BRITISH AND FOREIGN OFFICIAL PUBLICATIONS

Pilot Error : Some Laboratory Experiments. By D. Russell Davis, M.D., M.R.C.P., D.P.M., of the Applied Psychology Research Council of the M.R.C. 1948. Air Ministry A.P. 3139A. Pp. 39. Price 9d.

This forty-page monograph describes the results of tests carried out by pilots in the Cambridge cockpit testing machine, in which 355 pilots carried out a test lasting forty minutes. The Cambridge cockpit is a replica of the normal aeroplane, and the apparatus is designed to copy flying conditions with suitable changes in the readings of the instrument panel, and alterations in position of the cockpit, noise, etc., which accurately mimicked flying conditions. The test was divided into four ten-minute periods, and the movements of the levers by the pilot following the changes in the instrument readings were all plotted. The test was standardized, and about 75 per cent. were regarded as normal.

Those who were abnormal (87 subjects) were marked by two distinct reactions. Two-thirds were classified as showing the *overactive* reaction. Their movements to stabilize the plane, correct direction and height, etc., were rapid and excessive. They became irritable, and angry either with the machine or themselves; they swore, and thumped on the controls, but seldom damaged the machine. They tended to concentrate upon one part of the problem, and neglected others. Those who showed this reaction returned later and wanted to do the test again, and they clearly showed an abnormal reaction to the procedure. The test had produced a post-experimental, too persistent, wrought-up feeling.

One third of the abnormal group showed an inert reaction. In the last period of the test these subjects' errors were large and the activity to correct the machine was small. There was a general omission of the necessary readjustments, but deterioration was selective and did not affect all parts of the test at once; the instruments furthest away from the centre of vision were most neglected. They became indifferent, they lacked the appreciation of the changed readings which they should have shown, and they markedly underrated their own faults.

Both groups showed much worse reactions when they *knew* they were reaching the end, than when they did not. The abnormal subjects often showed preoccupation with one part of the task and were unable to organize their attention in such a way that they could attend to all the details at once. This apparent failure in behaviour was not associated with failure in the ordinary tests of intelligence, and surprisingly the author can find little justification for the belief that fatigue alone is the cause of failure.

There was good reason to believe that when it could be pointed out to the subjects what difficulties were likely to be encountered, and how these can be checked, the performance was improved. Results were impaired seriously by alcohol. Benzedrine in small doses gave conflicting results, but it did improve capacity after a sleepless night. The effects with barbiturates, caffeine, and vitamins were observed in some subjects. With the

first two no conclusions were reached. With the latter, no alteration was produced despite large doses. *It was not found possible to explain the results on the theory of fatigue*, since no simple relation existed between frequency of errors and the duration of the test.

If fatigue cannot be incriminated, what explanation of the results can be given? The author indicts "anticipatory tension," a process in all normal persons which lessens as success is gained. In the abnormal subjects the wish to succeed and the fear that they may not, result in the errors found. Confirmation of this was found in the study of the responses of thirty-nine patients, where the findings in the cockpit experiences were compared with the results of interviews with two independent psychiatrists, and where there was close correspondence between test results and subsequent flying career.

The application of these results to industry may seem small. Yet every factory has its overactive and inert persons, some of whom are problems when they are not actually accident-prone. It is seldom that matters of life and death weigh so heavily as in the conditions copied in the Cambridge cockpit. Yet such a study can hardly afford to be neglected, for several reasons. It confirms the doubts as to how far fatigue alone plays a part in accidents. It emphasizes human variables. It throws doubt on the efficiency of aptitude tests alone, divorced from the problem of the persistence of skill. We may find by the new tests the apt workman. Can we ensure so far as the delicate processes go that his skill will continue, or will he constantly be giving variable results because his performance can so seldom be relied upon? Dr. Davis's paper should be studied alongside Grinker and Spiegel's *Men Under Stress*, a study of breakdown in U.S. airmen. The memorandum under review is very silent upon psychiatric problems and theory. But it does quietly emphasize how important these theories are, and it throws into commendable perspective the relationship between theory and the practical results which are presented.

This contribution from an academic psychological laboratory is an admirable survey. Is it too much to hope that bequests and grants should be given to quiet investigations of this sort, even though large-scale or immediate benefits are unlikely to follow?

Henry Wilson.

Central Mining—Rand Mines Group. Report for the year 1947. By A. J. Orenstein. Johannesburg: Health Dept., Rand Mines Ltd. 1948. Pp. 18. No price given.

This is a statistical report on the native labour employed in the Rand mines. There are 91,108 natives employed and this labour showed a turnover during the year of 90.7 per cent. It is concerned with mortality rates, morbidity rates, food, the incidence of diseases in general, occupation, cost of hospital beds, and other such data. It states that silicosis does not play an important role in the health of native employees. This