Eric Trist and Ken Bamforth

The Stress of Isolated Dependence (1)

The Filling Shift in the Semi-Mechanized Longwall Three-Shift Mining Cycle

Conventional semi-mechanized longwall coal-mining consisted of three shifts in the 24 hours. On the first shift, the coal was undercut by an electric coal cutter. On the second shift, it was hand-loaded onto the conveyor. In preconveyor days it was handfilled into tubs, and the men were still called fillers. On the third shift the equipment in the face and gates was moved forward. In other collieries where we worked, the filling shift was the middle shift of the cycle, which reduced the tension.

The Special Situation of the Filling Shift

Relationships between members of the filling shift are characterized by an absence of functional interdependence that arises from the absence of role differentiation in the 20 identical tasks performed by the shift aggregate. The filler is the modem version of the second collier of the older hand-got systems, whose hewer has departed to the cutting shift. While his former mate has acquired a new partner in the back man on the coal cutter and is serviced by a new group of laborers who clear out the undercut-gummers-the filler is alone in his stint, the dimensions of which are those of the short face formerly worked in common. The advent of mechanization has changed but little the character of filling, except that the filler has, in his air pick, the assistance of one power-driven tool and, instead of a hand-pushed tub, a mechanically driven conveyor on which to load his coal.

The effect of the introduction of mechanized methods of face preparation and conveying, along with the retention of manual filling, has been not only to isolate the filler from those with whom he formerly shared the coal getting task as a whole but to make him one of a large aggregate serviced by the same small group of preparation workers. In place of an actually present partner who belonged to him solely as the second member of an interdependent pair, he has

(1) A shortened version of E.L. Trist and K.W. Bamforth, ''Some Social and Psychological Consequences of the Longwall Method of Coal-Getting.'' Human Relations, 4:3-38, I951.

acquired an "absent group," whom he must share with 19 others. The temporal distance separating him from this absent group is increased by the interval of the ripping shift

The preparation group itself is so loosely organized that its boundaries are difficult to determine. The extent of the filler's dependence on earlier activities, if thought of as centered on the two cutters, is such that the cutting group must be expanded to include the two borers as well as the four gummers. Since, in addition, the filler is dependent on the belt-men, these latter, representing transformed but likewise absent versions of trammers formerly under his own eye, must also be included in his absent group. While, in the time perspective of the present, the filler has no relationships of functional interdependence with other fillers on his own shift, in the time perspective of the past, he must contend with a complex set of dependent relationships with the entire series of preparation workers who have preceded him in the face. These relationships are dependent rather than interdependent since, within a given cycle period, they operate only in one direction.

Though, from the filler's point of view, preparation personnel form a total group in virtue of their common relation to him, they do not constitute an organized group with respect to each other. The structure of their own relationships is that of a series of self-enclosed interdependent pairs whose connection with each other is small compared with their common connection with him. In this series the cutters form a pair of the extended type with the four gummers loosely attached. But gummings "left in" cause no difficulties for the cutters; and, though antecedent, the work on the borers also causes them no difficulties. On the next shift, the belt-builders complete the second part of an overall conveyor task begun by the breakers, but the work of this team is not affected by the level of performance of those who prepare the coal face. A series of absent pairs, on each and all of whom one is dependent but who themselves are not reciprocating this dependence and who remain relatively independent of each other, constitutes a difficult group with whom to enter into a working relationship. This difficulty is increased by the fact that their services have to be shared among ig others, who are in the position of rivals for the receipt of preferential attention.

Difficulties are increased further by the fact that this succession of pairs pertains to the entire 180-200 yards of the face. For the pairs, the face is a single continuous region, whereas, for the fillers, it is differentiated into a series of short adjacent sections. For the individual filler it is the 8- 10 yards of his own length. In the comer of this length the filler usually chalks up his name,

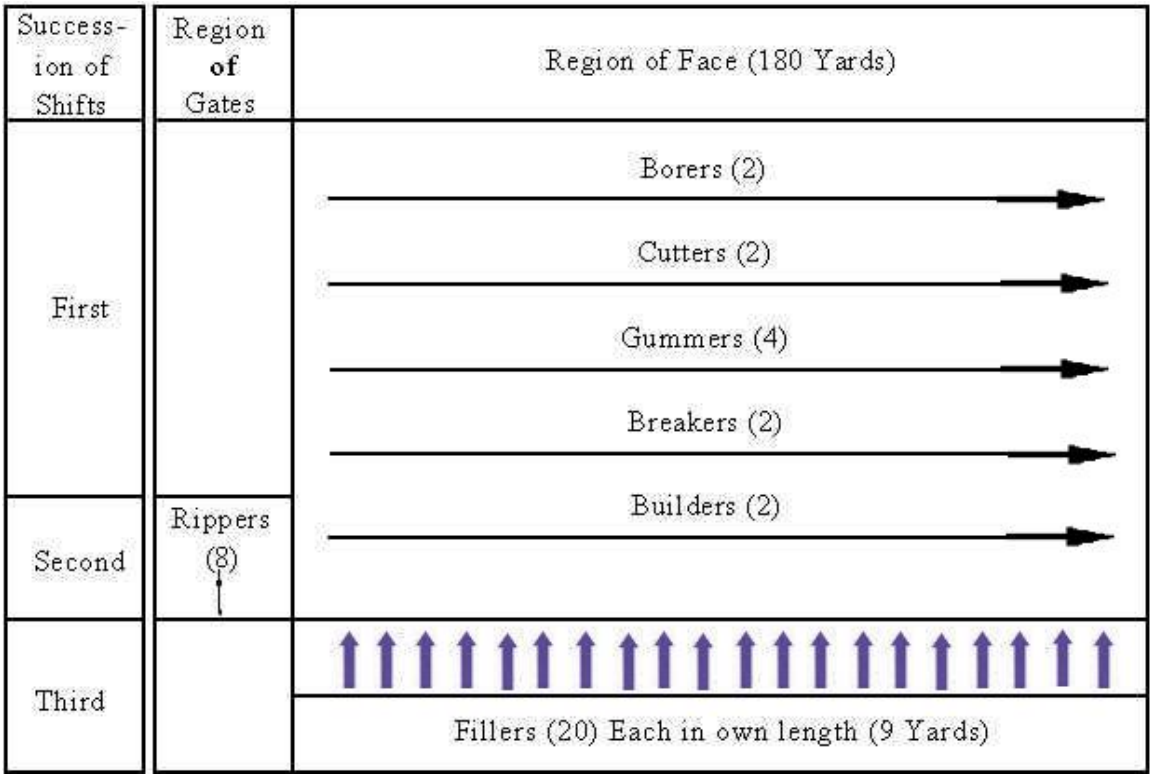

Figure I. Position and locomotion of successive groups of face workers on the longwall.

but these chalk marks mean little more than just a name to traversing pairs. The structure of the preparation tasks as continuous activities covering the entire expanse of the face gives the succession of traversing pairs no functional relationship with the discrete tasks of individual fillers. The absent, internally disconnected group on which he is dependent takes no functional cognizance of the existence of the filler as an individual. In view of the far-reaching community as well as work-separation that exists between the preparation and the filling shifts (produced by the time-table arrangements), actual cognizance tends also to be minimal. The pattern of these relationships is shown in Figure I, where the picture presented is one in which, within the period of a given cycle, the fillers are left "alone with each other" and at the mercy of the rest.

UNEQUAL MEN WITH EQUAL STINTS UNDER UNEQUAL CONDITIONS

The fillers have no secure relationships in face of the differential incidence of the bad conditions they may encounter or of the bad work they may inherit

from the preparation workers on whom they are dependent. The men who face these unequal conditions are themselves unequal, but the lengths of face they clear are the same. The detailed implications of this situation are set out in Table I where the differential incidence of some of the most common types of bad conditions and of bad work, in the different lengths of a typical face, is shown in relation to the variations in skill, conscientiousness and stamina in a typical set of fillers, fractionated into informal sub-groups interspersed with isolates.

The local arrival of certain types of bad conditions, such as rolls that move across the face (**Table 2**), can be anticipated, so that anxiety piles up. The passage across a face of a roll that continues for different periods of time in various lengths is shown in Figure 2. As regards bad work left by the other shifts, the filler is in the situation of never knowing what he may find, so that anxiety of a second kind arises that tends to produce chronic uncertainty and irritation. There is little doubt that these two circumstances contribute to the widespread incidence of psychosomatic and kindred neurotic disorders among those concerned.

Many instances were given of neurotic episodes occurring on shift-of men sitting in their lengths in stony silence, attacking their coal in a towering rage or leaving the face in panic. In a situation of dependent isolation, with the odds unequal as regards both his own resources and what is required of him, the individual inevitably erects protective defenses, which are elaborated and shared in the work group. These defenses are reactive rather than adaptive. Their effectiveness, therefore, is only partial. But without them life at the longwall would be intolerable for all but those whose level of personal adjustment is rather higher than that attained by most individuals in the course of their development.

In other coalfields in which we subsequently worked, and possibly also in parts of Yorkshire, the filling shift was placed in the middle of the cycle. This enabled more to be done in the last shift to prevent loss of the next cycle. In northwest Durham, not only were the two groups on either side of the main gate regarded as separate, but the six men next to the main gate and the six men next to the tail gate were supposed to help each other so that stress was greatly reduced in these small groups.

FOUR TYPES OF GROUP DEFENSE

INFORMAL ORGANIZATION

The functional isolation of the filler within his own group, which leaves him

"officially" alone with his "coals," is met by an attempt to develop informal, small groups, of two, three or four, in which private arrangements to help each other out are made among neighbors. But these solely interpersonal arrange-

Table 1

Occupational Structure in the Longwall System

Shift sequence	*Occupational roles*	No. *of men*	*Methods of payment*	Group organization	Tasks	Skills	Status differences and ranking
First (usually called "cutting" shift). Either *night* 8 p.m.-3.30 a.m., or *afternoon* 12 noon-7.30 p.m. (borers start an hour earlier) Though alternating between *night* and *afternoon* personnel on the cutting shift are never on *days*.	Borer	2	Per hole	Inter-dependent pair on same note.	Boring holes for shot-firer in each stint to depth of undercut.	Management of electric or pneumatic drills, placing of holes, judgment of roof, hardness of coal, etc,	4.5, equal in pair.
	Cutter	2	Per yard	Inter-dependent pair on same note, front man and back man.	Operating coal cutter to achieve even cut at assigned depth the entire length of the face; knocking out (front man), re-setting (back man) props as cutter passes. Back man inserts noggings.	Requires rather more "engineering" skill than other coal-face tasks. Mining skills in keeping cut even under changing conditions, watching roof control.	1, front man senior and responsible for cut; back man assists; cutting is the key preparation task.
	Gummer	4	Day wage	Loose group attached to cutters, though front man without supervisory authority.	Clearing out undercut, so that clear space for coal to drop and level floor for filler. The coal between undercut and floor is called "the gummings."	Unskilled, heavy manual task, which unless conscientiously done creates difficulties for filler, for when gummings left in, the shot simply blows out and coal is left solid	7, equal in group; some chance of promotion to cutter eventually.
	Belt-breaker	2	Per yard	Inter-dependent pair on same note.	Shifting belt-engine and tension-end into face clear of rippers; breaking up conveyor in old track, placing plates, etc., ready in new track, drawing off props in old creeping track; some packing as required	Belt-breaking is a relatively Simple engineering task; engine shifting is awkward and heavy; drawing off and packing involve responsibility for roof control and require solid underground experience.	4.5, equal in pair.
Second (usually called the "ripping" shift). Either *night* or afte, *noon* alternating with cutting shift. Rippers may start rather later than builders. None of these personnel go on day shift proper.	Belt-builder	2	Per yard	Inter-dependent pair on same note.	Reassembling conveyor in new track; Positioning belt-engine and tension-end in line with this, testing running of reassembled conveyor; placing chocks; packing as required.	As with breaking, the level of engineering skill is relatively simple; inconvenience caused to fillers if belt out of Position. The roof control responsibilities demand solid underground experience.	4.5, equal in pair.
	Ripper	8	Cubic measure	Cohesive functionally interrelated group On same note.	To "rip" "dirt" out of main and side gates to assigned heights, Place cambers and build up roof into a solid, safe and durable structure; pack up the sides. The ripping team carries	This work requires the highest degree of building skill among coal face tasks. Some very heavy labor is entailed. Since the work is relatively permanent there is much pride	2, the status of the "main ripper" is next to that of the front man on the cutter, but he is not separately

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					out all operations necessary to their task, doing their own boring. The task is a complete job in itself, seen through by the group within the compass of one shift.	of craft. On the ripper depends the safety of all gates and main ways.	paid. The group usually contains all degrees of experience and is egalitarian.
Third (usually called "filling" shift). Either *day*, 6 a.m. - 1.30 p.m., or *afternoon*, 2 P-M-9.30 p.m. Never *night*.	Filler	20	Weight—tonnage on conveyors	Aggregate of individuals with equal "stints"; all on same note; fractionated relationships and much isolation.	The length of the "stint" is determined by the depth of the cut and the thickness of the seam. Using hand or air pick and shovel, the filler "throws" the "shot" coal on to the conveyor until he has cleared his length, i.e. "filled off." He props up	The filler remains in one work place while conditions change. Considerable underground experience is required to cope with bad conditions. Each man is responsible for his own section of roof. Bad work on other shifts makes the task hard-	4.5, equal throughout the group; "corner" men are envied; reputation of being good or bad workman is important.
	Belt-breaker	2	Per yard	Inter-dependent pair on same note.	Shifting belt-engine and tension-end into face clear of rippers; breaking up conveyor in old track, placing plates, etc., ready in new track, drawing off props in old creeping track; some packing as required.	Belt-breaking is a relatively Simple engineering task; engine shifting is awkward and heavy; drawing off and packing involve responsibility for roof control and require solid underground experience.	4.5, equal in pair.
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Total, 3 shifts	7 roles	40 men	5 methods	4 types	The common background of "underground" skill is more important than the task differences.		Differences in status and weekly earnings are small, apart from the case of the gummers.

Table 2

Cumulative and Differential Incidence of Bad Conditions and Bad Work in the Filling Shift,

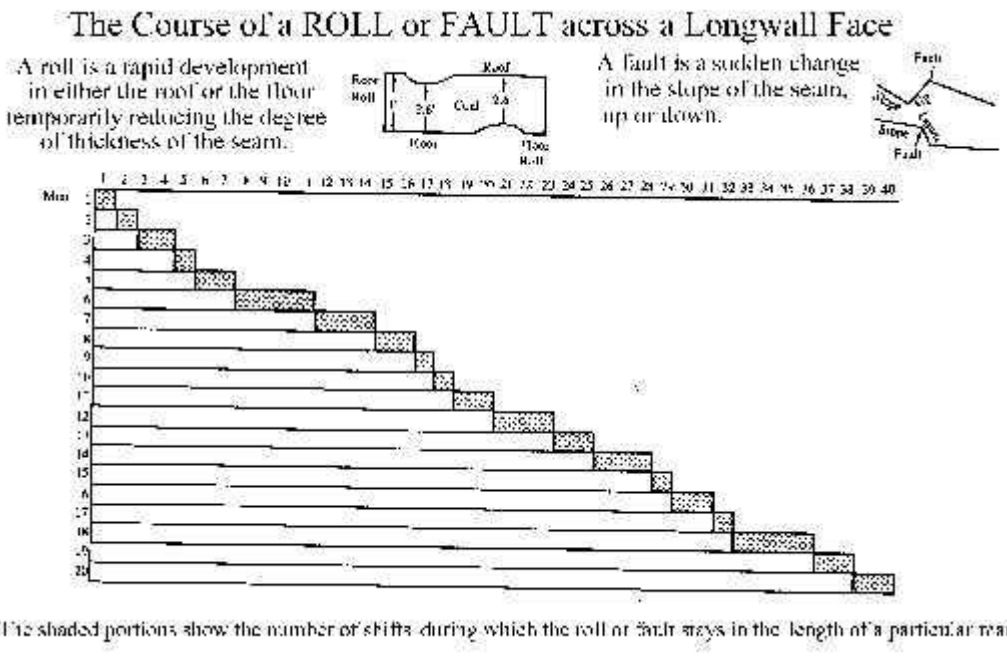
Types of adverse factor	*Positions across the face of 20 fillers*																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Loose roof roof broken up by weight or natural "slips" (cracks) making it difficult to support; extra time required for timbering reduces that for filling.				x	x	x				x				x	x	x				
Faults sudden changes in slope of seam either up or down, producing bad conditions capable of anticipation, possibly lasting over a considerable period.	x	x																		x
Rolls temporary unevenness in floor or roof reducing working height and producing severely cramped conditions in thin seams. As above for anticipation and duration.	x				x										x					
Roof weight roof sagging down especially in middle positions along the face where weight is greatest; not dissimilar to above in effect.					x	x	x								x	x	x			
Rising floor from natural bad stone floor, or from the cut having been made into the coal so that the gas in the coal lifts up the floor, or from naturally inferior coal which is left down but which lifts (gas).				x		x								x	x					
Bad boring holes bored short so that coal at the back of the undercut is unaffected by shot (hard backs); heavy extraction task with air pick at end of shift, when tired; or holes too low, so that shot leaves coal clinging to roof (sticky tops). Both these conditions tend to occur through naturally hard coal and certain types of roof.					x							x						x		
Uneven cut from the coal cutter having gone up into the coal. This reduces the filler's working height, cf. rolls, and the tonnage on which his wages depend. Also, as with rolls, faults, etc., it means that 3 ft. props have to be inserted in 2 ft. 6 in. height, which means sinking them in floor (dirting props) as an additional unremunerated task.	x				x					x	x						x			x
Gununings left in failure on the part of the gunmers to clear coal from undercut so that coal cannot drop and shot is wasted. The result is a solid mass of hard coal, requiring constant use of air pick and back-breaking effort. The amount left in varies.				x	x	x				x	x			x				x		x
Belt trouble the belt may not have been set in a straight line, or bad joints may have been made, or it may not have been made tight enough. On top-delivery belts coal going back on the bottom belt very soon stops it. Belt stoppages may produce exceedingly awkward delays, especially if conditions are otherwise bad.					x	x	x	x												

Table 2 cont'd

Cumulative and Differential Incidence of Bad Conditions and Bad Work in the Filling Shift [a]

Types of adverse factor	Positions across the face of 20 fillers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Total,	3	1	–	3	7	5	2	1	–	3	2	1	–	3	4	2	2	2	–	3
Skilld	+			+			–						–	+	-	–		-		+
Staminad				+											+			-	+	
ConscientiousneSSd				-														-		
Sub-group membership	a	a	a	1	b	b	1	c	c	c	d	d	1	e	e	e	e	1	f	f

(a) This table has been built up as a "model" of the situation from the experience of a group of face workers who acted as informants. It relates the effect of bad conditions and bad work, traversing the face unevenly, to the unequal personal and group qualities of the fillers.
(b) X indicates local distribution of difficulty in typical examples of different kinds of bad conditions and bad work.
(c) These numbers simply indicate the fact that several different kinds of things often go wrong in the same length. Severity varies. At one extreme there may be a series of minor nuisances, at the other one major interference. When conditions seriously deteriorate the interaction of factors and effects is such that some degree of disturbance is apt to be felt from most quarters at one or other point along the face.
(d) PlUS or minus ratings have been given for supra- or infra-nonn group status on the three attributes of skill, stamina and conscientiousness on the job, which represent the type of judgments of each other that men need to make, and do in fact make.
'Members of the same informal sub-group are indicated by the same letter; I = Isolate.



The shaded portions show the number of shifts during which the roll or fault stays in the length of a particular man

Figure 2. The course of a roll or fault across a longwall face

ments are undependable and open to manipulation for antisocial and competitive, as well as for mutually protective, ends. A number of isolates persist. The total face group is incapable, except defensively, of acting as a socially responsible whole since not even private allegiances are owed outside the small informal groups. These, in turn, are without responsible autonomy; the absence of institutionalized mutual obligation means that there are no statutory group tasks and each individual can be held ultimately responsible for clearing only his own length. Thus internal "rows" can easily break up the informal "coalitions," whose morale tends to be of the clique type.

Examples were, however, given to the writers of stable groups who stuck together and worked well over long periods. One informant said of these, 'Here things are more like the old times in the pit." Groups of this kind were envied and also criticized for being "too close." They appeared sometimes to be held together by a natural leader and at other times to be made up of individuals of generally good personality. Most informants were agreed that there was a tendency for the extremes to sort themselves out; there were "good" and "bad" faces as well as "good" and "bad" cliques within a particular face aggregate. But all this happened as it might. There was no support from the system.

Isolates, it appears, are either individualists who "won't even share timber" or men with bad reputations with whom others refuse to work. Amongst these are the unconscientious who "won't help out at the end of shift" and who are frequently absent, and the helpless who "cannot learn to look after themselves under bad conditions." Others, whose stamina is deficient (whether through age, illness or neurosis) and whose lengths are often uncleared in consequence, are dropped from the informal groups.

Only to a very limited extent, therefore, does his informal group organization meet the filler's need for a secure role in a primary group within his own shift. in view of the extent of his dependence on the performance of those in the other two shifts, his need for this foundation is greater than that of any of the other occupational groups, while the resources available to him are fewer.

REACTIVE INDIVIDUALISM

His small group failing, the filler is thrown back on himself and against others. The second defense against isolation is the development of a reactive individualism in which a reserve of Personal secrecy is apt to be maintained. Among his own shift mates there is competitive intrigue for the better places-middle

positions are avoided (from these "it is a long way to creep")-and there is a scramble for jobs where conditions are good.

On some faces described to the writers, fear of victimization was rife, particularly in the form of being sent to work in a "bad place"; the deputy being more easily turned into a persecutor in view of the guilt arising from the intrigue and deception which the men Practiced both against him and against each other. Against the deputy, advantage is taken of the scope afforded in the underground situation for petty deception over such matters as time of leaving the pit or the "measure that is sent up" (amount of coal filled onto the conveyor). With the deputy, however, men are also prepared to enter into alliance against each other, Often for very good reasons-to stop mates from going absent and by so doing throwing more work onto the others who must then clear their lengths unless substitutes can be found.

As regards outside groups, practices of bribing members of the other shifts in the hope of getting a "good deal" in one's own length were mentioned by several informants. Tobacco is taken to the cutter; gummers are "stood a pint" on Sunday. These practices are to be regarded as symptoms of a state of affairs rather than as widespread in themselves. The effect of this defensive individualism is to reduce the sense of secure identification in the larger pit collectivity, which was the second principle on which the older equilibrium was based.

Nowhere is the distrust that shift mates have of each other more in evidence than in controversies over "bye-work" "slipping off the note." On what is referred to as the "big note" is entered all the contract and bye-work done during the week by the shift aggregate. This note is issued to the man called "the number man" since he is identified by his check number. In no sense is this individual a representative appointed by his mates. Only rarely is he an informal leader. Customarily he is a "comer man" whose length adjoins the main gate, i.e., the man most conveniently within reach of the deputy. When asked about bye-work, he does not always know what has been done at the far ends of the face, and he is under no obligation to stop his own work to find out. But though a number of men will grouse about their pay being short, mentioning this or that item as having slipped off the note, very few ever bother to check up. There are men who have worked on a face for three or four years and never once seen their own big note. Yet these are among the more ready to accuse the comer man or the deputy. The comer man is suspected at least of never forgetting to make the most of his own assignments. To the deputy is ascribed the intention of keeping the costs of his district down. Conspiracy between the two is often alleged. Only when a major rumpus occurs are such suspicions put to the test, but showdowns of this kind are avoided as they are apt to peter out in squabbles proving nothing.

The competition, intrigue, unwillingness to put allegations to the test and

reserve of personal secrecy are parts of one pattern. Whatever their personal wishes, men feel under pressure to be out for themselves since the social structure in which they work denies them membership in any group that can legitimize interdependence. In this respect reactive individualism makes a basic interpretation of the social structure of the filling shift and is the only form of authorized behavior.

MUTUAL SCAPEGOATING

Fillers almost never see those who work on the "back shifts, " and this absence of contact gives full scope for mutual and irresponsible scapegoating. When there is a crisis and the filling shift is unable to "fill off," the buck is passed to the other shifts-or vice versa if disorganization has occurred elsewhere. It is frequently also passed onto the deputy who is blamed for not finding substitutes and to repair men brought in but too old to stand the pace.

For these men to pass the buck back again to the fillers is fruitless. As the fillers do not exist as a responsible whole; they, as a group, are not there to take the blame, and the individual filler can always exempt himself. Since bad conditions and bad work interact so closely, it is usually difficult to pin blame specifically. Mutual scapegoating is a self-perpetuating system in which nothing is resolved and no one feels guilty. For all concerned to remain in collusion with such a system is a defense which allows each to make his "anonymous contribution" to the "group mentality" (Bion, 1949) which sabotages both the goal of cycle productivity and the needs of the individual for membership in a satisfying work group. So far as this pattern obtains, all strike at each other in a mock war in which no one is hurt yet all suffer.

This defense can also be seen as a backhanded attempt to recover the supportive unity lost through reactive individualism in a way that is consistent with it. For all to be "in the bad" together is at least a way of being together. If one's contribution to a group is to help carry the badness of others, the group's contribution to oneself is to allow one to leave some of one's own badness in the group by being granted the privilege of withdrawal so that one's absence is sanctioned on a fair share of occasions. This formula provides a workable scheme, since the tacit agreement is only too plausibly maintained that the badness both of the group and of the individual are exclusively effects of the system which the group is compelled to operate without having power to change, i.e., these effects are regarded as "induced" rather than as "own forces." The group and the individual can therefore deny and get rid of their own badness by ascribing it to the system. The alternative would be constructive limitation of its real deficiencies so that it might be operated with more productive results and a higher degree of mutual satisfaction.

Not that the system is felt as entirely bad since it is the means by which a living is earned. Moreover, under present economic conditions this living is a good one, both in terms of wages and of community status. But the benefits which these "goods" bring are not realized in the work activities of the group. They lie outside the work system, which is tolerated as a means to external ends rather than accepted also as an end in itself, worthy of wholehearted pursuit in virtue of the internal satisfactions it affords. When these different aspects of the matter are put together the expectation emerges of a balance being struck which would allow things to tick over, though with a degree of social illness costly alike to productivity and to personal well-being. This expectation accords with reality.

SELF-COMPENSATORY ABSENTEEISM

Withdrawal is the fourth form of defense, complementing mutual scapegoating, and absenteeism is to be regarded as a recognized social technique within this pattern. For example, one filler, returning from his week's paid vacation, complained that the first two shifts had "knocked it all out of him." The gummings had been left in. His coal was solid. He had had the air pick on all day. "I've tried cursing 'em but it's no use, and pleading with I em but it's no use. I'll take a day off for this."

When conditions on a face deteriorate, especially in ways that are predictable, absenteeism among fillers sometimes piles up to a point where the remainder have to stay down an extra two or three hours in order to clear the face. Should this situation repeat itself for more than a day or two, those coming on shift often meet at the pit-head baths before presenting themselves for work. If fewer than a certain number arrive, all go home.

Absenteeism of this self-compensatory type, though carried out as an act of aggrieved defiance against a system felt in these circumstances as persecutory, is an attempt on the part of the individual to prolong his work life at the coal face. For, without the respite of occasional absences, he feels that he would soon become unable to carry on. In view of the accentuated differences both in wages and in status between face workers and repair, haulage or surface personnel, the goal of remaining at the coal face for as long as Possible would appear to operate as a powerful motivational force in determining the behavior of the ordinary face worker.

The following is some of the material obtained in interviews and discussions. Fear of being "too old for the face at 40" or even at 35 was a frequently expressed anxiety, made more acute by personal experience of the painful tensions in miners' families where a father relegated to the surface at $ 8.60 US. a week must face a son, still in his early 20s, earning more than twice this wage.

Instances were reported of quarrels between brothers, among whom long-standing but mild neurotic rivalries had existed, that severely disturbed the larger family when the older, through sickness (often of a psychosomatic kind), had been forced to leave the face. In the culture of the mining family a face worker husband is the object of special care on the part of his wife. There were men who felt that the privilege of this care, the emotional need for which was now stronger, was no longer merited once their elite position had been forfeited and their potency as breadwinners reduced. The dilemma of this situation is that fear of the loss of this care and acceptance of its continuing offer are both unbearable.

This self-compensatory absenteeism is a socially structured activity operated in accordance with a complex code that governs both the occasions and amounts regarded as permissible. It is a psycho-social defense motivated by the wish to remain at the coal face and is a species of "institutional" conduct with a functional role in the total social system in which the longwall method plays a central part.

This and the other three defenses discussed play a dynamically interrelated part in forming the culture (Trist, 1950/Vol. 1) of the work group, though naturally the intensity to which the pattern is Present varies widely and there are faces where the group atmosphere remains for long periods relatively immune from these influences. These are apt, however, to be "fair-weather" faces.

The danger is that habituation to working in a bad system has the compensation of enabling those concerned to leave too much both of their own and of their group's "badness" in the system. This built-in compensation ties them to the system despite their hatred of it. As well as its faults, it is their own hatred that they hate in the system, and there is usually stubborn refusal to recognize such projections in work groups not less than in therapy groups. A characteristic of faces with a bad group atmosphere is the protesting yet excited collusion of all concerned with the state of affairs. This is in contrast to the more independently critical and realistic attitude of those in groups where the pattern is less complete and less intense.

Some Problems of the Other Shifts

THE ABSENCE OF AUTHORITY IN THE CUTTING TEAM

As it is on this preparation group-containing the front and back man on the cutter and the four gummers-that the filling shift is most dependent, there is a special need for social organization to be sound at this point. But the cutting team does not exist officially as a group since the cutters are on their own note, responsible for and paid for their cutting alone. The gurnmers are not under

their authority, and no one except the deputy can take responsibility for any tendency they may have to leave some or all of the gummings in in certain stints as they traverse the face. As they are on day wage, they have nothing to lose unless they go too far so, at least, the fillers feel in their bitterness on this score.

As the lowest paid and lowest prestige group on the face, doing the least skilled task, gummers are both an outcast and a scapegoated group. Their work is arduous, dangerous, dusty-and awkward. Their hostility toward "the system" and toward other face workers is almost inevitable and is most easily displaced upon the fillers, whom they never see but can severely annoy-not necessarily with conscious malice-by leaving in some of the gummings under conditions of fatigue or difficulty. A system that puts this power of interference into the hands of a potentially disgruntled, scapegoated group, with no effective social means of controlling it, fosters the hostile tendencies almost inevitably present. These difficulties are increased by the fact that, among all face workers, status differences are greatest between cutters and gummers and by the fact that the cutters are a closed pair. Tensions within this ambiguously organized group are apt to be sharp.

There are, of course, instances where effective leadership is exercised over the gummers by the front man, and some of these were quoted by informants But it was stressed at the same time that management could hold the cutters responsible only for the cut and that to exercise detailed supervision was an impossible task for a deputy, especially on back shifts where his territory of responsibility is apt to be more extensive than on day shift. In shift groups where a good spirit of cooperation obtains, the belt-breakers are often willing to help out the gummers. It was suggested that fewer lapses occurred when these interchanges took place. But the pattern of the cutting shift works against such cooperation, consisting as it does of four different categories of workers successively traversing the face with their own separately institutionalized component tasks, with no overall goal to bind them together and no functionally defined responsibilities to each other.

So closely tied, however, are the cutting and gumming operations that they cannot in practice be treated as separate. Hence arises the dilemma of the team that is at the same time not a team. Given a work system with a different type of culture there might be no problem but, given longwall separatism, there would appear to be no solution-until new conceptions of relationship emerge.

Some instances were quoted of gummers being paid by the front man, who could therefore be penalized for gummings left in by having money stopped out of his contract. But it was pointed out that this sanction could be applied only in cases of the grossest kind, which the deputy would in any case pick up, and that it tended to place cutters in the hands of their gurnmers. This suggests that the

persistence or resuscitation of the old forms of contract are not in themselves enough to restore responsible autonomy.

THE SPLIT-OFF POSITION OF THE INTERDEPENDENT PAIRS

Superficially, borers, belt-builders and belt-breakers look like pair structures that echo those of pre-mechanized days. But, whereas the pairs of hand-got coal getting had craft status and an artisan type of independence in working their own face, with the satisfaction of seeing through the whole coal getting job, these longwall pairs are restricted to work tasks of a singularly narrow component character.

The borers are off by themselves; and, as regards the belt workers, since breakers and builders are on different shifts, neither can feel the satisfaction of accepting responsibility for the conveyor system as a whole.

The most fractionated tasks are therefore performed by those restricted to the narrowest relationships. It would be difficult to imagine a situation in which they were more completely split off from any sense of belonging to a shift or total production group. But they are at least responsible to each other and are based on a stable, if narrow, relationship.

The Social Viability of the Ripping Team

By contrast, the ripping team is a well-organized primary work group of seven or eight men with an intelligible total task, for which it carries complete responsibility. Rippers are frequently referred to by others as a "good crowd" who seldom "go absent on each other." Pride of craft is considerable. A main ripper and, usually, individuals of very varying experience compose the group, but it appears to manage its internal relationships without status difficulties. Here, responsible autonomy persists.

Unfortunately, like the other face-work groups, it is a group by itself, and there is no transfer of its more stable morale to other groups in the system. Working as it does in the main and side gates, it is felt to be a closed group very much apart from the interaction between the preparation and filling operations carried out in the face itself.

In all essential respects the ripping teams represent a survival of the hand-got past in the mechanical present. For the gates in which ripping parties of varying sizes operate are, as it were, their own "stalls', continuously and

autonomously worked. All relevant operations are carried out within the group, which completes them within the compass of one shift. Rippers have escaped from, rather than become part of, the longwall system, retaining intact their total task, their multiple skills, their artisan independence and their small group organization. They work in the gates. Though part of the task remains small, the spatiotemporal structure is simple and methods are unmechanized. Changes consequent on the introduction of power-driven tools, or of steel replacing wood, have been assimilated without essential restructuring.

In the face, it was the introduction of machines (still foreign to the gates) that caused the appearance of a new order, changing the scale to mass production and bringing fractionation of tasks, extension of sequence, role and shift segregation, small group disorganization and inter-group dependence. In the gates the old order continues in a special setting. To compare the two, one needs only to step from gates to face. Those in the face once fared as well as those in the gates.

Conclusions

The fact that the desperate economic incentives of the between-war period no longer operate means a greater intolerance of unsatisfying or difficult working conditions, or systems of organization, among miners, even though they may not always be clear as to the exact nature of the resentment or hostility they often appear to feel. The persistence of socially ineffective structures at the coal face is likely to be a major factor in preventing a rise of morale, in discouraging recruitment and in increasing labor turnover.

The innovations in social organization of face-work groups that have begun to appear, and the success of some of those developments, suggest that the organizational changes brought about by nationalization provide a not inappropriate opportunity for the experimental working through of problems of the types that have been indicated. It can certainly be said with some confidence that within the industry there exist the necessary resources and creativity to allow widespread constructive developments to take place.

As regards the longwall system, the first need is for systematic study and evaluation of the changes so far tried.(2) It seems to the present writers, however, that a qualitative change will have to be effected in the general character of the method so that a social as well as a technological whole can come into existence. Only if this is achieved can the relationships of the cycle work group be successfully integrated and a new social balance created.

The immediate problems are to develop formal small-group organization on the filling shift and to work out an acceptable solution to the authority questions

in the cutting team. But it is difficult to see how these problems can be solved effectively without restoring responsible autonomy to primary groups throughout the system and ensuring that each of these groups has a satisfying sub-whole as its work task and some scope for flexibility in work pace. Only if this is done will the stress of the deputy's role be reduced and his task of maintaining the cycle receive spontaneous support from the primary work groups.

It is likely that any attempts in this direction would need to take advantage of the recent trend of training face workers for more than one role so that interchangeability of tasks would be possible within work teams. Moreover, the problem of shift segregation will not be overcome until the situation is altered in which one large group is permanently organized round the day shift and the others round the back shifts. Some interchange between roles in preparation and filling tasks would seem worth consideration. Once preparation workers and fillers could experience each other's situation, mutual understanding and tolerance would be likely to increase.

It is to be borne in mind that developments in room-and-pillar methods appear to be stressing the value of the strongly knit primary work groups and that the most recent advances in mechanization, such as power loaders or strippers, both require work teams of this kind.

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(2) 0ne of the most interesting of these changes is described in Sheppard (I 951).