AN ACCOUNT OF AN EXPERIMENT ON VISUAL AFTER-SENSATION IN REFERENCE TO ILLUMINATION IN COAL MINES CARRIED OUT BY THE NATIONAL INSTITUTE OF INDUSTRIAL PSYCHOLOGY

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AN attempt was made to measure the effect, as shown by the number and duration of visual after-sensations, of the ordinary miners' lamp in various positions in relation to the eye of the subject, and with various methods of diffusing the source of light. The experiments were carried out in a dark room, and pit conditions were reproduced as far as possible, a standard miners' electric lamp of one foot candle power being used throughout the experiments. A preliminary series of experiments was carried out which showed that a stimulus of two seconds duration was sufficient to produce well recognized after-sensations, and the same length of stimulus was ensured by means of a kymograph drum. The subject was seated at the centre of an arc of a circle 21 inches in radius, his head being supported by a chin rest; and he was instructed to fixate a small white spot at eye level on the black wall opposite. The stimulus was applied by switching on the light at seven different positions in the arc, viz., at a zero position directly in front of the eye of the subject, and at 30, 60 and 90 degrees to his right or left. Five readings were taken in each position, and the subject was asked to count his after-sensations and say when they ceased. The average of five mining subjects was:*—

90° L	60° L	30° L	Zero	30° R	60° R	90° R
No. 0·8 D 16·1	No. 1·1 D 25·4	No. 1·5 D 25·6	No. 2·9 D 40·0	No. 1·8 D 23·5	No. 1·1 D 25·9	No. 0·9 D 20·3

Twenty seven miners were tested with the lamp at zero position only in order to see how many of them were subject to after-sensations. The average number of after-sensations was 2·2 (ranging from 0·2 to 8·4); the average duration of the after-sensations was 51·3 seconds (ranging from 7·2 to 114). Five subjects had so many after-sensations that they were unable to count them.

Experiments were carried out on two subjects with the lamp one foot above eye level, at eye level, and one foot below the eye level. One foot above the eye level was found to be the least irritating position, there being no after-sensations at all at 90° right and left.

A series of experiments was also carried out with various

* No. = number of after-sensations. D = duration of after-sensations. R = Right. L = Left.

methods of softening the effect of the light stimulation and of altering its colour. The best results were obtained by treating the outer glass with hydrofluoric acid and so rendering it translucent. The illumination of the standard and the translucent lights were measured by two independent observers by means of a Holophane lumeter, and it was found that the translucent light had an illumination 28 per cent. less than the standard lamp.

Thirty miners were tested for visual acuity with the standard and the translucent light by the method described by Flügel in the *British Journal of Psychology*, Vol. XI., 289. The results showed that with fifteen subjects visual acuity was better with the translucent light, with nine subjects visual acuity was equal with both lamps, and that with four subjects visual acuity was better with the standard lamp.

With nystagmic subjects the number and duration of after-sensations was more marked than with others, and tests showed that these subjects were those who appreciated the effects of the translucent light most.

The new lamp has found great favour with the miners, and is being supplied to them as fast as it can be manufactured.

The manager reports that "the men who have worked with the electric lamps fitted with opaque protecting glasses are very pleased with them, finding their work more comfortable, less strain on their eyes, and would not like to go back to the ordinary clear glasses again."

(A more detailed account of the experiments will be found in the *Journal of the National Institute of Industrial Psychology*, Vol. I., No. 5, and in the *British Journal of Psychology*, Vol. XIV., No. 1.)

THE VISION OF RAILWAY SERVANTS

BY

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THE interesting communication of Dr. Leonard Mitchell published in your issue of July, 1922, on the Vision of Railway Men, raises quite a number of problems to which I should like to draw attention briefly.

1. The occasions to which he refers on which Dr. Orr, Dr. Murray and I tested the capacity of people with normal and supernormal vision to recognize signals in the open air showed conclusively that all such efforts are doomed to failure, if anything like accurate standardization is required. On these three occasions the distance at which the semaphore was recognized by people with normal