PSYCHOLOGICAL CHANGES IN CHRONIC SCHIZOPHRENICS FOLLOWING DIFFERENTIAL ACTIVITY PROGRAMMES*

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INTRODUCTION

RECENT interest in the problems of long-stay mental hospital populations has led to a number of studies which have been concerned with rehabilitation and particularly the re-activation of chronic, deteriorated patients by deliberate and systematic modification of their environment. In some of these studies, attention has been focused on the hospital ward itself, both as the background against which personal and social deterioration may be assessed, and as the means of re-building desirable patterns of behaviour (Cameron, Laing and McGhie, 1955; May, 1956). Another group of rehabilitation studies has been concerned with the value of specific work programmes. Industrial-type workshops in Dutch mental hospitals have been discussed by Carstairs *et al.* (1955), and the value of industrial and productive work in hospitals in this country, as well as some of its therapeutic effects, have been described in other publications (Baker, 1956; Stern, 1959; Collins, Fynn, Manners and Morgan, 1959). Considerable developments in the rationale and organization of sheltered as well as financially viable industrial workshops or factories for chronic mental patients have been made more recently (Wadsworth, Scott and Tonge, 1958; Early, 1960; Cooper and Early, 1961; Wadsworth *et al.*, 1961).

In studies with a somewhat different orientation, some efforts have been made to establish more adequate controls of validity and reliability in the assessment of chronic patients and their response to industrial rehabilitation. Wing and Giddens (1959) reported on an Industrial Rehabilitation Unit programme in which clinical and social changes in chronic schizophrenics were assessed by means of an objective clinical rating scale. Other research has attempted to deal experimentally with isolated and specific issues of the general problem of rehabilitation, e.g. O'Connor, Heron and Carstairs (1956) found that chronic schizophrenics could be trained to achieve the same performance level as normals, though they took longer to reach it. Differential reactions to incentives in paranoid and non-paranoid schizophrenic patients were also found (O'Connor and Rawnsley, 1959), and this result was endorsed by Topping and O'Connor (1960), who observed motivational differences between schizophrenics and normals, and between paranoid and non-paranoid schizophrenics.

Some success has been achieved in the rehabilitation of chronic mental patients by social therapy as well as work therapy of an industrial or quasi-industrial nature. After periods of training, patients have been clinically assessed

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as improved, and this improvement has been partly validated by the subsequent stability and maintenance capacity of discharged patients. There is, however, a relative dearth of information on the many factors involved in the social and occupational re-integration of long-stay mental hospital patients. In many cases, there may be no motivation whatever to leave the shelter and security of the hospital, and there is no evidence to suggest that a chronic schizophrenic, for example, would necessarily respond to incentive conditions which are found to operate in a normal population. If some success in rehabilitation has been achieved, the studies that have so far appeared do not isolate the specific factors that have determined success. It may have been the type of work or therapeutic activity, the type of supervision, the presence or amount of financial reward or particularly good relationships with members of the therapeutic team. Further pertinent questions concern the extent to which objectifiable working capacity can be re-established in patients, and the extent to which this capacity is critical for successful re-integration into the community. In addition, the various rehabilitation techniques have not as yet been related in any systematic way to changes in the whole range of functions which are normally impaired or deteriorated in chronic psychotic patients. As a result, it is not clear where interest should legitimately focus beyond the clinical appraisal of each case. The present investigation represents an attempt to provide some information relevant to these problems.

DESIGN

Aims of the Investigation

The first aim of the investigation was to make a comparative study of two distinct types of work programmes: occupational therapy as it is currently practised in mental hospitals and quasi-industrial work in a workshop. By postulating that certain functional areas are relevant to successful rehabilitation, and by measuring any changes in these areas associated with work programmes, it was hoped to supply some evidence of the relative efficacy of rehabilitation programmes in objective, psychometric terms.

The second aim was the investigation of two *specific* aspects of the work situations: financial reward and workshop structure. First, to assess the influence of monetary reward the relationship between behavioural changes and increased earnings, where the opportunity for this was given, were observed. Secondly, an analysis was planned of the contribution of socio-psychological factors characteristic of normal workshops, by comparing different types of formal workshop structure.

The validation of the assumption of a causal link between changes in certain behavioural areas and the ultimate success of a rehabilitation programme lay outside the scope of this first study. While the present activity programmes were conceived as aiming ultimately at the full rehabilitation of the patients as working members of the community, our investigation was aimed mainly at the identification of test changes associated with different activity programmes, different reward schemes and different degrees of co-operative work, where the relevance of the tests and the test changes to final rehabilitation remains untested but was clearly implied.

Method

The two therapeutic situations selected for comparative study differed in a number of important aspects, most of which, owing to the limited available

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population, could not be independently varied to study their specific effects. Accordingly, they were broadly defined as different work "climates", and three main areas of differentiation were noted—type of supervision, type of activity, and presence or absence of financial reward.

Supervision in the Occupational Therapy climate was defined as relatively non-directive, socially therapeutic and patient-centred. The supervisor was a fully trained female occupational therapist. Supervision in the Workshop climate was defined as directive, not deliberately therapeutic, and orientated towards output and work efficiency. The supervisor was a trained male staff nurse with a number of years' experience in workshop supervision, who for the present investigation wore a foreman's brown overall. The activities of the Occupational Therapy group included painting and decorating, gardening, preparatory building operations, percussion band music, cooking and quizzes, arranged in a variable daily programme. The Workshop group had no variability of activity, and was confined throughout the working day to the range of operations necessary for the dismantling of G.P.O. telephone receiver sets. No money was received for work done in the Occupational Therapy Department, whereas patients working in the Workshop received a weekly wage.

The influence of the financial reward factor was assessed in relation to the Workshop group only, by (*a*) comparing two different methods of reward, (*b*) assessing behavioural changes associated with actual increases in amount of money earned where opportunity for this was available, and (*c*) comparing industrial output for two methods of payment. The two types of reward were flat rate and piecework payments. Under the flat rate scheme patients were paid 10s. per week irrespective of output, deductions of 1d. being made for every 10 minutes' avoidable absence. Under conditions of piecework, deductions for absence were made at the rate of 2d. per 10 minutes. The piecework rate was fixed at 3d. per set dismantled, on the basis of the observed average weekly output of the group under flat rate conditions of payment. Under piecework conditions the ceiling of earnings was set at £1 per week, but this limit, of which the patients remained unaware, was never actually reached. Each pay scheme was operated for a 12-weeks period separated by 3 weeks of re-testing.

To assess the effects of variations in Workshop structure, the Workshop group was sub-divided into two sub-groups for the piecework phase of the investigation. One sub-group continued to work individually, and to be paid for individual output, the other sub-group was further sub-divided into small groups, each consisting of 3 men working as a team. The teams were formed on the basis of comparable individual outputs during the flat rate phase of payment. Both the Workshop and the Occupational Therapy group worked for 23 hours per week.

A Control group not taking part in any organized therapeutic activity programmes was included in the investigation. Men belonging to this group continued to be employed on routine ward work or work in hospital utility departments.

The selection of behavioural areas within which to make an objective assessment of improvement was guided by their relevance to areas of schizophrenic cognitive impairment and to social and occupational rehabilitation.

Tests and Apparatus

The tests used are enumerated under the heading of the specific behavioural area for which they were considered appropriate.

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1. *Functional intelligence:* (*a*) Mill Hill Vocabulary, (*b*) Progressive Matrices.

2. *Logical thinking:* (*a*) "Similarities" sub-test of the Wechsler-Bellevue Intelligence Scale Form I, (*b*) from the Revised Stanford-Binet Test Form L, the "Mutilated Pictures" from year VI and "Picture Absurdities" I and II from years VII and X respectively. In scoring, each correct card was scored 1, with a maximum score of 6.

3. *Clinical state:* Patients were rated on a modified version of a rating scale of schizophrenic symptoms previously used in connection with the rehabilitation of chronic schizophrenics (Wing and Giddens, 1959; Wing, 1961). The Scale covered four areas of schizophrenic symptomatology: affect, speech, delusions and hallucinations. Rating on the basis of carefully defined objective criteria was carried out independently by the two consultant psychiatrists associated with the investigations.

4. *Social competence:* (*a*) Vineland Social Maturity Scale (Doll, 1953) appropriately modified for the present sample and using the Social Age index, (*b*) Venables' Activity/Withdrawal Scale (1957). Ratings were carried out on the basis of information supplied by the charge nurse of the ward to the psychologist for (*a*) and to the psychiatrists for (*b*).

5. *Reaction time:* Experimental findings have shown that the visual and auditory reaction times of schizophrenics are longer than those of normal subjects (Venables and Tizard, 1956; Venables and O'Connor, 1959). Therefore both reaction time tests were included in the present battery, adopting standard laboratory techniques. After 5 practice trials 10 test trials were given and the average reaction time was calculated in hundredths of a second.

6. *Skill:* (*a*) Manual and Finger Dexterity Tests of the U.S.E.S. General Aptitude Test Battery given in a modified form, (*b*) Hand-eye co-ordination measured by scores on the Cambridge Triple-Tester (Eysenck, 1947). Each patient was given a 1 minute practice trial and the score was the average number of "hits" over 5 subsequent 1-minute trials.

7. *Accuracy of estimation:* assessed by the Cambridge Triple Tester. A Goal Discrepancy Score, as described by Himmelweit (1945) in her level of aspiration experiments, was obtained from the difference between actual performance and predicted performance on the Triple Tester. Since the Goal Discrepancy Score is a function of the subject's accuracy in estimating his own performance, this score was used as the criterion for this variable. It was intended to validate the score as a measure of closeness of reality contact in relation to the Clinical Rating Level.

Procedure

The investigation was restricted to male long-stay non-paranoid schizophrenics aged 20–40 years in order to obtain a homogeneous population, to by-pass differences in incentive responsiveness between paranoid and non-paranoid schizophrenics, and for reasons of space. Schizophrenic patients who were additionally classified as mentally defective, brain-damaged, or epileptic were excluded, and the sample was confined to patients with an uninterrupted stay in hospital of at least 2 years, and who were able to co-operate in psychological testing. The distribution of the groups on age and chronicity is shown in Table I. None of the differences is significant.

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TABLE I

Constitution of Groups by Age and Chronicity

	Occupational Therapy	Workshop	Controls
Age:			
$\bar{x}$	36·2	32·2	33·7
S.D.	4·29	3·83	4·42
Range	26–39	25–39	27–39
Chronicity:			
$\bar{x}$	8·3	6·9	7·3
S.D.	5·83	4·90	3·87
Range	2–19	2–19	2–12

The available population satisfying the criteria of age, diagnosis and chronicity was found to be distributed fairly evenly over locked and open wards.

Patients were allocated to three groups: a Control group (N=11), an Occupational Therapy group (N=11) and a Workshop group made up of two equated groups (N.s=12 and 12), in order to carry out the more detailed studies previously described.

In the construction of groups, the need for randomization inevitably conflicted with the need for adequate equating. An element of randomization was maintained, however, by allocating patients initially to the groups in chance order. The groups so formed were then manipulated to equate them as far as was possible on all relevant variables. While equating on the initial criteria of age and chronicity was relatively easy and while it also proved possible to equate the groups for previous highest occupational level and current financial income from all sources, it was clearly not possible, with the small numbers available, to equate the groups on all 13 tests. Accordingly, five criterion tests were selected on the assumption that they would probably be of fundamental importance in rehabilitation and reasonably representative of the battery at the same time. These were Progressive Matrices I.Q., Clinical Rating, average Manual and Finger Dexterity combined, average Visual and Auditory Reaction Time combined, and accuracy of estimation as measured by the Goal Discrepancy score. The summary of results in Table III shows that the general aim of the procedure appears to have been fulfilled, for only two significant differences remained for the 3 groups on the 13 measures. These were better scores by the Occupational Therapy group compared with the Workshop group on the Activity/Withdrawal Scale ($p<0·05$), and better scores again by the Occupational Therapy group compared this time with the Control group on the Mill Hill Vocabulary ($p<0·05$).

RESULTS

Statistical techniques not pre-supposing a normal distribution of data were employed throughout. The Mann-Whitney U-Test was used to determine the significance level of test changes, and Spearman's rank correlation rho was used for the correlations. Since hypotheses were not formulated, probability values were determined by 2-tail tests of significance except in the case of comparisons between the Control group on the one hand and the Occupational Therapy and Workshop groups on the other, because in this case *a priori*

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grounds led to the prediction of greater improvement on the part of the special activity groups. With the exception of Clinical Rating, Visual and Auditory Reaction Time and Goal Discrepancy scores, high scores represented good scores. For the tests just mentioned *low* scores represented good scores.

Comparison of Therapeutic Situations

The effects of the different activities will be considered after 12 weeks, and after 27 weeks (including a 3-week interval for re-testing) from the start of the investigation. Within-group and between-group changes were examined.

Means and within-group differences for the three occasions of testing (i.e. initial scores and scores after 12 and 27 weeks) are given in Table II. Within-group differences for the Control group and comparisons between test occasions 2 and 3 for the other two groups are not tabulated because none was significant. Similarly, the details of the between-group comparisons are omitted because only few of the results reached the usual significance level. The main data, both significant and non-significant in terms of the superiority or inferiority of groups or test occasions, are summarized in Table III.

The three groups available for re-assessment after 27 weeks were smaller (Workshop group=21, Occupational Therapy=7 and Control=6) than the original groups at the beginning of the investigation. This was because a number of patients were discharged, returned to hospital utility departments or transferred to other hospitals at the end of the first 12-week phase of the investigation. The calculations of differences between groups and between test occasions for the period of weeks 12–27 and for initial scores and scores after 27 weeks were based on these reduced numbers. The significance of the differences between the original and new groups was assessed by U-tests for the 13 assessment measures used. Only one of these was significant at the 5 per cent. level: the Occupational Therapy group being better than the Control group on the Mill Hill Vocabulary as for the original samples.

Monetary Reward

The total Workshop group and the sub-group working as individuals during the piecework phase earned more during the flat rate reward phase than during the piecework period ($p<0\cdot05$ and $p<0\cdot002$ respectively). The sub-group working as teams during the piecework phase earned more during the piecework phase but not significantly more. During the piecework reward period the sub-group of teams earned significantly more ($p<0\cdot002$) than the sub-group working individually during that phase.

The relationship between opportunity for increased earnings and behavioural changes was assessed in two ways:

(*a*) Behavioural changes associated with two different methods of reward, i.e. flat rate, and opportunity to earn more than flat rate by piecework. The relevant comparisons here were:

(*i*) Between changes in test scores during the piecework phase and changes during the flat rate reward phase *for the total Workshop group*. The results are summarized in Table III and show that while the total group continued to improve on 7 of the 13 measures during the second, piecework phase of the investigation, the major and only significant changes occurred during the flat rate reward phase;

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TABLE II

Means and Within-Group Differences of Workshop and Occupational Therapy Groups for 3 Test Occasions

		Test Occasions:	M.H.	P.M.	Sim.	P.A.	Clin. Rat.	Vine.	M.D.	F.D.	R T v	R T a	T.T.	Goal Discr.	A/W
Occupational Therapy	N's=11 and 11	1	**98·55**	**95·36**	8·45	4·40	2·75	**13·13**	32·18	18·77	37·23	36·67	20·42	19·27	**30·32**
		2	96·82	95·91	**10·82**	**4·76**	**2·13**	13·76	**34·45**	**19·23**	**25·15**	**30·30**	**24·73**	**22·82**	28·18
		U	57½	59½	39	55½	33	55½	43½	50	27½*	39	45	60	39
	N's=7 and 7	1	**99·86**	**95·00**	8·43	5·20	2·93	11·91	32·00	18·93	38·51	38·00	20·11	20·71	**28·36**
		3	94·86	91·29	**9·43**	**5·66**	**2·83**	**13·97**	**31·00**	**19·29**	**35·64**	**35·81**	**20·74**	**20·29**	27·29
		U	19	20½	21½	21½	23½	21½	21½	21	16½	18	23	22½	20
Workshop	N's=24 and 24	1	87·04	88·33	7·21	4·26	2·79	13·56	29·60	17·10	40·49	35·38	21·51	24·83	25·21
		2	**89·17**	**90·75**	**8·83**	**4·98**	**2·33**	**15·62**	**29·21**	**19·50**	**32·00**	**31·03**	**22·65**	**16·00**	**26·42**
		U	258	262½	225½	208½	172*	222½	279½	194	191*	223½	261	197	265
	N's=21 and 21	1	83·57	85·67	6·71	4·15	2·86	13·21	29·17	16·74	41·29	37·08	**21·04**	25·14	25·55
		3	**87·43**	**93·81**	**8·48**	**4·78**	**2·50**	**16·78**	**28·62**	**17·90**	**31·18**	**26·38**	20·10	**16·67**	27·38
		U	194½	173	167½	168	139*	131½*	212½	184½	131½*	104½†	196	159	175

The mean for the occasion with, according to U-test, the better score is given in heavy type. This occasion is the one with the larger score except in the case of Clinical Ratings, Visual and Auditory Reaction Times and Goal Discrepancy, where it is the smaller score.

*=$p<0·05$. †=$p<0·01$, 2-tail tests.

TABLE III

Summary of Within- and Between-Group Differences

Within-Group Differences on 13 Tests	Occupational Therapy	Workshop	Controls
No. of tests with better scores after 12 weeks, compared with initial scores ..	9	13	10
Significant	1	2	0
N's	11	24	11
No. of tests with better scores after 27 weeks compared with scores after 12 weeks	6	7	7
Significant	0	0	0
N's	7	21	6
No. of tests with better scores after 27 weeks compared with initial scores ..	10	12	12
Significant	0	4	0
N's	7	21	6

Between-Group Differences on 13 Tests	Initial Scores	Scores After 12 Weeks	Scores After 27 Weeks
Occupational therapy better than Workshop	11 (8)	9	7
Significant	1 (0)	0	0
N's	24 & 11 (21 & 7)	24 & 11	21 & 7
Workshop better than Control	8 (8)	9	10
Significant	0 (0)	1	0
N's	24 & 11 (21 & 6)	24 & 11	21 & 6
Occupational therapy better than Control	11 (8)	10	8
Significant	1 (1)	2	1
N's	11 & 11 (7 & 6)	11 & 11	7 & 6

The figures in parenthesis refer to the reduced groups.

(*ii*) Between changes in test scores during the two reward periods for *the sub-group on individual piecework* during weeks 12–27. The results show that this sub-group improved on all 13 tests during the flat rate reward phase and further improved on 7 tests during the piecework phase when it was actually earning significantly less money. None of the test changes was significant.

(*b*) Behavioural changes associated with actual increases in money earned

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These were assessed by comparing:

(*i*) Differences in test scores during weeks 1–27 for the two Workshop sub-groups. The results show that the sub-group of individuals which had earned significantly less during the piecework phase was significantly better on Auditory Reaction Time ($p<0.02$) after 27 weeks and that the sub-group of small teams was significantly better on the Vineland Social Maturity scale ($p<0{\cdot}05$) and on accuracy of estimation—the Goal Discrepancy score—($p<0{\cdot}05$) at the end of the piecework phase of the investigation. These were the only significant differences.

(*ii*) Changes in test scores for the two Workshop sub-groups during weeks 12–27 of the investigation. There were no significant changes in test scores during this period in either of the two sub-groups, although the sub-group that had worked as teams during the piecework period had earned significantly more during that phase than the sub-group working as individuals.

Output changes are shown graphically in Figures 1 and 2.

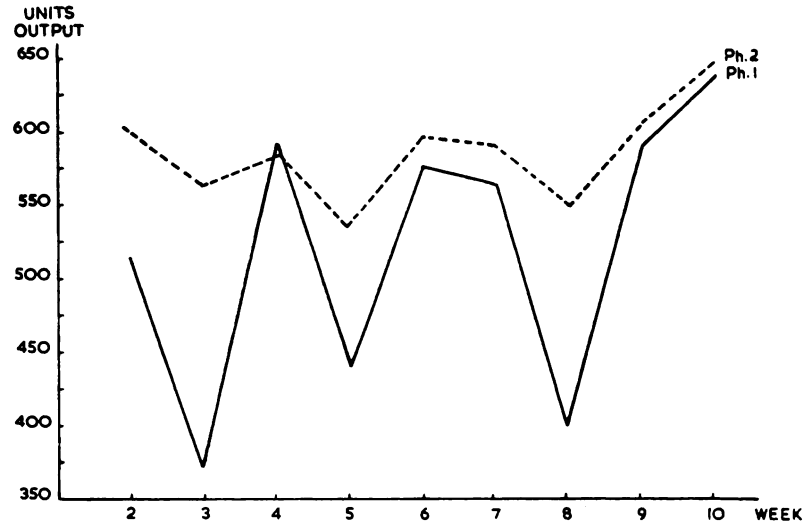


FIG. 1.—Weekly output of full Workshop group during flat rate (Ph. 1) and piecework (Ph. 2) reward phases.

The output levels in Figure 1 are weekly group totals for the flat rate and piecework reward phase ($N=21$) without regard to differential rates of absenteeism. The difference between the phases is not significant on U-test although output in the piecework phase is substantially bigger. The rate of increase of output during the period of investigation appears on inspection greater during the flat rate reward phase. This impression is confirmed by calculating "slope" values for the two output curves. The difference between these slope values is statistically not significant.

In order to assess the differential effect of absenteeism on output in the two phases, weekly output was prorated for hours lost. Working with the prorated figures, output during the piecework phase is still higher than output during the flat rate reward phase.

Comparison of output under flat rate and piecework conditions for the

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whole Workshop group would give a somewhat distorted picture, however, because half the Workshop group was working as teams during the second phase of the investigation, thus introducing a new factor. A more appropriate comparison to assess the effect of opportunity for higher earnings on output would therefore involve only those patients individually on piecework during the second reward phase. Inspection of Figure 2 (Graphs I_1 and I_2) suggests that there was no significant difference in output for this sub-group between the two reward phases. This is confirmed by U-test, but "slope" values indicate greater output increments during the flat rate reward phase. After prorating for absences, output for the sub-group of patients working as individuals during the piecework phase remains higher in the first phase, but the difference is still not significant.

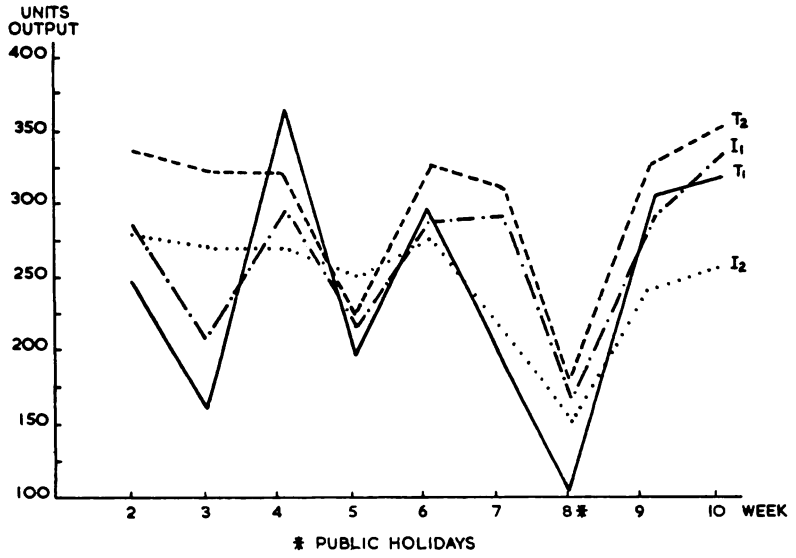


FIG. 2.—Weekly output of Workshop sub-groups during flat rate and piecework reward phases. (I="Individuals", T="Teams", 1=flat rate payments, 2=piecework payments.)

Workshop Structure

The relevant statistical tests to assess the effects of different forms of social structure in the Workshop were within- and between- sub-group comparisons. The within-group comparisons of the sub-group working as individuals during the piecework phase of the investigation, show that this sub-group improved on 7 out of 13 tests during weeks 12–27 (on none significantly), and that it improved on all 13 tests (Auditory Reaction Time $p<0{\cdot}02$) during the whole experimental period. The sub-group working as teams during the piecework phase of the investigation improved on 6 of the 13 tests during weeks 12–27 (on none significantly), and improved on 11 of the 13 tests (Social Maturity $p<0{\cdot}05$, Goal Discrepancy score $p<0{\cdot}05$) during the whole experimental period.

After 12 weeks the sub-group working as teams during the piecework phase of the investigation was better than the sub-group of individuals on 5 of the 13 tests (Goal Discrepancy score $p<0{\cdot}02$), after 27 weeks the teams were superior to the individual workers on 10 of the 13 tests (Goal Discrepancy score $p<0{\cdot}05$).

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Figure 2 shows the weekly output of the two sub-groups on piecework as well as on flat rate. The output difference between the sub-groups during the piecework phase (Graphs I_1 and T_2) is highly significant ($p<0{\cdot}002$). This difference ceases to be significant, however, after prorating for absenteeism. The calculated "slope" values show a higher incremental rate for patients working as teams. Comparison of Graphs T_1 and T_2 in Figure 2 shows the difference in output for the sub-group of teams as between flat rate and piecework conditions. This difference is significant at the 5 per cent. level, output in the piecework phase being greater both with and without prorating for differential absences in the two phases.

Calculating number of hours lost per week during the two phases, shows in the first place that absenteeism for the total Workshop group was higher in the piecework phase of the investigation. Considering the sub-groups independently, the sub-group working as teams lost more hours during the flat rate reward phase, but not significantly so, while the sub-group working individually during the piecework reward phase lost significantly more hours during the piecework period ($p<0{\cdot}01$). The greater absenteeism of the sub-group of individuals between the flat rate and the piecework reward period, is statistically significant ($p<0{\cdot}02$). At the same time the sub-group working as teams shows a progressive (non-significant) decrease in absenteeism from the first to the second reward period.

Correlational Data

The inter-correlations between the tests of the battery based on initial equating scores are given in Table IV. The ranks for Clinical Rating, Visual and Auditory Reaction Times and the Goal Discrepancy scores were reversed in order to make lower ranks represent good scores throughout.

TABLE IV

		1	2	3	4	5	6	7	8	9	10	11	12	13
Mill Hill Vocabulary	1		·823	·570	·448	·250	·305	·446	·362	·041	·075	·366	·163	·316
Progressive Matrices	2			·592	·471	·081	·295	·565	·415	·118	·124	·412	−·051	·099
Similarities	3				·504	·281	·237	·328	·264	·035	·045	·250	·282	·223
Pictorial absurdities	4					·204	·362	·428	·505	−·032	−·079	·417	·170	·383
Clinical rating	5						·553	·219	·058	·088	·144	·269	·338	·463
Vineland	6							·563	·339	·429	·392	·342	·180	·512
Manual dexterity	7								·746	·464	·361	·322	−·019	·328
Finger dexterity	8									·119	·132	·237	−·075	·289
Visual reaction time	9										·837	·117	·159	·230
Auditory reaction time	10											·221	·118	·048
Triple tester	11												−·098	·272
Goal discrepancy	12													·284
Activity/Withdrawal	13													

Significance level of rho: N-2=44; 5 per cent.=0·291; 1 per cent.=0·376.

DISCUSSION OF RESULTS

The summary of within- and between-group differences (Table III) shows that superior behavioural changes occurred in the Workshop group as compared with the Occupational Therapy group at both stages of re-assessment. These changes are described by significant as well as non-significant differences. It is particularly interesting that only the Workshop group showed any significant changes over the total period on the measures used in the investigation, and

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that the inferiority of the Workshop group to the Occupational Therapy and Control groups which was present at the beginning of the investigation, was progressively reduced during the 27 weeks of the investigation.

On results obtained with the tests used here, Occupational Therapy as an activity appears to lead to only slightly greater improvements than the absence of deliberately therapeutic activities as in the case of the Control group. In accounting for the consistent improvement of the Control group, two factors are postulated. First, the successive re-testing of *all* patients led to greater personal contact between patients and investigators, resulting in some reduction in test anxiety and thus possibly better scores. Secondly, in the course of the investigation the general climate of the hospital may have become more permissive and more consciously orientated towards the rehabilitation of chronic schizophrenics with concomitant changes in the attitude of staff. Both factors as well as practice effect may be assumed to have contributed to the observed improvements in all groups.

The data concerning earnings and output presented above show that the mere availability of higher earnings at the levels used, did not by itself lead to higher wages or output or to relatable changes on the tests. In any case, the experimental method of the present investigation could not lead to an unequivocal answer as to whether financial reward as such operates with chronic schizophrenics, because the present comparisons are in terms of *differences* of earnings available and/or earned. Ideally, the specific effects of financial reward should have been assessed by comparing a no reward with a reward phase in the Workshop for any changes in the forms of behaviour tested in this study. The methodological objection to this plan in the present scheme was that it was generally known in the hospital that Workshop activity carried with it a financial reward. If this had been withheld for experimental purposes, any behavioural changes or their absence might have been produced by a negative incentive rather than by the absence of an incentive. On the assumption, however, that an increased monetary reward has in our culture a generally accepted incentive value, it may be justifiable by implication to link response to *changes* in reward with reward responsiveness as such. The conclusions obtained at this explanatory level cannot, of course, have the force of formal proof. The present findings with their only slight, if any, relationship between financial incentive and test and output changes, suggest that financial incentive at the present level had no direct bearing on the differential changes of the experimental groups or the progressive changes in the Workshop group.

Manipulation of Workshop structure during the piecework phase of the investigation led to the finding that greater group structure in a Workshop increases productivity, and thus earnings, through a reduction of absenteeism in the inter-dependent work groups. These are, of course, well-known phenomena in normal industrial groups (Argyle, 1957). The imposed co-operative structure did not, however, lead to many significant changes in the functional areas selected as relevant to rehabilitation. On the other hand, the sub-group of teams ended the investigation by being generally superior to the sub-group on individual piecework. This result suggests that the effects of a co-operative working group structure are not entirely confined to a reduction of absenteeism but may affect the general state of the patients.

Of the correlations between the tests, 46 per cent. are significant at better than the 5 per cent. or 1 per cent level (Table IV). The correlational trends suggest that a socio-clinical and an intelligence factor on which dexterity and reaction time measures will have high loadings, may account for most of the

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observed correlations, but a factor-analysis is needed to confirm these assumptions.

The significant correlations linking particularly Progressive Matrices with Manual and Finger Dexterity, the Clinical Rating Scale with the Vineland, and Manual Dexterity with Visual and Auditory Reaction Time, are felt to be important because speed of reaction, dexterity, intelligence, social and psychological competence are important features in work efficiency. It is clear from Tables II and III that the Workshop group showed the bigger improvements in these areas, and the suggestion is implicit that these changes and relationships have considerable implication for final re-integration into the community. To verify this suggestion, the data will first have to be treated by factorial analysis, and a group of patients will have to be followed up to the final rehabilitation stage; placement in industry. Attempts in this direction are at present under way.

The significant correlation between the Goal Discrepancy score and Clinical Rating appears to validate the former as a measure of closeness of reality contact. This conclusion is drawn because the Clinical Rating Scale in terms of its assessment of degree of delusions, hallucinations and incongruity of affect can be regarded as a measure of reality contact, and because the Goal Discrepancy score, which was used as the index of accuracy of estimation, depends on the accurate assessment of the reality factors involved when manipulating, scoring and anticipating scores on the Triple Tester apparatus.

Our remarks have so far been largely confined to identifying the type of activity programme which leads to the greater psychological changes. Some discussion is indicated of the nature of these changes themselves, though it is realized that the present theorizing can only be tentative, and that a number of different and equally plausible suggestions may be put forward. Since all significant or near-significant changes are confined to the groups with specifically organized therapeutic activities, the Control group's performance will not now be considered. For the Workshop as well as the Occupational Therapy group the most marked changes were in the clinical and social areas and in speed of reaction. Since these changes were most marked in the Workshop group, it would seem reasonable to suggest that the changes may be due to a planned activity which not only makes specific demands on a patient but which is socially relevant. Workshop supervision stressing output and quality of work, may well have led to greater alertness and awareness of external and objective demands and needs. In complying with the demands of the situation, changes in clinical and social status and speed of reaction may develop, and the behavioural changes though not all statistically significant may nevertheless be fairly general or even cover all areas assessed. This would raise the possibility that the changes associated with therapeutic workshop activities may also be associated with more fundamental physiological changes. Recent work (Venables and Wing, to appear) has shown that there is a relationship between arousal level of the reticular formation and clinical and social ratings of patients. A new experiment is, therefore, planned on the relationship between behavioural changes associated with therapeutic work and changes in operationally defined measures of reticular activity.

The results also suggest that Workshop activities may lead to significant changes in the objective assessment of reality factors. This appears to be shown by the consistent improvement of the Workshop group and particularly by its sub-group of teams on the Goal Discrepancy score which was used here as an operationally defined measure of degree of reality contact.

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Specific changes in the areas assessed are probably dependent on the more general changes, but in addition would be affected by the general background of individual differences in pre-morbid intelligence, special aptitudes, motivational hierarchies and past occupation. Individual test changes may also be assumed to be related to degree of psychotic deterioration from a best ever level which in most cases can be inferred with only minimal accuracy. These conceptualizations are necessarily vague, but they do seem to offer a challenge for further investigations.

An important general point remains to be raised: to what extent are the observed behavioural changes due to changes in what Russell Barton (1959) has called "institutional neurosis", i.e. a reduction of secondary, institutionalized behaviour, and to what extent, if any, do they represent alterations in the primary schizophrenia disorder? The present data cannot give an answer to this problem. It would require a careful differential analysis at various stages of chronic schizophrenia of factors which are clearly a reflection of hospital behaviour patterns, and factors which equally clearly belong to the individual's constellation of symptoms. It would also require an experimental investigation in which the factor of institutionalization was the independent variable.

Summary and Conclusions

The investigation reported here attempted to carry out an objective comparison of certain psychological, clinical and social effects following upon Workshop therapy, Occupational Therapy and the absence of any specific activity for male chronic schizophrenics. The data obtained showed that while all three conditions led to improvements on the measures employed, the group receiving Workshop therapy improved to the greatest extent. The most important changes were in terms of social competence, clinical state, reaction time, and accuracy of estimation. It has been shown that most of these measures were linked in terms of changes on them by significant correlations, and the assumption has been made that the measures reflect important capacities involved in industrial efficiency and adaptability.

Separate and controlled manipulation of financial reward and Workshop structure indicated:

(*i*) That the major behavioural changes occurred when patients were paid on a flat rate basis and were working independently of each other;

(*ii*) That consistent behavioural changes for the Workshop group continued to occur while patients were paid on a piecework basis working both independently of each other and as members of a team, but that these changes were not significant;

(*iii*) That holding absenteeism constant, the prospect of earning more money did not lead to significantly greater output;

(*iv*) That team work compared with working individually appeared to lead to additional changes on the behavioural measures used, and

(*v*) That holding absenteeism constant, output and earnings were greater for patients working as teams than for patients working individually.

Since opportunity for increased earnings did not lead to significantly greater output, and since opportunity for increased earnings is a normal positive incentive in our industrial culture, the conclusion is implicit, though not substantiated beyond doubt, that financial reward as well as changes in type and amount of reward did not play a crucial part in the behavioural changes

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observed. In view of the remaining doubts, however, concerning the absolute role of financial reward as such, further investigations in this area are planned.

What appears to be important is the total effect of what might be called the "workshop climate". This "climate" may be seen as an amalgam of industrial work, male supervision, time keeping, payment, and working in the company of other men on a socially approved task. They are features which are an integral part of a normal working situation and which convey a definite though non-specific socio-psychological climate. It is this "climate", which was experimentally enhanced by organizing teams of patients, which in turn led to the rise in output and earnings and a decrease in absenteeism. It is held to be the same total situation which led to the superior and consistent changes of the Workshop group in the behavioural areas tapped by the test battery. It was tentatively suggested that the amount of change recorded might be due to a general re-activation of patients expressed in changes in alertness, awareness, responsiveness and objectivity.

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