for the Drug Use and Nondrug Use Groups on Rorschach Variables

Variables*	Means				Analysis of Variance F (df = 1,75)			Correlation (r) With Responses (R)
	Drug Users		Nonusers		Drug	DX	Inter- action	
	Schizo- phrenic Patients	Nonschizo- phrenic Patients	Schizo- phrenic Patients	Nonschizo- phrenic Patients				
A. Formal properties								
Responses (R)	27.86	24.50	21.21	21.24	13.23†	1.51	1.55	1.00
Very poor form (F—)	2.06	1.43	2.29	0.62	0.39	6.03‡	1.22	0.28‡
Movement (human)	2.50	1.93	2.04	1.90	0.36	0.75	0.30	0.03
Color	5.18	4.79	6.32	4.76	0.29	0.91	0.32	0.15
B. Thought disorder verbalization								
Thought quality	31.94	16.79	25.71	7.71	4.77‡	22.40†	0.17	0.41†
Affect elaboration	2.88	5.00	3.00	3.19	0.54	1.01	0.71	0.12
Overspecificity	25.12	17.50	20.21	9.04	6.71‡	13.27†	0.47	0.43†
C. Drive								
Defended drives								
Drive II	6.31	4.86	5.82	4.52	0.27	2.98	0.01	0.25‡
Aggression II	3.62	3.14	3.79	2.29	0.35	2.81	0.74	0.27‡
Sex II	1.12	0.50	0.68	0.62	0.34	1.49	1.02	0.02
Oral II	1.50	0.71	1.36	1.38	0.75	1.59	1.79	0.11
Primitive drives								
Drive I	2.69	1.14	1.25	0.43	8.90†	10.76†	1.05	0.24‡
Aggression I	1.31	1.00	0.86	0.33	4.46‡	2.48	0.16	0.16
Sex I	1.06	0.00	0.39	0.05	1.74	8.98†	2.32	0.36†
Oral I	0.38	0.07	0.00	0.05	4.72‡	1.94	3.66	0.02
D. Boundary diffusion								
Fabulized combinations	2.75	1.43	2.18	0.67	2.12	9.58†	0.04	0.13
Contamination tendencies	2.00	0.79	0.96	0.28	4.64‡	7.09†	0.56	0.30‡
Full contaminations	0.81	0.14	0.50	0.05	1.59	12.04†	0.45	0.10
Contaminations sum	3.62	1.14	1.96	0.38	4.90‡	13.80†	0.67	0.14
Penetration	5.25	3.14	2.71	2.52	9.00‡	4.77‡	3.32‡	0.31†

* Variables defined in text. † $P < .01$. ‡ $P < .05$.

correlated with productivity, and in the analysis of covariance, the frequencies of these verbalizations were not significantly greater beyond what could be attributed to greater productivity of the drug users. The results (*thought quality* and *overspecificity*) for diagnosis (schizophrenia), on the other hand, do hold up after the correction for R, as previously reported^{11,12} (Table 3).

Those manifestations of drive content showing greater operation of socialized defenses do not differ significantly in the four groups. Those showing more "primitive" or blatant drive content do occur at different levels in the groups. For drug users, the overall amount of *primitive drive content* is higher, even after partialling out the effects of productivity (Table 3). This greater incidence occurs in significantly higher frequencies for primitive *aggression* and *orality* drive scores (two types of responses not correlated with R). (Table 2, part C).

Boundary Diffusion.—All of the scores for responses indicative of various levels of *boundary diffusion*, which included indices of *penetration*, *fabulized combination*, *contamination tendencies*, and *full contamination*, were significantly higher in the schizophrenic groups (Table 2, part D). Among these, contamination tendencies were significantly higher in the drug users, but as shown by the analysis of co-variance, this was attributable to the larger number of R. Penetration responses, on the other hand, were significantly higher in the drug user groups even af-

ter adjusting for productivity (Table 3). In general, the drug users differ from nonusers on less severe forms of boundary permeability¹³; these variables have been related to normal personality variation by others.^{13,14}

Variations Within Drug Users.—The analysis in Tables 2 and 3 presented the scores across diagnostic and drug use groups. The variations within drug user groups for hallucinogenic drug use are presented in Table 4. Accurate information on the extent and length of major hallucinogenic drugs (LSD, etc) was available on 29 of the 30 drug users. Neither intensity nor length of drug use were significantly correlated with productivity on the Rorschach within the drug users. Interestingly none of the Rorschach variables correlated significantly with the intensity (frequency), of hallucinogenic use prior to admission. However, the length of use of hallucinogens was significantly correlated with some of the Rorschach scores, namely *thought quality* and *contaminations* and at a near significant level with *overspecificity* and absences of *affect elaboration*. Drug users with a longer history of use tended to show higher incidence of the disrupted thinking, boundary confusion, and to a degree a higher extent of over-specific, personalized, or idiosyncratic thinking, and also tended to show a lesser incidence of the appearance of affect in their responses. The correlation with contamination is especially strong, and is highly significant for both contamination tendencies and full contaminations when ex-

Table 3.—F Ratios for Analysis of Covariance of Variables Significantly Correlated With Productivity

	Drug Use	Diagnosis	Interaction
Very poor form	0.17	4.65*	2.26
Thought quality	0.65	20.55†	0.86
Overspecificity	1.40	11.40†	1.54
Primitive drive	5.95*	9.79†	0.77
Contaminations tendencies	1.74	5.83*	0.25
Penetration	4.96*	3.91	2.60

* $P < .05$. † $P < .01$.

Table 4.—Correlations of Hallucinogenic Drug Use (LSD) With Rorschach Variables

Variable	Amount of Use		Length of Use		Total Drug Use	
	r	(No.)	r	(No.)	r	(No.)
Responses	.13	(29)	.02	(29)	-.08	(29)
Very poor form	-.31*	(29)	-.20	(29)	-.19	(29)
Thought quality	.21	(29)	.38†	(29)	.09	(29)
Affect elaboration	-.09	(29)	-.32*	(29)	-.08	(29)
Overspecificity	.22	(29)	.35*	(29)	.12	(29)
Primitive drive	.10	(29)	.22	(29)	.01	(29)
Primitive aggression	-.03	(29)	.16	(29)	-.02	(29)
Penetration	.19	(29)	.10	(29)	.06	(29)
Contaminations	.21	(29)	.58‡	(29)	.16	(29)

* $P < .10$. † $P < .05$. ‡ $P < .01$.

amined separately. In general, the drug users with a longer history of use evidenced high degrees of thinking disturbance. The amount and variation of drug use did not show these significant correlations. Overall the data analysis showed similar trends for marihuana and amphetamine users. However, these data are not presented due to the small number of subjects who reported heavy use of these substances and the clinical impression that the use of these substances was not as accurately reported as the use of hallucinogens.

Demographic Variables.—The variables of age, sex, and years of education, were examined to rule out the possibility that the results presented above could be accounted for by special characteristics of the population studied. None of the results on the variables for which significant correlations were found could be accounted for solely in terms of these variables. Correlations for intensity and length of major hallucinogenic drug use with demographic variables showed that younger subjects had used drugs for a significantly shorter period of time ($r = .46$, $P < .05$). Age had no relationship, however, to amount of drug use, either hallucinogenics or all drugs. Patients with more years of education tended to have used drugs for a shorter period of time ($r = .35$, $P < .10$), which may be due to their greater age or to the specific exposure to drug use with more college education. To assess whether the results noted were confounded by different sex composition (Table 1) of the group, analyses of variance were calculated using the factor of (1) drug use; (2) diagnosis; and (3) sex ($2 \times 2 \times 2$). No significant interactions between drug use and sex were found. Thus our findings concerning the

relationship between various indices of thinking and drug use are comparable for both sexes.

Comment

The data from the patient sample studied showed a clear tendency for the drug users regardless of diagnosis to have more signs of increased intrusion of primitive drive material, higher penetration scores, and higher Rorschach responsivity. There were also indications of conceptual boundary disturbance (contaminations) in the drug users, although this was closely related to their greater responsivity. Overall, in many areas of thinking the drug users were not more disturbed than other comparable patients. At the same time in select areas concerning higher degrees of primitive drive content and responsivity the drug users were different than other patients.

Another feature of interest from this data is that the length of drug use seems to be the most critical factor in the relationship of hallucinogenic drug use to unusual forms of responses on the Rorschach (there is some indication that this may be true of amphetamine use also, although there were no heavy or exclusive amphetamine users in the sample). While this is particularly true of LSD and marihuana, it is of note that neither the age the drug use was started, nor the variety of drug use is significantly related to thinking disturbance in the sample studied.

The pattern that emerges also indicates that these drugs might have effects in exacerbating the existing pathology. Specifically, the schizophrenic patients studied who use drugs seem to show more disturbances in the area of thought disturbance and more severe disturbances of conceptual boundaries in terms of fabulized combinations and contaminations. It is interesting to note that the hallucinogenic experience, frequently described as "boundlessness" or "fusion with the universe" should give rise during drug free periods to a greater frequency of responses reflecting permeable boundaries and fused percepts.

The results from this data must be interpreted carefully. The current research (as most studies on the same subject) presents data from people who have used hallucinogenic drugs and are now hospitalized. Many of the differences found in this study may be characteristic of the group of people who become attracted to or tend to use drugs more extensively rather than to the effect of the drugs themselves. The data might also indicate a self-selection factor in that more constricted people may avoid hallucinogenic drugs since they may have difficulty tolerating the unrestrained feelings attributed to the hallucinogens. In part, the data concerning higher levels of Rorschach responsivity and greater expression of primitive drive content in drug users would seem to support this hypothesis. In any event, the differences between the drug users and nonusers are in select areas and do not in themselves imply that other types of accompanying psychopathology are present.

Any discussion of the effects of hallucinogenic drugs presents a complexity and plethora of speculative hypotheses. This is in large part due to the fact that hallucinogenic drug use itself is a complex drug-behavior-cultural

interaction. With respect to the effects from the drug alone it is possible that these drugs (or experiences during the drug state) may produce more or less permanent states that give rise to the forms of thinking noted in this study. It is also possible, that drug users become more familiar with these forms of thinking while under the influence of drugs, and this type of thinking persists during drug-free periods. However, we have a history of multiple drugs used of unknown quality and purity, even this simple conceptualization is made more complex as in this study (and in most studies of hallucinogenic drug users). The fact that these drugs are also used in varying doses, frequencies, sequences, and routes of administration complicates analysis. Any of these variables or constellation of variables over time may be the critical factor.

It is possible that even after a single dose the drug user, in an attempt to master the experience or to "restore constancies"¹² or the "need for synthesis,"¹² may be *intrinsically* predisposed to thought disorder; events during the drug state could create such a predisposition—a drug-behavior interaction. The drug user living with such thought patterns and frequent drug dosage over time may *reinforce* and/or add to the deviant thought patterns, while individual predispositions could reinforce their probability (D.X. Freedman, personal communication). These thought patterns could be part of an adaptive maneuver in dealing with internal conflicts as noted by Spindler¹⁵ in drug using American Indians and as noted in other drug users.¹⁶

Finally, it is not at all clear how the subculture and its accompanying ideology that has grown up around the use of these drugs has contributed and reinforced the unusual thinking noted in the patients in this study and others.^{8,16} Crosscultural studies of thought processes in nondrug using groups produce the kinds of Rorschach findings noted here? While all of these factors complicate attempts to specify causal relations, some of the data are consistent with findings in other studies of drug users.

The findings of increased responsiveness to stimuli as manifested in this sample by their increased responses on the Rorschach are consistent with the findings of Blacker et al¹⁶ who noted increased sensitivity to a wide range of stimuli. Although not exactly comparable (due to different scales) the Rorschach findings of Spindler on the use of peyote by American Indians are similar to the present study.

In one sense the passivity described both by Blacker et al¹⁶ and Glass and Bowers⁸ in their patients would be consistent with the lack of affectual elaboration noted in the present sample. In another sense the drug using patients were not "passive" in terms of their increased responsiveness on the Rorschach. McGlothlin et al,¹⁷ in a sample similar to ours, but studied for organicity, noted some difficulties in abstracting abilities. While the present study did not examine organicity the finding that some of the disturbances of thinking noted in schizophrenics may also be present in drug users may indicate that the difficulties in thinking found in this study may underlie or relate to difficulties in abstraction as has been noted by Klee¹⁸ and Goldstein.¹⁹

It is difficult to tell definitely from the present data alone whether there is a cause-and-effect relation between

these findings and length of drug use, since disturbances in the areas found may be the very personality or cognitive characteristics that predispose to drug use. The present findings, however, are clearly suggestive of specific types of cognitive disturbances found in patients using hallucinogens, and should be tested further in a population at high risk, eg, early high school students in drug using areas. Testing of nonhospitalized drug users and nonusers from the same cultural milieu is presently underway. This may provide data for teasing out the effects of factors associated with hospitalization. If the question is also the specific effects of the hallucinogenic drugs, then it would be of interest to test similar demographic groups who abuse exclusively nonhallucinogenic drugs, eg, alcohol, heroin, etc. Further information about the specific cognitive effects of these drugs vs cultural effects might be gained from studying nondrug using groups who describe similar experiences, eg, yogas, practitioners of meditation, etc.

From these data we may make a tentative conclusion that prolonged hallucinogenic drug use by nonschizophrenics could heighten pathological disturbances of thinking, selected aspects of which are similar to those found in schizophrenics.

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