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## VARIATIONS IN EGO FEELING INDUCED BY D-LYSERGIC ACID DIETHYLAMIDE (LSD-25)<sup>1</sup>

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D-lysergic acid diethylamide (LSD-25 or LSD) is a partially synthetic derivative obtained by condensing D-lysergic acid, extracted from ergot of rye with a secondary amine, diethylamine. In doses of 10-100 micrograms it produces the following changes in the psychic equilibrium:

1. Hallucinations.
2. Elation, depression and anxiety.
3. Regression to autistic states.
4. Profound ego disturbances including depersonalization and delusion formation.

The following is a summary of over 300 observations on 32 hospitalized patients and 6 normal controls. (Normalcy implies only that the individual be employed full time at a position commensurate with his abilities and have no obvious psychiatric disturbance.) The diagnostic breakdown of the patients was as follows: 6 acute schizophrenics, 8 chronic schizophrenics, 15 schizoid personalities with depression, 3 patients with involuntional depression. Most of the observations reported below were made on the normals and on the acute schizophrenics. All the normal controls showed these effects in varying degrees. In the normals these effects seemed to arise *de novo* and comparable disturbances usually could not be demonstrated in the past experiences of these individuals. In some instances these effects could be induced by doses as low as 10 micrograms. Acute schizophrenics were relatively less reactive and required 100 micrograms to produce a much slighter effect. Their symptoms appear to be an exaggeration of already existing symptoms but not invariably, as some of them reported visual hallucinations which they had not previously observed. Where minimal evidences of depersonalization were already present, such symptoms are greatly intensified by the LSD. By and large, the chronic schizophrenics did not show the phenomena described below; they did, however, show behavior

<sup>1</sup> The lysergic acid diethylamide (LSD-25) used in this study was furnished through the courtesy of the Sandoz Chemical Works, Inc., New York.

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which was similar to what had been observed during the more acute phases of their illness.

The schizoid and involuntional patients with depression complained chiefly of an intensification of anxiety and depression and somatic symptoms.

The LSD was given in whatever dose (10-100 micrograms) sufficient to produce a recognizable effect. It was given orally or by injection just before or after breakfast. Control doses of distilled water did not produce the effects described. The effects usually begin within one-half to one hour regardless of the route of administration. Most individuals developed tolerance to LSD after repeated doses.

#### SUMMARY OF THE EFFECTS OF LSD

1. *Hallucination.* Hallucinations were described by 5 of the 6 controls and by 4 of the 14 schizophrenics. While hallucinations of sound, taste, smell, touch and body sense are all present, the most vivid hallucinations are visual.

The world is transformed with bright and everchanging colors, even as autumn transforms the woodlands. The world becomes a place of indescribable beauty—"Blues, amethyst, yellows, greens"—at the same time imperfections become glaringly apparent. One individual found things so disgustingly dirty that he insisted on painting the walls. If the individual closes his eyes or sits in a subdued light, he is overwhelmed by a kaleidoscope of fantastic images. There is a progression from the change in appearance of external objects, "a blue flame shooting out from the tip of the pencil" through bright lights flashing in the periphery, neon lights which organize to form geometric designs, lattice works and arabesques; then formed objects appear, such as tapestries, animated wire-like drawings of people, such as airplanes with pilots and finally very realistic representations of human beings. "Everything is dark now except for that naked woman. She is certainly voluptuous." These representations can sometimes be shown to be the condensation of previous memory traces. These visions are at times of surpassing beauty: "A landscape with peasants in the field hoeing corn"; at other times they are comical: "Donald Duck with eyes puffed out; they are emerald lit—feet with glistening bunions;" "Groucho Marx—his wig turned into a rat and ran off the piano", and "someone hits Dagwood on the head, and his tongue keeps coming out." Initially the individual watches the hallucinations as though he were sitting, looking at a movie, but gradually as he continues he sees scenes of his past life which take on a certain measure of reality: "It's hard to describe the hallucinations because one is really there."

He may see a play he has seen before and feel as though he were back in the theatre 10 years ago watching the play, and re-experience the same emotions he had then, but at the same time, he recognizes that he is still in the hospital describing what he sees.

Very often the attempt to describe or write down the illusion causes it to go away: "When I try to write it down, it vanishes." When the experiences begin to take on the character of reality, when they are reacted to, they are again recognized as hallucinations; that is, the act of answering a voice, of reaching

for an hallucinated glass of wine may suffice to awaken the dreamer. One subject who saw a picture of a golden flower of unequalled beauty, wished he could sketch it, then thought why not photograph it. Expressing this idea aloud reminded him that this was an hallucination.

The hallucinations, while at times coming without apparent rhyme or reason, can sometimes be related to various stimuli from the environment.

Listening to the sound of a radio in the distance, one subject sees and hears a chorus of blue-birds and purple violets all singing. "A train whistle sets off a whole symphony."

The setting sun's rays lead to a vision of a "sun dial—sun streams through girl's face—as if I was in a vacation Palm Beach window looking at opportunities."

Some hallucinations can be related to stimuli from the internal environment. Thus the sensation of thirst produces this hallucination: "Look at the Indian dying of thirst and turning into a skeleton." A sore throat produces a vision of a raw hamburger with a knife scraping it.

Subjective feelings may be projected as hallucinations: "A feeling of confusion is followed by a vision of a devil laughing." Feelings of distrust and suspicion are followed by hallucination: "I see eyes, myriads of them detached, all staring at me. I'm the patient in a surgical amphitheatre. The students are all laughing and looking seductive. It's as though I were coming out of an anesthetic. . . lots of faces upside down laughing at me."

At times the hallucinations can be conjured up at will, induced by direct suggestion or by a voluntary effort to see a particular hallucination, but at other times they perversely refuse to appear or appear in some variant: "The thought of a thunderstorm registers as sound of storm warnings, SOS in Morse code, but visual scenes comprised dark but very still lagoon lit by sunset."

Thoughts can be shown to be directly translated into symbols which are seen as visual hallucinations. One subject was asked "What does a 'warning' bring to mind?" He saw "an owl chasing people down the street. He turns into a street light." Insanity suggested "a wall and a drawbridge being slammed shut. The wall turns into people who are fuming like smoke stacks pushing this way and that." Another subject was asked: "What do you see when you think of an electron in a box?" He saw the appropriate differential equation with bats hanging down from the various symbols. He also saw a firefly fitting about the room. Sometimes hallucinations obey the associational laws of contiguity and similarity. A visual impression of a circle may stimulate visual hallucinations of other round objects such as faces or breasts or eyes. Visual hallucinations sometimes involve related sensory modalities, "I see a hall of carpets, rugs, sofas, and feel that I am rolling on the sofa and see a yacht, an ocean liner, pitching back and forth lazily, and I am on it, and I feel sea-sick."

The drawing illustrated here (fig. 1) was done under the influence of LSD by a patient at the beginning of analysis. I asked the patient for her associations to this drawing and received the following reply: "A reproduction of a tapestry scene one might see in a museum; just a medieval pageant—that's all." A

month later the drawing was again presented and the following associations elicited: "It seems like art appreciation class in freshman college—it was a great disappointment."

The question: "What else has disappointed you?" elicited a sudden recognition of the meaning of the drawing. "The medieval knights in armor are really psychiatrists at an actual party. One fellow is drawn leaning or slant-wise (lower center); that's Dr. A.—. . . he's a drunkard. This one has (left—next to palm tree) a door for a mouth and one window for an eye—one good eye. That's Dr. B. He sees only half your trouble, and his mouth is open all the time bleating. (Far right) This one is a jovial little man with his visor open and closed. A recent description of Dr. C. He could be two ways: a fine serious person to talk with but two-faced. This is Dr. D. (upper center) holding a glass two fingers up—the only one I'm drawn to—sign of victory (the only one I could possibly get along with and that's the symbol of victory—seems to have many lettuces and cabbages on his head. No, plumes. He's got an ermine stole—highest—best dressed. It's a plume, cascade of plumes—the most gorgeous one here—drawing it is same as trying to remember the dream. . . . The first time made me think of rich pageantry of Ivanhoe—the party note but a disappointing background." This illustrates how like the dream hallucinations are subject to elaborations and interpretations and afford insights into unconscious processes, how distrust of psychiatrists was projected into hallucinations.

2. *Elation, depression, and anxiety.* Euphoria is not the most common response to LSD. It occurred in only 3 of the 6 normal controls, 2 of the 14 schizophrenics, 3 of the 15 schizoid personalities with depression and 1 of the 3 involuntal patients.

The first manifestations are subjective. The individual reports a sense of lift,



FIG. 1. Variations in ego feeling induced by D-lysergic acid and diethylamide (LSD-25).

of well-being, of discovery. His perceptions are exciting to him. He takes joy in the new found beauty of the world. His bodily sensations are intensely pleasurable. His skin for example feels as though it were being caressed. This is followed by joking and laughter. He feels witty and ironic and makes jokes and sly remarks at other people's expense. Everything strikes him funny. He goes into gales of laughter at his own remarks and at the remarks of others. He becomes talkative and uninhibited. He has flight of ideas: beginning with a serious topic he ends up reciting nursery rhymes. The laughter is often in response to a painful or anxiety provoking situation. A girl looks in the mirror and says "I look like a crone" and howls with laughter. Another subject complains "this pain in my stomach is killing me" and doubles up with pain and laughter until the tears run down his face. This behavior is followed by a withdrawal from the outer world. The individual lies with eyes closed in a state of ecstasy. He can be aroused with difficulty. He describes a delightful state of bliss, and he wishes to be left alone to enjoy the visions and fantasies that swarm over him. One individual reported fantasies of nursing.

The depression is often an intensification of previous depression often accompanied by ideas of helplessness and worthlessness and wish to die. Weeping is frequent and could in two cases be related to the feeling of helplessness induced by the drug in the face of disapproval or non-support from the experimenter.

Where any response at all to the LSD could be demonstrated, anxiety was present. This was manifested by a complaint of "nervousness", somatic complaints, fear, restlessness, and requests for the action of the drug to be terminated. Less overt anxiety was demonstrated by the normal controls who were somewhat conversant with medical research and by the schizophrenic groups. Naive control subjects and schizoid patients showed intense anxiety.

*3. Autistic States.* By and large, verbal communications during LSD intoxications are entirely rational. However, in deep levels of intoxication autistic productions can be observed. The following is a sample of autistic spontaneous reverie of a normal control obtained under the influence of lysergic acid diethylamide. I do not believe it can be distinguished from a schizophrenic production: "That voice— . . . like a sharp point on a rake—a prostitute—a patriarch. He had a meadow—a fish meadow. The hospital admission room. The hospital ambulance will soon be here to get you. Why not handle it here? Too much excitement—smart thing to leave record out a room. Put me down for overdose of seconal. It's evil for a person to commit suicide—glad there's a hell. He'll suffer as he deserves. Only way to escape purgatory. I can't convince two men. No hell worse than this. Two car family. Premature ejaculation. Chicken s——. Bottom layer all you find is s——. The shrewd thing to do with the walking psychiatrists is to get them Sunday. Monday there's a lot of cheap s——. Like Tuesday. See Horatio Alger. Find out what he'd do with the rest of his kids. The simple s——. Always putting the button over. I wish he'd fasten down to a dog blanket. A monstrosity. The knitting association turned it down. But the pup likes it as a bed. . . . I wish I had that R of mine. I forgot two things. My

fingertips asleep. I'm ambivalent about tips. I resent tips. Chief of the box. Chief Mary. A girl from Beltsville said after raising 25 turkeys. She was embarrassed. I feel well. I certainly am a victim of the f— machine age."

This can be translated somewhat as follows: the subject hears his own voice which sounds as sharp and piercing as the point on a rake. The rake makes him think of a Rake's Progress, which makes him think in turn of a prostitute. He then feels that he is down in the emergency room waiting for an ambulance to take him to the hospital. He doesn't want to go to the hospital because it will appear in his record. He then wonders if it would not look better in the record to be admitted as a case of overdose of sleeping medicine rather than admit to taking an experimental drug. But this would mean admitting a suicidal attempt which he feels is an evil thing to do and for which he thinks he should be punished. He expresses his contempt for psychiatrists who give shock treatments and do experiments on people like himself. He expresses a fantasy of having intercourse with Mary who has pretty large white breasts like the Beltsville turkeys.

4. *Ego disturbances, depersonalization and delusion formation.* The ego disturbances induced by lysergic acid diethylamide (LSD-25) can be described in terms of Federn's theories of the ego which are here briefly summarized (1):

The ego is the experiencing of one's own thoughts, feelings, and body in their relation to the rest of the world coupled with the expectation that these experiences will continue tomorrow as they have today.

One's ego is actually felt and this feeling is described as ego feeling. It is ego feeling which differentiates the self from the rest of the world, which distinguishes ego from external reality. What belongs to the ego is invested with ego feeling.

The perception of the extension of our ego feeling is designated as the ego boundary, i.e., how far we feel the ego extends. By and large the individual is not aware of the ego boundaries of his mind and body and becomes aware of them only when a change has occurred in them.

The ego has boundaries not only against the external world but also against the inner world; that is, the id, superego, repressed impulses, unconscious material and representations are not invested with ego feeling and are therefore beyond the pale of the ego boundary.

As the individual develops, entire ego boundaries are successively repressed and the unconscious portion of the ego consists in the stratification of "repressed ego states."

"The bodily ego feeling is a compound feeling including all motor and sensory memories concerning one's person, not identical with these memories but rather a unified feeling of libido investment of the motor and sensory apparatus." Ordinarily there is no particular attention paid to the body as long as it is functioning correctly. However, if one pays attention to various parts of one's anatomy, they awaken a feeling of familiarity which we may describe as body ego feeling. When regression breaks down the boundary between the feeling of the body ego and the perception of objects, projection of bodily processes into the external world takes place as in dreams and psychoses.

"The mental ego embraces not only perceptions, feelings, and emotions but

also all conative acts—that is, volition, thinking, and impulses towards movements, drives, memories, and anticipations. It includes also representations of time and space; in brief, the formation of all concepts." Mental ego feeling is reduced in dreams where most of the ideas, actions and representations are felt as foreign or ego-alien.

As long as the ego boundaries are intact the individual discriminates real from unreal. When ego boundaries are no longer intact, the individual loses the capacity to discriminate real from unreal. In going to sleep there is a gradual loss of ego feeling both for one's psyche and for one's body, i.e., the "ego feeling is withdrawn from the ego boundaries." (Since the ego boundary has been defined as the extent of the perception of ego feeling, the ego boundary here must represent the memory and consciousness of the previous extent of ego feeling.) The sensation of having a body gradually slips away and regresses to the stage where the various parts of the body first came to be included in the ego. One's thoughts and feelings start appearing in the form of hypnagogic hallucinations and dreams which seem to be coming from the outside world. That is, when the ego becomes drowsy, mental phenomena not invested with ego feeling enter the weakened boundary of the ego.

The contents of the hallucinations can be recognized as one's previous thoughts which became deprived of ego feeling on going to sleep and to which ego feeling was restored on awakening.

By contrast in the waking state, however, when "an object impinges on a part of the ego boundary which is not invested with ego feeling it is felt as strange." That is, a feeling of estrangement in perceiving the external world ensues when the ego boundary loses some of its ego feeling despite the continued investment of objects with significance.

If representations which ordinarily pertain permanently to the conscious ego, those of the body in particular, lose their ego feeling, depersonalization ensues. In depersonalization the feeling of unity in the ego in regard to time is absent. Consequently there is an ego boundary which is directed against time perceptions.

All of the normal controls and four of the schizophrenics showed profound ego disturbances after taking LSD, and two normal controls and four schizophrenics showed delusion formation. The first effects of LSD are simple feelings of change in the self and the external world.

#### CHANGES IN BODY EGO FEELING

About one-half hour after taking LSD there is an increase in the extent and intensity of body ego feeling. There is an increased awareness of the body, an increased sensitivity to all bodily sensations, an increased preoccupation with the body. The entire body is felt; instead of being taken for granted, it becomes the entire focus of attention. Things that ordinarily are out of awareness come into the foreground: the fillings in one's teeth, the contractions of the stomach, and the urinary and anal sphincters, the pulsations of the arteries, the pounding of the heart, the sensations of the skin and muscles. The body feels charged with energy. Often these sensations are enjoyed. Every sensation is pleasurable.

There is a sense of well-being, or lift, of wanting to do things. One individual commented: "Oh, what it does to the libido." The euphoria associated with the early phases of LSD intoxication has a large somatic component in the enhanced body ego feeling.

Anxious subjects do not experience these variations in body ego feeling as pleasurable. They complain of blurred vision, eye strain, stomach ache, urgency, nausea, pains in the head, neck and face, hot and cold flashes, and numbness and tingling of the hands, feet, genitals and lips which are described as like electric waves or like ants crawling. These symptoms of pain and paresthesias are quite compelling and demand the individual's entire attention so that they may exclude everything else from awareness.

Associated with the tearing up of the body ego as well as the inability to coordinate the impression of the senses is a severe dizziness. This may be the first symptom, and it may occur when the individual's attention is called to his inability to coordinate. One individual was seized with vertigo when his attention was called to the fact that he was eating his meal backwards. With the onset of dizziness the individual finds it difficult to walk; he sways and complains that he feels drunk. The dizziness is most severe when the individual attempts to walk, but it is not relieved by sitting or lying down. In fact lying in bed with closed eyes he feels as though he were sailing through space at a rapid rate and that if he let go of the bed he would fall, because the bed seemed to turn over and over.

With this phase many changes can be observed in body ego feeling. The unity of the body ego cannot be maintained; the parts of the body seem dislocated. Limbs feel detached and floating. The symmetry of the body is lost, and it assumes enormous plasticity. It becomes warped and distorted in every direction. Some parts of the body feel heavier than others. When one attempts to lift something, that arm feels stretched out and longer while the body feels shorter and compressed. The body outline seems lost and it appears confluent with the bed, like a sheet lying on the bed. The body seems to be a vague mass except the parts towards which one directs attention. The body may feel light as air or heavy as lead. The body may feel large and inflated or so small that the individual fears lest he be stepped on. (This can be shown to reflect the individual's estimate of his own worth.) Parts of the body seem to vary in size according to the attention paid to them; an aching tooth seems enormous. The body may become separated from the individual so that he feels himself sitting off in a corner or standing in back or the side of himself. His body may even seem to come apart so that he feels that he can take off his head and hold it in his hands. In time the body ego feeling is lost. This is a gradual process. The feeling for the legs and genitals disappears first, then the arms, then the trunk. In time ego feeling may be lost for everything but the face and lips, the body ego regressing to the stage where the various parts of the body first came to be included in the ego. These losses may not be observed by the individual at first and may come as a great shock to him when he becomes aware of them. "What happened to my body?" He may complain with some surprise that he

cannot urinate because he has no body, that he cannot talk because he has no throat. There may be only a vague awareness of change exemplified in the frequent complaint of feeling disembodied or like a disembodied spirit. All consciousness of the body is finally lost, and the individual is aware of only his thoughts. These disturbances in the body ego feeling are reflected in the visual hallucinations. Complete human figures are rarely seen. Hallucinated figures are seldom filled out below the waist. Usually only the face and head are represented in hallucinations. The complete loss of body ego feeling or its regression to the mouth, tongue and lips was not complete when the individual suffered from an already existing pain or hypochondriacal tendency. Body ego feeling was often retained in an organ that felt painful or uncomfortable. LSD accentuated whatever aches or pains already existed. When this happened, the afflicted organ became the only reality—the rest of the body seemed to have melted away. The individual's entire being was centered in the painful organ: the sore throat, the aching back, the toothache, which in turn swelled to alarming proportions.

#### CHANGES IN THE BOUNDARY OF THE BODY EGO

With the changes in body ego feeling are associated changes in the ego boundaries of the body. Ego feeling is withdrawn from them, and they become weakened, fluid and variable. It becomes increasingly difficult to tell where the body leaves off and the rest of the world begins. Initially, the change is in the direction of enlargement of the ego boundary so that anything that happens within the room is felt within the body. The motions of others are felt within oneself. The individual looks out the window at the cars passing by and feels the cars running over him. He hears noises in the next room and feels that he is making them. When he lies in bed, the bed feels like part of his body, and when he gets up, he feels as though the bed were still a part of him.

Not only are perceived actions appersonated but hallucinated motions as well. One individual while passing urine noticed on the wall what he took to be a shadow of himself. Actually it was not; it was an hallucination or, more properly, an illusion derived from some markings on the wall. Suddenly, the hallucination disappeared. When this happened, he felt a pain in his body and complained of an injury to his own body. The individual has a visual hallucination of a ship; he feels that he is on it, and he feels that he is being tossed and turned with it, even though he recognizes the ship is only an hallucination. Gradually, the ego boundaries are constricted. The clothes, the shadow, the mirror reflection, the skin and finally the extremities are shed chrysalis-like and are no longer felt as belonging to the body. The body ego feeling for them has been lost.

#### ESTRANGEMENT OF THE BODY

When ego feeling is withdrawn from an ego boundary, the result is estrangement. During the LSD intoxication there is a gradual withdrawal of ego feeling from the ego boundaries of the subject's own body. Initially this may not be noticed. If the individual's attention is then directed to what was formerly invested with ego feeling, this is felt as estranged. One subject under the effect

of LSD typed unconcernedly until he noticed his hands. Then they appeared strange to him, as if they could not be his, and he wondered who was typing. Another subject insisted on reading a book in an effort to cling to some familiar vestige of reality. Suddenly, he wondered what was holding the book up in front of him. He noticed two hands dangling in space from the book. They did not appear to be his hands. He wriggled his hands and saw the hands in front of him move. Unconvinced, he continued to watch and noticed that the hand appeared to move without his making any effort to move it. The skin of the hand wrinkled up before his eyes, and it took on a simian cast. The individual then traced his hand back to his arm, shoulder and trunk which he felt belonged to him. This convinced him temporarily that the hand was really his. Estrangement for any part of the body may be observed. Thus: "holding a head in my hands and wondering whose it was—what it had to do with me; it felt like the calvarium of an unbaked (sic!) ape." Genital sensation is originally intensified. The paresthesias which sweep over the body are felt as sexually stimulating. One individual said he felt he was being pleasantly impaled. This is in turn followed by loss of ego feeling for the genitals which is difficult to restore. One patient complained: "One is not a man without an erection." Complaining that he had lost his penis, he felt for it to find out if it was still there. What he felt did not appear to be his penis, and he complained that what he felt was only an old dried up frankfurter. He subjected the matter to visual inspection but was unable to convince himself that the penis was really his. He recognized that the penis was attached to his trunk, and so it should be his, but it did not feel like his. Only the passage of urine restored body ego feeling to the penis.

As in the agnosias the individual can dispel estrangement and force recognition of part of the body by a tremendous effort of will. Marshalling all the energies at his command and concentrating all his attention and by using all the sensory modalities at his disposal, he can restore ego feeling to the part of his body in question. But, as in the agnosias, he cannot maintain this effort, and the limb is soon lost only to be rediscovered in the same manner.

Feelings of unreality spread from the body to the outer world and from the outer world to the body. Where the individual's leg feels unreal, everything that he walked on feels unreal. If the hands feel unreal, touching a familiar object does not make the hands more real but the object less so.

#### DEPERSONALIZATION

In time the body is totally estranged. The individual feels that his body is not his, that it functions automatically, that he has nothing to do with its activity. He watches the movement of his hands and does not feel that he has initiated it. He cannot tell whether the motion is real or hallucinated. He feels that the saliva in his mouth is not his, that someone is pumping it in from the outside. One subject complained: "I am like Gulliver tied down by tiny bands; my hand is moved by their tiny windlasses."

In one subject the depersonalization proceeded to a degree where his body was projected as an influencing machine which made him see pictures (hallucina-

tions) and controlled his thoughts, feelings and actions. He complained of "an indwelling television set," that the LSD has transformed him into a television set and that some one else was controlling him by sending out impulses which caused him to see pictures and induced sensations in his face and lips, which were misinterpreted as the fade out and ripples on a television screen. Not only could that someone control him but could even read his mind and everything that the individual was seeing.

The someone else was conceived to be the doctor who by using LSD may have gained this ascendancy over the subject. The subject felt that if he in turn could get control of a supply of LSD, he could control any one he could persuade to take it.

So convinced he was of the reality of his delusions that he got up and went to the phone in order to announce his discovery which seemed to him revolutionary. It seemed to him that whoever could control the supply of LSD could control the rest of the world.

In order for experimental depersonalization to appear, not only must ego feeling be withdrawn from the body ego, but the individual must pay attention to and observe his body. If he is put to work doing a psychological test which absorbs all his interest, he will not notice his body. If he lies in bed with his eyes closed, he may not notice his body. Here his body is no longer felt as strange or unreal. It is no longer felt.

#### CHANGES IN MENTAL EGO FEELING

Changes in body ego feeling usually precede changes in mental ego feeling and sometimes are the only changes that are observed. Initially mental ego feeling is heightened. The individual notices his thought processes more. His ideas seem unusually rich. Thoughts seem to come quick as a flash and without effort. Thinking itself becomes pleasurable. Ideas are expressed perfectly. He feels witty and superior and discovers new philosophies of life without difficulty. His affects are intensified. He feels everything more keenly. He weeps and laughs easily. Anxiety becomes crushing, grief is overwhelming, and enjoyment becomes hilarity. His perceptions seem to be quickened, and he takes pleasure in looking. He becomes increasingly sensitive and alert to the environment. He notices things which he had not noticed before. He complains that he is seeing things for the first time and that up till then reality had been hidden from him. Dirt, imperfections, all seem to hit him forcefully and become intolerable. His concept of spatial relations is impaired. He loses the ability to integrate objects in space. The stability of the outer world is lost. Corners lose their rectangularity; solid objects move; lines and planes bend. "The walls flap in the breeze like tapestries—they run like melted wax." "The floor flows like a river." One man complained he could not write because his pen kept growing and shrinking. The concept of distance is lost. The world appears as though painted on a glass window, two dimensional. The body ego takes part in these disturbances so that the individual has great difficulty orienting himself in space as he does other objects, and his body is subject to the same visual distortions as other

objects so that both he and the outside world look as though seen in a crooked or curved mirror. His hand held out in front of him may seem the same distance as the wall 20 feet away.

Disorientation in space may proceed to a point where the world no longer appears in the upright position and tilts one way or the other. Visual hallucinations may appear upside down, leaning or sideways. One subject reported seeing Da Vinci's Last Supper lying on its side.

#### ESTRANGEMENT OF THE EXTERNAL WORLD

Gradually, ego feeling is withdrawn from perceptions. When this happens, whatever is perceived appears strange. His perceptions no longer awaken a feeling of familiarity. When he hears someone speaking, the voice is unfamiliar and causes him to start. His own voice is unrecognizable, and he shudders at the sound of it and wonders who is talking. Other people seem unfamiliar, as does the individual's mirror image. To quote one individual: "I looked in the mirror; the hands, face and eyes were not mine; they are so evil looking. The hand is not mine; it looks like a corpse's hand; this dress isn't mine; yet, I recognize the spots on it." Initially, the feeling of estrangement can be dispelled by concentrating on familiar objects; but if the individual, having satisfied himself of the familiarity of one room, then goes to another, the familiar feeling is again lost. Eventually, it is no longer possible to restore the feeling of familiarity by concentration.

#### ESTRANGEMENT OF TIME PERCEPTION

Ego feeling is withdrawn from the ego boundary for time as well as space perception. Not only is there impaired ability to estimate the passage of time, but there is also a sense of timelessness. Past, present and future lose all meaning. This is patently demonstrated by the individual who, having laboriously established the fact that a hand is his own, loses that feeling and has to do it all over again. This does not represent a memory loss, for he can recall having done it before. But the experience of having done it before seems unreal and without meaning for the present. This illustrates how the individual is unable to bring past experiences to bear on present happenings, how the awareness of time and space is related to feeling of reality, how each experience is felt as happening *de novo*, i.e., for the first time. Without the feeling of reality, time and space concepts lose all meaning. The apprehension of time and space requires a continual integration of past, present and future and relating of them to the percept of the moment. Judgment of the passage of time is related to one's awareness of what is going on inside and outside the body. The fact that time appears to pass rapidly causes the individual no great concern as long as he makes no effort to confirm his subjective impression. When he attempts to check his estimate of time against the clock or the sunlight, he is beset with feelings of unreality. A frequent reaction to the clock is that it must have stopped or that it is wrong. The evidence of sunlight cannot be so easily dismissed and

leaves the individual with the feeling that the whole experience is unreal. The disturbed awareness of space and time, the inability to relate the moment of the past to the moment of the present is reflected in the inability of some patients to perceive motion. The concept of motion is lost; movement is decomposed, as though one were looking at a series of "stills" each independent of and unrelated to the succeeding one.

LOSS OF EGO FEELING FOR (ESTRANGEMENT OF) THOUGHTS AND FEELINGS

Eventually the individual withdraws ego feeling from not only the external world (objects) and from his body, but also from his thoughts, ideas and feelings.

He no longer has any identification with his own feelings. He laughs; yet, he feels no mirth. He weeps, yet he feels no sadness. It is as though he were standing by watching the emotions of another person. Thoughts appear to come out automatically without effort or will. Thoughts appear strange and new and no longer awaken a feeling of reality. Their very newness and strangeness may give them the force of revelation. Eventually, thoughts take on the character of objective reality and are no longer recognizable as one's own thoughts. They seem to originate from without rather than from within the person. As the ego boundaries become constricted, thoughts and affects are projected into the outside world and are felt as impinging from without rather than as arising from the ego itself. The individual no longer can tell where his thoughts leave off and the thoughts of others begin. He feels that others can read his mind and that they share his thoughts and feelings. The boundary between his perceptions and his inner feelings is lost, and the distortions which he sees in the faces of other people can sometimes be traced to the projection of his own self-image. One patient saw other patients as small, flat, yellow, wherein he reveals his feelings about himself. Another saw the nurse as kind faced and concerned, wherein he projected his need for her concern.

One individual was asked his associations to an idea. Instead of producing verbal associations, he had an hallucination of two men carrying in a heavy box, the plastic representation of the idea he was seeking. So real was the hallucination that he said aloud: "O.K., boys, you can set it down right here."

Thus, instead of activity directed towards a goal, he is content with hallucinated wish fulfillment. He is thirsty; he has hallucinations of watermelons, pools, aucets, beer mugs and glasses of wine. Reaching for the glass of wine, he discovers it is not there, and he is awakened to the fact that he is still thirsty.

Not only are wishes separated from the individual in this fashion but his conflicts as well. One individual had considerable conflict about taking the drug and felt considerable resentment about having done so. He had the hallucination that two doctors were arguing hotly over the disposition of a case of delirium tremens. Awakening, he recognized that he was the patient, and he also recognized the doctors' arguments and accusations as some that he himself had previously put forth in *re* taking the drug.

Eventually, he may even refer to himself in the third person. Yet he is still

capable of effective action and can carry out tasks assigned to him. One subject who had apparently but not really recovered from the effects of the drug drove 30 miles to a class on infra-red spectrophotometry. He drove without difficulty and apprehended all the material in the class. Yet the experience was completely unreal. He behaved automatically like a machine. While driving he had the feeling that other cars did not exist for him, that they constituted no menace to him, that they could not possibly get at him.

#### REGRESSION TO EARLIER EGO STATES

Hallucinated conversations can sometimes be recognized as the memories of real conversations which actually happened. The subject regresses to an earlier ego state when these voices were actually outside the ego boundary, and thus the voices are heard as real instead of being recognized as hallucinations.

Episodes of depersonalization are sometimes recognized as re-enactments of previous experiences.

Further evidence of regression to earlier ego states may be found in the Rorschach. One individual had a test protocol while he was under the influence of LSD which differed from a control protocol of a 4 months earlier date but closely resembled a Rorschach done a decade previous.

#### SUMMARY

Lysergic acid diethylamide causes a severe ego disturbance which manifests itself first in a raising, then in a lowering of ego feeling followed by withdrawal of ego feeling from the ego boundaries with symptoms of estrangement and depersonalization and ultimately regression to previous ego states with appearance of hallucinations, delusions and projection of bodily processes.

LSD-25 acts by altering perception. Continuous correct perception is necessary to maintain ego feeling and ego boundaries. Federn has already pointed out how a mandibular block destroys the ego feeling for the part of the jaw which has been anesthetized. When the anesthesia wears off and ego feeling is gradually restored, the affected jaw feels estranged before it regains full ego feeling. This is even more striking after spinal anesthesia where ego feeling for the entire lower half of the body is completely lost and the legs are felt as foreign bodies. Without perception, no ego can develop; with impaired perception, ego development is also impaired. Without perception there can be no relation to the outer world. By motor activity the person makes an effect on the outer world, but unless he perceives the act it does not constitute a relation with the outer world. *Perception determines our ego boundaries.* If perception is accurate, the differentiation of ego from the outer world is complete; where perception is inaccurate, as in drowsy states, anesthetized states or LSD intoxication, ego boundaries may lose ego feeling and be lost altogether. These disturbances in perception caused by LSD make it impossible for the ego to integrate the evidence of its senses and to coordinate its activities; proper correlation of perceptive and executive functions cannot be carried out. Perceptions no longer awake the feeling of recognition.

The individual is unable to bring into congruence his perceived environment and the schema of the environment that he carries within himself.

If we make the following broad assumptions: 1. There is a psychic energy called ego libido (or more precisely ego cathexis); 2. ego libido is subjectively recognized as ego feeling, then we can also say that LSD interferes with the amount of libidinal energy available to the individual. The disturbances produced by LSD illustrate the enormous energy required to maintain ego boundaries. Depersonalization follows when for some reason this energy is not available. In LSD intoxication it is not loss of interest in objects that leads to estrangement but the fact that the individual does not have sufficient energy to maintain object investment.

The individual rejects the outer world not because his hallucinations and delusions and fantasies are so much more fascinating than the external world. Far from it, the individual strives desperately to hold onto his reality, as for example, reading a book which he has read many times before. This does not entail a loss of interest in the external world but a feeling of insufficient libidinal energy to maintain contact with it. Attempts to regain object relations are likely to increase the unpleasant feelings of unreality. For this reason the individual prefers to lie in bed where he is less troubled by feelings of unreality. When he does function, it is like a machine, like an automaton.

To dispel feelings of unreality he must concentrate all his thoughts, all his senses. To invest his hand with ego feeling, i.e., with reality, he must look at it and observe its relation to his own body. He must feel it with the other hand. He must feel with it, and he must feel it move. This leaves him no energy for anything else. If he relaxes his efforts, body ego feeling for the hand is again lost. When he sees it again, it again appears unreal. Such efforts do not always work to dispel a feeling of unreality. Visual estrangement instead of being dispelled by touching may produce tactile estrangement.

Observations on LSD structured in terms of Federn's theories suggest that impoverishment of ego libido or ego cathexis can be demonstrated in experimental psychoses and also in functional mental disease. How LSD-25 brings about a diminution of ego cathexis remains a problem for further investigation

#### CONCLUSION

Lysergic acid diethylamide (LSD-25) is a powerful pharmacological agent, harmless in its correct dosage range, 10-100 micrograms, which produces psychoses in normal individuals without untoward after effects. It has a factor of safety of more than a thousand. Its effect on individuals already suffering from mental disease is less dramatic; however, it accentuates pathological processes already present.

1. It permits the study at close range and in intense detail of phenomena that are relatively transient in ordinary clinical practice such as hallucinations, depersonalization and elation.

2. It permits the study of psychotic processes and communications and their meaning from their inception up until their resolution—the fate of the ego in

psychoses can be observed. It allows the investigator to develop a certain feel or empathy for its psychotic process.

3. It allows experimental studies to be brought to bear on psychiatric theory. Psychiatric hypotheses are not usually found in terms sufficiently rigorous to allow of proof or disproof. Nevertheless, the evidence from LSD seems to support present day theories of ego psychology and ego boundaries.

#### BIBLIOGRAPHY

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