THE NON-SOCIAL WORLD OF WORK – A PERSONAL VIEWPOINT

THE EFFECT OF PHYSICAL FACTORS, SHIFT WORK AND OVERTIME ON JOB PERFORMANCE

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OPSOMMING

Aandag word gevestig daarop dat bedryfsielkundiges relatief min klem lê op die invloed van sekere "nie-sosiale" faktore in die werksituasie. Dit sluit veral fisiese werksomstandighede, werksure, oortyd en skofwerk in. Onlangse Suid-Afrikaanse navorsing onder Swart- en Kleurlingwerkers word beskryf en daar word aanbeveel dat werkerreaksie teenoor die faktore gereeld gemeet word deur statistiek van afwesigheid en arbeidsomset te verkry en te ontleed. Data oor 'n tydperk van jare ingesamel, wys daarop dat patrone van onttrekking binne spesifieke organisasies min of meer stabiel is en steun die hipotese dat nie-sosiale faktore binne die organisasie grotendeels hiervoor verantwoordelik is.

Few industrial psychologists today - be they academics, consultants or personnel practitioners - would deny the influence on their own work of the great names from Mayo (the group and work as a social activity) through Schein (complex man) to a long list of the more recent greats. In embracing the advances of the last 20 or 30 years, however, I am of the opinion that many of us have been guilty of neglect of much of the earlier work on the admittedly unglamorous but nevertheless important effect of certain physical and environmental factors on task performance.

The purpose of this article, then, is to discuss some of these non-social factors in the work situation, possibly to remind my older colleagues of a few things we once learnt and hopefully to alert newcomers to the field to certain neglected but important dimensions of work.

I should like to touch briefly on a fairly wide range of factors and then - against the background of my own research - to look in more detail at two areas: overtime and shiftwork.

There is a relative dearth of research in these fields, yet they form the background against which many of our more socially-oriented manipulations take place. Ideally, we

should see to them *first* and we should also have some means of monitoring the effect of these factors on the behaviour of our labour force.

Some physical factors

Buzzard (1973, p.45) has this to say:

> "The medical tradition insists on careful physical examination of a patient before sending him for psychiatric treatment. He may be psychologically ill as well; the physical causes of his illness may even have been due in part to his psychology. But, if remediable physical causes are allowed to continue, psychiatric treatment will be seriously impaired, while successful treatment of those causes may make psychiatry unnecessary.
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> It is wise to adhere to this tradition in industrial psychology today: to attend to the physical before the mental, to start with the familiar and well known before proceeding to what is less well understood. At least attention should be paid to all areas that may be causing trouble. It is bad practice to let new beliefs blind us to old facts."

Let's look briefly at some of these "areas that may cause trouble". They may serve to remind us that not all our work places are "model cow houses". We know - but perhaps need to be reminded - that performance deteriorates under unduly high work loads, stress, temperature, noise and bad light. Older persons are more affected and - perhaps not so well known - vigilance tasks are the soonest affected, often by quite small changes (Buzzard, 1974). And a trend in our modern technology is away from physical labour to more tasks requiring attention and concentration but which are relatively inactive. Perhaps we should look again at some of our workplaces.

What, for example, are the limits on readily-measurable factors such as temperature? Briefly, 18-24ºC is a satisfactory range, depending also of course on humidity (McCormick & Tiffin, 1974, pp.465-9). Too hot or too cold results in fatigue or loss of attention.

Vision is a vital perceptual area in a wide variety of tasks and it may deteriorate rapidly under certain conditions. The periphery of vision suffers first - a significant factor in accident causation. However, poor illumination is surely not a problem for most workplace tasks in this age of fluorescent strip lighting? Yet a recent article by Lowson (1973) points out that many of our modern buildings - particularly offices - are in fact over-lit, resulting in fatiguing

glare; and at the same time incurring an enormous, unnecessary air conditioning load to remove the heat. A good example of our conspicuous waste of energy.

Noise is in the news at present. The new Hearing Conservation legislation has produced a flurry among industrialists, and all manner of reason are being advanced for non-compliance. Let's agree that the time period originally allocated was probably insufficient, but the evidence presented on the incidence of hearing loss is, to say the least, disturbing, especially as so few people were even aware of the problem. It points again, to our relative neglect of the physical factors in the work situation.

From all the above, there would certainly seem to be a case for the teaching of ergonomics in more university departments where industrial psychology is offered.

Hours of work

I wonder if I should be right in describing the whole subject of hours of work and overtime as "one of the great, unlearned lessons of industrial psychology?". As long ago as 1918 (Ministry of Munitions) the effect of long hours on productivity was clearly demonstrated; between the wars, the lesson was forgotten, and after the Second World War it was demonstrated again, when many industries drastically reduced working hours, with actual net gains in overall production.

It was then forgotten again, and Tiffin & McCormick (1959, p. 456) say quite rightly that industry has failed, by and large to recognise the results of exhaustive and conclusive investigations into hours of work, especially as they affect overtime.

More recently, Buck and Shimmin (1959) have again demonstrated the relationship of absence to overtime, noting it as both cause and effect. Thus a worker easily goes absent after long hours on overtime as his financial needs are already covered. Or he wishes to work overtime to cover loss arising from absence for other reasons. Our own research work has corroborated all this. Nel (1973, p.49) demonstrated that absence rates of workers tend to rise when overtime is worked and fall during short time. My own experience with an experimental absence control system has clearly shown the relationship between overtime and unexcused absence.

Most personnel managers of course see nothing new in these findings - the relationship is almost common knowledge. But why, then, do so many industries continue to work long hours of overtime almost as a matter of course? And remain convinced that they are obtaining

extra production? How many companies regularly maintain statistics which will show the effects of overtime on, for example, absence and labour turnover? I should like to return to this again a little later.

Shiftwork

As social scientists, we should from time to time stand back and consider significant trends in technology and their likely effect on society. One such trend is the increasing use of shiftwork, particularly continuous three-shift operation. How does it affect our workers, how do they perceive it and what should we know about managing shiftwork, as part of the personnel function?

I should like to draw on three main sources for my discussion here. Firstly, on the literature relating to shiftwork; secondly, on a study performed by one of my research students where he actually worked shifts, anonymously on the factory floor, in two local factories - at the same time having access to personnel statistics specially structured for the study. And thirdly from data collected on our U.P.E. study of labour turnover in 25 secondary industry companies over the past five years.

a) *Shiftwork Literature*: The most useful volume to appear on this subject in recent years is undoubtedly that of Sargean (1971) and I have no intention of repeating his excellent literature review. I should like, however, to touch on a few studies relevant to our arguments here.

The *physiological effects* of rotating shiftwork have been well documented. For example, Teleky (1943) has studied body temperature curves, and has shown that inversions occur after varying periods of shiftwork. For physical work, the inversion period is from 4 - 7 days for most people; adaptation takes longer if sedentary, mental or vigilance tasks are involved. The implication here is that on the usual 6 - 7 day cycle, the body has barely adapted before the shift cycle again changes.

Sleep patterns have also been extensively studied. This remains a problem, with night-shift workers generally having difficulty to obtain undisturbed sleep and averaging as little as 5½ hours per day (Venter, 1974).

There are few objective findings on *health and shiftwork*; responses are mainly subjective and it certainly cannot be concluded that health is adversely affected.

Findings on *relative performance* on day and night shift are also interesting. Venter (1974) concludes that studies conflict on relative outputs where active physical work is involved, but that "those studies which have been concerned with vigilance tasks have shown that vigilance consistently falls during the night" (Op.cit., p.44).

There is general consensus that *shiftwork is unpopular* with workers' families, and that problems arise with wives having to stay alone at night. Although no research data are available, this can be expected to apply particularly to Black and Coloured areas, where security is poor at the best of times.

A growing trend in shiftwork management has been the consideration of *worker preferences* in shift patterns, and the development of new rotas to replace the traditional 7 day cycle on morning, afternoon and nightshifts respectively. Apart from the physical adaptation mentioned earlier, a worker may, under such a rota work 6-8 weeks before having a complete weekend off, and this is understandably unpopular. Sergean (1971, p.44) has this to say: " ..... a working week of fewer but longer night-shifts is now increasingly preferred to five nights of shorter duration .... This underlines the importance with which the traditional weekend is regarded by shift workers". There are other alternatives, of which the following rapidly-repeating rota is an example:

The new rota is based on a 3-block week (Mon-Tues; Weds-Thurs; Fri-Sat-Sunday) and shift workers move forward one shift type at the end of each block, giving a 24 hour break at changes from mornings to afternoons, and from afternoons to nights; plus longer breaks, 48 hours twice and 72 hours once a month at the end of the night-shift block. This is a 28 day cycle, averaging 42 hours per week, and providing one full weekend in each cycle. A study of worker preference by Walker (1966) has shown that more frequent alternations were preferred by 86 % of workers in one plant and all the workers in another.

Another outcome of considering worker preferences for shifts has been for workers to group themselves so that some worked only night-shifts and others only day shifts (De la Mare & Shimmin, 1964).

Results of other studies on preference for shiftwork have been conflicting; briefly, in some cases there has been a preference for, in others, dissatisfaction with shift work. One important general conclusion - and this refers to overtime schedules as well - is that *consultation with workers* can result in arrangements which are mutually acceptable. Venter (1974, p.54) says: "The self-selection and control (obviously within limits) of their own

working hours could be a satisfying factor in the choice of workers to work shifts, and …… flexible shift working arrangements have been found to promote better work situations….."

b) *A South African Study*: Venter's study, already referred to, is to the best of my knowledge the only local work to date on shifts and the Black worker - again emphasizing the dearth of research at factory-floor level. It is useful because it embodies both a qualitative assessment of shiftworkers' attitudes (while Venter worked among them) and more objective, quantitative data. A brief résumé of his main findings follows:

Health: There were no complaints from shiftworkers about health problems. But in Company A, sick absence increased some months after the introduction of shifts, while in Company B, there was consistently more sick absence among shift- than day-workers.

However, closer investigation and discussion with workers revealed that this "sick" absence consisted of short, uncertified "illnesses", taken as a quick rest from work when they were feeling tired. "This, of course, is withdrawal in the fullest sense" (Op.cit., p.136)

No other serious physiological problems were noted; however, workers did complain of insufficient sleep while working nightshifts.

Attitudes: Blacks expressed largely positive attitudes towards shiftwork, mainly because of the extra money that could be earned. Coloureds were rather more casual about it all, their absence (in Company B) was very high, and shiftwork appeared generally unpopular - especially over weekends. Whites were also tolerant towards shiftwork; the extra money again appeared to be an incentive, but it was also far easier for a White to take absence and withdraw when it suited him, due to the "absence culture" being more permissive for Whites.

Perhaps the most significant finding of the study emerged here, namely that there was a marked contrast between the subjective and the objective data. For example, in neither company did any workers voice any strong objections to shiftwork - when asked by a "fellow worker", as they saw the researcher. Yet in Company A, absence and labour turnover increased a few months after shiftwork was introduced; and in Company B, absence and turnover was consistently higher, for all three race groups, among shift workers than among non-shift workers in the same company (some 40 % were day workers).

Thus the majority of shift workers in both companies stated that they encountered "no problems" with shiftwork. "And yet . , ... there arose occasions when, on a Friday night, only 7 out of 25 operators would report for work in one section" (op.cit., p.141).

Among young White shift workers there was surprisingly little concern at the disruption of their social lives; among older workers, many of whom also worked long hours of overtime, there was a disturbing urge to be at work, which suggested an alienation from family and from society. Work was the only place he knew well and where he felt he "belonged", and he not only willingly worked overtime on his "days off" but he also arrived early for shifts - which provided no extra money.

These findings stress two main implications; firstly that there is a need for individual records on the hours and overtime hours worked by anyone person - especially where dangerous vigilance-type tasks are involved (as in Company B). And secondly, that objective quantitative data are essential to monitor the effects of shifts and long hours on - at least the absence and turnover levels of working groups.

c) *Results from the U.P.E. Survey*

In one of our earlier studies (Van der Merwe & Miller, 1973) we looked at labour turnover and absence in a continuous three-shift plant. The study was carried out during 1970-71, in a period of near-full employment in the Port Elizabeth labour market and revealed that when alternative avenues of employment are easily available, workers will readily reject an in acceptable job situation. Table 1 below illustrates the position:

TABLE 1

LABOUR TURNOVER RATES (PER CENT PER ANNUM) FOR 3-SHIFT AND DAYWORKERS: BLACK AND COLOURED MALES, JANUARY-MARCH 1971

3-Shift		Daywork	
LTO	rate %	LTO	rate %
Black	119.7		68.8
Coloured	787.0		357.6

Clearly, this company had a problem and one which was further illustrated by the absence situation. Again, Coloured absence rates (12,9 %, typical monthly average) were higher than Black rates (5,3 %). Typically, too, weekend rates (15-17 % overall) were much higher than weekday rates (2-3 %). Statutory paid sick leave was also "taken" as a matter of course by most of the workers. It was clear that many workers were rejecting the job situation in the two main ways open to them: by absence at first, and finally by permanent withdrawal, i.e. separation.

More recently, we have been able to express Median Lengths of Service by shift for leavers in our survey reports[1], and this shows clearly that 3-shift workers serve for much shorter periods before separating. Interestingly, more 3-shift leavers are dismissed and mostly for irregular attendance. The pattern of job stress and job rejection is again apparent.

CONCLUSIONS

I should like to stress again the need for us to monitor our personnel practices wherever possible; not to act on faith only, but to make some quantitative assessment of the effects of the techniques which we apply, and the changes which we make. The measures which I have mentioned in this paper - of absence and labour turnover - can, if properly chosen and properly interpreted, provide some of the sort of quantitative feedback that we need for evaluation.

Our own work has convinced us that we are measuring something relevant. Differences in labour turnover among 25 companies from 9 % to 130 % p.a. over the same period in the same area must be significant (Van der Merwe & Miller, 1976b); differences in absence from nil to 13 % on building sites in the same company (Confidential Report, 1973) can likewise not be ignored. Yet the majority of companies *outside* our research sample, with which we have come into contact, have been blissfully unaware of the extent of their problems - or even that employee reaction through withdrawal *was* a problem.

More recently, we have shown (Van der Merwe & Miller, 1975) that the pattern of withdrawal is a relatively constant characteristic of an organisation. Briefly, the ranking of 25 companies by quarterly and annual labour turnover rates over four successive years, has resulted in very significant rank order correlations, despite large variations in overall levels of turnover in the region. We have interpreted this to mean that employee instability in any organisation is determined primarily by factors *inside* the organisation and not by outside influences over which it has no control. Our current research programme seeks to define some of these internal factors more clearly.

A purpose of this paper has been to stress that further research is very necessary in a number of neglected areas and it is in these very areas - relating mainly to the worker on the

[1] As employment breakdowns are not separately available for shift and dayworkers, medians are used as a measure of service before separating. For a discussion of this concept, and turnover measurement in general, see Van der Merwe and Miller (1976a).

factory floor. With Cherns (1973) I am also concerned about the "irremediably lousy" job, and what can be done to make it more acceptable, especially if it just cannot be "enriched". Cherns notes that, contrary to what we might hope, people with "lousy" jobs don't compensate through additional outside interests. Rather the reverse - improve a man's job and you also improve his involvement with society. Or, too many lousy jobs and you end up with a lousy world. As people who help to shape the world of work, our responsibilities may be graver than we think.

SUMMARY

Attention is drawn to the relative neglect by industrial psychologists in recent years of the effect of certain non-social factors in the work situation. These include physical conditions of work, hours, overtime and shiftwork. Recent South African research into shiftwork among Black and Coloured workers is described and it is suggested that worker reaction in the form of withdrawal should be regularly monitored through statistics of absenteeism and labour turnover. Data collected over a period of years have supported the hypothesis that patterns of withdrawal within particular organisations show stability and are related to "non-social" factors within the organisations.

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