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Commentary

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The Hawthorne studies—a fable for our times?

E.A.M. GALE

From the Medical School Unit, Southmead Hospital, Bristol, UK

'*The consumer of knowledge can never know what a dicky thing knowledge is until he has tried to produce it'.*
F.J. Roethlisberger, investigator at Hawthorne

Introduction

There is a familiar anecdote that relates, with variations, that experiments with improved factory lighting increased the productivity of workers. The outcome seemed clear until someone turned the lighting down to below baseline, whereupon output increased still further. The moral of this tale, referred to as the Hawthorne effect, is that people change their behaviour when they think you are watching it. The story relates to the first of many experiments performed at the Hawthorne works of the Western Electric Company in Chicago from November 1924 onwards. The original aim was to test claims that brighter lighting increased productivity, but uncontrolled studies proved uninterpretable. The workers were therefore divided into matched control and test groups and, to the surprise of the investigators, productivity rose equally in both. In the next experiment, lighting was reduced progressively for the test group until, at 1.4 foot-candles, they protested that they could not see what they were doing. Until then the productivity of both groups had once again risen in parallel. Two volunteers went on to demonstrate that a high output was possible at 0.06 foot-candles, equivalent to moonlight.

The investigators next changed the light bulbs daily in the sight of the workers, telling them that the new bulbs were brighter. The women commented favourably on the change and increased their work-rate, even though the new bulbs were identical to those that had been removed. This and other manoeuvres showed beyond doubt that productivity related to what the subjects believed, and not to objective changes in their circumstances. These at least seem to be the main facts behind the popular legend, although these particular experiments were never written up, the original study reports were lost, and the only contemporary account of them derives from a few paragraphs in a trade journal.[1,2]

Compelling though this fable may be, it conceals something of greater interest. Behind it lies the story of investigators who wanted to make the sweat-shop conditions of factory life in the 1920s more humane and yet more profitable; of the research they ran—research that affected the working conditions of millions of people while generating an academic industry all of its own; of the way in which a particular academic interpretation was imposed upon an untidy reality; of the turf wars that resulted; and of five young women who entered the folklore of sociology because they got faster and faster at making telephone relays. Their work also entered the folklore of medicine, as an 'effect' that everyone refers to, but no-one can source or define. The Hawthorne studies deserve more detailed consideration.

Men and machines

At the start of the 20th century, most people still worked on the land, heirs to a rhythm of life that stretched back unbroken into Neolithic times. Those who moved to the cities found a new sort

Address correspondence to Professor E.A.M. Gale, Diabetes and Metabolism, Medical School Unit, Southmead Hospital, Bristol BS10 5NB. e-mail: edwin.gale@bristol.ac.uk

of work: year-round performance of the same set of tasks with output measured against the clock. A day's work for a day's wages was typically based upon an uneasy pact between the employer, who wanted the maximum output for the minimum wage bill, and the work-force, whose defence against exploitation lay in defining a customary rate of output and penalizing anyone who exceeded it. This became the subject of intense scrutiny by Frederick Winslow Taylor, who possibly did more than anyone else to change the way in which people would work in the 20th century.[3] His self-appointed mission was to define the most efficient way of carrying out any task performed by human hands, and of enforcing this upon the workplace. The success stories, at least as recounted by him, are remarkable. After examining a factory at which each workman brought his own shovel to work, he worked out the optimal weight for each shovelling task (21 lb) and adjusted shovel size according to the weight of the material being shifted. When he was done, the factory used 15 different shovels, and 140 men performed the work previously done by 600.[4] The views of the other 460 were not recorded. Or again, he found that pig-iron was being moved at a customary rate of 12½ tons per day per man. Calculation showed that the figure should be 47 tons per day. Incredible though this seemed, his slide rule left no room for doubt, and the transition was duly achieved by a combination of subterfuge and judicious extra payment to the most efficient workers.[5] His unsentimental view was that workers should appreciate that the factory 'exists, first, last and all time, for the purpose of paying dividends to its owners'.[6] Archetype though he was of the man with the clip-board and stop-watch, the most hated person on the shop floor, Taylor knew one big thing: make shoes more cheaply, and people will buy more shoes. Cheaper goods and higher wages make the producer into a consumer, creating the spiral that has sustained us ever since.

The First World War introduced high throughput homicide and other industrial methods into warfare.[7] As whole populations were pitted against one another in the race to produce food and munitions, there was large-scale forced expansion of the factory population, and the role of women was transformed. Munitions workers were initially obliged to work 7 days a week, with one day off per month, and were often found asleep at their lathes. The futility of this approach was brought home by the demonstration that the total output of women producing fuses rose by 13% when working hours were reduced from 75 to 55 h.[8] Physical fatigue became the subject of high-level concern,

Figure 1. Measuring industrial fatigue, 1920s style. From Hill AV, *Living Machinery*.

and the recently formed Medical Research Committee (later Council) was asked to advise an Industrial Fatigue Research Board (Figure 1). Investigators in the US paid close attention to the resulting partnership between academics and industrialists, no doubt noting that 'sometimes the mere presence of the Institute's investigators and the interest which they have shown in the employees' work have served to send up output before any actual changes have been introduced'.[6]

It became evident that fatigue had many causes, monotony high among them.[9] The sheer mind-numbing monotony of factory work before the introduction of the silicon chip is hard to comprehend. To take one example, assembly of relay R-1498 at the Hawthorne factory required 32 separate operations for each hand. The worker was expected to assemble one of these relays every minute for up to 9 h a day, and for five and a half days per week.[2] Allowing for one week of holiday (later rising to two) and six statutory days off, they were required to work 300 days in the year, with little hope of change or promotion. Studs Terkel, the social historian of Chicago, prefaced his book *Working* by saying 'this book being about work is by its very nature about violence—to the spirit as well as to the body. It is, above all, about daily humiliations. To survive the day is triumph enough for the walking wounded . . . '.[10] Monotony as penal as this required either incentive or coercion. Economic necessity might provide the incentive, but fatigue, error and carelessness became major problems. Looming behind was the threat of industrial unrest, strikes, and a descent into anarchy.

Few were more aware of this threat than the leaders of the socialist revolution in Russia,

who used ruthless discipline in forcing progress towards industrialization and collective farming. Curiously enough, Frederick Winslow Taylor had a big influence upon Lenin, who encouraged Alexei Gastev to carry out experiments at the Central Institute of Labour in which 'hundreds of identically dressed trainees would be marched in columns to their benches, and orders would be given by buzzes from machines. The workers were trained to hammer correctly by holding a hammer attached to and moved by a hammering machine so that after half an hour they had internalized its mechanical rhythm'.[11] Gastev honestly believed that efficiency would be improved if people were given numbers instead of names, and thus inspired the satire *We*, written in 1924 by Yevgeny Zamyatin, in which people known only by number lived in glass houses and performed each activity of the day in a mechanical fashion that maximized its efficiency.[12] This dystopian vision, much admired by George Orwell, was banned from the Soviet Union for more than 60 years. While the emerging totalitarian powers in Russia, Italy and Germany would set out to mould their populations into national task forces by discipline, propaganda and the parade ground, the privileged and managerial classes in the democracies viewed the emergence of the working masses with some concern.[13] This was not the deferential working class of before the war. These were people thronging to the dance halls and cinemas, casting votes, banding together in unions and generally threatening to throw the old order into chaos. Worse still, these were the new masters.[14]

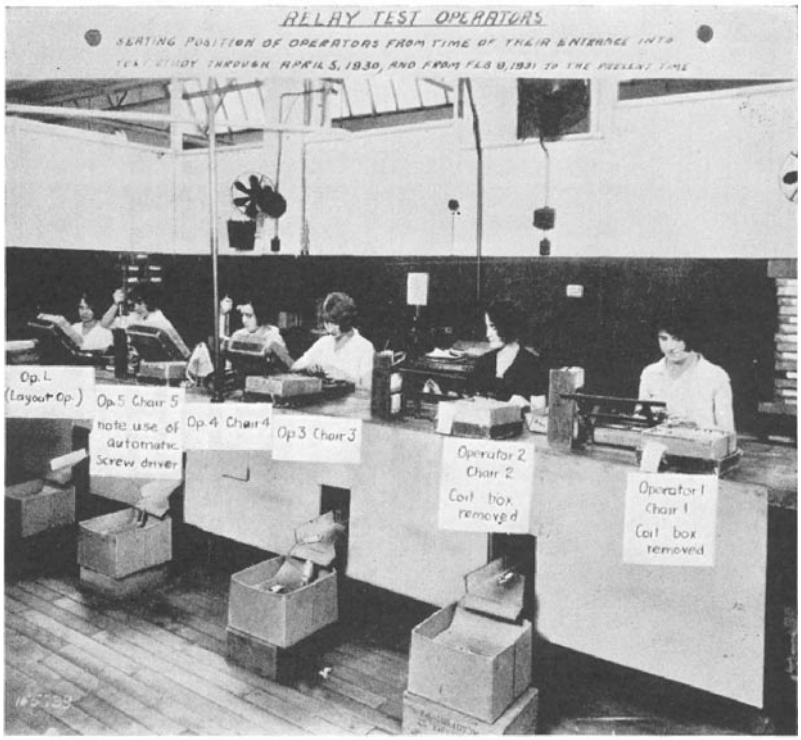
Hawthorne

Chicago was built on the American Dream. It was where immigrants came to become Americans. In the 1920s alone, a wave of immigrants from southern or eastern Europe took its population from 2 701 705 to 3 376 438,[15] yet elderly inhabitants could still remember when prairie wolves would howl in the streets on cold winter nights.[16] One of its most successful industries was the telephone business, effectively monopolized by the American Telephone and Telegraph Company (AT&T). The monopoly supplier of telephone equipment to AT&T was the Western Electric Company, and its main factory in the Chicago suburb of Hawthorne offered employment to some 35 000 people, mainly first- or second-generation immigrants from 60 nationalities. Western Electric was a paternalistic organization that enjoyed the status of a public utility, forbade union membership, and yet led the way with pension schemes and social and sporting facilities for its workers. Their electrical suppliers claimed in the early 1920s that better lighting improved productivity, thus prompting the famous illumination experiments. These experiments were supervised by two company officials, Clarence Stoll and George Pennock, and it was they who dreamed up the next experiment, on the back of which so many academics were to rise to fame.[16]

The study was carried out in the relay assembly Test Room.[1] A relay was a switching device activated in the telephone exchange as each number was dialled. Six experienced workers were moved into the area constructed for the illumination experiments in April 1927: five to work on assembly and the sixth to keep them supplied with parts. The young women (invariably referred to as 'girls' by the investigators) worked in a row (Figure 2) and each completed relay was dropped into a chute and automatically recorded by a hole punched in a tape. The supervisor sat at a desk directly opposite with his assistants in a row beside him; in further emphasis of the social divide, the clerical and administrative staff entered and left the room by a different door.

The aim was to examine the effect of changes in working arrangements upon productivity. Pennock and Stoll were engineers, and treated the row of women like an engine in its test bed, tweaking the conditions to achieve maximum output. Output did indeed rise in response to shorter hours and the introduction of rest breaks, but Pennock was puzzled to observe that—with occasional hitches—it continued to rise regardless of any changes he made to the experiment. Most baffling of all, output remained high when he decreed a return to baseline working conditions for 3 months in 1928. By this stage, the women were making 2900 relays per week instead of 2400, rising to 3000 when the most successful innovations were subsequently reintroduced. The company became interested, and brought in academic consultants. One of these was Elton Mayo, an Australian recently appointed to the Harvard Business School. Conservative in his views, he attracted the attention of leading industrialists because he considered industrial unrest and political dissidence to be symptoms of psychopathology brought on by an unsuitable working environment.[2] He first came into the Test Room in April 1928, measured the blood pressures of the women at different times of day, and departed. Only later was he to rescue Pennock from his uninterpretable experiment and himself from academic obscurity by pointing out that the key variable was the attitude of the workers.

SKETCH 2



SKETCH 3

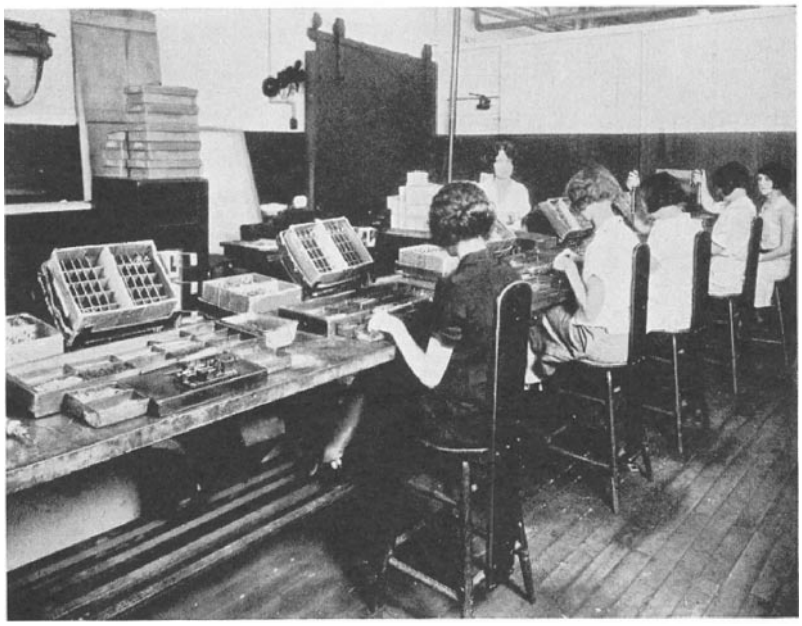


Figure 2. The Test Room in 1931. From left to right (upper panel), layout operator, Anna Haug, Wanda Blasejak, Theresa Layman, Jennie Sirchio, Mary Volango.

Discipline was initially a problem. Accustomed as they were to the classroom atmosphere of the shop floor, the women now found themselves free to work in the way that suited them best. They talked, so much so that the two most challenging (and least productive) women were replaced after 8 months. Jennie Sirchio, known as Operator 2, was one of the replacements. Born of Italian immigrants,

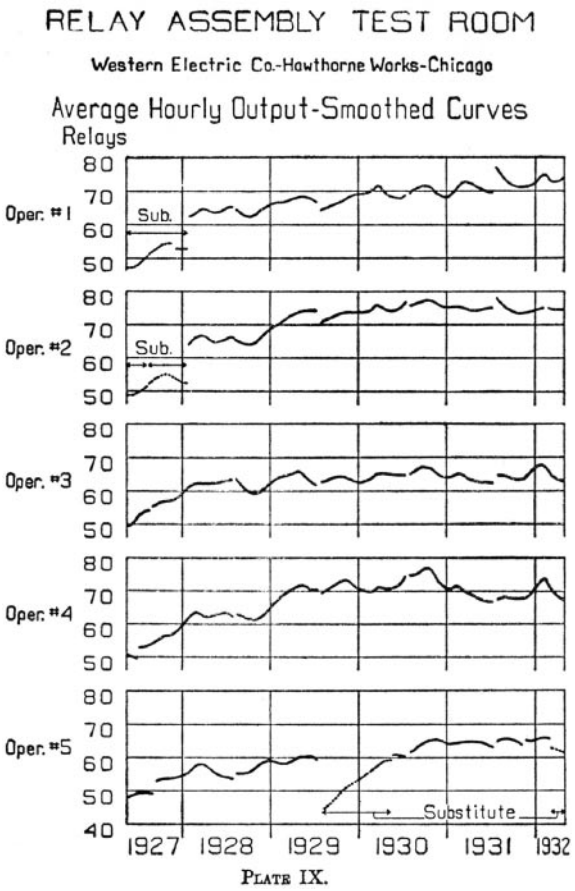


Figure 3. Rate of production of relays in the Test Room. Note that 50 per hour was the base rate, and that Operators 2 and 4 approached 80 per hour at maximum.

she dreamed as a child of working in an office, but left high school early because her family needed the wages. When her mother died, she became the housekeeper, main breadwinner, and financial manager for her father and three brothers, breaking off with her long-established boyfriend to do so. Her fierce loyalty to her family was soon matched by her loyalty to the Test Room, not least because to her the wage of $30 per week (1 cent per relay at group rates) appeared astronomical. Her arrival changed the course of the experiment. She rapidly became the centre of the group, and discipline was no longer a problem. The girls would laugh and talk, sometimes even sing together, but the focus was now firmly on output.

On her left was Mary Volango. Eighteen and born of Polish parents, she aspired to look and behave as much like an American as possible; 'motion pictures were her chief diversion, and if given the opportunity she talked about them incessantly'. On her right was Theresa Layman, who had lied about her age and was only 15, also with Polish parents. Her mother dominated her husband and six children, and the three wage-earners were obliged to hand over their wage-packets unopened; she was allowed no regular spending money, despite her longing for clothes. Wanda Blazejak, also Polish, lived in a six-room bungalow with her grandmother, parents and six siblings, forming a thrifty, close-knit family group. Her parents ordered her to break off with a boyfriend because he was not Polish. The odd one out was Anna Haug, a 29-year-old from Norway who came to Chicago on her own at the age of 25, and who by some amazing chance ran into her childhood sweetheart at a party. They married while the study was in progress, and planned to save enough money to return to Norway.[1,2,16] None of the five spoke English at home, but they adopted American customs which, much to the scandal of their families, included serial boyfriends. During the boom they would buy a new outfit of hat, dress, artificial silk stockings and shoes (at a cost of $10–15) every few weeks; the style would be set by the latest movies and the outfit would be discarded rather than cleaned. For one observer these clothes were symbolic of 'their desire for another and largely imaginary world peopled by wealthy young men and 'smart' women such as could be seen in any movie, where social obligations and routines of behaviour are conspicuous by their absence'.[16]

By February 1929, and largely due to the Test Room, the company committed itself to studying its workers. A Division of Industrial Research was formed, and the Test Room supervisor was promoted to department chief. He was assisted by a new test room supervisor, an office boy, a lady who helped with the statistics, and the superintendent of the Inspection Branch (Pennock himself). To this could be added 'an intermittent stream of other visitors or consultants: industrialists, industrial relations experts, industrial psychologists, and university professors'.[1] All eyes were on the five women as they worked away demurely, each dropping a new relay down the chute every 40–50 seconds, 8 hours a day.

The twenty-first century reader might pause to wonder why the Test Room was considered so interesting. It may seem self-evident that the girls became the centre of a lot of fuss, were accorded unheard-of autonomy and respect, bonded as a group, and gained a whole range of rewards and privileges in return for making relays faster. Why should there be anything surprising in that? The difficulty, or so I believe, lies in our twenty-first century eyes. We have seen too many costume dramas in which people from other times and places think and behave just as we do. They didn't.

Talk to someone who lived through the 1920s, and the strangeness will not at first be apparent—for them the landscape has moved at the same speed as the train—but sooner or later they will say 'things were very different then'. Things *were* very different. Let us therefore pause to adjust our focus.

In a book titled (with unintended irony) *The Scientific Outlook*, and published in 1931, the philosopher Bertrand Russell mused about the future of industry: 'the pleasantest work, of course', he wrote, 'will be that which gives the most control over the mechanism. The posts giving most power will presumably be awarded to the ablest men (sic) as a result of intelligence tests. For entirely inferior work negroes will be employed wherever possible . . . The society will not be one in which there is equality . . . '.[17] In the following year, Aldous Huxley published *Brave New World*, a satire in which factory workers are cloned, deprived of graded amounts of oxygen during fetal maturation, and classed beta to epsilon according to the technical skills they would require. This classification was not invented by Huxley, but by Robert M Yerkes, Professor of Psychology at Harvard, who produced the first mass tests of intelligence and applied them to 1.75 million US army recruits in World War 1. Those who could read were given a test known as Army Alpha; the remainder were given a pictorial challenge known as Army Beta; all were then graded from A to E according to intellectual capacity. The results of these tests horrified the educated classes, for they showed that the average mental age of White Americans came in at 13.08 years; it was now official that half the population were semi-morons. Needless to say, immigrants from Southern or Eastern Europe came in even lower (10.74 years for Poles), with Black people scoring lowest of all.[18] The inescapable conclusion, or so it seemed, was that the masses were intellectually and biologically inferior to their social superiors.[19] Without firm leadership from above—which democracy could not provide—society was on a one-way trip to the abyss. So at least many right wing thinkers believed.[20] Those of a more liberal disposition set out to study the working class using techniques developed by anthropologists, tried to improve them by education, advised them not to breed too enthusiastically, or aped their speech and manners. The Old Etonian Eric Blair (George Orwell) went on the personal voyage of discovery described in the *Road to Wigan Pier* and other books. The common factor in all this was that working people were always *them*, while we—the people who communicated between ourselves about them—were always *us*.

Seen from this perspective, the excitement of the Hawthorne investigators becomes easier to understand. They had bridged a social abyss and discovered a new alchemy. Treat working people with respect, understand their thinking and group dynamics, reward them appropriately, and they will work better for you. Everyone can be a winner. In the view of one investigator, the invitation to the girls 'to work like we feel' had 'the emotional force of a Magna Charta or of a Declaration of Independence, and unwittingly it inaugurated a revolution in employee and supervisory attitudes'.[16] George Pennock addressed the Personnel Research Federation in New York in this vein on 15 November 1929. Describing the Test Room, he claimed that 'a relationship of confidence and friendliness has been established with these girls to such an extent that practically no supervision is required. In the absence of any drive or urge whatsoever they can be depended upon to do their best. They say they have no sensation of working faster now than under the previous conditions . . . they have a feeling that their increased production is in some way related to the distinctly freer, happier, and more pleasant working environment'.[9]

While academics began to build their reputations around these findings, the management at Hawthorne was quick to apply them. Rest breaks were introduced across the factory, with a general increase in productivity. The observation that the women worked more freely and effectively when relieved of the 'apprehension of authority' prompted a review of supervisory style. The new mood had evidently caught on, for someone soon said 'why not ask the workers?' and an ambitious interview programme was launched. A cadre of trained interviewers was recruited, and some 21 000 employees were interviewed between 1928–1930. The interviews were an immediate success, popular both with the employees and the interviewers. Oddly enough (or perhaps not) there was an immediate effect upon the supervisors themselves, even though they were not involved—yet another Hawthorne effect. Before long they too were participating in regular training conferences. At the outset it was assumed that the interviews would generate practical suggestions, but most complaints were found to relate to vaguely expressed personal grievances, some of which had been nursed for years. These were often relieved by being expressed, so that the employee walked out of the interview with considerable lightening of mood. Meanwhile the interviewers 'felt that they had acquired a new and improved way of understanding and dealing with their fellow men'.[1]

After considerable debate, this experience led to a change in interviewing technique. The original direct approach based on a pre-selected list of questions was abandoned in favour of an indirect technique which encouraged the subject to develop and follow his or her own train of thought, with minimal prompting from the interviewer. The interviews now took 90 min, were recorded almost verbatim, and subsequently took up 10 pages of single-spaced typescript. Certain areas of complaint (e.g. about the cafeteria) were no longer treated as facts in themselves, but as pointers to underlying personal or social situations which warranted exploration. What had been learned was 'that opinions are not detachable. What a worker thinks on a certain subject is a symptom of what he is; his ideas cannot be torn out of their personal context and exhibited as significant'.[9] Only later did the investigators realise that they had rediscovered the psychiatric interview as developed at the Salpêtrière Hospital in Paris and adopted by the psychoanalytic community. The Hawthorne interview did have some influence on the medical consultation,[21] however, and undoubtedly influenced Carl Rogers as he developed non-directive counselling,[22] the basis of modern counselling techniques.

Meanwhile, Hollywood style, the Test Room women had been translated from anonymous drudgery to minor celebrity; 30 000 other Hawthorne workers now enjoyed regular rest breaks because of them. Jennie Sirchio and Wanda Blazejak had become the fastest relay assemblers of all time, each with a distinctive style; Sirchio appeared quite leisurely from across the room, but up close her hands became a blur. Meanwhile, their world was beginning to fall apart. AT&T had more than 15 million telephones in operation in 1929, and became the first company ever to gross $1 billion. The boom ended when Wall Street crashed on Black Thursday, 24 October, and one in ten US phones was disconnected in 1932. Western Electric's takings fell from $411 million in 1929 to $70 million in 1933, and 80% of the workforce lost their jobs.[23] Exploring the intimate feelings of employees was no longer on the company's agenda. The Test Room women received their notice in 1932. An exception was made for Jennie Sirchio, who achieved her ambition of working in an office for a few brief months, before she too was sacked. They tracked her down two years later, earning a bare living as a shop assistant. There was one final question. The phenomenal output of the Test Room girls had fallen for the first time when they were given their notice, although logic dictated that they should have worked flat out to maximize their income over the final weeks. Asked why this happened, Jennie said 'we lost our pride'.[16]

The Hawthorne wars

The missing link in most accounts of the Hawthorne studies has been the investigators.[2] As we have seen, the studies were initiated by company officials who approached worker output as if it was a problem in engineering. To do them justice, they were well aware of the human factor, but lacked the vocabulary to describe it. Academics rescued them by transforming a series of poorly performed experiments into a potent myth. The resulting alliance fulfilled the unwritten agenda of all professionals: identifying problems to which they themselves are the solution. The company officials had generated a whole new role for middle management, and the academics now had their feet firmly under the big business table. First on the scene was Elton Mayo, whose somewhat racy account of the doings at Hawthorne was heavily influenced by his reading of Durkheim and the concept of social disorganization.[9] Mayo's disciple J.F. Roethlisberger showed the workforce as a *social system*, influenced by group interaction, participation and a more relaxed style of supervision. In 1936, he presented these ideas for the first time to an audience of prominent business executives, asking himself 'were they to remain the robber barons or to become the saviors of our industrial civilisation?'.[24] His talk was well received but no doubt naïve; as a later commentator put it 'the Goliath of industrial warfare cannot be slain by the David of industrial relations'.[25] There is, after all, a genuine conflict of interest between management and worker that cannot be resolved by psychotherapy, and his account blithely ignores the role of unions. Later and more hard-nosed commentators would derisively label this as the 'Pet Milk' concept of industrial relations, after a famous advertising slogan which claimed that '*Pet Milk comes from contented cows',* but 20 000 future graduates of the Harvard Business School would nonetheless cut their teeth on the Hawthorne studies.

Hawthorne duly became a *locus classicus* of industrial relations, the place where every commentator worth his salt came to sharpen his claws. You might imagine that the studies had demonstrated for all time that (a) the behaviour of individuals cannot be abstracted from its personal and social context, and that (b) the observer of a behavioural experiment is also in some way a participant. Not so.

One commentator after another jumped straight in with one eye and both feet to offer a reductionist 'solution' based around their own personal or academic value system. The performance of the girls has thus been attributed to discipline and firmer supervision (amazingly enough), to kindness and better working conditions, to pay, to feedback and learning curves, to operant conditioning (by the behavioural psychologists), to group interaction and mutual support, and to some intuitive yet undefinable *gestalt* which incorporates all of the above.[26]

Things move on, however, and the behavioural sciences have left Hawthorne behind them. There are, come to that, no more workers for them to study;[27] transformed into technicians, robots or rows of children in some tropical sweat-shop, they are no longer worthy objects of academic investigation. The Harvard Business School lost its human heart long ago,[28] and sociologists would consider the suggestion that their task is to provide the tools with which to construct a better society laughably naïve. Indeed, after doing much to justify Francis Crick's famous quip that any academic discipline with 'science' in its title probably isn't one,[29] the social science represented in some current journals has become an academic exercise in fashionable linguistics, the unreadable in pursuit of the uninterpretable. All that remains of Hawthorne is the name, and the fable.

A fable for our times?

In spring 1974, Fritz Roethlisberger lay dying in hospital, alert as ever to the nuances of corporate behaviour. 'The physicians want to be surgeons', he would say, 'the nurses want to be physicians, the aides want to be nurses, and no one wants to fluff my pillow'.[30] Fifty years earlier, when the studies that made Roethlisberger famous were under way, the medical practitioner was an isolated professional who sold his skills for whatever the market would bear, and was answerable only to the code of his chosen profession. The time would come when presumed skill with the scalpel or stethoscope would not be enough, and he or she would come to rely increasingly upon expertise and technologies provided by others. Later still, the doctor would evolve into the means by which a complex technology is delivered,[31] within a medical system that has acquired many of the features of an industrial process. Hence the haunting sense of *déjà vu* within the Hawthorne story. Techniques of management developed on the shop floor in the 1920s have at long last worked their way through to us. Here you will find the same mantras regarding hours of work, rest breaks, group dynamics, personal review, feedback, pay linked to productivity, audits, reports and outcomes, all rebadged and sold as new. And there within our medical factories we will find the older generation of factory hands, deskilled, shaking their heads over the new work practices, resentful of the present, apprehensive of the future, and vaguely aware that something important has been taken from them. You might call it respect.

Meanwhile, the 'Hawthorne effect' scored 1940 hits on a recent electronic search of the medical literature. The term 'effect' is used in physics to describe a phenomenon that cannot be accounted for within current theory: a stimulus to further endeavour. In medicine it is all too often used to close a door, conveying the impression of understanding where none in fact exists, as in the placebo effect, or (within my own speciality) the now-defunct Somogyi effect.[32] Be that as it may, there are two frequently quoted examples of studies in which control groups changed their behaviour. One involved health professionals: medical residents in a US hospital participated in a trial of two methods, financial incentive or chart discussion, designed to reduce the frequency with which they ordered laboratory tests and X-rays.[33] One third of the residents acted as controls. The upshot was that the chart review group made a 47% reduction, the financial incentive group made a 29% reduction, and the control group made a 36% reduction! The second example comes from the Multiple Risk Factor Intervention Trial. In this, some 12 000 men were selected for an intervention programme on the basis of increased cardiovascular risk, and then randomized to 'special intervention' and 'usual care' groups. After 7 years, the special intervention group had reached its targets in terms of smoking cessation and reduced diastolic blood pressure, with a less-than-desired but still useful fall in cholesterol, but did not differ from the usual care group in terms of total mortality and incidence of coronary heart disease. Smoking had decreased in the control group from 59% to 46%, and diastolic blood pressure from 91 to 84 mmHg; antihypertensive use rose from 19% to 47%. Oddly, altered behaviour of the controls (or their physicians) was not at the time among the three hypotheses put forward by the investigators to explain the lack of difference between the groups.[34] No doubt many more examples could be found, but let us consider patients as individuals.

Economists have a concept known as 'economic man'. This is a person whose behaviour can be understood and predicted on the basis of financial self-interest. Less explicitly, health workers

assume a 'health man' whose behaviour can be understood and predicted in terms of a rational desire for longevity. The limitation of both assumptions is that balanced individuals have many other desires and fears. The undivided pursuit of wealth may result in a knighthood, a prison sentence, or both, but the undivided pursuit of health commands little respect and is generally considered unhealthy. The behaviour of most of us emerges as a compromise between conflicting motives. There may be good reasons for what we do, but they are not rational ones. Instead, they derive from our background and from the situation we find ourselves in. This is why we find it easier to understand and predict the behaviour of someone with whom we can identify reasonably closely. Prediction becomes progressively uncertain with people we know less well, and true strangers are viewed with caution because we have little idea what they will do next.

I specialize in looking after people with diabetes. As such, I operate as a trader in risks and futures, and use the clinical interview as a means of identifying the personal and social context within which to operate. Long term risk is a tricky concept to handle; diabetes can only be lived one day at a time. Change the day, and you change the life. Which brings us back to monotony. Elton Mayo has interesting things to say about this. Some tasks, he observes, are so automatic that the operatives can pass their time day-dreaming or chatting to one another. At the other end of the scale are tasks that are absorbing because they demand skill and full attention. It is the work in between, characterized as 'semi-automatic' and combining monotony with constant vigilance and frequent interruptions, that generates the stress and depression.[9] Managing your own diabetes is a semi-automatic activity.

The evidence that behaviour is the dominant element in successful management of diabetes is so overwhelming that we tend to ignore it. It is too much in the foreground, and runs counter to the widespread assumption that we can live pretty much as we please provided we have access to the right pharmaceuticals. Hawthorne does not just provide an occasional academic footnote to the management of diabetes; it is the basis of good management. Let us take some examples. I was involved in the first studies of home blood glucose monitoring for diabetes. Our patients almost invariably improved their control, and we had no hesitation in attributing this to the technique. It took a study in which patients were randomized to blood or urine tests, with equal attention to both, to show that the benefit was unrelated to the intervention.[35] Increased attention is only as useful as the behaviour advocated, however, as was shown in a primary care study in which newly-diagnosed patients with type 2 diabetes were randomized to routine care or more intensive patient-centred consulting. The intensively managed group gained significantly more weight, with associated deterioration in blood pressure and triglyceride levels. Glucose control was unchanged. The depressing but likely explanation was that the intervention group gained weight because they were more conscientious in taking their sulphonylurea medication, since the effect was seen only in this group and could not be accounted for by differences in the amount prescribed.[36]

Beneficial non-specific treatment effects are regularly seen in drug trials, which in diabetes are often judged against a rule of thumb used by the US Food and Drug Administration, to the effect that a reduction in HbA1c of 0.5% is clinically useful. Many published trials omit an adequate description of the run-in period on unchanged therapy, but when supplied, it very often demonstrates a clinically useful improvement in control. Every diabetes specialist knows this, but (so far as I know) it has never been the subject of a systematic review. Meanwhile the insulin analogues continue to sweep the market on the basis of benefits demonstrated in unblinded trials, although blinded trials of the rapid-acting analogues suggest that they are virtually indistinguishable from standard insulins.[37]

Hawthorne reminds us that there are times when context is more important than science, and that Voltaire may have missed the point when he remarked that the main function of doctors was to keep the patient occupied 'while the disease ran its inevitable course'. Keeping the patient occupied can be very effective. Studies of weight control, or of glucose control in type 2 diabetes, both behaviour-based therapies, show a tick-shaped response: the greatest fall below baseline is reached within six months or so, and is followed by an inexorable return towards baseline. Good diabetes teams get round the tick phenomenon and the semi-automatic monotony of diabetes by constant introduction of new gadgets or nostrums, thus creating a continuous experiment. Ironically, practitioners of this art almost invariably credit their success to the intervention rather than to the context in which it is offered. This is indeed an essential part of the trick, since the confidence with which the new therapy is offered largely governs its success. No surprise that the literature is replete with conflicting recipes for successful management.

The importance of context can also be overlooked in studies of the efficacy of placebo medication. As good clinical scientists, we will look for evidence that is generally applicable,

precisely because it is independent of context. We will be reassured by evidence that under neutral and carefully controlled conditions inert substances used as placebos are virtually (although not quite) free of effect.[38] Should we then conclude that placebos are powerless? Or should we reflect that in human affairs, context is everything? That in 1993 some 45 million Americans paid $13 *billion* for fraudulent or ineffective remedies?[39] Or that every fake medicine has its passionate advocates, and that Arbuthnot Lane used to exhibit a grateful patient to prove that total colectomy was a wonderful treatment for rheumatoid arthritis?[40] Science lights a lonely path through an irrational world, and follow we must, but not at the cost of excluding the obvious because it is not easy to measure. A clinician is an amphibious creature, trained in the abstractions of science but relied on as a human being. As a scientist, he is detached and reductionist. As a human being, he exists as an element in the situation he is attempting to resolve. Hawthorne showed that to change one element is to change the situation, and that human behaviour never is, never was, and never will be a spectator sport.

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