Autistic Schizophrenic Children

An Experiment in the Use of D-*Lysergic Acid Diethylamide (LSD-25)*

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Introduction

Since the hallucinogenic properties of D-lysergic acid diethylamide (LSD-25) were accidentally discovered by Hoffman in 1943 there has been wide experimentation with the drug designed to test its properties both as a psychotomimetic and as a therapeutic agent. It has been considered by some investigators as having great value in revealing the nature of the schizophrenic state and thereby advancing the understanding that leads to progress in therapy. However, other investigators, while acknowledging the undoubted psychic effects of the drug, insist that the LSD experience cannot be equated with naturally occurring psychosis.[1] It is not the first psychopharmaceutical agent to be used as an adjunct to psychotherapy; most of its predecessors were greeted with equal enthusiasm by some because of their action in unlocking the gates of repression and thus leading to disinhibition and catharsis. In fact, according to Hoch,[2] careful studies of a large number of patients who were under the influence of different drugs did not reveal any marked specificity as to the use of those different agents. He describes mescaline and LSD as essentially anxiety-producing drugs which, because of their magnification of the patient's symptomatology and the accompanying increase in anxiety and fear of loss of ego integration, may lead to the release of repressed material. These same qualities may be re-

Submitted for publication July 6, 1961.
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sponsible for the precipitation of overt psychosis in borderline cases.[3]

However, the facilitation of psychotherapy with these agents is by no means uniform. Variations in response to them by different patients may be due to metabolic as well as psychological and social factors, and the attitude of the psychotherapist who employs these adjuvants has been recognized as subtly—or not so subtly—influencing the results obtained.

While the therapeutic value of LSD in the treatment of psychoneurotic patients has been accepted with greater or less enthusiasm by various investigators, its value in the treatment of the psychoses has been considered much more questionable. In fact, by 1954, there seemed to be fairly general agreement that it provided little opportunity for genuine progress in the treatment of schizophrenics. This group of patients was found to be markedly resistant to the drug and relatively higher doses than for normal or neurotic subjects were necessary to produce any effects. Nevertheless, some striking temporary changes were observed in the behavior of schizophrenics who had been given LSD.

In a study of 18 schizophrenic patients, Busch and Johnson[4] reported that excitation was the outstanding effect of LSD administration. This group moved and talked more than usual and showed greater interest and emotion.

Hoch, Cattell, and Pennes[5] observed psychic changes including hallucination, perceptual disturbances, and unreality feelings in a group of 21 schizophrenics. There was also evidence of anxiety, euphoria, and depression.

Pennes[6] reported of LSD and mescaline, "The characteristic effects of both these drugs consisted of an exacerbation of preexistent symptoms." In a group of 25 schizophrenic subjects he found that responses to LSD could be classified as intensifications in 16 (64%), diphasic (mixtures of intensification and normalization) in 6 (24%), and absent in 3 (12%). Normalization features in the 6 diphasic reactors included definite relaxation, decreased anxiety and tension, decreased concern over phobias and compulsions, subjective euphoric state with lifting of depression, and improved affective display and general contact.

At the Second International Congress of Psychiatry in Zurich in 1957, Hoch, Pennes, and Cattell[7] raised the question, "What is the reaction of psychotic subjects to drugs which have strong psychological effects or induce psychotic states in normal individuals?" Their answer was, "The majority of schizophrenics displayed intensification of their pre-existing symptomatology on administration of mescaline or LSD 25 . . . The reactions of schizophrenic patients to mescaline and LSD 25 are usually marked with severe anxiety and other emotional patterns, while disorganization of thought and behavior patterns may be profound."

It has been the opinion of some investigators, however, that this disorganization of behavior patterns in schizophrenics might be followed by a reorganization that could be a step toward normalization. Quite recently, Bierer and Browne[8] stated that "We thought this so-called 'disorganization of the psychic integration' must be a temporary removal of the ego-defenses and possibly could be used therapeutically." They decided to combine LSD or LSD plus methamphetamine hydrochloride (Methedrine) with group psychotherapy. Their report on results of treatment of 75 patients, of whom 30 had the diagnosis of schizophrenia or advanced schizoid states, indicated that "burnt out" schizophrenics are among those on whom LSD appears to have no effect. They also state, "Further work is necessary, but it is clear that to include 50% of schizophrenics in a group markedly reduces the chances of success."

Sandison and Whitelaw[9] have treated and followed up a substantial number of patients over a period of years, using LSD and chlorpromazine in combination. They found that this method of treatment "shows encouraging results in well-preserved schizophrenics of one to two years' duration that

had not responded to orthodox methods of treatment."

The work of Abramson and his colleagues,[10] in which tape recordings were made of group sessions in which the participants were a patient, a "stablemate," and an interviewer, revealed that "Under LSD the patient's participation in the group process is increased. Both the frequency of the patient's interaction and the amount of the patient's verbal contribution in the group situation are higher in the LSD than in the placebo sessions." Further, "Under LSD the patient's affective references revolving around the self decrease and affective references toward or centering around other persons increase. Under LSD the patient's non-personal references decrease and other-oriented references increase." They believe, "In general, there is just as much if not more change of behavior under LSD for schizophrenic patients than for normal subjects."

Since we were involved in the treatment of a group of autistic children, all of whom were mute, or practically so, we were particularly interested in the work of Cholden, Kurland, and Savage,[11] who studied the reactions of chronic, regressed schizophrenic patients to LSD. They reported that, "One catatonic patient who had been mute for some years suddenly burst into loud wailing sobs which were shortly followed by overwhelming bursts of laughter starting 35 minutes after the drug was taken . . . Every few moments for the next few hours she would shake with laughter, and then she might talk a little . . . She often said she enjoyed things very much and that this was a nice ward, etc. . . . The next morning when she awoke, she was her old catatonic self, unable to speak, unable to show interest in anything about her, and quite withdrawn." On the second day of treatment this patient showed much less change from her usual behavior than she did on the first, and on the third day there was no response at all. Three other regressed schizophrenics also showed a marked change in behavior on the first day of drug administration, although all seemed to develop complete tolerance to the drug by the third day. In another group of patients, a 60-year-old man "responded with wild bursts of laughter which was most unusual for him since Mr. G. never spoke." Of the 20 patients studied, *each* showed some unusual behavioral manifestation as a result of the drug administration. Some patients showed an intensification of their usual symptomatology and behavior patterns (this was more common in the more acute schizophrenics), while others showed striking reversals of accustomed behavior, as in the case of those who had been mute and who became talkative.

At the time that we made the decision to observe the effects of LSD on a group of schizophrenic children (spring of 1959) there was no indication in the literature that the drug had been used with children elsewhere. Since that time there have appeared scattered references to such use, but no detailed reports.

In a conference on LSD held in Princeton, N.J., in April, 1959,[12] several investigators reported having treated children with LSD. However, among the 5 references there were a total of only 12 children and results of treatment were not given for most of these cases. One psychiatrist, Dr. T. T. Peck of Texas, did report having administered LSD once a week over a 3-to 6-week period to 5 children ranging in age from 5 to 14. They received an average of over 4 treatments per patient and the results were classified as excellent in 4, poor in 1. However, he also stated that even 1 treatment in a child provided alleviation of symptoms, which continued when there was also environmental change. Dr. Robert Murphy reported having treated 3 children with LSD over a period of months. One 8-year-old girl, described as an enuretic child "with a long-standing extremely chronic and extremely resistive character disorder" had been in unsuccessful psychotherapy for a year before starting LSD. After working up to regular weekly treatments with LSD she made a very good re-

covery. Dr. Murphy also states[13] that a 10-year-old girl, moderately autistic, seemed to show profound changes during 3 months of treatment. In that case treatment was interrupted by external circumstances and follow-up was not possible. Dr. A. Hoffer of Saskatchewan states[14] that he has used LSD on only 3 or 4 children, so that its results could not be assessed, but one boy, a severe behavior problem, appeared to have been markedly changed by LSD. Dr. A. M. Hubbard of Vancouver has also used LSD with some children, primarily delinquents, and considers[15] the work to have been 85% successful. He refers to the striking behavioral change in a 13-year-old boy after treatment with LSD.

Method

The institution at which the present studies were undertaken was a day school for schizophrenic children. A total of 40 children attended the school which had on its staff a director, a psychiatric director, 2 psychologists, a psychiatric social worker, dance therapist, music therapist, 14 teachers, administrative and housing personnel.

A total of 12 children, all autistic schizophrenics, were chosen for the experiment. All were well known to the authors prior to this study. The children—10 boys and 2 girls—ranged in age from 5 years 11 months to 11 years 10 months. Seven of the children were mute and the remaining 5 used words or phrases occasionally, most often for no apparent reason. Each had noticeable compulsive motor behavior that was characteristic of him. Six of the 12 received tranquilizers regularly. Table 1 summarizes the relevant usual characteristics of the group.

The experiment was conducted over a period of several weeks so that only one child received the drug on any one day. Two children were given LSD on 2 separate occasions. In order to minimize the difficulties in administration of LSD to the children, it was decided to give the drug orally to each child in a vehicle to which he was accustomed or of which he was particularly fond. The dosage was set at 100μg. for each child except for one smaller girl who received 50μg. and one boy who received 200μg. on a second administration. In the latter case, 100μg. was given initially and another 100μg. about 2 hours later. The relatively high dosage (of 100μg.) was decided upon in order to eliminate beforehand the factor of inadequate dosage should there appear to be no reaction in the children. Each child was given his drink containing the LSD immediately

TABLE 1.—*Population*

Patient	Age		Sex	Customary Affect	Customary Language	Customary Physical Mannerisms	Customary Treatment
	Yr.	Mo.					
1. Ralph	8	4	M	Flat, depressed	None	Rocking, finger twisting teeth grinding	Reserpine
2. Richard	11	10	M	Flat	Words, very rarely	Rocking	None
3. Danny	6	10	M	Variable	None	Covering ears and vocalizing	Atarax
4. Nancy	7	11	F	Depressed	None	Rocking, jumping, clapping, rubbing abdomen	Prochlorperazine
5. Charles	10	2	M	Flat	None	Jumping	None
6. Gene	6	5	M	Flat	None	Swaying, squatting	None
7. Pearl	9	4	F	Variable	Words, phrases	Rocking, scratching, tics	None
8. Harold	6	1	M	Flat, depressed	None	Arm waving, teeth grinding	None
9. Edgar	8	6	M	Depressed	Words, rarely	Jumping, giggling	Chlorpromazine
10. Ronnie	9	2	M	Flat	None	Striking self	Prochlorperazine Reserpine
11. Francis	8	8	M	Normal	Words, phrases	Rocking, teeth grinding, thumb sucking	Chlorperazine
12. Donald	5	11	M	Flat, normal	Words, phrases	Running in circles, forcible laughing	None

TABLE 2.—*Administration of LSD*

Patient	Blood Pressure	Pulse	Dose μg.	Vehicle	Time of Onset of LSD Effect (Min.)	Duration of Effect
1. Ralph	90/60	120	100	Choc. milk	15	4 hr. 10 min.
" *			100	Choc. milk	30	4 hr.
2. Richard	100/80	112	50			
			60	Coffee	30	4 hr.
" *			100	Orange juice		
			100 †	Orange juice	15	4 hr.
3. Danny	110/80		100	Coca Cola	20	4 hr. 40 min.
4. Nancy	100/75	92	50	Cocoa	25	4 hr. 30 min.
5. Charles	100/70	100	100	Cocoa	30	4 hr. 15 min.
6. Gene		100	100	Milk	25	4 hr. 10 min.
7. Pearl	110/70	100	100	Cocoa	25	4 hr. 10 min.
8. Harold	110/80	120	100 †	Water	30	4 hr.
9. Edgar	110/80	96	100	Cocoa	30	4 hr.
10. Ronnie	95/70	80	100	Cocoa	15	Over 5 hr.
11. Francis	90/60	80	100	Cocoa	20	4 hr. 20 min.
12. Donald	95/70	100	100	Cocoa	15	4 hr. 10 min.

* Second administration of LSD.
† Spilled some.

after arriving at school in the morning. The 6 children who regularly received tranquilizers were given no drugs for 24 hours preceding the administration of LSD.

From the time the drug was administered until its effects had apparently worn off, a pediatric psychiatrist with whom the child was very familiar (one of us) was present. Careful notes were taken of all physiological and mental changes that were observed while the child was under the influence of the drug.

Blood pressure and pulse were taken immediately after ingestion of the LSD. One child vigorously resisted the taking of his blood pressure, and pulse was not obtained in his case.

In 4 instances onset of the effect of the drug was noted in 15 minutes. Two others showed a response in 20 minutes, 3 in 25 minutes, and the remaining 5 in 30 minutes. The obvious symptoms were apparent for a minimum of 4 hours. Eight children showed effects for something between 4 and 5 hours and one child for more than 5 hours. Table 2 summarizes the data relevant to administration and duration of effect of the drug.

Somatic Reactions

The commonly observed signs of facial flush and pupillary dilatation appeared in the children at varying times from 5 minutes to over 2 hours following ingestion of LSD, although one child developed no obvious facial flush. There was no change in the pulse rate or blood pressure other than that normally associated with a general state of anxiety.

In 3 children there were evidences of catatonia, with true waxy flexibility developing in one child who was given 200μg of LSD. The possible catatonia included a strange, fixed position of the hands in one child; the maintenance of various bizarre positions by another child; and more obvious catatonia in a third who remained in odd positions for various periods of time with marked waxy flexibility of the left arm. Equilibrium was unchanged in 8 instances, but one child developed marked ataxia, a lesser degree of ataxia was seen in 4 other instances, and one child developed dizziness due to whirling.

Appetite was markedly affected in all cases. Although the children were offered lunch at the usual time and place, none accepted it except one boy who ate a negligible quantity. As the effect of the drug wore off, all were offered food and ate it. There was no obvious evidence of nausea, which has been reported by some investigators. If nausea occurred it was not sufficient to cause vomiting.

Muscle tone varied among the children from relaxed to tense, with 2 of them showing variability dependent on mood. In 2 cases the muscle tone was doughy, and one child gave no evidence of change from his usual state.

TABLE 3.—*Somatic Reactions to LSD*

Patient	Time of Onset: Facial Flush	Time of Onset: Pupillary Dilatation	Catatonia	Equilibrium	Food Ingestion	Muscle Tone	Body Awareness	Physical Contact
1. Ralph	15 min.	20 min.	None	Unch.	None	Relaxed	Feeling lips	Seeking
" *	30 min.	30 min.	Possible	Some ataxia	None	Doughy	Feeling lips	Seeking
2. Richard	60 min.	5 min.	None	Unch.	None	Relaxed	Wriggling nose	Seeking
" *	60 min.	15 min.	Waxy flexibility	Unch.	None	Tense	Moving lips	Seeking
3. Danny	20 min.	20 min.	None	Some ataxia	None	Relaxed	Mouthing food	Unch.
4. Nancy	40 min.	25 min.	None	Unch.	None	Doughy	Playing with arm	Unch.
5. Charles	60 min.	2 hr. 15 min.	None	Unch.	None	Variable with mood	Clutching penis, throat	Unch.
6. Gene	None	1 hr. 10 min.	Possible	Unch.	Decr.	Relaxed	Mouthing food	Unch.
7. Pearl	1 hr. 20 min.	25 min.	None	Minimal ataxia	None	Variable with mood	Feeling lips	Seeking
8. Harold	30 min.	2 hr.	None	Unch.	None	Variable	Moving lips	Molding
9. Edgar	30 min.	30 min.	None	Marked ataxia	None	Unch.	Unch.	Seeking
10. Ronnie	15 min.	30 min.	None	Some ataxia	None	Relaxed	Unch.	Seeking
11. Francis	30 min.	55 min.	None	Unch.	None	Tense	Unch.	Seeking
12. Donald	15 min.	15 min.	None	Dizziness due to whirling	None	Relaxed	Unch.	Unch.

* Second administration of LSD. Code: Decr.-decreased; Unch.-unchanged.

There was evidence of some change in body awareness or development of new bodily sensations, since all but 4 of the children were observed to repeatedly stroke or move a particular area—most often the lips or mouth. A desire for increased physical contact was apparent with many of the children. This was shown by several as they sat on the doctor's or teacher's lap and cuddled against her to a greater degree than usual, clung to her hand or body, touched her arms, or otherwise tried to maintain some physical closeness.

Physical mannerisms characteristic of the children under ordinary circumstances seemed to disappear in several during the experiment but reappeared as the effect of the drug wore off.

Table 3 summarizes the somatic reactions to LSD by the children.

Psychic Reactions

The most striking of the observable psychic effects of LSD in the children were the mood swings which were sharp and rapid from extreme elation to extreme depression or anxiety. Both the elation and the depression varied in degree and duration among the children. The increase in anxiety, similarly, was moderate on 3 occasions, but severe on 4 and could be described as panic in at least one child. In 8 instances there was no evidence of actual depression but in Richard, Danny, Gene, Ronnie, and Donald there seemed to be flattening of affect. One-half the group gave no apparent sign of unusual anxiety. One child, having left school in the afternoon in a relaxed, happy mood, arrived home in a very agitated state, striking himself and biting others. His usual dose of prochlorperazine (Compazine) and reserpine (Serpasil) was ineffective and it was necessary to call the family doctor. Chlorpromazine (Thorazine) (50 mg.) successfully controlled him. He came to school the next day in his usual mood.

On 7 occasions the children seemed to be experiencing hallucinations which appeared during the period of elation and continued through a substantial part of the time the LSD was having its effect. Both auditory and visual hallucinations occurred, although the latter seemed to predominate.

Half the children seemed to demonstrate decreased alertness while 4 showed an increase in this quality and the remaining 3 seemed unchanged from their usual state.

On 10 occasions the children's remoteness was increased; 4 experiments seemed to have no effect on this characteristic.

Eye contact was increased in only 2 children, but decreased in 4.

Verbalization and vocalization were affected in quantity rather than quality. Those children who normally use some words or phrases did so more freely under the influence of LSD but did not use any new words. Two of the children seemed to experiment with new sounds.

Table 4 indicates the emotional and psychic effects of LSD upon the children.

It is of interest to consider in somewhat greater detail the changes from usual behavior which were manifested by some of the children after ingestion of LSD.

Nancy, a slight girl, 7 years 11 months old at the time of the experiment, had shown fairly substantial improvement in the 2½ years she had been attending the school. From constant withdrawal from both adults and children she had progressed to touching other people, sitting on the teacher's lap, and watching other children play. Bodily movements and coordination were greatly improved as were eating, self-help, use of play equipment, etc. More sounds, but no words, were produced. Constant anxiety seemed to have ended and depression lessened. Under the influence of 50μg. of LSD, Nancy quickly became euphoric, "singing" while sucking her thumb, and vocalizing almost constantly. At the end of an hour the vocalizing ceased and depression set in. Whistling, never heard before, and preoccupation with her left arm went on for some time. Her lips moved frequently, as though to form words, but no sounds emerged. There was no interest in lunch although she usually eats with great zest. Depression continued for over 3 hours, until the effect of the drug seemed to have worn off.

Ralph, a slender, delicate-looking child, 8 years, 4 months old at the time of the experiment, had shown neither development nor regression in the 2 years 7 months he had attended the school. He was a very passive but anxious child, unable to relate to others, with poor coordination, a super-

TABLE 4.—*Psychic Reactions to LSD*

Patient	Elation		Depression		Change in Anxiety	Apparent Hallucinations		Change in Alertness	Change in Rem.	Change in Eye Contact	Verb. Vocal.
	Onset	Duration	Onset	Duration		Type	Duration				
1. Ralph	30 min.	1 ½ hr.	2 hr.	1 hr.	None	Visual	1 ½ hr.	Incr.	Incr.	Incr.	Unch.
" *	20 min.	3 hr.	None		None	Auditory Visual	3 hr.	Decr.	Incr.	Unch.	Unch.
2. Richard	30 min.	1 ½ hr.	Fleeting		Moderate Incr.	None		Incr.	Unch.	Unch.	Unch.
" *	15 min.	1 hr.	None		Moderate Incr.	None		Unch.	Unch.	Unch.	Unch.
3. Danny	30 min.	2 ¼ hr.	None		Moderate Incr.	Auditory Visual	2 ½ hr.	Decr.	Incr.	Decr.	Unch.
4. Nancy	25 min.	½ hr.	1 hr.	3 hr.	None	None		Decr.	Incr.	Decr.	Incr.
5. Charles	30 min.	1 hr.	1 ½ hr.	2 ½ hr.	Extreme Incr.	Auditory Visual	2 ½ hr.	Decr.	Incr.	Unch.	Unch.
6. Gene	25 min.	2 hr.	None		None	None		Decr.	Incr.	Unch.	Incr.
7. Pearl	25 min.	¼ hr.	None		Extreme Incr.	Auditory	Intermittent.	Decr.	Incr.	Decr.	Repetitive Echolalia
8. Harold	70 min.	1 ¼ hr.	2 ½ hr.	1 hr.	None	None		Decr.	Incr.	Unch.	Unch.
9. Edgar	15 min.	1 ½ hr.	None		Extreme Incr.	Auditory Visual	2 hr.	Incr. to Sound	Unch.	Incr.	Unch.
10. Ronnie	4 hr.	2 hr.	None		None	Visual	2 ½ hr.	Unch.	Incr.	Unch.	Unch.
11. Francis	None		½ hr.	3 hr.	Extreme Incr.	Auditory Visual	2 hr.	Incr.	Unch.	Decr.	Unch.
12. Donald	15 min.	1 ½ hr.	None		None	None		Unch.	Incr.	Unch.	Incr.

Code: Incr.-increased; Decr.-decreased; Unch.-unchanged; Rem.-remoteness; Verb.-verbalization; Voc.-vocalization.
* Second administration of LSD.

ficial, bland expression, with occasional self-stimulated outbursts. He was mute although there were some occasional repetitive sounds for communication. His anxiety appeared in hand clenching and teeth grinding and a "startle" response to any movement. He rocked, standing and lying down, and twisted his fingers; only rarely could he be prodded into limited activity. When given the LSD he was very tense but didn't resist. Within 20 minutes there was both pupil dilatation and mild flushing of the face. Muscle tone was definitely relaxed, and more than usual eye contact was noticeable. In another 15 minutes he was attempting a puzzle, seemed more alert, responding to his name and to commands. He started rocking in a boat with apparent joy, never seen before. For the next 50 minutes he was definitely elated, tried all sorts of equipment and sat in a chair quite relaxed for a fairly long time. In another 25 minutes he was following something with his eyes—apparently visual hallucinations—and making guarding movements with his hands. He became more depressed, more remote, and continued guarding off motions, ignoring objects placed in front of him. This passivity was followed (about 4 hours after LSD was given) by increased alertness but motions suggesting hallucinations continued. In another hour he was extremely irritable. He had disregarded food at lunch but now took a glass of chocolate milk, whereupon the irritability stopped at once. He rocked on his cot, somewhat depressed, but relaxed.

One week later Ralph was given another 100μg. of LSD. Within 20 minutes he started jumping up and down, vocalizing "happy" sounds, and soon gave evidence of pleasant hallucinations (auditory). He smiled and manipulated his lips without sound. In another hour he sat motionless with his hands in an odd position, his facial expression changing constantly, but always on the pleasant side. Given a doll he held it, but seemed unaware of it, and when it was taken away his hands resumed their former strange position, possibly catatonic. He wouldn't walk by himself; when led he moved awkwardly. Later he walked alone, grimacing and motioning with his hands. His mood seemed rather flat. Four hours after ingestion of the drug he took chocolate milk and ice cream, behaved as he normally does, but seemed more awkward.

Comment

At the time this acute experiment in the use of LSD was undertaken there had already been a number of reports demonstrating the development of tolerance to the behavioral and some of the autonomic effects of LSD in psychotic [11] and nonpsychotic [16] human beings. This quality was also demonstrated in rats [17] which developed virtually complete tolerance in 4 days to the behavioral impairments induced by daily intraperitoneal injections of LSD, although LSD-induced bradycardia was not affected in the same way. It was recognized, therefore, that continued usage of the drug with schizophrenic children might be of little value in the cure of their disease. Nevertheless, it was felt that if they reacted in a fashion similar to that of the adult psychotics described by Cholden, Kurland, and Savage, some marked alteration might occur in the patterns of autism characteristic of them.

An analysis of the response to LSD by this group of children reveals many similarities to the behavior of adults to whom it has been given. Not all the children manifested the same changes; for example, apparent catatonia developed in only 3 instances, and ataxia in only 5. However, changes in body awareness, often reported by adults who have had LSD as a sense of distortion of parts of the body, seemed to occur in most of the children. The outward manifestations of this heightened or changed body awareness included running a finger across the lips a great deal, as though the child were experiencing a new or different sensation; much wriggling of the nose; holding food in the mouth for long periods, grinding it with the teeth and in other ways seeming to "feel" rather than to eat it; preoccupation with an arm—looking at it, stroking it, moving it over the face; clutching the penis and the throat.

While hallucinations are rare in autistic children and were not observed in this group usually, behavior suggestive of both auditory and visual hallucinations was observed during the experiment. One child stood in one spot for some time apparently listening to something and smiling; another placed his hands over his ears frequently as though hearing something unusual and also seemed to follow something on the ceiling with his eyes; several assumed an attentive look as though listening to something, plugged or covered their ears and smiled; eye move-

ments of others definitely suggested visual hallucinations.

Although none of the children showed any qualitative difference in speech patterns, there was definitely an increase in the quantity of sounds, laughter, or words produced. A number of children moved their lips as though trying to speak, but no sounds emerged. Some brought out new sounds, never heard before, but no words. One girl who normally uses some words repeated phrases or words continually, responded "No" to everything said to her, and laughed a great deal.

The euphoria commonly associated with the LSD experience was apparent in all except one child. In him there was an occasional fleeting smile, but depression and anxiety predominated for the entire period of over 3 hours. In every other instance there was obvious elation for varying periods of time, with frequent mood-swings seen in a number of children. Quick changes occurred from laughter to depression or anxiety manifested by sweating, clinging to the doctor, and generally fearful behavior. In some children the anxiety reached the point of panic, with the pulse elevated, the body shaking, the child clutching his genitals, stomach, and throat, making guarding motions, and running and clinging to the teacher or doctor for protection. At the opposite extreme there was evidence of relaxation in many of the children as they quietly cuddled in the doctor's lap or sat or lay on the floor or elsewhere in the room.

The disappearance of customary physical mannerisms in most of the children gave further evidence of the disorganization of behavior patterns under the influence of the drug.

The inability of these children to verbalize their sensations does not preclude the conclusion that much of the behavior described above is comparable with the reactions of adult schizophrenics to LSD. There was relaxation, excitation, euphoria, depression, anxiety, disorganization of thought and behavior patterns, improved affective display and contact. Further use of the drug on a basis which overcame the development of tolerance to it would be required to demonstrate its potentiality for utilizing these effects therapeutically, but the experience with its use in adult schizophrenics offers little hope for its success in the treatment of children.

Summary

Twelve children, ranging in age from 5 years 11 months to 11 years 10 months, who attended a day school for schizophrenic children, were given LSD on 14 different occasions. Ten of the children received 100μg., one received 50, and one had 110μg. on one occasion and 200 on another. The drug was administered orally in a vehicle (Coca Cola, orange juice, etc.) which the children liked. All the children were of the autistic type and all were mute or nearly so.

The effects of the drug appeared an average of 20 minutes after its ingestion and lasted about 4 hours. Somatic effects of the drug included facial flush, dilatation of pupils, some catatonia, some ataxia, complete loss of appetite, increased body awareness, and desire for physical contact. Psychic effects included rapid mood-swings from elation to depression, anxiety, or flattening of affect, auditory and visual hallucinations, decreased alertness in most but increased alertness in a few, increased remoteness, decreased eye contact in several and increased eye contact in a few, and increased vocalization and verbalization. The hoped-for change from muteness to speech did not occur.

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