piece rates and production bonuses are involved (Moore, 1951; Caplow, 1954; Lupton, 1956).

It seems then that though this kind of analysis may have some application in the grading of white-collar and managerial jobs, and perhaps in manual jobs where the workers are not well organized, the possibilities of extending it to manual jobs in general, especially where the workers concerned are well organized, are extremely limited. Moreover, it seems unlikely that agreements on the relative worth of jobs will extend over the entire range of occupations in an undertaking. White-collar and managerial workers may agree among themselves about the pay which jobs within their own range merit. They may even agree about the payment of manual jobs compared with their own, especially if the former happen to be paid less. It is less likely that manual workers will agree on the pay attaching to white-collar and managerial jobs, although regional variations and local factors may be important here. Possibly such agreement might be reached in the west London suburbs where most of the Glacier employees presumably live, but in other parts of London and elsewhere many manual workers vigorously dispute the pay and prestige attaching to white-collar and managerial jobs, as both the study of coal-miners discussed earlier and the work of the Institute of Community Studies attest (Young and Willmott, 1956). Finally, agreements reached in one sector of social life do not necessarily hold in another. Men may agree at the place of work where they attend to earn money that skill, extra effort, and responsibility should be rewarded. Outside the place of work, where earnings are spent, visible differences in wealth and standards of living may command something less than assent. Though it is legitimate, and indeed necessary, to isolate phenomena as far as possible for closer study, eventually they have to be restored to their original setting. Valuable results have been obtained by studying the social processes which operate in factories, mines, shops, and offices, but life is not confined to them. These processes are modified by the interchanges which take place with processes operating in the local community and outside the place of work. Sooner or later, both sets of processes have to be taken into account.

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A Discussion of Technique and an Analysis of Errors in Taking Industrial Histories in Coal-miners

G. JONATHAN, F. MOORE, and L. ROBERTS

From the Pneumoconiosis Research Unit of the Medical Research Council, Llandough Hospital, near Cardiff

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The following description of the technique of industrial history taking employed by the Medical Research Council's Pneumoconiosis Research Unit in their chest radiography surveys at various collieries in this country (Cochrane, Davies, Chapman, and Rae, 1956) may be of some practical interest.

The technique we employ is simply to ask each man to give a chronological account of his occupations and places of employment since leaving school, and the information is tabulated on our industrial history form which has a series of sub-divisions into: (i) surface and underground occupations; (ii) various types of dust exposure—coal, stone, mixed, and minimal; (iii) the actual occupations. As our dust measurements have only been made at the coal face during the coal-getting shift, the occupations included under this heading are specially grouped. Other sections of the industrial history form are used for (i) any other information which has been collected at a particular survey, such as anthropometric of social data, (ii) the industrial history in the periods between surveys.

Practical complications arise during the actual history taking as a miner's working life is commonly elaborate and he often finds it difficult to remember every detail of his career in the correct sequence, especially any periods of unemployment, but we have enjoyed the cooperation and forbearance of the vast majority of the miners we have interviewed.

As it is by means of his industrial history that a man's dust exposure may be estimated and related to the radiological findings, it is apparent that the same care and meticulous technique should be applied to the taking of an industrial history as to the reading of the radiograph, but the possible errors in the former were not appreciated so early as were those of radiological diagnosis, and we have found no reference to their magnitude in the literature. Over 20 people have taken industrial histories during our surveys and we have investigated in three ways the observer error involved:

(1) Retaking industrial histories of the same men after a period of two and a half years; complete industrial histories were taken of the "pure face workers" at a South Wales colliery on two separate occasions in 1947 and 1949, and the results are compared in Table 1. The errors appear small and random, even though this

TABLE 1

DIFFERENCE IN STATED NUMBER OF MONTHS WORKING ON COAL FACE IN A GROUP OF INDUSTRIAL HISTORIES TAKEN AT A SOUTH WALES COLLIERY IN 1947 AND IN 1949

Collier's Lamp No.	Months on Coal Face up to 1947 from 1947 Industrial History	Months on Coal Face up to 1947 from 1949 Industrial History	Difference
279	48	48	0
475	36	30	-6
581	57	48	-9
588	54	54	0
25	72	66	-6
488	42	42	0
624	54	66	+12
24	78	78	0
209	84	78	-6
359	84	78	-6
147	9	18	+9
513	36	27	-9
45	18	24	+6
712	22	18	-4
670	29	36	+7
718	30	36	+6
739	30	39	+9
697	36	42	+6
263	85	78	-7
473	84	84	0
685	66	84	+18
729	60	60	0
725	78	84	+6
447	90	90	0
36	84	84	0
38	90	90	0
Total 26	1,456	1,482	+26
Average	56	57	+1

comparison magnifies them. It should be stressed that there was no common member between the industrial history-taking team in 1947 and 1949, a different form was used in the later survey, and in the interim period our industrial history-taking technique had been elaborated.

(2) Comparisons between characteristics of industrial histories of groups of miners questioned by different observers at a single survey; this technique, previously used by Cochrane, Chapman, and Oldham (1951) to investigate observer error in medical history taking, is briefly as follows. If it can be shown that miners choose or are chosen by the industrial history takers in a random way (as by an analysis of the age distribution of those seen by each observer) then the differences in any characteristics of the groups seen by each observer are a measure of the systematic error involved in assessing these characteristics. At an English colliery, four observers took industrial histories from the miners, and the groups seen by each of the four were shown to have the same age distribution. Table 2 shows an analysis of the distribution of the number of years worked underground by the miners in these groups, and Table 3 a similar analysis by years worked on the coal face. Statistical analysis showed no evidence of bias amongst the observers.

(3) The histories taken and the colliery records of the men may be compared. Our investigations in this direction have been hampered by the lack of suitable colliery records, the only ones available consisting of weekly time-sheets covering comparatively short periods of time (not exceeding five years) and with the occupations

TABLE 2

DISTRIBUTION OF NUMBER OF YEARS WORKED UNDERGROUND BY MINERS AT AN ENGLISH COLLIERY AS RECORDED BY FOUR OBSERVERS

No. of Years Under-ground	Observer A		Observer B		Observer C		Observer D	
	No. of Men Seen	%	No. of Men Seen	%	No. of Men Seen	%	No. of Men Seen	%
< 5	36	13.8	32	12.8	34	11.4	24	13.3
5-9	38	14.6	35	14.0	50	16.7	35	19.3
10-14	32	12.3	39	15.6	39	13.0	28	15.5
15-19	31	11.9	44	17.6	49	16.4	32	17.7
20-24	48	18.4	33	13.2	53	17.7	25	13.8
25-29	30	11.5	32	12.8	33	11.0	20	11.0
30-34	16	6.1	18	7.2	22	7.4	10	5.5
35-39	11	4.2	7	2.8	9	3.0	1	0.6
40+	19	7.3	10	4.0	10	3.3	6	3.3
Total	261		250		299		181	

TABLE 3

DISTRIBUTION OF NUMBER OF YEARS WORKED ON COAL FACE BY MINERS AT AN ENGLISH COLLIERY AS RECORDED BY FOUR OBSERVERS

No. of Years on Coal Face	Observer A		Observer B		Observer C		Observer D	
	No. of Men Seen	%	No. of Men Seen	%	No. of Men Seen	%	No. of Men Seen	%
< 5	48	24.7	45	23.4	48	21.3	35	26.3
5-9	38	19.6	32	16.7	41	18.2	27	20.3
10-14	24	12.4	37	19.3	41	18.2	20	15.0
15-19	28	14.4	27	14.1	43	19.1	22	16.5
20-24	26	13.4	23	12.0	25	11.1	16	12.0
25-29	10	5.2	15	7.8	18	8.0	9	6.8
30-34	10	5.2	5	2.6	6	2.7	4	3.0
35-39	6	3.1	6	3.1	3	1.3	—	—
40+	4	2.1	2	1.0	—	—	—	—
Total	194		192		225		133	

sub-divided into "colliers" and "day-wage men" in contrast to our more detailed classification. Consequently we have applied this technique to a small sample of the histories taken between two of our surveys at a South Wales colliery. In the sample there were 20 colliers. All of these were confirmed from the colliery records as having been colliers during the period mentioned in the industrial history, and the day-wage men were confirmed as having been day-wage men. Five colliers underestimated their "time off" (one, one week, two, two weeks, one, three weeks, and one, four weeks), and four overestimated their "time off" (one, one week, one, two weeks, one, four weeks, and one, six weeks).

Undoubtedly some errors remain, but we have no experimental evidence to show by what techniques they could be reduced. Repeat assessments are too time-consuming to be applicable, and we can only suggest that industrial history-taking should be the task of the minimum possible number of observers with the maximum possible skill and knowledge of mining and miners.

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