In 1898 a psychologist named Norman Triplett performed the very first social psychological experiment. Triplett had noted that bicycle racers made faster speeds when they raced against one another than when they raced individually against the clock. From this observation he developed the hypothesis that performance improves in competition with others. He tested this hypothesis in his laboratory by having children turn fishing reels. The children were asked to turn the reels as quickly as they could and he measured their speed. He found that when two children worked together (each with his own reel), their respective speeds exceeded either child's pace when working alone. Triplett's observation has been repeated many times since. The effect — enhanced performance when working competitively — has come to be called social facilitation.

More recent experiments have shown that competition is not the essential factor underlying social facilitation. Just having an audience can improve performance. The best example of this was an experiment conducted in primary-school classrooms by psychologist Robert Rosenthal. Randomly chosen children were singled out for observation by experimenters who periodically visited the class. Just being observed was found to improve the children's school performance.

The exact mechanism by which social facilitation operates is unknown. However, one thing is quite clear — its very existence presents a problem for social psychologists. If people change their behaviour simply because they are being observed, then the possibility exists that subjects in psychological experiments (who know they are being observed) may not be reacting in their normal manner. Social facilitation rather than the experimenter's manipulations may be responsible for any changes in behaviour. This means that social psychologists who design experiments to measure one variable may find that they are studying something quite different. This is exactly what happened in the classic experiments at Hawthorne.

THE EXPERIMENT THAT TRIGGERED THE HAWTHORNE RESEARCH

Employee Relations
In the years preceding the Great Depression of the 1930s manufacturing industries grew at incredible rates throughout the industrialised world. Economies boomed throughout the 1920s and unemployment was relatively rare (but not unheard of). Although profits were healthy, little of this money actually filtered down to the workers. Wages were often barely above subsistence level.
What is more, working hours were long (50 hours per week was not uncommon) and conditions were harsh. Coffee breaks were unknown and worker exploitation was common. Workers were often forced to kick back part of their wages to their supervisors, they could be fired without notice (and without cause) and sexual exploitation of female employees was routine. There were few strong unions to protect workers in those days; the power was almost entirely with management.

Against this background the Western Electric Company’s plant at Hawthorne, Chicago (known as the Hawthorne Works), was something of a model of industrial enlightenment. The plant was owned by the giant American Telephone and Telegraph Company and manufactured telephone equipment. Even in the 1920s the Hawthorne Works included an industrial relations branch which looked after all aspects of employee relations. The branch saw to it that workers were placed in jobs best suited to them. It arranged for extra training for those workers keen for advancement and it even undertook to advise employees about personal problems, education, health, advancement and savings. The company ran a stock participation plan in which employees could buy shares in the company; an insurance office was set up in the plant to advise workers on their insurance needs; a building society association was established to help employees buy homes; sickness, accident and death benefit plans were operated by the company; the company even ran a recreational and social programme.

While the Hawthorne Works could hardly be compared to some of the sweatshops operating early in this century, it should be made clear that its industrial relations policies were not entirely benevolent. Workers still could be dismissed without notice and any attempt to form a union was quashed rapidly. In fact many of the employee benefits were designed to keep workers happy and non-unionised.

Perhaps because of their appreciation of the “human element” in the workplace, Western Electric managers were anxious to involve the newly developing field of industrial psychology in their manufacturing plants. In 1924 the Hawthorne Works, in collaboration with the National Research Council, began a series of experiments on the factors influencing industrial output in their Chicago plant. These experiments were the beginning of a research programme that lasted until 1932.

The Illumination Experiments

Although psychologists began doing research in industry before the turn of the century, industrial psychology was hardly a burgeoning field even in the 1920s. Practically all of industrial psychology was concerned with the influence on worker output of the “physical” conditions prevailing at a factory. Indeed, most industrial psychologists were behaviourists who eschewed all motivational and social influences on the individual. They acted as if changes in the physical environment (number of rest pauses, amount of light, temperature, and so on) directly affected output. Workers were viewed as extensions of the machines they operated, mere cogs in a giant assembly line whose feelings, desires, needs and motives could be safely ignored.

It should not be surprising, therefore, that the National Research Council’s industrial psychologists decided to investigate the effects of a physical variable — level of illumination — on productivity at the Hawthorne Works. The research began in 1924 with observations of workers in three departments, each engaged in different work. Without warning the workers, illumination in each of the three departments was progressively increased. The researchers expected all three groups of workers to increase their output with increased illumination. But things did not quite work out this way. Despite identical treatment, the three
groups responded differently. In one department, illumination and productivity were totally unrelated. In the others, output sometimes increased and at other times did not. There seemed to be no consistent relationship between illumination changes and productivity.

The researchers worried that their results could be due to the different work being done in the three departments. They reasoned that some jobs might be more sensitive to light levels than others. So they decided to conduct a controlled experiment using workers from just one department. Two groups of workers were chosen so as to be about equal in experience. The first group was designated the control group. Control group workers continued to work in the conditions to which they were accustomed. The experimental group, however, worked under light intensities that were systematically varied. Sometimes the illumination was increased, at other times it was decreased. The results, however, were not quite what the experimenters expected. They did find that illumination increases led to increased productivity in the experimental group, but productivity also increased in the control group whose illumination level remained unchanged. Even more surprising was what happened when light levels were decreased in the experimental group. Their productivity continued to rise! Further manipulation of light levels only served to confirm these observations. Productivity continued to rise in both the experimental and control groups irrespective of whether illumination was increased, decreased or remained the same. The only way the researchers could actually produce a decrease in productivity was by reducing the level of illumination in the experimental group to the equivalent of moonlight!

The researchers were naturally perplexed by their results and undertook to repeat the experiment again with tighter controls over illumination levels. The results, however, were the same. Experimental groups working under increasing illumination increased their productivity, but so did the control group whose physical environment was unchanged. Even those workers who had their light levels decreased produced more. In short, no matter what the experimenters did to the light levels, productivity increased by the same amount in all groups.

From today’s perspective, these findings can be viewed as constituting another demonstration of the influence of social facilitation. Somehow subjects chosen to participate in an experiment—who knew they were being observed—altered their behaviour. Even those in the control condition, who were working under the same physical conditions that they always worked under, improved their performance when they were being watched. However, there is a big difference between labelling a phenomenon “social facilitation” and explaining how it works. The researchers realised that their apparently contradictory results had to be caused by uncontrolled variables operating in the experiment. But they made no attempt to identify these variables or explain their findings. Instead, they recommended that more research be conducted. This recommendation was followed by psychologists from Harvard University who, along with their colleagues at Hawthorne, were responsible for the classic experiments described next.
CLASSIC EXPERIMENT 12:

SOCIAL RELATIONS AT WORK

The Hawthorne experiments were actually a collaborative effort, but their results were popularised by the leader of the research team, Elton Mayo. Mayo was born in 1881 in Adelaide, South Australia. He received his initial education in South Australia, graduating from the University of Adelaide in 1899. Mayo’s academic career began at the University of Queensland in Brisbane where he lectured in philosophy and logic, eventually becoming a professor in 1919. Mayo emigrated to America in the 1920s. He first took up an academic post at the University of Pennsylvania and then moved to Harvard University in 1926. Mayo’s appointment at Harvard was not in psychology but in industrial relations. He was appointed head of the newly formed department of industrial research in the Harvard Graduate School of Business Administration. The new department was largely funded by John D. Rockefeller Jr, a person Mayo came to know quite well.

Mayo’s appointment to this new department indicated a shift in thinking in the field of industrial psychology. Unlike the typical industrial psychologist, Mayo was not nearly so interested in the physical conditions governing output as he was in the social relationships among workers, and between workers and their supervisors. Mayo had some research experience in industry but he was mainly known as an integrator of various social science areas. He had written on psychiatry, social psychology, anthropology and politics. Mayo viewed his new job as a way to apply social and clinical psychology in the workplace. His interest was in determining how the social and emotional needs of workers operate to affect productivity. He also believed that enlightened human relations in industry would increase industrial harmony and decrease worker-management conflict.

Mayo joined Harvard at the time the illumination experiments were being conducted at Hawthorne. These experiments ended the research collaboration between the National Research Council and Western Electric. In 1927 a new collaborative research programme began, this time between the Harvard industrial research group led by Mayo and the Hawthorne researchers. This

FIG. 65. Elton Mayo (1881–1949) organised and directed the Hawthorne research
research programme lasted six years; the outcome was what later became known as the "human relations" movement in industry.

Although the Hawthorne research programme actually consisted of several experiments as well as an attitude survey, most historical attention has been given to the first experiment which was concerned with worker fatigue. The experiment began as another attempt to investigate the effects of changes in the physical conditions of work on productivity. The main focus was on the effect of rest pauses and shorter working hours on worker output. The experiment was designed to eliminate (or control) those variables that the researchers believed may have confounded the results of the earlier illumination studies. To give but one example, the researchers chose employees whose rate of productivity was determined entirely by themselves rather than workers whose job involved interacting with a machine. The authors argued that in the illumination experiments, workers could have adjusted their pace to the machine's speed, thereby rendering themselves relatively insensitive to changes in illumination.

The experiment was named after the area of the plant in which it was conducted, the Relay Assembly Test Room. Six highly experienced female employees were recruited by asking two who were known to be friends to choose four others. Before the experiment began the workers received an explanation of the purpose of the research. They were asked not to strain to overproduce but to work as they normally would. Each change in the research project was similarly explained before it was introduced. The workers had the opportunity to make suggestions about proposed modifications and their ideas were often incorporated into the experimental procedures.

When the experiment began the workers were taken out of their normal departments and put in a special area separated from the rest of the department by a three-metre partition. This area was designated the Relay Assembly Test Room. The room was well lit and its temperature and humidity were carefully regulated. In addition the six employees were given regular medical check-ups.

The room contained an assembly bench at which five of the women sat assembling telephone relays. The sixth worker provided the others with a constant supply of parts. Constructing the relays required a fair degree of skill. Each relay consisted of a coil armature, contact springs, an insulator and many fasteners (35 parts in all) secured into a fixture with four screws. The workers chosen for the experiment produced about 500 relays each in an average day.

The experiment began in April 1927 and lasted for more than two years; it consisted of 13 periods. Period 1 actually occurred before the beginning of the experiment. For two weeks prior to the move to a separate room, and unknown to the women, a record had been kept of their productivity. This record was used as a baseline upon which to evaluate later changes in their output. During the experiment productivity was measured in two ways. First, an observer and several assistants were placed in the room and told to record "everything that happens". In addition, as each completed relay was dropped in a slot in the bench, a specially constructed mechanical device automatically kept a tally of each worker's productivity. During their first five weeks in the test room no changes in hours or rests were introduced. This provided the authors with another five weeks of baseline data and also told them whether just moving to a new room affected productivity. These five weeks constituted period 2.

At the end of period 2 a new method of incentive payment was in-
introduced. Before moving to the test room the workers were paid according to the production level of their entire department. The six workers in the experiment, however, were taken off this pay system and were formed into a special group for pay purposes. This meant that their earnings would be more closely tied to their own, rather than the whole department's, productivity. This change in pay was period 3 of the experiment.

Following the introduction of the incentive payment scheme, rest pauses were introduced into the working day. Several different varieties of rest pauses were instituted. Each type was evaluated for a fixed period before the next type was tried. In sequence, the workers received:

Period 4. Two five-minute rest pauses (one in the morning and one in the afternoon).

Period 5. Two 10-minute rest pauses.

Period 6. Six five-minute rest pauses distributed throughout the day.

Period 7. The company provided snacks during a 15-minute morning break, a second 10-minute pause occurred in the afternoon.

Following these manipulations the investigators began to introduce variations in the length of the working day. Again, in sequence, the working day was changed so that:

Period 8. Work ended at 4:30 p.m. instead of 5 p.m.

Period 9. Work ended at 4 p.m.

Period 10. Work conditions reverted back to those of period 7.

Period 11. Saturday work was eliminated.

Period 12. Work conditions reverted back to those of period 3.

Period 13. Work conditions reverted back to those of period 7.

Although the various periods were not of equal length, no period,
except for the original two-week baseline, lasted less than four weeks and many lasted for two or three months. Productivity data were examined for each of these 13 periods. In addition the workers were interviewed and their interpersonal behaviour at work was also recorded. As might be imagined, after more than two years of recording, the experimenters had collected a mountain of data. The experimenters chose to emphasise one aspect of their data — the one they found most surprising. This was that, with only small variations, productivity showed an almost unbroken rise from period 1 to period 13. The experimenters contended that no matter what the conditions prevailing in a period and despite the reversion to a longer working day in period 12, the women continued to increase the number of relays they produced. At the beginning of the experiment the women produced about 2400 relays in an average week. Two years later the average was 3000. Although periods 7, 10 and 13 had very similar working conditions (morning and afternoon breaks with a morning snack), the average output climbed from 2500 relays per week in period 7 to 2800 relays in period 10 and 3000 relays per week in period 13.

These results are quite similar to those obtained in the illumination experiments. Although the experimenters hoped to demonstrate that productivity varies with changes in rest pauses and working hours, they found instead that productivity increased regardless of the manipulations they made. Once again, social facilitation appears to have occurred. But why? The workers themselves were asked why they produced more in the experimental context but they could not say. A partial answer came from the reports of the observers who monitored the experiment throughout the two years. They noted differences between the six workers in the experiment and other workers in the plant. For example, the six workers rarely missed any days. Their absences from work were only one-third of the average for the plant as a whole. In addition their morale seemed higher. They also grew more friendly toward one another and saw each other socially after work. Not only did they begin meeting together for parties, they also pitched in to help anyone who became sick. Their socialising, their separation from other workers, the envy of the other workers and the experimenters' interest in them, created in the six women a feeling of being different and special. The researchers believed that it was this feeling of being part of a special group that led to increased productivity among the women rather than any changes in working conditions made by the experimenters. In Mayo's own words:

Undoubtedly, there had been a remarkable change in attitude in the group. This showed in their recurrent conferences with high executive authorities. At first shy and uneasy, silent and perhaps somewhat suspicious of the company's intentions, later their attitude is marked by confidence and candor... The group unquestionably develops a sense of participation in the critical determinations and becomes something of a social unit. The developing social unity is illustrated by the entertainment of each other in their respective homes...

Mayo took the results of this experiment to support the notion that human relations are more important than physical conditions in determining productivity. He believed that the workers began to see themselves as a social unit. He interpreted the improvements in their productivity as the result of group cohesion and morale rather than as the result of changes in incentive payments, rest pauses or working hours. According to Mayo subgroups are formed because "the industrial worker wants... first, a method of living in social relationship with other people" and "happiness and such sense of personal security as may be found in sub-
ordination of an individual to a common purpose”.

Of course there is another possible explanation for the findings — one that does not depend on changes in morale but purely on the changed method of payment. Recall that workers in the experiment were taken off the usual pay system. Instead their pay was more closely tied to their own productivity. Thus it is possible that they produced more in the experiment simply because they realised that increased production led more or less directly to higher pay.

In order to determine just how important the wage system was in determining the experiment’s results, the Hawthorne experimenters conducted a second study. Called the Second Relay Assembly Group study, this experiment was meant to serve as a control for some aspects of the first. Workers selected for this second experiment were seated next to one another in the regular relay assembly department. They were put on the same incentive payment system used in the first experiment, but except for this change they worked as they normally did. Not only were they not segregated into a separate room, they also received no special rest pauses nor any change in working hours. After nine weeks it seemed clear that productivity had risen among the workers placed on the new incentive pay system. Thus even without the development of group identities and even without changes in their physical environment, these workers increased their output. This productivity increase, which could only be due to the new pay scheme, amounted to about 13 per cent. This was substantial, but only half the gain in productivity observed in the original experiment. Thus the experimenters concluded that changes in the pay system alone could not account for the entire productivity improvement obtained in the first Relay Assembly Room experiment.

**AFTERMATH**

The results of the Hawthorne experiments or, more specifically, Mayo’s interpretation of them, led to the development of human relations as an important research area not only for psychologists but also for industry. After Hawthorne, industrial psychologists could not continue to look upon workers as just a bundle of skills hooked onto the end of a machine. No longer was it possible to view workers as responding automatically to changes in physical conditions such as light, heat or rest. Instead the human relations movement forced managers and researchers to look upon workers as flesh-and-blood organisms with feelings and instincts, whose relationships with those around them influence how they behave.

The Hawthorne research programme did not end with the two experiments already described. There were further studies as well as a large-scale attitude survey designed to uncover employee attitudes toward management and their feelings about one another. Of this additional research the experiment that received the most attention is known today as the Bank Wiring Observation Room experiment. Actually this was not an experiment at all. There were no control groups and no true experimental manipulations. Instead the research consisted of the close monitoring of the performance of nine male workers. Like the workers in the Relay Assembly Test Room, the nine male workers were isolated from the others. Their task was wiring and soldering banks of terminals. Once again a baseline measure of productivity was taken. After this period the men were placed on a sophisticated wage-incentive system modelled on the one
introduced in the Relay Assembly Room experiment. The system ensured that those who produced more would receive greater rewards.

Although the incentive pay system rewarded maximum individual productivity, the researchers found that workers failed to maximise their output. Instead productivity changed very little from week to week and from person to person. When questioned about their performance, the workers in the Bank Wiring Observation Room made it clear that they believed that wiring two banks (6000 terminals) constituted a "fair day's work". This view was so widely held that instead of maximising their output, the workers adjusted their reported productivity to conform with this group "norm". Thus when reporting their productivity some workers overestimated what they had done, others underestimated. The effect was to keep the average output at two banks per day. When the experimenters analysed the actual production data — rather than the output reported by the workers — they found that only three of the nine men consistently produced as much as they claimed. The others misrepresented their productivity.

The experimenters concluded on the basis of their observations and interviews with the workers that the group was operating well below its capability in order to protect itself. The workers feared that increasing their output could lead to a cut in the incentive rate (the pay per bank) or an increase in their expected daily output. Some believed that greater productivity could lead to layoffs, especially of the slower workers. To avoid these consequences the group established a productivity norm — not too low or too high — and then made sure that their reports reflected this norm. The group developed rules of conduct: do not be a rate buster (turn out too much work); do not be a chiseler (produce too little); and do not turn in any of your fellow workers. Those who did not adhere to these norms were ostracised, ridiculed or even, on occasion, physically assaulted.

Partly because of the Hawthorne experiments the development of group norms has become an important area of research in social psychology. We now know that social interactions almost always take place in the light of group norms. These norms are consensual agreements about how to act in particular situations and may be explicit (No Parking, No Smoking, No Talking) or they can be unspoken (wait for everyone to be served before eating). The influence of social norms is particularly noticeable when you visit another culture in which norms are different. For example, in some societies it is considered a sign of politeness to burp loudly after a good meal, this shows the host that you appreciate the cooking.

Of course we do not and we cannot follow all of the norms established in a society. Instead we tend to have reference groups with whom we identify. Sailors who identify with their reference group get themselves tattooed; executives following their reference group's norm wear pinstriped suits. Social reference groups serve to guide their members' behaviour while at the same time providing them with a social identity. This sort of reference group identification is what Mayo and his colleagues believed was going on at Hawthorne. Productivity, they believed, was governed not solely by economic interests or by physical working conditions but by the social relationships among workers and between workers and supervisors. Mayo believed that when human relationships were taken into account, management and workers could cooperate in their common interest.

The Hawthorne research made Elton Mayo famous. He used the Hawthorne data as the basis for three books on the problems of industrial civilisation. The Human Problems of an Industrial Civilization, The Social Problems of an Industrial Civilization, and The Political Problems of an Industrial Civilization. He received honorary degrees including one from Harvard and was elected a Fellow of the American Academy of Arts and Sciences. He retired from Harvard
in 1947 and moved with his family to England where he died in 1949.

Although Mayo’s fame was great, the Hawthorne experiments were not without their critics. Almost from the beginning the research was the focus of intense controversy. Most of this criticism was aimed at Mayo’s interpretations. A common theme among his critics was that Mayo underestimated the extent of the conflict between workers and management. Mayo’s belief that with the right sort of human relations policy workers and management would work together toward common goals was portrayed as naïve. Critics, particularly those with Marxist views, saw the conflict between workers and management as inextricably built into the capitalist system. This conflict, they argued, cannot be eliminated simply by cosmetic changes in supervisory style. Mayo was also accused of being anti-union and pro-management and of treating workers as simple-minded people who could be easily “taken in” by trivial changes in management techniques.

These criticisms are not entirely unfounded. There were no unions at Hawthorne when the experiments were conducted and Mayo did not believe any were necessary. He did seem to identify with management and sometimes described worker behaviour as “irrational”. Perhaps even more important than criticisms of Mayo’s interpretations were attacks on the Hawthorne experiments’ methodology. It is true that none of the experiments was tightly controlled. It is also true that changes outside the plant (the Depression began and deepened while the studies were in progress) could have affected the experiments’ results.

Even more troubling was Mayo’s habit of playing down the weak points in his data. For example, in the first Relay Assembly Test Room experiment Mayo reports that two of the workers “dropped out” and had to be replaced. More extensive reports of the experiment by Mayo’s colleagues suggest that the two dropped workers were not cooperating. If these workers were replaced by two more cooperative ones, then it could be argued that the results of the experiment (continued productivity increases) were rigged by choosing workers whom the experimenters knew would respond in the desired fashion. There is even some doubt about Mayo’s presentation of the results themselves. For example, in period 12 when workers in the Relay Assembly Test Room had their working day revert from the shorter hours back to the longer work week — hourly productivity actually fell. Instead of interpreting this fall as a reaction to the lengthened work week, Mayo chose to emphasise that weekly productivity continued to increase. What he neglected to point out was that this increase was the result of working longer days rather than a rise in hourly productivity.

Another example of Mayo’s tendency to ignore data pointing toward alternative explanations for his findings is his treatment of the Bank Wiring Observation Room experiment. The nine men working in the Bank Wiring Room were observed during a period of great economic uncertainty. During the course of the experiment the men were put on progressively shorter hours. After a few weeks their work week was actually reduced to four days. Before they could adjust to this the hours were reduced further and the men were working only alternating weeks. Finally, the whole study had to be terminated because there was no work for the men to do. Surely such cutbacks in work (not to mention wages) could have motivated the men to try saving their jobs by restricting their output. Yet this possibility was never seriously considered by Mayo.

The Hawthorne experiments remain controversial, critiques and defences still appear in the psychology literature more than 50 years after the experiments were conducted. Although many textbooks describe the Hawthorne experiments as unqualified proof that human relations are more potent influences on productivity than economic incentives or physical working conditions, most careful readers agree that Mayo and his colleagues exaggerated their findings and
ignored contradictory data. Although their precise interpretation will probably always remain in doubt, the original illumination experiments and the subsequent Hawthorne experiments do make one very important point. Observing people in social psychology experiments can change the way they behave. This phenomenon is so closely associated with the Hawthorne experiments that it is today universally known as the *Hawthorne Effect*.

**Further Reading**

