

Relationship Between Effects of a Number of Centrally Acting Drugs and Personality

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The relationship between the effects of drugs and the personality of the recipient of the drugs is an area of research that has been ignored, for the most part. It is usually tacitly assumed that the personality will have something to do with the manner in which the individual responds to a drug. This view is commonly held concerning alcohol. Most people who have observed others under the influence of this drug are implicitly, if not explicitly, aware that the personality of the indulger, as well as the situation, will contribute to the effect of this universal relaxer.

A specific attack on the problem of the relationship between personality and drug effect was made by von Felsinger, Lasagna, and Beecher.¹ They concluded that those subjects who seemed to have deviant personalities, as determined by interview and the Rorschach test, were the subjects who responded atypically to amphetamine and morphine. These investigators stated explicitly² that the effects of a drug are determined not merely by the specific pharmacological action of the drug, the dose, and the route of administration, but also by the nature of the subject and the situation in which the drug is given.

The present report is part of a larger study³ which compared certain of the psychological effects of several classes of centrally acting agents. The following drugs and dosages were used: secobarbital sodium,

100 and 200 mg.; meperidine hydrochloride, 50 and 100 mg.; chlorpromazine hydrochloride, 100, 200, and 400 mg., and lysergic acid diethylamide (LSD), 50 γ and 100 γ . The original design called for subjects to receive 200 and 400 mg. of chlorpromazine; however, owing to the severity of postural hypotension, this was reduced to 100 and 200 mg. after the higher doses were given to the first four subjects. These compounds were selected as representative of the categories of hypnotic, narcotic, "tranquilizing," and psychotomimetic drugs. The subjects used were 10 normal volunteers between the ages of 18 and 23, 6 males and 4 females. There was a minimum of one day between drug administrations, and the order of administration was a 10 $\times$ 10 Latin square which included two placebos. All drugs, including placebos, were given orally in identical capsules; the "double-blind" technique was employed throughout.

The tests used to measure the effects of these drugs were as follows: addition, both three and nine digits; pursuit rotor; digit symbol test; speed of copying numbers; tachistoscopic discrimination, and tactual perception. Scores were expressed as a per cent of the mean of two control scores, and then an over-all mean per cent score for all tests was obtained. This score will be referred to as the objective test score.

In addition to receiving the objective tests, each subject received a 46-item questionnaire at 30, 90, 150, and 210 minutes after the ingestion of the drug. The score on this questionnaire (the total number of symptoms for the four periods) will be referred to as the subjective score.

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The results of the above study indicated that the psychological effects of these drugs are somewhat dependent on the reaction pattern of the subject, and independent of the specific pharmacological activity of the drug which elicited the effects. Thus it was found that those subjects who were most affected by one drug were also most affected by the other drugs.

Present Report

The present report deals with the correlations between four MMPI (Minnesota Multiphasic Personality Inventory⁴) scales and the extent of effect of each of those drugs that significantly altered the objective and subjective responses. An a priori decision was made to use only the Hy (hysteria), and Hs (hypochondriasis), D (depression), and Pt (psychoasthenia) scales from the MMPI. The Hy and Hs scales were selected because it was believed that these might very well correlate with both placebo and drug effects; the D scale, because of our impression, based on other studies, that the more depressed a person was the greater the effect of the drugs, and the Pt scale, because it was believed that this was a good measure of general anxiety level. The Pt scale is significantly correlated (0.92) with the Taylor Scale of Manifest Anxiety.⁵ The MMPI was administered prior to the start of the experiments.

TABLE 1.—*Rank-Difference Correlations (ρ) Between MMPI Scales and Subjective Effects of Centrally Acting Drugs*

Drug	MMPI Scale			
	Pt	D	Hs	Hy
Secobarbital, 200 mg.....	0.58	0.66	0.16	0.16
Chlorpromazine, 200 mg.....	0.73	0.57	0.56	0.49
LSD, 50 γ	0.94	0.57	0.46	0.47
LSD, 100 γ	0.14	0.10	-0.11	0.06
Placebo.....	0.01	0.00	0.06	0.10

Results

Table 1 shows the rank-difference correlations⁶ between each of the four MMPI scales and the effects of those drugs that produced significant or near-significant effects on the subjective data. Although 400 mg. of chlorpromazine hydrochloride produced a significant increase in plus responses, the computation of a correlation was precluded, for only four subjects received this large a dose.

TABLE 2.—*Rank-Difference Correlations (ρ) Between MMPI Scales and Objective Effects of Centrally Acting Drugs*

Drug	MMPI Scale			
	Pt	D	Hs	Hy
Secobarbital, 200 mg.....	0.31	0.60	0.30	0.43
Chlorpromazine, 200 mg.....	0.53	0.15	0.14	0.14
LSD, 50 γ	0.51	0.56	0.25	0.45
LSD, 100 γ	0.34	0.47	0.59	0.23
Placebo.....	0.59	0.27	0.05	0.05

Table 2 shows the rank-difference correlations between each of the four MMPI scales and the objective psychological data.

In both Tables the larger the correlation the greater the relationship between the extent of drug effect and deviation in the personality scale.

Comment

The scores on the psychoasthenia and depression scales showed significant, or almost significant, relationships with the subjective effects of 200 mg. of secobarbital sodium, 50 γ of LSD, and 200 mg. of chlorpromazine hydrochloride. Thus, the more deviant the subject on these two MMPI scales, the greater were the subjective effects of these drugs.

The failure of the subjective effects of 100 γ of LSD to show any relationship with MMPI, while the effect of 50 γ was significantly related to the MMPI scores, suggests that when a severe drug effect is obtained, the personality of the subject does not play an important role. In other words, if a large enough dose of any drug were given, all subjects would respond in the same manner. The lack of a relationship between the placebo effect and personality was somewhat contrary to what might be expected, for here the drugs exert no influence on the performance of the subjects. The subject has the possibility of allowing his personality to account for all of the variance.

The correlations between the Pt and D scales and the objective drug effects also yield positive relationships. However, these correlations were not as large as those between the subjective effects and the MMPI scales. The relationships between the ob-

jective effects and the Hy and Hs scales were smaller than those with the Pt and D scales. However, the effects of 100 γ of LSD did correlate almost significantly with the Hs scale.

The conclusions that can be arrived at from these results must be somewhat circumscribed, for the number of correlations computed would give some significant correlations by chance alone. In addition, there was no specific hypothesis as to the relative extent of relationship between each drug and the specific MMPI scale. There was the general hypothesis, however, that in the case of those drugs that produced significant effects on the tests used, there would be a positive relationship with the score on some of these MMPI scales. In other words, the more deviant a subject on the MMPI scales the greater the drug effect. This hypothesis is believed to be supported by the data.

The results of this investigation, along with those from the previous report,³ indicate that there are reactors and nonreactors to drugs and that the reactors are likely to be those people who are more depressed (the D scale) and/or likely to have more unreasonable fears of things, as well as overreact to environmental stimuli (the Pt scale).

It must be mentioned that there are physiological factors that also contribute to the responsivity of people. In further studies these variables will be investigated.

Summary

Ten normal young adults were given various doses of chlorpromazine, meperidine, secobarbital, and lysergic acid diethylamide (LSD). The effects of the drugs were

determined by both objective and subjective psychological tests. The Minnesota Multiphasic Personality Inventory was also administered to all the subjects prior to the start of the experiment. Four scales from this test were selected for testing relationships between personality variables and both the objective and the subjective effects of the drugs.

The Depression and Psychoasthenia scales correlated significantly, or almost significantly, with the subjective effects and, to a less extent, with the objective effects of those drugs and dosages that produced significant effects.

These results support a hypothesis that personality plays a role in determining the extent of drug effect.

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REFERENCES

1. von Felsinger, J. M.; Lasagna, L., and Beecher, H. K.: Drug-Induced Mood Changes in Man: 2. Personality and Reactions to Drugs, *J. A. M. A.* 157:1113-1119, 1955.
2. Lasagna, L.; von Felsinger, J. M., and Beecher, H. K.: Drug-Induced Mood Changes in Man: 1. Observations on Healthy Subjects, Chronically Ill Patients, and "Postaddicts," *J. A. M. A.* 157:1006-1020, 1955.
3. Kornetsky, C.; Humphries, O., and Evarts, E. V.: Comparison of Psychological Effects of Certain Centrally Acting Drugs in Man, *A. M. A. Arch. Neurol. & Psychiat.*, this issue, p. 318.
4. Hathaway, S. R., and McKinley, J. C.: Minnesota Multiphasic Personality Inventory, New York, The Psychological Corporation, 1951.
5. Brackbill, G., and Little, K. B.: MMPI Correlates of the Taylor Scale of Manifest Anxiety, *J. Consult. Psychol.* 18:433-436, 1954.
6. Edwards, A. L.: Statistical Analysis for Students in Psychology and Education, New York, Rinehart & Company, Inc., 1946, p. 123.