DRUGS AND PERSONALITY

VIII. THE EFFECTS OF STIMULANT AND DEPRESSANT DRUGS ON VISUAL AFTER-EFFECTS OF A ROTATING SPIRAL*

By

H. J. EYSENCK, Ph.D.

and

J. A. EASTERBROOK, M.A.†

Institute of Psychiatry, University of London

1. Introduction

In a previous paper in this series Eysenck, Holland and Trouton (1957) showed that the seen after-effects resulting from stimulation by means of a rotating spiral were increased very little by a stimulant drug and decreased significantly by a depressant drug. At that time there was little evidence that these after-effects were in fact correlated, as the theory demanded, with extraversion and introversion. Since then two separate experiments dealing with normal and neurotic subjects respectively produced very strong evidence in favour of this hypothesis (Eysenck, 1960), and it seemed desirable to repeat the experiment in order to discover whether the failure of the stimulant drug in the first experiment to produce very positive results was merely a chance effect or was in fact a genuine failure of the theory.

2. The Experiment

Details of drugs, experimental design and subjects have been given in a previous paper (Eysenck and Easterbrook, 1960a). Eight subjects in all were tested under four drug conditions (d-amphetamine sulphate, sodium amylobarbitone, meprobamate, and a placebo), under an experimental design which ensured that each drug would be given once after each other drug and in each serial position. The experimental design, a balanced incomplete block, was completed twice, once for the subjects seen in the morning and once for those seen in the afternoon. The test under discussion here was only one of several applied to the same group of subjects under the same conditions.

The spiral, rotating at a speed of 100 r.p.m., was illuminated by twin spotlights in an otherwise dark room, and S was instructed to fix his vision on the silvered screw at its centre. After a short demonstration of the effect, S was instructed that the spiral would be started and stopped and that he should tell E when the after-effect had ceased. He was cautioned against mistaking the end of the spectacular immediate after-effect for the moment when the effect had completely disappeared. The measure was the time in seconds taken by stopwatch from the instant E turned off the spiral motor to the instant S announced

* We are indebted to the Wallace Laboratories for the support of the investigation.

† Now at the Burden Neurological Institute, Stapleton, Bristol.

https://doi.org/10.1192/bjp.106.444.842 Published online by Cambridge University Press

the effect had ceased. A single reading was taken on each of four days after 45-second stimulation.

3. Results

The mean durations of after-effect are shown in Table I. These results were relatively consistent as between replications, though the matrix failed to show a significant general effect of treatments. However, the greater duration of effect under the amphetamine as compared to the placebo treatment is significant by t test.

Table I

Mean Duration of After-Effect Following 45 Seconds' Stimulation with Spiral

	Treatments			
	Placebo	Amphetamine	Amytal	Meprobamate
Duration in seconds	24·05	29·64	23·11	24·97
Duration as percentage of individual totals (=100 per cent)	22·6	29·5	23·6	24·3

The duration of spiral after-effect may be an inverse measure of rate of recovery from visual stimulation. If so, it would be comparable with the rate of iris dilation after a continuing stimulus had been turned off. Measures of such rates were in fact available for these subjects (Eysenck and Easterbrook, 1960b), so that this possibility could be tested. When the differences between the treatment were expressed as percentages of the totals across treatments for both measures, as shown in Table I for the spiral after-effect durations, the agreement between these percentages was quite close. Analysis of variance was therefore conducted on a 6×4 matrix composed of two block means under each treatment for dilation rate (stimulus "off"), difference in dilation rate (stimulus "off"–stimulus "on") and the reciprocals of duration of spiral after-effect (each in percentage form). In this matrix, the effect of treatments was significant ($F=3 \cdot 42$ with 3/20 d.f.), the mean percentages being 28·1 for the placebo, 20·9 for amphetamine, 25·7 for amylobarbitone and 25·3 for meprobamate. The relatively slow recovery of amphetamine-treated subjects is the notable observation.

4. Discussion

The results of the experiment are again in line with prediction, duration of the after-effects being longest for the stimulant drug (amphetamine) and shortest for the depressant drug (amylobarbitone). The effects of meprobamate, however, are not in the expected direction, and altogether the depressant drugs do not produce effects large enough to differentiate responses under them from placebo responses. The amphetamine conditions, however, do produce large and significant differences, so that the experiment may be said to be successful in clarifying the point which it was carried out to prove. It is difficult to know why the two experiments, although broadly giving similar results, differ in showing greater differences for depressant drugs in one case and for stimulant drugs in the other. It is possible that slight differences in experimental procedure may be responsible for this. Thus in the first experiment four readings were taken to make up each score, whereas in the present experiment only one reading was taken. This repetition would, according to our theory, favour the

https://doi.org/10.1192/bjp.106.444.842 Published online by Cambridge University Press

accumulation of inhibition and might thus facilitate also the effectiveness of depressant drugs which are supposed to increase inhibition. Too little is known of the interaction of drugs and conditions to make it possible to advance this as anything but an *ad hoc* hypothesis, but as work in psychopharmacology becomes more accurate and begins to test specific hypotheses it will inevitably have to take into account and test such interactions. It is not impossible that we have encountered here one of the reasons for the frequent failures in this field to duplicate results when conditions are not precisely equated. An alternative possibility, of course, is that we are only dealing with chance differences here, and if larger numbers had been used no such differences between the two experiments would have occurred. Only further research will enable us to decide upon the accurate answer to this problem.

5. Summary

The effects were studied of one stimulant and two depressant drugs on the seen after-effect of a rotating spiral, and compared with those of a placebo. As predicted the stimulant drug was found to have a facilitating effect, i.e. it prolonged the period of apparent movement after stimulation. The depressant drugs only differed slightly from the placebo in their effects, and did not, as in a previous experiment, give consistent and significant results. A theoretical explanation has been advanced to account for the differences in outcome between this and the previous experiment.

References

Eysenck, H. J. (Ed.), *Experiments in Personality*, 1960. 2 vols. London: Routledge & Kegan Paul.

Idem and Easterbrook, J. A., "Drugs and personality: VI. The effects of stimulant and depressant drugs upon body sway (static ataxia)", *J. Ment. Sci.*, 1960a, **106**, 831.

Iidem, "Drugs and personality: VII. The effects of stimulant and depressant drugs on pupillary reactions", *J. Ment. Sci.*, 1960b, **106**, 835.

Idem, Holland, H., and Trouton, D. S., "Drugs and personality: III. The effects of stimulant and depressant drugs on visual after-effects", *J. Ment. Sci.*, 1957, **103**, 650–655.

https://doi.org/10.1192/bjp.106.444.842 Published online by Cambridge University Press