

A COMPARATIVE STUDY OF THE FATIGUABILITY
OF A GROUP OF CHRONIC SCHIZOPHRENICS
AND A GROUP OF HOSPITALIZED
NON-PSYCHOTIC DEPRESSIVES

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PROBLEM

To make a comparative study of the fatiguability of chronic schizophrenics and non-psychotic depressives and to test Kraepelin's hypothesis that schizophrenia is typified by rapid and acute fall-off in work performance (Kraepelin, 1910). Kraepelin's explanation of the cause of this fall-off was in terms of constriction of volition. However, on the basis of operational definitions, there appears to be little justification for regarding the phenomenon as other than a special case of fatiguability.

SAMPLE USED

All of the patients taking part in this study were already employed in the Industrial Workshop and had been registered as Disabled Workers with the Ministry of Labour. They were all used to working a 38 hour week and were familiar with the type of work to be studied, having performed closely similar work with the same tools over at least the previous 6 months.

The group of chronic schizophrenics consisted of 6 subjects; 3 male and 3 female. The sub-class diagnoses were 3 hebephrenic and 3 paranoid cases. No patient had been hospitalized for less than 10 years, and the mean period of hospitalization was 13.7 ± 2.92 . The mean age of the group was 45.8 ± 8.85 .

The depressive group consisted of 5 subjects; 2 male and 3 female. All of them suffered from depressions of a non-psychotic kind. The mean age of the group was 48.5 ± 9.59 . The mean period of hospitalization was 2.4 ± 1.88 .

There was no significant difference between the ages of the groups, though the periods of hospitalization were not comparable.

THE TASK

The task studied was the assembly of a carnival hat. None of the patients had previously made this particular hat, but the tools, materials, and elements of the assembly were familiar to them from other hat assemblies. The hat made in this study was an imitation Red Indian headdress. It consisted of a strip of foil board which was looped and stapled into a circle, and on to which was then stapled a slogan and 3 different coloured feathers.

METHOD

A standard method of assembly was shown to each subject by a trainer who had carefully studied the best technique of assembly in terms of job-analysis.

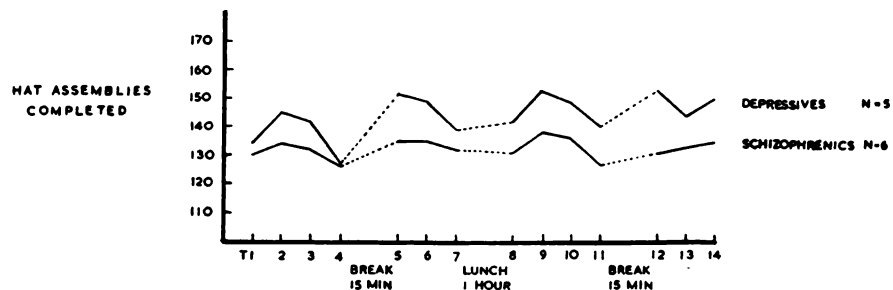
One afternoon was devoted to training and practice; the study started on Monday morning and continued until Friday evening.

For the first four days of the study, production was recorded for each half-hour by removing the finished work-box, providing a new box, and counting the numbers completed. As a certain amount of stress was noticed in the patients by Day 4, it was arranged that instead of the work being collected at precise half-hour intervals as before, it should be collected at odd times—as an individual's work-box began to fill up. The patients were informed at the beginning of the fifth day (Friday), that our half-hourly check on output had been discontinued. The only difference in the physical conditions between Days 1-4 and Day 5 was that, in the first case, output was being rigidly checked on the half-hour; in the second case, it was removed and checked in an un-systematic manner. It was arranged however that all of the work should be counted during the lunch-hour and after work in the evening so that morning and afternoon totals could be recorded (Table III). This was particularly required since it had been noted that both groups tended to work better in the afternoon, and it was necessary to establish whether this was linked to the checking system.

RESULTS

Inspection of the data for each individual's performance over the course of the four experimental days indicated no substantial fall-off effects throughout either the morning or the afternoon periods. The group data are summarized in the following graph which shows the daily fluctuation of output, in half-hour periods, for the experimental period days 1-4.

GROUP MEAN DAILY OUTPUT PER 30 MINUTE PERIOD



Linear regressions were fitted to the above fatigue curves and the significance of the difference between the slopes was calculated.

It will be seen from Table I that the slope for the regressions was, in both cases, slightly positive; this being more pronounced in the depressives than in the schizophrenics. The significance test performed on the standard error of the slopes failed to show any significant difference between the fatigue curves for the depressive and the schizophrenic groups over a 7 hour working day.

TABLE I

Days 1-4

	Level	Slope	S.E. of Slope	t
Schizophrenics ..	131.42	0.144	32.967	} 0.0203 Not Sig.
Depressives ..	137.818	0.851	11.347	

An unexpected result was that the output for both groups was higher in the afternoons than in the mornings. One would expect, in the case of normal workers, that they would show a marked decline in the afternoon, or at least that their output would be somewhat lower than that of the morning.

The total scores of each group for the morning and afternoon, for both the experimental conditions (Days 1-4) and the non-experimental condition (Day 5), are summarized in the tables below. The morning and afternoon work periods were of equal duration, i.e. 3½ working hours each, and can thus be compared directly.

It will be seen from Table II that, of the four experimental days, on two occasions the schizophrenic group had a higher output in the afternoon than in the morning and that the depressive group consistently performed better in the afternoon. A significance test was applied to the group mean scores for Days 1-4, comparing the morning's output with that of the afternoon. The test yielding *t* values of 0·243 and 3·182 for the schizophrenic and depressive groups respectively. The value was not significant in the case of the schizophrenics, but significant at the 5 per cent. level in the case of the depressives. The difference in output between morning and afternoon on Day 5 was not significant for either group.

TABLE II
Number of Hats Assembled

Day	Schizophrenics			Depressives		
	Morning	Afternoon	Total	Morning	Afternoon	Total
Monday ..	853	925	1778	962	1032	1994
Tuesday ..	955	895	1850	921	945	1866
Wednesday ..	946	929	1875	1013	1063	2076
Thursday ..	940	973	1913	1056	1081	2137
Totals ..	3694	3722	7416	3952	4121	8073

The fact that the output of the depressive group was significantly higher in the afternoons, though there was no significant difference between the regressions for the two groups, is due to the regression being more dependent upon the variability of the curve than the absolute scores involved in it.

The results for Day 5, when the patients were no longer being paced by the regular checking of their work, form a natural experiment. The non-checking condition was not, as stated above, planned as a part of this study but arose when undue stress caused the experimenters to discontinue regular checking. Comparison of the scores for Day 5 (Table III) with those of Days 1-4 (Table II), indicate a considerable drop in performance. *t*-tests were performed on the differences between the scores for Day 5 and the mean scores for Days 1-4. *t* values of 7·659 ($P < 0\cdot001$) and 4·044 ($P < 0\cdot02$) were obtained for the schizophrenic and depressive groups respectively.

TABLE III
Number of Hats Assembled

Day	Schizophrenics			Depressives		
	Morning	Afternoon	Total	Morning	Afternoon	Total
Friday ..	867	872	1739	976	985	1961

One further comparison was made; the significance of the difference between the output of the two groups for the experimental period days 1-4. A *t* of 14·754 was obtained which was significant at the 0·001 level.

The behaviour of the patients in both groups during the study was of some interest; the half-hourly work checking by the experimenter during the first four days of the study appeared to result in a marked increase in intrapsychic tensions. Staff members who had worked with the patients before the start of the study made spontaneous comments upon this, as did staff from other parts of the hospital. They reported that many of the subjects were clearly depressed or agitated and that their appetites were suffering. One of the patients developed insomnia after the first day of work, 2 others were quite markedly depressed, and one paranoid patient developed the type of paranoid feelings that she had been free of for some time. There was also an increase of complaints about trifling somatic conditions, e.g. dizziness, backache, sore hands, etc. The conditions of work for Day 5 appeared to be considerably less stressful; the experimenter noted a change in the morale of the group and this observation was strengthened by the reports of other members of the staff from their observations during the lunch-hour. A follow-up of the morale of the patients, who continued with the task beyond the end of this study, indicates that it is quite different from the group and individual morale pertaining during the first four days, and that they were considerably happier at perceiving no external pressures of work.

DISCUSSION OF RESULTS AND CONCLUSIONS

The stated aim of this study was to examine Kraepelin's description of the fall-off in work performance that was supposed to distinguish schizophrenics from normals and from other categories of mental patient. The results show that the schizophrenics held a very steady level of performance over a full working day, with no evidence of abnormal fatiguability. As the regression fitted to the daily performance curve was slightly positive, there was no need to invoke the comparison with the depressive group, except in so far as it was evidence that the schizophrenics may not be distinguished from other groups on the basis of their fatiguability, in the sense of a dramatic fall in work output per gross unit/time over extended work sessions.

The daily fatigue curves for the two groups are interesting in that the variations in the curves parallel one another almost exactly. It will be noticed that the fall-off before break periods is quite small and that, though the amount of fall-off tends to be proportionally larger for the depressives, their increments after breaks are greater than those of the schizophrenic group. In summary, it appears that there is no marked fall-off in performance for the schizophrenic group, nor is the fatigue curve significantly different from that of the depressive group.

The fact that the fatigue curve, plotted at half-hour intervals, shows no marked fall-off effects does not, in itself, prove that the schizophrenics do not suffer from an acute fatiguability. Kraepelin's early experiments on work performance dealt with such aspects as performance on a dynamometer, and continuous mental arithmetic. It may be that pathological fatiguability does exist in the form of reactive inhibition, building up extremely rapidly at the beginning of a task and dissipating slowly. If this is the case, then the low level of schizophrenic work output would be explicable in terms of it. This type of fatiguability need not necessarily be associated with the fall-off phenomena of gross unit/time studies. Indeed, the low level of schizophrenic work output resulting from reactive inhibition might cause this sort of an effect to be reduced, because of the smaller muscular effort. The interpretation is, however, speculative and is offered only as an alternative line of investigation. This study

has shown that the schizophrenic does not suffer from abnormal fatiguability when measured in gross terms. It remains to be established whether there are other forms of abnormality, and whether these are applicable in the motivating conditions of regular paid employment on meaningful tasks.

The secondary results arising out of the patients' behaviour under conditions of regular checking (Days 1–4), and the changes in both behaviour and the level of productivity occurring when checking was discontinued (Day 5), are suggestive of further practical conclusions:

1. The fact that the schizophrenics showed a greater decrement in performance than the depressives when their output was no longer being regularly counted and checked suggests that their efficiency might depend, to a larger extent, upon conditions that tend to pace them and provide environmental reminders of the speed at which they are working; this acting to offset the supposed breakdown of the internal reality principle.
2. Behavioural problems arose under the conditions of the first four days, but disappeared when they were modified slightly, suggesting that the type and range of tasks should be flexible enough to allow for both production requirements and modifications to reduce the impact of what the patient perceives as a stressful situation.

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