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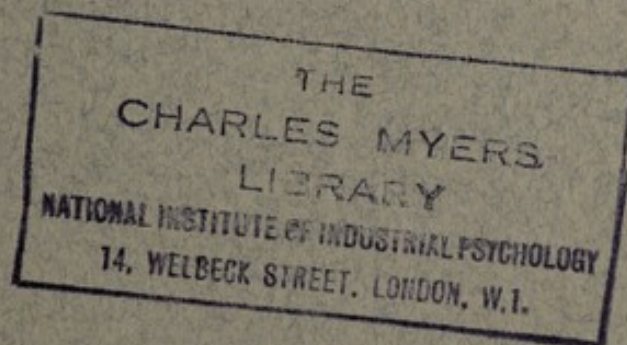
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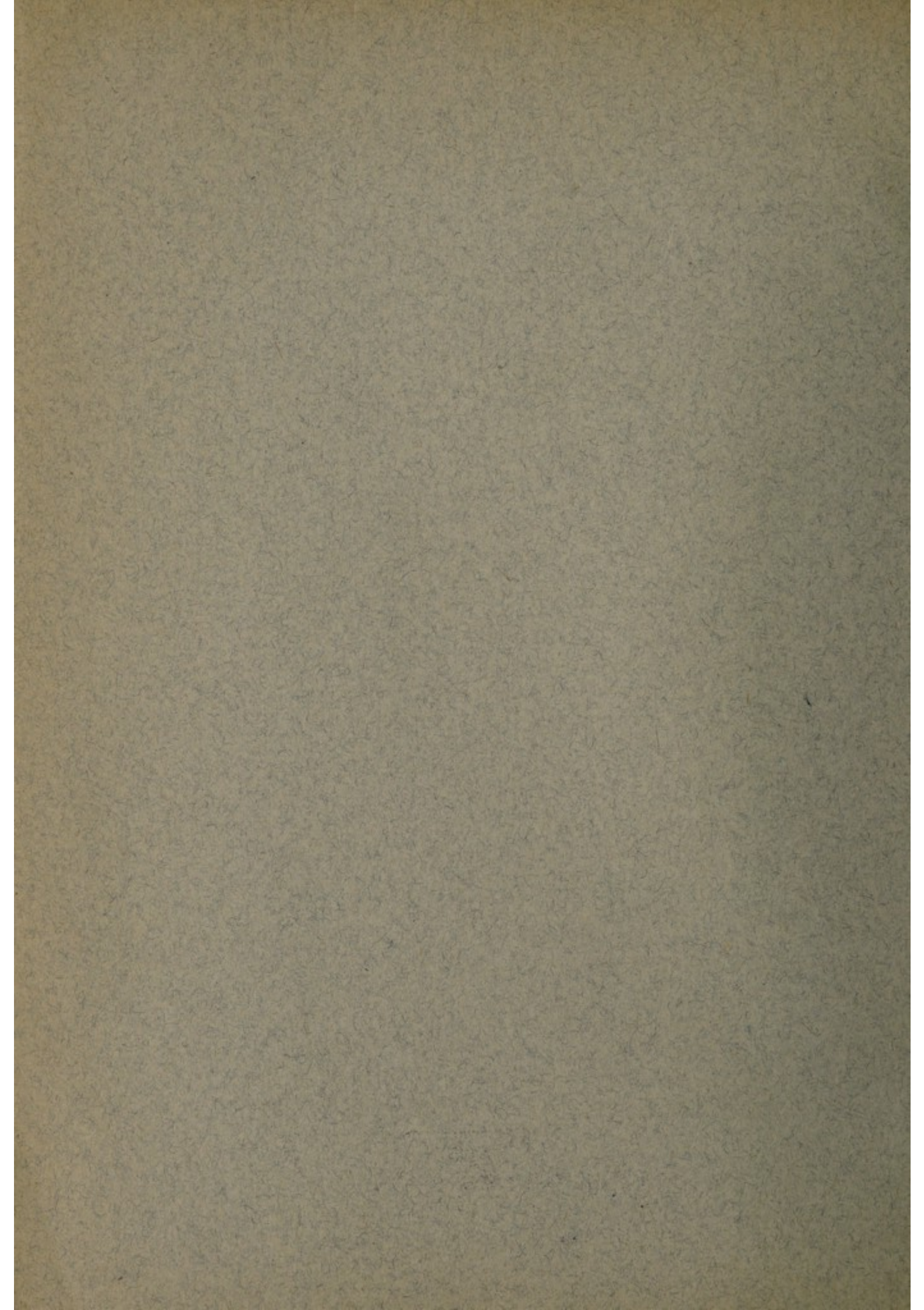
INDUSTRIAL PSYCHOLOGY :
ITS SCOPE AND EFFECT ON EFFICIENCY

ABSTRACT OF LECTURE BY
CHARLES S. MYERS, M.D., Sc.D., F.R.S.



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Abstract of lecture by CHARLES S. MYERS, M.D., Sc.D., F.R.S.,
Director of the National Institute of Industrial Psychology.

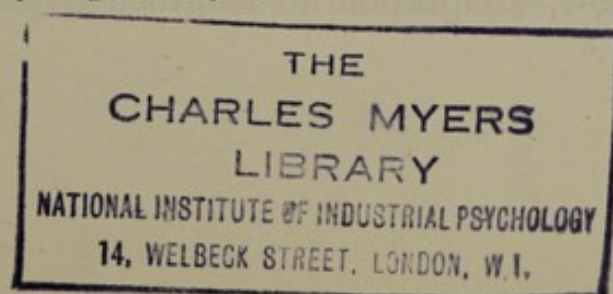
(Read before the Society, 7th November, 1923).

It is only recently that attention has been paid to the scientific study of industrial conditions from the *human* or psychological standpoint. This has to a large extent been made possible by the development of experimental psychology, which within the last fifty years has elaborated methods competent to examine, if not always completely to solve, many of the problems at issue.

Industrial psychology deals with movement study, spell study, environment study, vocational training, vocational guidance, vocational selection, improvements in the workers' incentives to work, the relations between management and labour and the study of advertisement.

The aim of the industrial psychologist is not directly to 'speed up' the worker but to discover the most effective methods of work, eliminating needless movements and wasteful energy. The adoption of this attitude has been found invariably to secure the workers' confidence and invariably to result in increased output. Thus in an investigation into packing output was increased by over 35% and the packers expressed their gratitude to the investigators because they were so much less tired by the end of the working day.

In such investigations an assistant investigator, supervised by a senior investigator who visits the factory from time to time, lives the life of the worker. Careful note is taken of wasteful movements on the part of the workers, bad arrangements and defective supplies of material, etc., and detailed records are taken of the output hour by hour throughout the day. Improved methods are tried and their results accurately ascertained. The co-operation of workers, foremen and managers is sought throughout and no attempt is made to increase output merely by 'speeding up' under unaltered conditions.



Excessive 'speeding up' sacrifices quality to quantity of output. Output curves must always take into account both the amount of *serviceable* output and the amount of spoiled work. Two interesting examples of spoiled work have recently come to my notice in the form of breakages. One firm installed a scheme of penalties for breakages, only to find that at the end of six months the breakages had actually increased. The other firm called in the help of the National Institute of Industrial Psychology to investigate the causes of the breakages, which were mainly found to be of a psychological nature, due to excitement, annoyance, worry and irritation. Improved apparatus was installed and opportunities for irritation eliminated, the result being a reduction in breakages by over 53%.

Closely allied to the problem of breakages is that of accidents. They may arise not only from carelessness and inexperience, but also from excitement, worry, irritation and annoyance. These latter conditions tend to occur during periods of rush and overpressure, and it is at these times, when output is at a maximum, that accidents are generally most frequent.

Fatigue is a normal and healthy result of all work and can only be considered serious and abnormal when it is not almost wholly dissipated by the rest which follows any given spell of work. The amount of fatigue during the week varies with the worker, the most expert operative's work rising sometimes throughout the week and the poorer operative's falling during the latter half of the week.

One problem which confronts us is the best distribution of hours of work to secure maximal efficiency. Vernon has studied the output records of four tinsplate factories. Here the hourly output during 4-hour shifts was found to be 11.5% greater than when 8-hour shifts were worked, and under the shorter shift system the output no longer showed the previously serious fall at the end of the day.

Vernon has observed that improvement in output does not necessarily attain its maximal effect immediately. The output rises very slowly, some time being needed for the worker to adapt himself to new conditions. But whereas adaptation to shortened periods of work is slow, adaptation to lengthened periods is quick. Vernon

concludes that overtime is uneconomical, for if an 8-hour day is increased on one day of the week to a 10-hour day, the speed of work tends to fall to that of a 10-hour day on *every* subsequent day of that week.

The most favourable length of rest pause and the most favourable point of its introduction must vary with the worker, with the nature of his work and with the duration of its spell. In a boot and shoe factory an increase of output for six presses was obtained of over 44%. This was effected by allotting to each press three instead of two girls; each of the three working for 40 minutes in each hour and resting the remaining 20 minutes.

In the majority of operations the work curve is not only raised in height, but is also improved in form if a spell of work exceeding four hours is divided into two halves, separated by a few minutes' pause. In one case, despite a 3% reduction in working hours, output increased by 5%, with less fatigue to the worker, by the introduction of two 7 minutes' rest pauses daily.

In another experiment an increase of over 14% in output was obtained by the introduction of a 15 minutes' interval in the morning and afternoon. This time was spent mainly in a change of work, viz., in collecting materials, which had previously been done the first few minutes of each morning's work and partly distributed irregularly throughout the remainder of the day.

Output is increased with less effort if we can convert an irregular series of actions into a rhythmical series. In an investigation in a coal mine the miners were trained to wield the pick rhythmically in a continuous curved path, output thereby being increased by 16%.

One of the most important principles of movement study is to avoid a needless number of separate angular movements, instead combining them into a single uninterrupted sweeping circular movement. By the introduction of such methods into the process of sweet-dipping, Farmer obtained an average increase of 27.1%.

Who can doubt the importance of determining wasteful methods of movement and of preventing the novice from falling into bad habits

of work? Yet how little provision is made for training the worker scientifically! In vocational training the mental differences of workers are so great that different methods of instruction must be employed for the different members of a group being trained. Some may learn from a diagram or from a wire model of the movement; others need to see the movement carried out; others again need to carry them out themselves. The problems of such important individual mental differences is the special concern of industrial psychology.

I need hardly lay stress on the immense importance of utilising the best means at our disposal in vocational guidance and vocational selection. What a wastage of time, money and happiness arises from the wrong peg everlastingly trying to fit into the wrong hole, and passing by trial and error through a variety of different holes, until at length one is found which the peg fits! The employee becomes discontented and discouraged; he loses heart, self-confidence and happiness; while the employer wastes time and expense in training the employee to work at which he will never do well. If a man is fitted to his work, not only is he happier and more efficient at it, but his health is better and thus the sickness records of the factory are improved. Moreover, the wastage through workers leaving because they are unfitted for their job becomes enormously reduced.

The methods of vocational testing are broadly three in number. The first is the method of "sample" tests; these involve a task which is a sample of that at which the candidate will be subsequently engaged in his occupation.

The second method of testing is by means of "analogous" tests. In order to examine workers applying to be engaged on feeding machines, Link devised a gramophone box, provided with a large horizontal metal disc having a sector of variable size cut in it, which when passing a certain spot would allow a shot to pass through. The candidate had to try to drop the shot through while the disc revolved. Some workers did better with slow, and others with a fast revolving disc, corresponding to their occupational efficiency, some doing better with fast and others better with slow machines.

The third method of vocational testing attempts to analyse the various qualities required for success in a given occupation, and to test each of these qualities separately. In an examination of 27 telephone exchange girls in Geneva, Fontègne selected tests for memory, for numbers and names, accuracy of aim, speed of reaction, speed and accuracy of cancellation of given letters in a sheet of printed words, speed and accuracy of card sorting. Twenty-one of the twenty-seven girls correlated very highly in order of success at the tests with the order independently ascribed by the telephone supervisor. Though vocational psychology is so young a science, it is unquestionably already capable of yielding information fuller and more precise than can be reached by the older unsystematic methods of procedure. It is rapidly becoming recognised as an indispensable supplement to the method of interview.

The third method of vocational testing still left to be considered is the method of direct observation. This method is based on the fact that many of the activities which are performed in industry are of a routine nature and can be observed and recorded in a systematic manner. The method of direct observation is particularly applicable to those occupations which require a high degree of manual skill and accuracy, such as the work of a machinist, a draftsman, or a typewriter operator. In these occupations, the worker's performance can be observed and recorded in a systematic manner, and the results can be used to select the most suitable candidates for the job. The method of direct observation is also applicable to those occupations which require a high degree of mental skill and accuracy, such as the work of a clerk, a stenographer, or a typewriter operator. In these occupations, the worker's performance can be observed and recorded in a systematic manner, and the results can be used to select the most suitable candidates for the job.

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