A PSYCHOPHARMACOLOGICAL TEST OF THE "BODY IMAGE" HYPOTHESIS[1]

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The basic hypothesis underlying the interpretation of human figure drawings is that the figures represent the subject's body image, defined by Schilder (11) as "the picture of our body which we form in our mind." In a recent review of research on figure drawings, Swensen (15) found few studies pertinent to the "body image" hypothesis, and he concluded that "there is slight basis for believing that the figure drawn usually represents the subject's own body." Among the investigations cited in this review, there is not one in which the investigator sought to produce body image changes in his subjects experimentally, and then determine whether these changes were reflected in their figure drawings. There are a number of ways in which such a study might be carried out. The use of hypnosis to induce alterations in sensory or motor functioning, presumably accompanied by changes in body image, is an approach that might prove fruitful. Another possibility, represented by the study reported here, is a psychopharmacological test of the "body image" hypothesis.

Body image changes are among the most dramatic symptoms produced by lysergic acid diethylamide (LSD-25). Virtually every investigator since Stoll (14) has remarked on the striking effects of the drug on body image. Savage (9) has given a particularly graphic and detailed account of the progression of these effects, from the pathological accentuation of body image shortly after the ingestion of LSD-25, through the manifold distortions that are experienced somewhat later, to the eventual loss of the boundaries of the body image, accompanied by estrangement and depersonalization. Such symptoms as these suggested the use of LSD-25 in an experimental test of the "body image" hypothesis. Paintings and drawings illustrating the drug experience have appeared in a number of papers (2, 6, 7, 8, 10, 16), but the literature contains no systematic comparison of figures drawn under the influence of LSD-25 with those drawn by the same subjects under control conditions. The present paper reports the results of such a comparison.

PROCEDURE

The subjects were 18 male college graduates between the ages of 20 and 24, each of whom had had a physical examination and a psychiatric screening interview prior to the start of the study. Figure drawings were obtained from the subjects under control conditions, and also after they had ingested 72 mcg. of LSD-25 in distilled water. The conventional procedure was followed: the subjects were first asked to draw a person—a whole person, and then a person of the opposite sex from the first. Finally, they were asked to draw a picture of themselves. No time limits were set, and no further directions were supplied. Half the subjects in the sample made their drawings first under control conditions, and again two days later, at approximately the height of their reaction to the drug. For the other half of the sample, the order of the two conditions was reversed.

STUDY OF JUDGMENTS

The drawings of the male, female, and self figures were treated separately. The figures drawn by each subject under control and drug conditions were paired in random order

[1] The study reported in this paper was conducted under the guidance and supervision of Dr. Jacob E. Finesinger, Director of the Psychiatric Institute.

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and then given to four judges, with instructions to identify the figure in each pair that had been drawn under the influence of LSD-25. Two of the judges were clinical psychologists, trained and experienced in the psychodiagnostic use of figure drawings, but with no first-hand knowledge of the effects of the drug. The other two judges were psychiatrists who had worked for some time with the drug, but who had had no formal training or experience in the interpretation of figure drawings. For the benefit of the psychologists, LSD-25 was described as "a drug that produces symptoms resembling those of schizophrenia in some respects, and those of the toxic psychoses in others." They were also told some of the common effects of LSD-25 on body image, as reported by subjects in the drug state. All the judges were told the general characteristics of the sample: age, sex, and educational level, but the individual drawinge were identified by name only.

RESULTS

The first step in analyzing the data was to determine the reliability of the judgments. Table 1 presents a summary of the numbers of agreements between the six possible pairs of judges. The significance of the results was evaluated by means of the binomial distribution, which was also employed in most of the tests of significance to be reported below. Judgments of the female figures tended to be more reliable than those of the others, three of the judges obtaining perfect agreement in identifying the female drug figures. The reason for this difference is not apparent. The data gave no indication of a higher level of agreement between judges in the same profession than between judges in different professions.

TABLE 1

Reliability of Judgments of Human Figures Drawn under Control and Drug Conditions

	Male	Female	Self
Median	13*	17**	14*
Range	11–16**	16**–18**	11–15**

* Significant at .05 level.
** Significant at .01 level.

The validity or accuracy of the judgments was then determined. Table 2 shows the numbers of drug figures correctly identified by each judge. These data were subjected to Friedman's two-way analysis of variance (13), which revealed that the three figures did not differ significantly in the accuracy with which they were judged, and that the four judges also did not differ significantly in their ability to identify the drug figures. On the other hand, as all the judges indicated after they had made their identifications, the individual subjects varied greatly in the ease with which their drug and control figures could be differentiated. Five of the 18 subjects had every one of their drug figures correctly identified by all four judges. In contrast, there was one subject none of whose drug figures was correctly identified by any of the judges. The male figures drawn by this subject under control and drug conditions appear in Figure 1. It seems clear that the quality of his drawing actually improved under the influence of LSD-25, and the same was true for his female and self figures. There was nothing in this subject's psychiatric interview material that would appear to account for his improved performance in the drug state.

When the judges had completed their task, they were asked what cues they had used or had attempted to use in arriving at their judgments. As might be expected from the relatively high reliability of their judgments, there was considerable consensus in the cues that they reported. Cues most often mentioned for identifying the figures drawn under the influence of LSD-25 can be grouped as follows: larger size, more disturbed line quality, less attention to detail, and a greater number and severity of distortions. Each of these cues was cited by at least three of the four judges.

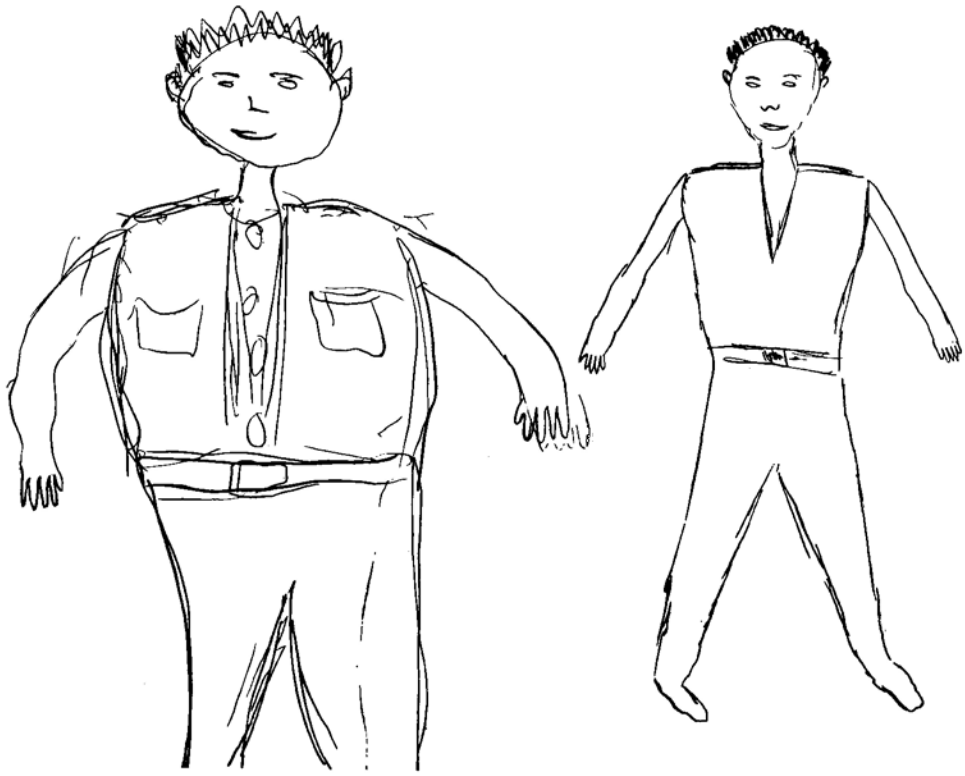

FIG. 1. Male figures drawn under control (left) and drug (right) conditions

COMMENT

The results of the study of judgments indicate that the judges were able to differentiate, both reliably and accurately, figures drawn under the influence of LSD-25 from those drawn under control conditions. However, the purpose of this investigation was not to develop a method of bio-assay for the drug, but to test the "body image" hypothesis. That the judges could identify the drug figures is thus not as pertinent as that the cues they reported using are consistent with what is known about the body image changes produced by LSD-25, from sources other than figure drawings. Nevertheless, an independent empirical test of the validity of these cues was considered desirable, to determine whether they were in fact the ones that had enabled the judges to identify the drug figures as well as they had, and to establish their relative value in differentiating drug from control figures.

TABLE 2

Validity of Judgments of Human Figures Drawn under Control and Drug Conditions

Judge	Male	Female	Self
Psychologist K	15**	15**	16**
Psychiatrist P	12	15**	15**
Psychologist I	14*	15**	12
Psychiatrist D	11	15**	11

* Significant at .05 level.
** Significant at .01 level.

STUDY OF CUES

The drawings were presented to two additional judges, both clinical psychologists, with instructions to compare the figures in each pair with respect to the four cues mentioned in the study of judgments. For each of these cues, specifications were drawn up with the aim of increasing the objectivity of the scoring. An abbreviated version of these specifications follows:

Size: Score the larger figure in each pair.

Line Quality: Score the one that shows more disturbed line quality, considering continuity, reinforcement, tremble, closure, and pressure. Definitions of these five points were adapted from Caligor (3).

Attention to Detail: Score the one that shows less attention to detail. Caligor's monograph also provided the details of this specification.

Distortions: Score the one that is the poorer portrayal of the human figure. This specification seems to convey what the judges had in mind when they spoke of "distortions." Its details were based primarily on Schubert and Wagner (12).

RESULTS

The reliability of the scoring was determined first. Table 3 gives the numbers of agreements between the judges for each cue. The scoring for size, being completely objective, was perfectly reliable—there were no disagreements between the judges. The scoring for the other cues was not as reliable as we had hoped to make it in drawing up the scoring specifications, but it was nonetheless regarded as satisfactory.

The judges resolved their scoring disagreements in conference, and the validity or accuracy of the resolved scoring was then determined. Table 4 shows the numbers of drug figures correctly scored on the basis of each cue. These data were subjected to Friedman's two-way analysis of variance, which revealed that the three figures did not differ significantly in the accuracy with which they were scored, but that the four cues did differ significantly in their ability to identify the drug figures, at the .05 level. Attention to detail and distortions were both highly valid, line quality was somewhat less so, while size proved valid only in the case of the self figures.[3]

TABLE 3

Reliability of Scoring of Human Figures Drawn under Control and Drug Conditions

Cue	Male	Female	Self
Size	18**	18**	18**
Distortions	16**	16**	14*
Attention to Detail	15**	13*	16**
Line Quality	16**	13*	15**

* Significant at .05 level.
** Significant at .01 level.

TABLE 4

Validity of Scoring of Human Figures Drawn under Control and Drug Conditions

Cue	Male	Female	Self
Attention to Detail	16**	16**	15**
Distortions	15**	15**	16**
Line Quality	13*	13*	15**
Size	10	10	14*

* Significant at .05 level.
** Significant at .01 level.

COMMENT

The results of the study of cues indicate that the cues cited by the judges in the study of judgments (with the partial exception of size), were, in themselves, valid for differentiating figures drawn under the influence of LSD-25 from those drawn under control conditions.

DISCUSSION

To point up the consistency of the findings of this study with the "body image" hypothesis, a portion of Savage's account of the effects of LSD-25 on body image (9) is presented here. The points that he makes in his description of the height of the reaction to the drug are illustrated by some of the drawings obtained in the present study:

"With this phase many changes can be observed in body ego feeling. The unity of the body cannot be maintained; the parts of the body seem dislocated. Limbs feel detached and floating. (Figure 2,A) The symmetry of the body is lost, and it assumes enormous plasticity. It becomes warped and

[3] A recent study (5) found a significant increase in the size of the figures drawn by schizophrenic patients under the influence of LSD-25; the figures drawn by normal subjects also increased in size in the drug state, but the difference was not significant. Self figures were not obtained in this study.

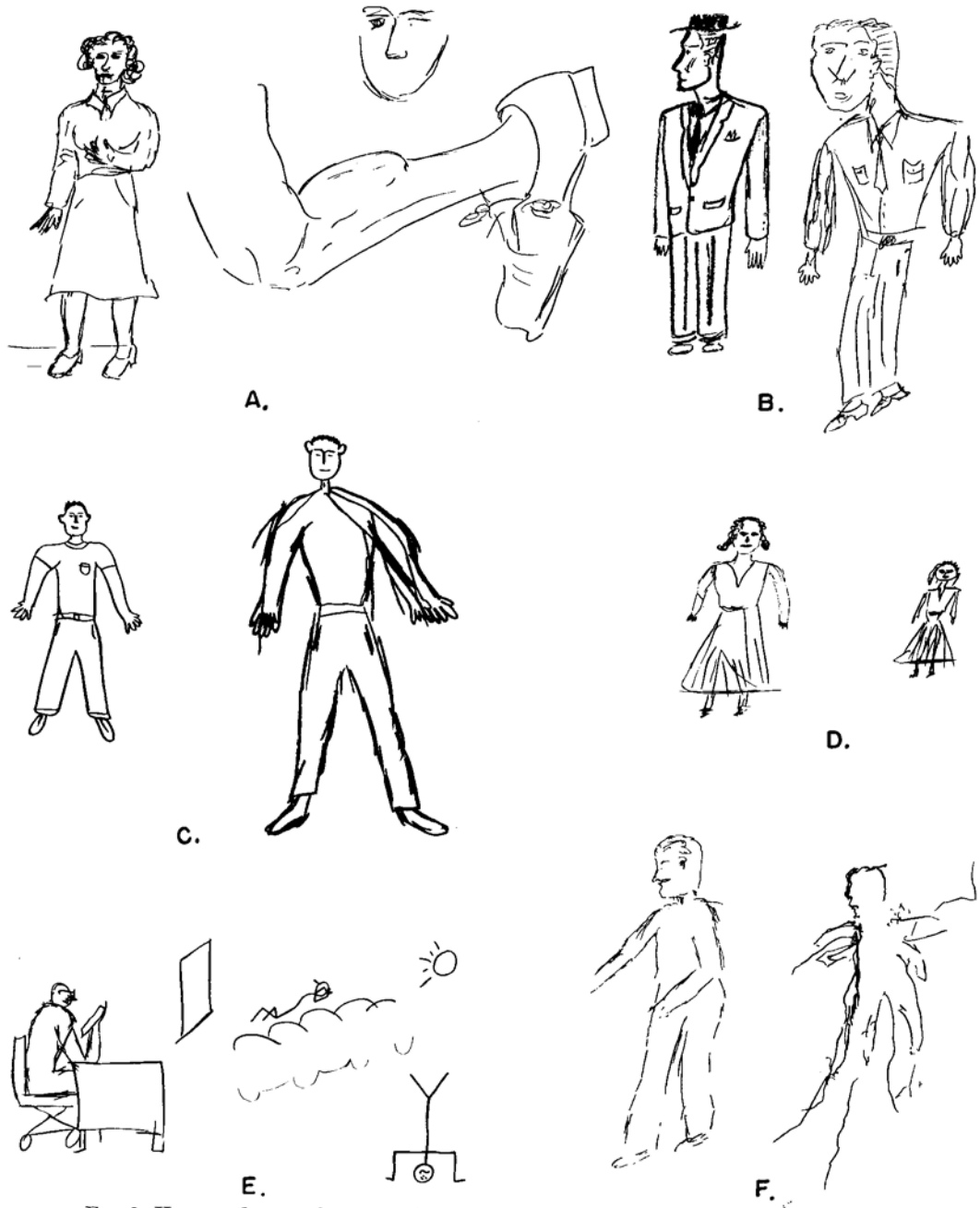

FIG. 2. Human figures drawn under control (left) and drug (right) conditions. A. Female figures. B. Self figures. C. Male figures. D. Female figures. E. Self Figures. F. Male Figures.

distorted in every direction.... (Figure 2,B) The body may feel large and inflated, (Figure 2,C) or so small that the individual fears lest he be stepped on....[4] (Figure 2,D) The body may become separated from the individual so that he feels himself sitting

[4] Only a few subjects drew drug figures appreciably smaller than their control figures.

off in a corner or standing in back or [at] the side of himself.... (Figure 2,E) 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. (Figure 2,F)"

Considering the four cues in order of decreasing validity, we regard the decreased attention to detail in the drug figures as a sign of the primitivization, or regressive dedifferentiation of body image produced by LSD-25. The increase in the number and severity of distortions seems to reflect the fluidity of body image in the drug state—changes in shape, disproportions, asymmetry, etc. The more disturbed line quality we would relate to changes in the body-image boundaries following the ingestion of the drug; the difficult struggle to maintain these boundaries, and in some cases at least, their eventual dissolution. Finally, we interpret the tendency toward an increase in the size of the figures as a further indication of the indefinitenoss of the body-image boundaries under the influence of LSD-25. In short, we believe that the results of this study are quite consistent with the "body image" hypothesis.

There are, however, two major reservations or qualifications that must be made with respect to our interpretation of the data. We have deliberately limited ourselves to a consideration of the implications of the results for the "body image" hypothesis. In doing so, we have not meant to rule out alternative explanations for the findings. For example, one might attempt to interpret the results in terms of personality dynamics, which provide the customary framework for the interpretation of figure drawings in the clinical setting. Alternatively, at least a portion of the findings are subject to interpretation in terms of impaired intellectual functioning produced by LSD-25 (4). Again, some of the results might be interpreted in terms of the effects of the drug on visual-motor coordination (1). We would certainly not deny the legitimacy and potential fruitfulness of any of these approaches to the data.

Finally, we must admit that in a sense the present study is incomplete. In the circumstances under which the drawings were obtained it was not possible to secure data systematically from the subjects themselves to support our interpretations of the changes that took place in their figures under the influence of LSD-25. We do not know for a fact that the subject who drew the detached limbs had felt his body come apart at the time he produced his drawing; or that the subject who drew the figure with the dissolving body outline was actually having difficulty in telling where his body left off and the rest of the world began; or for that matter, that the few subjects whose figures were virtually unchanged in the drug state were *not* experiencing any marked body image changes when they drew them. From incidental observations made during the course of the study, it seems that this was the case, but the data presently available are not such as prove the point. A study is now in preparation which will attempt to relate changes in figure drawings to verbal reports of the effects of LSD-25 on body image.

SUMMARY AND CONCLUSIONS

Sets of human figure drawings—male, female, and self figures—were obtained from 18 male college graduates under control conditions and at the height of their reaction to 72 mcg. of LSD-25.

1. Judges who had either worked with the drug for some time, or who had had training and experience in the psychodiagnostic use of figure drawings (but not both), were able to differentiate, both reliably and accurately, figures drawn under the influence of the drug from those drawn under control conditions.

2. Figures drawn in the drug state showed

less attention to detail, a greater number and severity of distortions, and more disturbed line quality than those drawn under control conditions. Drug figures also tended to be larger than control figures.

These findings were taken as lending support to the "body image" hypothesis, namely, that human figure drawings are basically representations of the subject's body image. Alternative explanations for the results were mentioned, an important limitation of the study was noted, and further research on the problem was suggested.

REFERENCES

1. Abramson, H. A., Waxenberg, S. E., Levine, A., Kaufman, M. R. and Kornetsky, C. Lysergic acid diethylamide (LSD-25): XIII. Effect on Bender-Gestalt Test performance. J. Psychol., **40:** 341–349, 1955.
2. Boston Psychopathic Hospital. Experimental psychoses. Sc. Amer., **192:** 34–39, 1955.
3. Caligor, L. *A New Approach to Figure Drawing*. Thomas, Springfield, Ill., 1957.
4. Levine, A., Abramson, H. A., Kaufman, M. R. and Markham, S. Lysergic acid diethylamide (LSD-25): XVI. The effect on intellectual functioning as measured by the Wechsler-Bellevue Intelligence Scale. J. Psychol., **40:** 385–395, 1955.
5. Liebert, R. S., Werner, H. and Wapner, S. Studies in the effect of lysergic acid diethylamide (LSD-25): Self- and object-size perception in schizophrenics and normal adults. A.M.A. Arch. Neurol. & Psychiat., **79:** 580–584, 1958.
6. Mátéfi, L. Mezcalin- und Lysergsäurediäthylamid-Rausch: Selbstversuche mit besonderer Berücksichtigung eines Zeichentests. Confinia Neurol., **12:** 146–177, 1952.
7. Rinkel, M. Experimentally induced psychoses in man. In *Neuropharmacology: Transactions of the Second Conference*, H. A. Abramson, Editor. Josiah Macy, Jr. Foundation, New York, 1956.
8. Roubicek, J. (Experimental mental disorders.) Vesmir, **35:** 291–294, 1956.
9. Savage, C. Variations in ego feeling induced by d-lysergic acid diethylamide (LSD-25). Psychoanalyt. Rev., **42:** 1–16, 1955.
10. Savage, C. The LSD psychosis as a transaction between the psychiatrist and patient. In *Lysergic Acid Diethylamide and Mescaline in Experimental Psychiatry*, L. Cholden, Editor, Grune & Stratton, New York, 1956.
11. Schilder, P. *The Image and Appearance of the Human Body*. Internat. Univ. Press, New York, 1950.
12. Schubert, H. J. P. and Wagner, M. E. *D.A.P. Quality Scale for Late Adolescents and Young Adults*. Delaware Letter Shop, Ken-More, N. Y., 1955.
13. Siegel, S. *Nonparametric Statistics for the Behavioral Sciences*. McGraw-Hill, New York, 1956.
14. Stoll, W. A. Lysergsäure-diäthylamid, ein Phantastikum aus der Mutterkorn-gruppe. Schweiz. Arch. Neurol. u. Psychiat., **60:** 1–45, 1947.
15. Swensen, C. H., Jr. Empirical evaluations of human figure drawings. Psychol. Bull., **54:** 431–466, 1957.
16. von Mering, O., Morimoto, K., Hyde, R. W. and Rinkel, M. Experimentally induced depersonalization. In *Experimental Psychopathology*, P. H. Hoch and J. Zubin, Editors. Grune & Stratton, New York, 1957.