The Hawthorne Experiments: The Illumination and Relay Assembly Test Room Experiments and Their Modern Managerial Applications

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Abstract

The Hawthorne experiments provided original research regarding the sociological, psychological, and human factors that influence a worker’s productivity. This thesis supports the initial findings of the Hawthorne experiments. In order to support the findings, this thesis initially provides analysis of the years of research conducted by Elton Mayo, Fritz J. Roethlisberger, and W. J. Dickson. The following section provides a literary analysis of the decades of related scholarly discussion. The main section offers innovative managerial techniques and methods for increasing the productivity of workers, applying the results of the Hawthorne experiments to modern management and contemporary work environments. Finally, this thesis addresses and demonstrates the need for additional research in the fields of management and industrial psychology with regards to the application of the Hawthorne effect, managerial discipline, small group work, and relaxed work environments. These applications have a decisive purpose: to increase employee productivity.
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Introduction

Overview of Thesis

Conducted in the late 1920s and early 1930s, the Hawthorne experiments examined the effects of managerial observation and discipline on worker productivity. Researchers discovered that employee output increased by altering the levels of observation and managerial discipline. Additionally, the experiments also offered insight on the effects of small group work and relaxed work environments on worker productivity. The experiments spanned a nine year period and yielded a large amount of research, stimulating various theories and future research. Throughout the decades following the experiments, managers and industrial researchers continued to study and critique the Hawthorne experiments in attempt to determine the validity of the original findings and conclusions.

While various critiques have surfaced regarding the validity of the conclusions drawn from the Hawthorne experiments, initial research and more recent reviews and scholarly journals support the findings of the experiments. The applications of the experiments remain evident in the modern business environment; however, critics of the Hawthorne experiments continue to create a demand for additional research to further support the modern applications. This thesis works to support the Hawthorne effect through analysis of research and reviews of scholarly journals and modern literature regarding the Hawthorne experiments and modern work environments. Furthermore, this thesis develops modern applications of the Hawthorne effect and associated methods by which managers and business owners can apply Mayo’s discoveries in order to increase their workers’ productivity. The modern applications are supported by the first two sections of this thesis: the research and investigation of the original experiments as well as a
literature review section. The modern applications are then developed from the information collected and analyzed.

As supported by Mayo and subsequent research, a greater work potential can be achieved from employees through the application of proper work supervision, environmental conditions, and attitudes within the workplace. The Hawthorne Effect, which suggests that an individual changes his or her behavior and performance while under supervision, is a psychological occurrence that affects all businesses and organizations. With such broad modern application, it is necessary for managers and executives to understand the implication and benefits of proper managerial supervision on employee productivity. As workers increase their output when receiving attention, managers must discover effective ways to continue providing attention. In doing so, managers and business executives can increase the efficiency of their employees today by applying a concept discovered decades ago.

Thus, this thesis begins with an introductory research sections, followed by a literary reviews section and the development of modern applications. The final section identifies the need for future research in order to provide additional modern support of the Hawthorne effect through fresh research and contemporary statistical analysis. Because the sociological and managerial discoveries of the Hawthorne experiments continue to affect management practices today, it is important to develop and execute additional experiments. In this way the results can be directly applied to management practices today. With proper techniques and methods, managers of businesses and organizations can greatly improve the productivity of workers and successfully apply the Hawthorne experiments to modern day business management.
The Hawthorne Experiments

The Hawthorne experiments consisted of a series of studies at Western Electric’s Hawthorne Works, a large plant located in Cicero, Illinois. Originally these studies focused on the correlation between the behavior of workers and their productivity. A landmark study with an enduring legacy, the Hawthorne experiments lasted just shy of a decade and resulted in the discovery of the Hawthorne effect. This phenomenon is characterized in management textbooks by an increase in a worker’s efficiency when under observation and was coined in 1955 by Henry A. Landsberger. He defined the Hawthorne effect as “a short-term improvement caused by observing worker performance,” which is identical to the majority of definitions provided in management textbooks.¹ Thus, the Hawthorne effect suggests that a person will work harder while being monitored, a phenomenon observed in numerous situations; examples of this include managers supervising factory workers or desk employees and researchers observing subjects of an experiment. Further elaboration of the term revolves around the idea that a person’s behavior can be altered by his or her awareness of participating in an experiment.²

Discovered through a series of experiments conducted between 1924 and 1927, factory workers inadvertently demonstrated the existence of the Hawthorne effect. Productivity increased when workers participated in supervised illumination tests. The correlation between manager supervision and employee output laid a foundation for future experimentation. The Hawthorne experiments have prompted additional research in the fields of human relations and

industrial psychology, suggesting that managerial relations directly affect worker productivity and output.

The innovative experiments involved nine years of intensive trial and observation, and consisted of managers and researchers systematically altering the environment of plant workers. These changes included different levels of lighting, the implementation of various managerial strategies, and altered rest periods. Researchers recorded the change in output within different environmental and managerial settings, anticipating higher employee outputs in more favorable working conditions. The original Illumination experiment (1924-7) was developed in order to determine the effects of environmental changes on employees. However, the results suggested that environmental changes were not the only cause of increased worker productivity.

The discovery of additional human factors led to further experimentation in order to better understand the causes of increased employee efficiency. Thus, the Hawthorne experiments were conducted in two sections: the Illumination and Relay Assembly Test Room experiments and the supplemental derivative experiments. The first section, including the Illumination experiment and Relay Assembly Test Room experiments, was designed in order to research the managerial and small group factors that influence worker productivity. These two experiments remain the most famous and highly discussed as they offer the most modern managerial applications. The second portion of the Hawthorne experiments was developed in response to the results of the first two experiments³, and was intended to gather data regarding

additional factors such as work breaks and incentive pay\(^4\). The majority of analyses and modern conclusions have been drawn based on the first section, using data from the Illumination and Relay Assembly Test Room experiments, which provides the foundation for this thesis.

The initial phase of the Hawthorne experiments was the Illumination experiments, conducted by Fritz J. Roethlisberger and W. J. Dickson. Throughout this phase, the researchers sought to establish whether a physiological relationship between light intensity and employee productivity exists.\(^5\) Roethlisberger and Dickson developed a series of lighting experiments in which the level of illumination was increased, decreased, or kept constant. Workers continued to perform their typical occupational responsibilities within the changed environments while researchers recorded the differences in employee output as a result of the changes in the level of illumination. The company conducted hundreds of trials, altering the level of light workers received while performing daily plant duties. Researchers observed the relationship between illumination and output within the experimental and control groups.\(^6\) Roethlisberger and Dickson then compared the change in the level of illumination to the change in worker output, anticipating that certain levels of lighting would correlate with higher worker productivity and predicting that consistent lighting would result in consistent employee output.

While experimental groups functioned under brighter or dimmer lighting, other test groups were made to think their lighting had been changed as well. In actuality, these control groups worked within unchanged environments. Researchers anticipated that brighter lighting


would result in an increase in worker productivity. However, the results were unexpected as worker productivity increased regardless of the level of illumination. Whether in dim or bright lighting employee output increased, decreasing only when the equipment was barely visible due to lack of lighting. Roethlisberger and Dickson were unsure of the reason that the altered level of lighting affected workers in the same way, regardless of the change. Creating further confusion, the control groups showed higher levels of productivity as well, despite experiencing no environmental changes. Researchers hypothesized that the change in productivity was related to factors other than illumination.

Looking beyond the factor of illumination, researchers attributed the increased output to the extra attention received by the workers, a human factor. The workers participating in the illumination experiment showed higher output levels when partaking in the experiment, regardless of environmental changes. Researchers recognized that human factors, such as supervision, were the cause of increased worker productivity, referring to the phenomenon as the Hawthorne effect. Although this phenomenon most likely existed prior to the Hawthorne experiments, these experiments provided the first formal evidence of the behavioral occurrence.

The Illumination experiments were intended to determine the effects of workplace lighting on employee productivity. However, Roethlisberger and Dickson concluded that the illumination experiments “failed to answer the specific question of the relation between illumination and efficiency” as worker efficiency and output increased because of supervision,

not altered lighting.\textsuperscript{8} However, the Illumination experiments provided “great stimulus for more research in the field of human relations.”\textsuperscript{9} Moreover, the discovery the Hawthorne effect continues to play an important role in human relations and industrial psychology as managers continue to develop their skills and strategies to increase worker productivity.

The unanticipated results of the Illumination experiments led to further experimentation at the Hawthorne plant. It is at this point that Elton Mayo joined the research team, redefining and expanding the Illumination experiments. Mayo, along with Roethlisberger and Dickson, developed a unique study of physical factors responsible for fatigue and monotony. The researchers chose fatigue and monotony because they were, and still are, common problems experienced by factory workers that affect worker productivity. Hoping to determine the extent to which physical factors affect employee output, the researchers created a series of tests related to the work required on an assembly line. Developed as a response to the results of the Illumination experiments, this research phase became known as the Relay Assembly Test Room and was led by Elton Mayo, with the assistance of Roethlisberger and Dickson. From April 1927 to June 1932, Mayo and his research team ran extensive tests in which quantitative data was collected in twenty four different “experimental periods” of varying lengths.\textsuperscript{10}

An expert in the disciplines of anthropology, psychology, and physiology, Mayo “believed that unlocking the psyche of the worker was key to understanding industrial unrest”

\textsuperscript{9} \textit{Ibid.}
\textsuperscript{10} \textit{Ibid.} 455.
and thereby understanding how to improve employee output. 11 Mayo was concerned with the effects of work breaks and monotonous motions on worker efficiency. Thus, Mayo developed the Relay Assembly Test Room experiments, recording the change in worker productivity as a result of changes in environment. This phase of the Hawthorne experiments focused on five young female employees who worked on the assembly line at the Cicero Western Electric plant. The researchers initially collected production data from the five workers within their normal work environment on the plant floor. In this case the work environment referred to the surrounding plant floor, coworkers, and supervisors. The five female workers were then separated from the factory itself and placed in a detached work room where researchers tracked their productivity. Output records were taken from each member of the test group before and after isolation in order to track any increases or decreases as a result of the changes in environment.

While the isolated room provided an initial environmental change, the workers showed no dramatic increase in productivity after their seclusion. However, the remote location played another important role in the Relay Assembly Test Room experiment as Mayo was able to manipulate the environment of the five workers. In this way, Mayo altered the experimental factors, testing for increased worker efficiency under different environmental and managerial situations. The different environments included the large factory room and the small test room, while management varied by the level of observation, the attitude and interaction of managers, and the amount of discipline received by workers. Within the isolated work room, researchers
introduced various environmental changes to the five female workers over twenty four test periods of varying length.

Moreover, in the article “Was There a Hawthorne Effect?” Stephen Jones explains the main experimental changes in the Hawthorne Relay Assembly Test Room. He states that the “changes relative to the regular department include a smaller room, more uniform lighting, fans for use in summer, one layout operator for five women rather than for six or seven, a new chute mechanism, fewer relay types to assemble (in general), a new repairs procedure, a test room observer who [took over some of the supervisory functions], periodic physical examinations, and the freedom to talk more freely while working.”

The female employees experienced various combinations of experimental changes listed above throughout the six year experiment, with testing periods lasting between three and thirty weeks. Similar to the Illumination experiments, the change in environment did not correlate with the change in output. In the beginning periods of the Relay Assembly Test Room experiment, workers continued at the same pace regardless of their environment. Furthermore, it appeared as though the environmental variables had no direct impact on worker productivity. However, researchers recorded an increase in output as the workers and supervisors worked together for extended periods of time. Researches theorized that the productivity of employees increased as they became a cohesive group. As the group unified, the efficiency of each worker increased.

This small group influence on employee output remains an important discovery with regards to managerial supervision and worker productivity.

Factors other than the experimental variables affected the efficiency of the Hawthorne employees. Despite various changes, worker productivity increased only after the passage of sufficient time. Since the workers continued performing the same tasks, researchers ruled out the explanation of learning curve as a cause for the increase in output. However, at the conclusion of the Relay Assembly Test Room experiments, Mayo observed that worker productivity increased as group cohesiveness developed.\(^\text{14}\) As the conditions of work gradually relaxed, the five females showed a dramatic increase in their productivity. Although Mayo was unable to determine the specific factors that caused the shift in productivity, it became apparent that under certain conditions workers increased their efficiency. This was a crucial discovery as researchers and managers initially believed environmental factors and changes were the cause of increased output.

By combining the findings of the Illumination experiments with his own discoveries, Mayo concluded that the data from the Hawthorne experiments supports the importance of positive employee attitudes and human relations. When receiving attention within the Illumination and Relay Assembly Test Room experiments, the altered human factors (e.g. managerial observation and discipline) led to a change in employee output. Ironically, the evidence regarding the original objectives of Mayo’s experiment, fatigue and monotony, was indecisive. Without adequate findings regarding the physical factors, a series of four derivative

experiments were developed. Although the original objective of the first phase of the Hawthorne experiments focused on the relationship between environment and output, the derivative experiments provided further insight into the specific factors affecting productivity. These experiments expanded on the original Illumination and Relay Assembly Test Room experiments, providing research regarding small group incentive pay, rest pauses, management relations, worker satisfaction, and social relations. By developing experiments that addressed each physical factor specifically, Mayo was able to track the effects of each factor on worker productivity. However, most analysis and criticism focused on the experiments of the first phase.

While providing additional insight into the worker’s environment, the derivative experiments are not directly related to the discovery of the Hawthorne effect and its managerial applications. Characterized by this increase in output, the Hawthorne effect is explained by phase one of the Hawthorne experiments through the Illumination and Relay Assembly Test Room experiments. Furthermore, the data collected from the Relay Assembly Test Room experiments provides additional insight into the productivity of work groups as a unit. Therefore, this thesis focuses on the first portion of the Mayo’s experiments, referring to the Illumination and Relay Assembly portions, as the ‘Hawthorne experiments.’

While the findings of the Hawthorne experiments are supported by various research, criticisms have developed over the years. One criticism of the use of the Hawthorne effect and experiments revolves around the argument that the results of the Hawthorne experiments cannot be applied to other factory or business situations. Critics argue that the results are specific to the factory in which the experiments were conducted and to the Hawthorne Works’ environment,
managers, workers, etc. With different workers, managers, plant sizes, occupational responsibilities, human relations, and additional factors, the critics suggest that the findings cannot be applied within different work environments. Critics of the Hawthorne effect suggest that additional experiments should be conducted in different environments before establishing conclusive results in order to ensure that the Hawthorne effect and related applications are applicable in various environments. However, while researchers would have benefited from conducting parallel experiments at different plants, the use of a single plant does not discredit the findings of the Hawthorne experiments. Instead, critics should take into account that the results of similar experiments and situations may vary.

Jones elaborates on the usefulness of the Hawthorne experiments, claiming that the “potential merit of field experiments over laboratory experiments is that the former can avoid or minimize artificiality and thereby overcome the problem of generalizing from the laboratory to real-life situations.”\(^\text{15}\) Therefore, while the Hawthorne experiments highlight the findings of one specific plant, the natural setting provides results that are more applicable than lab experiments. Lab experiments are run out of context and in highly controlled settings, making it nearly impossible to effectively relate the laboratory findings to real world situations and environments. Researchers avoided this generalization process by conducting the experiments in an authentic environment. This allows the results of the Hawthorne experiments to be applied to other factory settings more effectively, despite existing criticism.

A second criticism of the Hawthorne effect exists as opponents argue the validity of the Hawthorne experiments. Validity refers to whether a test or experiment measures what it intends to measure. While the Hawthorne experimenters intended to measure the effects of lighting on worker productivity, the initial results led researchers to alter the experiments to test for new outcomes. Thus, critics question the validity as researchers potentially used data out of context. As a result of the conclusions drawn after the Illumination experiments, many critics argue that the Hawthorne experiments have low validity. However, the Illumination experiments did demonstrate that worker productivity increased regardless of the change in environment (lighting) which was the initial intention of the experiment. In order to provide an explanation for the phenomenon observed researchers credited human factors. These factors, namely variables relating to managerial supervision, were not original experimental variables. Yet researchers theorized that human factors led to the increase in worker productivity. In order to support their new theories, researchers then developed the Relay Assembly Test Room experiments. Therefore, the Illumination experiments maintain their validity and provided a foundation for the Relay Assembly Test Room experiments, which also maintain validity as the Relay Assembly Test Room experiments tested for the intended variables.

Similar to the concerns about low validity, researchers question the reliability of the experiments. This criticism of the Hawthorne experiments developed more recently with advances in statistics. Reliability is crucial to an experiment as it determines whether the data is free from error and can be replicated over hundreds of trials and in multiple situations. The same, or a similar, experiment should receive the same results. However, the Relay Assembly Test Room experiments recorded the output of five female workers, a statistically insignificant
number. Modern statistics require a minimum of 40 subjects as well as the use of control groups and rigorous experimental controls in order to maintain reliability. The Relay Assembly Test Room experiments tracked the productivity of the five workers before moving to the test room and within the test room. In this way, this phase of the Hawthorne experiments acted almost as a case study for each of the five subjects. The data collected before the switch to the test room could be considered ‘control’ data while the data from within the test room could then be considered ‘experimental.’ Because of small test group and limited data, the reliability of the Hawthorne experiments is questionable. This resulted in significant doubt within current writings as the original findings are based on weak evidence.

Additionally, the lack of control groups throughout the Relay Assembly Test Room experiments has led to further skepticism. Instead of creating separate control groups, researchers devised individual case studies in which the five female workers were observed before and after the change in environment from factory floor to the separate room. By tracking the women before and after the variations, the initial data received from the women within the factory functions as the control group. Furthermore, by executing the experiments as case studies, researchers were able to attribute the environmental changes to the change in individual performance as the women experienced both environments. While this resulted in the experiment being conducted with no conventional control group, researchers were able to track individual changes, which was highly beneficial. The case study methods employed by the researchers at the Hawthorne plant offer valid data despite the lack of control groups.

Critics also highlight the failure of Mayo, Roethlisberger, and Dickson to scrutinize the data of the Hawthorne experiments. With limited statistical analysis and no systematic study of
the evidence, many critics argue that there is little confirmation of the existence of the Hawthorne effect. Mayo, Roethlisberger, and Dickson drew conclusions based on limited analysis. The researchers used observations and raw data that were not analyzed statistically as the researchers lacked modern analytical tools to properly examine the data. However, this does not discredit the data or findings of the Hawthorne experiments but, rather suggests a need to further analyze the original data. Since the experiments, scientists and scholars have conducted further statistical analysis of the data using modern regression techniques that are discussed in the following literary section.

Despite various critiques, the Hawthorne experiments offer valuable insight into the productivity of workers within changing environments. The experiments provided crucial findings regarding the increase in employee output as environmental and managerial procedures varied. Throughout the Illumination and Relay Assembly Test Room experiments, researchers determined the effects of lighting, social changes, and managerial changes on employee output. The results of the experiments illustrated the importance of managerial supervision, managerial discipline, relaxed environments, and social cohesion throughout the workplace. Furthermore, Roethlisberger, Dickson, and Mayo also “provide a basis for most current studies in human relations as well as for subareas such as participation, organizational development, leadership, motivation, and even organizational design.”16 Most significantly, the Hawthorne experiments produced the psychological phenomenon of the Hawthorne effect. The idea that workers increase their productivity when under supervision remains an important concept within the

workplace and has various modern day applications developed in the following sections. While additional research is necessary in order to determine the entirety of the advantages of the Hawthorne effect, the applications developed from the original results and literary analyses will increase worker efficiency, thus benefiting business and organizations today.
**Literature Reviews**

*Introduction*

The Hawthorne experiments and resulting conclusion have been analyzed and critiqued heavily throughout the past eight decades since their completion in 1933. In order to fully understand the original experiments as well as the possible real-world applications, it is crucial to research, read, and analyze the critiques of other experts. This section provides an overview of the literature relating to the Hawthorne effect and experiments. The literature review section includes informative, supportive, and controversial articles, beginning with an article that maintains a neutral position with regards to the debated validity of the Hawthorne effect. In this first review written in 1985, Jeffrey Sonnenfeld’s provides a unique contribution to the topic through his inclusion of interviews conducted with participants in the Relay Assembly Test Room experiments. The following section analyzes an article that inaccurately refutes the original findings of the Hawthorne experiments. Written by Richard H. Franke & James D. Kaul and published in 1978, the authors provide the first statistical analysis, thinking that their data disproved Mayo’s original conclusions regarding the Hawthorne effect. The final section by Milton Bloombaum in 1983, was written in favor of the Hawthorne effect and challenges Franke and Kaul’s analysis and conclusions.

By gathering information, analyses, and opinions from different authors of varying areas of expertise, it is possible to better understand the Hawthorne experiments and the corresponding Hawthorne effect. Although the articles appear dated, each article reviews and analyzes the Hawthorne Experiments and their existing data, which has not changed over the years. Additionally, no attempt to replicate the experiment has been made, allowing us to utilize these
scholarly reviews of the experiments although written years ago. Thus, the literature review section, along with the previous ‘Hawthorne experiments’ section, provides a foundation for the final portion of the paper in which contemporary business applications are developed from previous research, modern developments, observations, and interviews.
“Shedding Light on the Hawthorne Studies”

Jeffrey A. Sonnenfeld

The beginning of Jeffrey A. Sonnenfeld’s writing, published in The Journal of Occupational Behavior in 1985, parallels most other articles written on the Hawthorne experiments. He immediately provides substantial background information as discussed in the preparatory ‘Hawthorne experiments’ section of this thesis. Sonnenfeld and other researchers begin this way in order to ensure that the reader has a detailed understanding of the Hawthorne experiments. Conducted 80 years ago, most people are unaware of the experiments, results, and modern examples of the Hawthorne effect. Therefore, researchers must include a concise, but detailed description of the experiment, design, and results. Sonnenfeld adheres to this framework, beginning his article by explaining the phases of the Hawthorne experiments, which include the Illumination experiments and the Relay Assembly Test Room experiments. He also briefly discusses the derivative experiments that followed in order to “check for other possible explanations of improvements in productivity.”\(^\text{17}\) After introducing the phases of the experiments, Sonnenfeld focuses specifically on the Relay Assembly Test Room experiments which had a purpose of demonstrating “the importance of employee attitudes and pre-occupations” within small group situations.\(^\text{18}\) While the Illumination experiments were the basis for the theory of the Hawthorne effect, Sonnenfeld focuses on these experiments because they have had the greatest impact on management and future research.


\(^{18}\) Ibid. 113.
After introducing the Hawthorne experiments, Sonnenfeld includes a section that addresses the “critics” of the Hawthorne experiments as well as a counteractive section addressing the “defenders.” Sonnenfeld discusses the opinions of two groups of evaluators: ideological and methodological. Ideological defenders and critics base their claims on a set of aims or ideas while methodological defenders and critics base their claims on the methods employed. The ideological critics suggest that the experiments inadequately represent society. They support their claim through the assertion that the experiments smooth over the conflict of interest that separates managers and workers; Sonnenfeld clarifies this conflict of interest, explaining that while employees desire higher pay, managers realize that less pay results in a greater profit.\(^{19}\) However, within the Hawthorne experiments the interest of managers, workers, and researchers was to further experimentation and findings regarding management, reducing conflict of interest. Conversely, Sonnenfeld notes that ideological defenders maintain that the experiments did not ignore conflict but, instead, “looked at the employee’s existing social relations within the plant: the social organization of the group with which he worked and his position in that group.”\(^{20}\) In this way, Sonnenfeld addresses possible conflict while asserting that the remaining conflict does not discredit the experiments and their findings. While controversy exists regarding the ideology of the Hawthorne experiments, sufficient defense secures the validity results of the Hawthorne experiments.

Sonnenfeld continues on to describe the methodological critics and defenders. Limited criticism regarding the experimental design of the Hawthorne experiments exists and revolves


\(^{20}\) Ibid. 116.
around the procedures implemented by Mayo and his research team. The Relay Assembly Test Room experiments lacked proper sample size, sufficient controls, and other constants such as pay and participants. The Relay Assembly Test Room experiments monitored the productivity of five employees; however, modern statistical procedures require a minimum of 40 subjects in order to ensure statistical accuracy. Although today’s statistical procedures are much more rigorous, the techniques implemented by Mayo were adequate for the 1930s. The majority of criticism was developed within the 1980s as experimental design and controls became increasingly important. Because of this, methodological defenders assert that the conclusions drawn from the Hawthorne experiments serve a purpose as the “reports of the Hawthorne studies are presented in a fashion which is intended to generate hypotheses rather than to test and refute a theory.”  

Furthermore, while critics claim that the learning curve increases a worker’s performance, methodological defenders maintain that Roethlisberger and Dickson acknowledged this factor since the processes under observation were older, well tested processes. Because the employees continued to execute the same tasks as they had done since they started working for the electric plant, no learning curve existed. Therefore, any change in worker productivity could not be attributed to a learning curve.

While many articles take a stance supporting or opposing the reliability of the experiments’ conclusions, Sonnenfeld remains neutral. He enhances general knowledge of the experiments by offering an informative analysis. Additionally, he provides controversial and supportive opinions of the Hawthorne experiments in order to reiterate the main arguments.

surrounding the experiments. However, he ventures away from the typical framework by providing a unique perspective of the Hawthorne experiments through the reflections of the individual workers. In his final section, Sonnenfeld addresses the interviews of the Relay Assembly Test Room experiment participants, including the opinions of employees and supervisors.

Decades after the completion of the Hawthorne experiments, researchers conducted interviews with participants in order to gain a better insight into the experiments by collecting the opinions and reflections of the Relay Assembly Test Rooms. Although the increase in productivity within the Relay Assembly test room is often attributed to the Hawthorne effect, the purpose of the experiments was to determine which variables caused changes in output, aside from ‘participating in an experiment.’ In order to determine the affects of small group work, relaxed work environments, and changes in managerial discipline, Sonnenfeld includes interviews of the original Relay Assembly Test Worker subjects in his writing. The female workers and one manager give personal statements regarding their feelings and opinions of the test room. By gathering subjective, personal data instead of numerical data (hours worked and worker output), researchers wanted to analyze the workers’ change in productivity from a behavioral perspective. Three of the participants, as well as their direct manager, were interviewed in the spring of 1979, offering new insight into the Relay Assembly Test Room experiments.22

Sonnenfeld discusses the various differences between their original surroundings and the Relay Assembly test room environment, as noted by the interviewees. The interviewees described the differences, mentioning altered managerial styles, the formation of friendships, a more relaxed environment, and other social factors.\textsuperscript{23} Sonnenfeld notes that the first factor, managerial style, reflects how the managers treated the five female workers differently within the test room. While the original floor supervisors were consistently mean to the employees, the manager within the test room treated the workers more politely; the workers noticed the change, describing it as a “different sort of supervision.”\textsuperscript{24} Sonnenfeld suggests that the workers increase in output might have resulted from the employees being under the control of a pleasant manager. In many cases, workers who are fond of the authority figure will work more productively out of mutual respect and the desire to please their boss. Another possible cause of increased productivity with regards to the managerial changes stems from the workers’ desires to remain a part of the experiment, thus avoiding returning to the plant floor and the ruthless supervisor. These are the primary ways in which the change in managerial behavior was thought to have affected the productivity of the workers.

The second feature of the Relay Assembly Test Room that influenced the workers was the relaxed environment. While working on the plant floor the women felt pressured by the supervisor and their coworkers to produce at a group norm.\textsuperscript{25} However, within the Relay Assembly Test Room, the subjects found themselves under less pressure to perform at their

\textsuperscript{23} Ibid. 122-4.
\textsuperscript{24} Ibid. 124.
highest potential. Therefore, without the pressures of authoritarian managers and daily work pressures, the five employees participating in the Relay Assembly Test Room experiments started to enjoy work. Sonnenfeld notes that researchers credit a portion of the increase in worker productivity to the human factor of relaxed work environment.

The next feature mentioned by the participants was the formation of friendships within the Relay Assembly Test Room. The interviewers recall that they all became close, forming friendships that extended outside of the plant. One interviewee recalls visiting one another’s house for dinner on a weekly schedule. This intimate social element resulted in a more comfortable and stress-free environment that eventually led to an additional increase in productivity. Other social factors included the ability to converse amongst co-workers and managers alike, as well as sharing in laughter regularly.26

Sonnenfeld takes great care in highlighting the changes in managerial behaviors and social environment. He states that researchers “assumed a social-psychological perspective and used social anthropological insights to better understand sociological phenomena.”27 In this way, Sonnenfeld provides a unique, but critical, evaluation of the Hawthorne experiments. He notes that while researchers raised questions regarding employee motivation, effective leadership, worker participation, decision-making, job satisfaction, resistance to change, and group norms, the Relay Assembly Test Room experiments raised additional questions regarding social psychological and sociological phenomenon.28 He concludes by asserting that additional

26. Ibid. 126.
27. Ibid.
research is necessary in order to provide statistically reliable data, complementary results, and modern applications. Overall, Sonnenfeld’s article provides an insightful overview of the Hawthorne experiments while also offering interview responses that provide additional insight into the experiments. Conversely, many articles, such as the following, critique the experiments and related conclusions while attempting to refute the original findings.
“The Hawthorne Experiments: First Statistical Interpretation”

Richard H. Franke & James D. Kaul

Throughout their article published in the *American Sociological Association* in 1978, Richard Herbert Franke and James D. Kaul statistically interpret the data of the Hawthorne Experiments for the first time. While Mayo, Roethlisberger, and Dickson collected extensive data throughout the Hawthorne Experiments, the three experts based their analyses on simple observations and minimal numerical examination. Thus, Franke and Kaul provide the first statistical analysis of the experiments, calculating regressions for a variety of variables. Their analytical procedures and results make the Relay Assembly Test Room data more accessible to other researchers. However, after performing numerous statistical analyses, Franke and Kaul determined that the numerical evidence from the Relay Assembly Test Room experiments does not provide evidence supporting Mayo’s Hawthorne effect.

Instead, the two authors claim that experimental variables account for most of the variance in the output. Franke and Kaul elaborate on this assertion, repetitively stating that the variables of the “imposition of managerial discipline, economic adversity, and quality of raw materials” are the causes of the increase in worker productivity. In this way, the authors suggest that the humanitarian factors of experimental participation and being under observation are not supported by the data. Thus, the statistical analysis fails to support the theory of the Hawthorne effect. Moreover, Franke and Kaul propose that managerial discipline explains the majority of variance in worker output, reiterating that “the exercise of managerial discipline

seems to have been the major factor in increased rates of output for the now altered group."30 In this way, the authors question the linkage between human relations and worker productivity for which Mayo’s Relay Assembly Test Room experiments tested. Furthermore, while previous researchers believed that participative treatment led to better productivity and efficiency, Franke and Kaul provide statistical analysis that suggests that humanitarian procedures are not the cause of increased worker productivity.

However, while Franke and Kaul provide complex statistical analysis of the Hawthorne experiments’ data, their results are questionable for various reasons. The first cause for concern regarding the data analysis of Franke and Kaul comes from the lack of rigorous mathematical approaches. Franke and Kaul performed their statistical analysis in the mid-1970s, using what was then considered ‘modern’ approaches. However, in the late 1980s and early 1990s, a mathematical reform took place, resulting in more reliable methods of statistical analysis.31 Because these methods were unavailable to Franke and Kaul, the two researchers were forced to use less reliable, inaccurate forms statistical approaches that have since been replaced. While one original criticism of Mayo and his researchers was their lack of mathematical analysis, a similar criticism applies to Franke and Kaul as they utilized unsophisticated statistical methods. The advances in the field of statistics after the publication of the article raise questions regarding the reliability of the statistical analysis performed by Franke and Kaul. Published in 1978, the

two had no access to the more accurate statistical methods developed soon after the publication of their article. Thus, the authors base their interpretation of the Hawthorne data on out-of-date statistical methods. It is crucial to note that the suggestions offered by Franke and Kaul are based on inaccurate statistical analysis, making the criticisms of these two researchers less reliable.

Additional criticism exists regarding Franke and Kaul’s claims apart from their unsophisticated statistical methods. While the authors suggest that the data of the Hawthorne experiments does not support the theory of the Hawthorne effect, the authors inaccurately use the Relay Assembly Test Room experiments to disprove conclusions that were based on separate, previously conducted experiments. While the Relay Assembly Test Room experiments provide insight into the cohesion of small groups and individual performance within groups, the Hawthorne effect was discovered and theorized during the Illumination experiments. Throughout the Illumination experiments, researchers recognized that human factors, such as supervision, were the cause of increased worker productivity. Thus, the results of the Illumination experiments resulted in the discovery of the phenomenon known as the Hawthorne effect. The Relay Assembly Test Room experiments followed the Illumination experiments in order to develop experiments that would provide further research on additional variables that might account for variation in a worker’s output. However, it is from this set of unrelated data that Franke and Kaul attempted to disprove the Hawthorne effect.

Although their statistical analysis appears to disprove the existence of the Hawthorne effect, the data Franke and Kaul used was collected during an unrelated experiment. The authors support their assertion that the Hawthorne effect is not a phenomenon caused by human factors
such as supervision, focusing on the data collected throughout the duration of the Relay Assembly Test Room experiments. However, Franke and Kaul’s conclusions are incorrect because the authors use data from unrelated experiments in order to challenge the findings of the previously conducted Illumination experiments. The authors inaccurately suggest that the data from the Relay Assembly Test Room experiments disproves the Hawthorne effect. However, the Relay Assembly Test Room experiments were designed in order to determine the effects of changes in environment on small groups, not participation within an experiment. Because the two experiments, Illumination and Relay Assembly Test Room, were developed for different purpose, it is erroneous to refute one experiment through the data of the other as Franke and Kaul attempt to do. This provides the second cause for refuting Franke and Kaul’s conclusions.

Additional evidence of the inaccuracy of Franke and Kaul’s statistical analysis stems from the lack of test subjects in the Relay Assembly Test Room experiments. Addressed earlier in this thesis, the Relay Assembly Test Room experiments focused on the productivity of five female workers in a separate work room at the Hawthorne Electric plant. However, modern rules suggest that in order to ensure statistical reliability, experiments and statistical analysis should use forty or more test subjects. While this appears to create a cause for concern regarding the original discoveries and claims of Mayo, Roethlisberger, and Dickson, the Hawthorne effect was based on the Illumination experiments which were performed prior to the Relay Assembly Test Room experiments. In contrast, Franke and Kaul performed their statistical regressions and analysis using the data from the Relay Assembly Test Room experiments and the five female participants. As this is a statistically insignificant number, this further discredits the results of
Franke and Kaul as well as their conclusion because the data collected from the five participants is unsatisfactory, jeopardizing the reliability of the data of the experiments.

The last cause for concern regarding the validity of Franke and Kaul’s analysis arises from the article’s publication within a sociological journal. Sociology is a broad field in terms of methodology and subject matter; moreover, it is devoted to knowledge about human structure through qualitative and quantitative research. Conversely, the fields of statistics and economics are much more rigorous, requiring strict regulations with regards to statistical design and analysis. Therefore, by categorizing the article within the field of sociology, Franke and Kaul impair the accuracy of their analysis. While the source of publication does not discredit Franke and Kaul’s findings, it is cause for concern and further examination of their article and its claims.

Although many criticisms of Franke and Kaul exist, their work offered great advances with regards to the modern applications of the Hawthorne experiments. While the authors spend the majority of their article providing evidence against the existence of the Hawthorne effect, Franke and Kaul eventually arrive at a conclusion similar to that of Mayo. The two researchers determined that managerial discipline was the direct cause of the majority of the variation in worker productivity throughout the Relay Assembly Test Room experiments, stating that the “exercise of managerial discipline seems to have been the major factor in increased rates of output.”

output, the authors make a profound statement with regards to managerial supervision and action. Establishing an important managerial function, Franke and Kaul suggest that managerial discipline causes an increase in worker productivity. By combining Mayo’s discoveries regarding managerial supervision with Franke and Kaul’s development of the need for managerial discipline, managers can increase the effectiveness and efficiency of their employees.

Ironically, while the authors suggest that the Hawthorne effect is fictitious, Franke and Kaul support the similar theory that managerial discipline affects workers’ productivity. The authors suggest that the way in which managers interact with their workers causes a change in output. Therefore, Franke and Kaul inadvertently support the concepts developed at Hawthorne Electric plant, simply replacing the concept of managerial observation with managerial discipline. However, the two maintain that the humanitarian approaches are not the cause of altered productivity, while disciplinary approaches increase the quantity and quality of a worker’s output. Whether inadvertently confirming the existence of the Hawthorne effect or not, Franke and Kaul offer additional support for strategic management. This managerial application requires superiors to refine their management skills in order to supervise and discipline workers in a way that results in increased output.

*Milton Bloombaum*

Providing unintentional support for the Hawthorne experiments, Milton Bloombaum contests Richard Herbert Franke and James D. Kaul throughout his article “The Hawthorne Experiments: A Critique and Reinterpretation of the First Statistical Analysis by Franke and Kaul.” The majority of Bloombaum’s writing is a critique of Franke and Kaul’s statistical analysis and their conclusions drawn from their mathematical investigation. Bloombaum points out numerous flaws in the authors’ arguments, asserting that the statistical analysis offered by Franke and Kaul does not disprove the discoveries of the Hawthorne experiments.

Bloombaum concludes his writing without supporting or refuting the Hawthorne effect. His writing simply rejects the conclusions of Franke and Kaul. Initially, Bloombaum credits Franke and Kaul with having “(1) assembled the necessary data in order to perform their analyses, (2) made these data available to others for inspection and further analyses, and (3) specifically invited such reanalyses.”

Although, he notes that Franke and Kaul provided great resources of statistical analysis for future researchers, Bloombaum also reiterates that the authors arrived at inaccurate conclusions.

Bloombaum reminds the reader that the test factor for the Relay Assembly Test Room experiments was managerial discipline. The first seven weeks of the Relay Assembly Test Room experiments were conducted under the same level of managerial discipline as the workers

received on the plant floor. Throughout the following sixteen weeks (weeks eight through twenty-four), researchers increased the level of managerial discipline within the Relay Assembly Test Rooms. Bloombaum continues to discuss that statistical analysis provided by Franke and Kaul. Their analysis allows for mathematical comparisons of the productivity of workers during the two sections: without additional managerial discipline and with additional managerial discipline. Researchers hypothesized that the workers would increase their productivity dramatically with the implementation of managerial discipline in the second phase of the Relay Assembly Test Room experiments. Likewise, Bloombaum arrives at the same assumption, explaining that researchers

“would expect a very high positive correlation between hourly and weekly output, and that is what we get in the partial correlation of .973 based on the first seven time periods. The partial correlation for the remaining sixteen time periods differs substantially not only by size but by sign as well (r= -.356).”

Although researchers expected a change in correlation, the results shifted unexpectedly. While experts in the field of statistics expected to see an increase in positive correlation after the implementation of additional managerial discipline, the correlation was lower and negative. However, Franke and Kaul failed to explain the dramatic shift in correlation, assuming that the implementation of managerial discipline is the cause of the shift and ignoring other possible factors.

Conversely, Bloombaum asserts that this change in correlation deserves further analysis, asking, “How can it be that weekly and hourly output are negatively related in the second set of times periods?” While the correlation was expected to change slightly with the implementation of managerial discipline, Bloombaum points out that the drastic change, along with the change in sign from positive to negative, is substantial. This is an important point because it demonstrates that the statistical analysis might not provide adequate information for researchers on which to base conclusions. As mentioned before, Franke and Kaul performed their statistical analysis prior to the development of modern statistical techniques, which might have contributed to the large difference between correlations.

While Franke and Kaul avoid examining the erratic correlations throughout their writing, Bloombaum addresses the potential causes for the changing numbers. He recalls that the original Hawthorne investigators determined that workers controlled their outputs in order to maintain an acceptable norm. Along with co-workers, employees change their productivity in order to match the group standard. In this way, workers do not have to work harder than their colleagues while maintaining equal reputations with regards to individual productivity. However, if this is the case, worker productivity might have changed because of the workers’ choice to increase their output. Managerial discipline would not be a primary cause of the change in productivity in this situation as the workers might easily control the pace of the group. This is the first major criticism that Bloombaum discusses with regards to Franke and Kaul’s work as the two critics

37. Ibid. 75.
fail to discuss the potential causes for the change in correlation between managerial discipline and worker productivity.

Apart from the correlation critique, Bloombaum suggests that the relationships Franke and Kaul discovered between dependent and independent variables affecting worker productivity interest researchers most. However, Franke and Kaul include irrelevant variables in their correlations, such as the length of time of the observation periods. Bloombaum states, “It appears nonsensical that the duration of observation periods would be meaningful as an experimental variable,” as the length of an observation period is not one of the factors that concerned researchers during the Relay Assembly Test Room experiments.38 While Franke and Kaul base their conclusions on all of the variables, including the illogical variables like length of observation period, Bloombaum suggests that the conclusions of the Relay Assembly Test Room experiments should be drawn based on the most important variables, which focus on managerial discipline.

Finally, Bloombaum discusses the final and most startling comparison between independent and dependent variables. He states that there is a dramatic reversal between “the [correlation of] -.878 between net hours per week and weekly output during periods 1-7, versus the .920 between the same two variables during periods 8-23.”39 Similar to his first criticism, Bloombaum indicates that this is an irrationally large change in correlation from -.878 to .920. He continues on to question whether this is “the primary evidence on which rests the conclusion

39. Ibid. 76.
that the exercise of managerial discipline beginning at period 8 accounts for increased worker productivity."  In other words, Bloombaum doubts that the statistical analyses performed by Franke and Kaul supported their conclusion that managerial discipline is the primary cause of increased worker productivity. Furthermore, Bloombaum reiterates his previous point supported by original investigators: that workers control their own output in order to adhere to norms. In this way, Bloombaum stresses that Franke and Kaul cannot assume managerial discipline to be the cause for the relationship between weekly output and net hours per week between the two phases of the experiment (Weeks 1-7 and 8-23).

Bloombaum concludes by claiming that “the question of interpretation must be answered in terms of selecting the most convincing theoretical rationale, not, apparently, on the statistical results themselves.”  Because of confounding data, Bloombaum does not trust Franke and Kaul’s statistical analyses or their conclusions based on the data. However, Bloombaum remains aware of the importance of the Hawthorne experiments and the future implications of such research. Therefore, despite the inaccurate correlations of Franke and Kaul based on the data of the Relay Assembly Test Room experiments, he suggests that readers, researchers, and managers might still use the Hawthorne experiments as a basis for theoretical developments.


47. Ibid. 87.
Conclusion of Literary Analysis Section

With limited literature concerning the Hawthorne experiments, the three articles reviewed in this section cover the majority of support and criticism regarding the experiments. After providing a neutral overview of the experiments, Sonnenfeld arrives at the conclusion that there is “substantial evidence in the published reports, observers’ records, secondary statistical analysis, and recent first-hand interviews with some of the actual study participants to strongly endorse the findings of the original study.”42 In this way, he supports the initial findings of the experiments, claiming that the records, secondary analysis, and interviews maintain that the Hawthorne experiments are dependable. Conversely, Franke and Kaul criticize the experiments’ statistical reliability. Although Franke and Kaul doubt certain portions of the experiments, they simultaneously acknowledge the managerial implications developed throughout the different phases. Although more research is necessary, the two critics determine that managerial discipline has a direct impact on employee productivity. The last literature review highlights Bloombaum’s analysis of Franke and Kaul’s critic of the experiments. This review provides an important point of view as it is crucial to remember that not all critiques are reliable or accurate. Through the literature reviews, it is possible to gain a better understanding of the Hawthorne experiments and past uses of the data. Despite various critiques of the Hawthorne experiments, including the three aforementioned articles, the overall applications of the Hawthorne experiments are undeniable. The Hawthorne effect, managerial supervision, and other factors are all direct results of the Hawthorne experiments. Apart from the applications of the Hawthorne

effect and managerial supervision, the Hawthorne experiments also provided evidence of the benefits of small group work and relaxed work environments. Sonnenfeld, Franke and Kaul, and Bloombaum discussed these applications, critiquing and supporting different concepts. After reviewing literature it is apparent that the findings of the experiments also benefit managers today. However, in order to do this it is necessary to develop modern applications and future research, both of which are discussed in the following sections.
Application Today

The Hawthorne Experiments and their Modern Applications

Although the Hawthorne experiments were conducted over seventy five years ago, the modern applications of the experiments, theories, and results are crucial to successful business management. The Hawthorne experiments provide insight and guidance for managers and business owners in the areas of managerial supervision, managerial discipline, the use of small groups, and relaxed work environments. However, the experiments, results, and related theories are not common knowledge amongst managers. In a sample of 227 subject-related books, only 42 books included the Hawthorne effect. This surprisingly low number, only twenty one percent, further demonstrates the lack of awareness of the potential benefits of the Hawthorne effect. Despite the numerous modern applications of the Hawthorne effect, managers remain unaware of the contemporary uses of the Hawthorne experiments.

Apart from being unaware of the Hawthorne effect and its uses, recent changes in organizational structure have altered the responsibilities of managers. With an increase in organizational flattening, self-managed teams, and work delegation, employees become increasingly empowered. This leads to less direct contact between managers and their employees. Flatter organizations eliminate the excessive job statuses that divide employees, lower-level management, upper-level management, and executives. Employers receive less direct management as there are fewer managers above each worker. Additionally, by employing

the strategies of self-managed teams and delegation, managers transfer responsibility to workers. Again, this reduces the need for managerial interaction with employees, often leading to less attention given to workers. However, despite a decreased necessity of interaction, managerial supervision continues to play a strategic role when considering employee productivity. Furthermore, with less direct management, it has become increasingly important to improve the techniques used by managers in order to ensure effective interactions with employees, thus increasing the output of workers.

With a primary goal of achieving the highest level of efficiency possible, businesses and organizations benefit from expert management. The following section applies the results of the Hawthorne experiments to four related areas of interest with regards to the management of workers: managerial supervision, managerial discipline, small work groups, and relaxed work environments. By improving the techniques used by their managers, these groups can increase worker productivity, which directly benefits the business or organization. By making managers more aware of the Hawthorne experiments, the Hawthorne effect, and the modern managerial applications, organizations can improve worker productivity. Furthermore, this section works to apply the historic experiments and their results to the modern business atmosphere, providing managers with specific strategies and techniques that work to improve employee productivity. The approaches discussed throughout this section reflect the work of Elton Mayo, Fritz J. Roethlisberger, and William J. Dickson throughout the Hawthorne experiments. Additionally, this application section expands on the results of the Illumination experiments and the Relay Assembly Test Room experiments to provide strategies and techniques that are applicable throughout business management fields today.
Technique I: The Hawthorne Experiments and Managerial Supervision Applications

The most well known development of the Hawthorne experiments remains the Hawthorne effect and the related implications of worker observation. In his article “The Good Manager—A Moral Manager” published in the Journal of Business Ethics, Per Sundman explains that establishing proper management is necessary in all organizations. He elaborates, stating that employees benefit greatly “if the role of a manager is performed with excellence.” This statement is reflected in the Hawthorne experiments as effective management resulted in increased worker productivity and higher employee satisfaction. One way in which managers can work to increase employee efficiency is by improving their observation methods. Proper observation of employees by managers leads to increased worker output as workers alter their behavior when receiving attention.

Additionally, Tom Peters and Robert Waterman explain the primary message of the Hawthorne experiments in their book titled In Search of Excellence: Lessons from America’s Best-Run Companies. The two authors suggest that the main discovery of the research conducted throughout the Illumination experiments “is that it is attention to employees, not work conditions per se, that has the dominant impact on productivity.” Although the original intention of the Illumination experiments was to determine the effects of lighting level on worker productivity, the experiments demonstrated instead that observation increases a worker’s output.

Therefore, by changing the level of attention given to employees, managers can impact the productivity of their workers.

Known as the Hawthorne effect, this phenomenon has significant modern day managerial applications. By incorporating the Hawthorne effect into daily managerial practices, managers can give employees the attention that is necessary to increase the worker’s productivity. In order to properly utilize this technique, managers must continuously alter their level of employee supervision. In this way, employees are constantly being made aware of their manager as he or she supervises regularly. The additional supervision leads to an unintentional increase in the employee’s productivity.

Managers may choose to supervise their employees through direct or indirect methods. When supervising directly, managers are physically present as the employee works. In this situation employees remain aware that they are under the direct supervision of the manager due to the physical proximity of worker and superior. However, indirect methods of supervision have become increasingly important as the contemporary workplace environments change. Contemporary work environments continue to shift away from the traditional office environment as global corporations develop and the use of telecommunications becomes increasingly popular. When implementing an indirect method of managerial supervisions, managers can monitor employees through phone calls, e-mails, teleconferencing, text messaging, video conferencing, and other modern forms of communication. In this way, managers successfully provide employees with the attention necessary to increase employee productivity even though not physically present.
Despite the many uses of indirect communication within the modern business environment, the Hawthorne experiments only support direct supervision, as indirect supervision was undeveloped and unnecessary at the time. However, direct supervision allows managers the opportunity to closely scrutinize their employees and provide direct feedback. One example of this is the New York based DeCrescente Distributing Co., a family run beverage distribution company. With regards to direct employee supervision by managers, Russ Teplitzky, the company’s general manager, explains that what separates DeCrescente Distributing Co. from its competition is that their company has an “owner [who is] hands-on, day-to-day.”

By remaining directly involved with their workers, the interaction of owners and managers with their employees directly impacts employee productivity. Additionally, as the DeCrescente Distributing Co. aspired to improve worker output, the company decided to improve the methods by which managers supervise their employees. As one of thousands of companies that have correctly identified managerial supervision and interaction as an influential factor directly affecting employee output, DeCrescente continues to develop its managerial techniques. Because a person’s behavior can be altered by his or her awareness of being observed, employee supervision should be a primary concern for managers.

Supported by historic and modern research and examples, it is apparent that managerial supervision is an important technique for businesses and organizations. Throughout the Illumination and Relay Assembly Test Room experiments, researchers realized “that the workers

47. Ibid.
[were] simply responding positively to attention from managers." Thus, managers can increase employee productivity today by altering the level of attention given to their employees. Although tested initially in a factory setting, this concept can be incorporated into all business environments as employees crave attention regardless of their workplace: offices, industrial plants, commercial stores, schools, and other work environments.

Furthermore, the supervision of employees allows for manager-employee interaction while regulating daily work processes. Managers following this technique will be able to easily perform their day-to-day managerial duties, simultaneously enhancing the behavior and work habits of employees. However, managers often abuse their authority and fail to supervise their employees as often as required to maintain productivity. When working within an unsupervised environment, employees tend to underachieve in place of various time wasting activities: day dreaming, surfing the internet, chatting with coworkers, and other non-work related activities. Because each individual work environment requires different, tailored management, the level of necessary supervision varies. This level depends on the individual manager, the workers, the worker environment, and the required task or work processes as well as other business related variables (work hours, time of year, etc). Nevertheless, managers must continue to supervise their employees in order to ensure proper performance. In this way employees know that their manager is aware of their behavior while simultaneously receiving the necessary attention suggested throughout the Hawthorne experiments.

While monitoring employees is essential to maintain and increase employee productivity, it can be a double edged sword. A certain amount of supervision is necessary; however,

organizations are witnessing an increasing trend toward micro-managing which is characterized by excessive supervision. Unfortunately, macro-managing is common but relatively unheard of, resulting in managerial problems that are commonly assessed incorrectly. However, micro-managing often leads to the loss of time for managers and decreased morale of employees. As managers increase their supervision, employees begin to feel as though they are performing inadequately or are not trusted by their superiors to fulfill their job requirements, both of which lead to decreased job satisfaction. Additionally, workers can be preoccupied with the extreme supervision, which adversely affects their productivity. As managers develop supervision techniques, they must achieve a desirable balance of supervision and trust, thus avoiding the consequences of micro-managing.

By altering the amount of attention paid to workers through daily supervision and managerial interaction, managers will increase the productivity of their employees. Developed from the findings of the Hawthorne experiments, business and organizations must take advantage of this technique in order to increase the output of employees without having to spend additional money. However, businesses should consider sending their managers to a training session on managerial supervision in order to perfect this technique, thus achieving the optimum level of supervisions and related employee productivity. If training programs are unavailable or undesired, managers can work to develop improved supervision methods through trial and error. Also, open communication with their employees will help managers in determining the effectiveness of their techniques, resulting in more effective methods. Overall, managers must

make a sincere effort to better their managerial observation techniques in order to achieve the
desired results of increased employee productivity.
Technique II: The Hawthorne Experiments and Managerial Discipline

While managerial observation led to an increase in employee productivity in the Illumination experiments, the imposition of managerial discipline was one variable that affected worker productivity in the Relay Assembly Test Room experiments. Franke and Kaul proposed that managerial discipline explains the majority of the change in worker output and is a major factor in the increased worker productivity. As a primary influence on worker productivity, the managerial techniques relating to discipline that are used today can be greatly improved by applying the findings of the Hawthorne experiments. Thus, modern management should work to improve existing disciplinary techniques in order to achieve higher levels of employee productivity.

Having discovered that “the exercise of managerial discipline seems to have been the major factor in increase rates of output” within the Relay Assembly Test room, the second technique offered to today’s managers is that of managerial discipline. The results of the Relay Assembly Test Room experiments analyzed by Franke and Kaul suggest that managers must be willing to discipline their employees when necessary. Through active discipline, managers can induce employees to work more effectively, thus achieving higher levels of employee efficiency. However, businesses and organizations that want to implement this technique must consider that a discipline system “is only as effective as the managers doing the discipline.” As a result, managers must be trained in order to successfully implement the technique of managerial discipline.

52. Ibid.
supervision. The article, “Organizational Punishment from the Manager's Perspective: An Exploratory Study,” written by Ken Butterfield, Linda Trevino, Kim Wade and Gail Ball and published in the June 2005 issue of the *Journal of Managerial Issues* and provides great insight into the development of disciplinary techniques and is referenced throughout the development of this technique.

When applying the following technique to the organization or business environment, it is important for managers to bear in mind that managerial discipline is a process. Therefore, it is crucial that managers follow the steps in order to successfully administer the discipline and achieve the desired result: increased employee productivity. While the Hawthorne experiments refer to managerial discipline in a non-descriptive way, this subsequent technique combines the demand for discipline offered within the results of the experiments with modern disciplinary methods in order to develop another contemporary management technique. The following five step technique requires managers to observe and record the errors of their employees, determine the severity of the employee’s mistake, develop the punishment, implement the punishment, and remain consistent in the future with regards to the disciplinary actions taken by managers. By following the steps of this technique, managers can effectively discipline their employees and increase the overall productivity of the organization, including the output of the problematic employee as well as his or her co-workers.

**STEP 1: Observation**

The initial step of the technique of managerial discipline developed from the Hawthorne experiments is to observe and record employee mistakes. In order to accurately complete this step of the technique, managers must observe their employees on a regular basis over extended
periods of time. Furthermore, managers must alternate their supervision methods between evident and discrete observation. In this way employees are not always aware that they are being watched, thus avoiding behavioral changes made when under supervision, which may temporarily disguise problematic workers. Additionally, managers can analyze production records, product repairs required, injury reports, and other documentation of employee efficiency and effectiveness. The observation phase must be lengthy enough for the manager or supervisor to collect and record sufficient data in order to provide rationalization and evidence supporting the discipline taken in the following steps. Although the observation phase of the Hawthorne experiments lasted for years, this phase may take a few weeks or months depending on the issue at hand. For example, managers often wish to act quickly upon disciplinary problems that are more severe.

**STEP 2: Determining Severity**

After collecting sufficient data regarding employee errors and mistakes, the following step is to identify the error and to classify its severity. Employees make numerous mistakes daily, which can be attributed to the fact that workers are human. However, managers must determine which mistakes break the employees’ contracts. When contracts or laws are broken, or the manager deems the behavior unethical or conflicting with the strategic plan of the organization, this indicates the need for immediate discipline. The manager must also decide on the severity of the error, as the seriousness of the employee error directly affects the level of disciplinary action necessary. Severity is often judged based on factors including the amount of money the error costs, the length of time the problem has been occurring, and the number of people affected.
STEP 3: Development of Discipline/Punishment

Throughout the following step, development of the disciplinary action, the manager must use the first two steps in order to accurately create a disciplinary plan and correct employee behavior. The disciplinary plan should be laid out in the employee handbook in order to act as a caution to the employees as well as to provide legal protection to the company. Managers must adhere to the disciplinary plan in the handbook in order to complete the punishment process fairly and to avoid legal consequences that may follow if the manager of company incorrectly and unlawfully penalizes its employees. Based on the prearranged discipline plan, managers can accurately determine the corrective steps to be taken depending on the severity of the error determined in step two.

A crucial part of the development of disciplinary action revolves around the concept of ‘severity appropriateness.’ After determining the severity of the error in step two (which is based on observation in step one), the manager must develop a punishment that matches the severity of the mistake observed. For example, if an employee arrives late to work an unacceptable number of times, management may give a verbal warning followed by a written warning before taking more serious actions. This process is often referred to as progressive discipline and implies that companies will take certain less significant disciplinary steps, such as warnings, before terminating the employee for his or her mistakes. Progressive discipline programs should be outlined in the employee handbook and explained to all new hires. In this

way, employees are aware of the steps that will be taken to discipline them if they fail to perform the occupational responsibilities at a certain caliber. Furthermore, the initial warning and subsequent disciplinary action of the manager allows the employee a chance to correct their behavior without monetary or occupational consequences. In addition, if the disciplinary action is not appropriate, employees may lose motivation, quit, or file a complaint or lawsuit, each of which adversely affects the organization financially while having negative consequences on its overall productivity. Therefore, the development of appropriate punishments is essential and requires sufficient observation and analysis of employee behavior.

**STEP 4: Implementation of Discipline**

The fourth step is the implementation of the disciplinary action. Managers must act promptly as the discipline must be timely in order for workers to associate the warning or punishment with their incorrect action. The execution of the discipline should follow the predetermined regulations found in the employee handbook and follow the error as promptly as possible while still allowing time for adequate observation of the problem. Although managers may prefer disciplining employees in confidence in order to avoid creating a scene, the overall productivity of workers often increases after witnessing the discipline of a colleague. Therefore, managers should consider that disciplining in front of the colleagues of a troublesome worker benefits the observing employees because these coworkers will learn vicariously as they observe

the others receiving discipline. However, more recent research also suggests that there are certain benefits from carrying out discipline in private whenever possible and necessary. Therefore, managers must determine which of the two discipline methods (public or private) benefit the individual workers involved as well as the overall organization most.

**STEP 5: Maintaining Consistency**

The final step of this technique to improve managerial discipline is to remain consistent. Once a process is determined that specifies the methods used for observation, determines the error and severity of the error, develops disciplinary action, and implements the punishment, it is crucial that managers adhere to the process to ensure equitable decisions. Equity refers to the fairness of the disciplinary action assigned, which should be similar to what other subordinates have received. The same errors and mistakes should result in the same disciplinary action for all employees in order to prevent resentment amongst employees and possible lawsuits that may arise from showing favoritism or implementing unreasonably severe punishments.

By mastering the five steps of this disciplinary technique, managers can increase the productivity of their employees through effective discipline. Throughout the Relay Assembly Test Room experiments researchers noted the increase in worker output as a direct result of managerial discipline. Therefore, managers must determine the most useful disciplinary plan of action in order to properly correct employee error within their organization or business. One modern way to develop this plan is by combining managerial discipline with newer forms of

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57. Ibid. 365.
58. Ibid. 367.
information technology. As organizations invest in innovative technology, managers can schedule and discipline workers more efficiently, which results in an increase in the overall productivity of employees.\(^6^0\) However, discipline programs cannot always be formalized as each work environment and situation is unique. Different problems are comprised of individual features such as types of error, the severity of certain errors, and the course of managerial action taken at each level of severity.

While experts agree, “the best way to deal with discipline issues is to prevent them,” managers must be ready and willing to confront employee mistakes through discipline.\(^6^1\) By being proactive and taking immediate corrective steps managers can reduce employee error and inefficiency. Overall, this technique utilizes the findings of the Hawthorne experiments, specifically the Relay Assembly Test Room experiments, in order to assist modern management in properly disciplining their employees. Managerial discipline is necessary when simple observation is not enough to increase employee productivity or when a problem arises that requires immediate action to correct.

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Technique III: The Hawthorne Experiments and Small-Group Social Applications

The Relay Assembly Test Room experiments were initially designed to expand on the results of the Illumination experiments and to provide further insight on the effects of the observation of superiors on worker productivity. However, these experiments also provided insight into the effects of working in small groups on employee output. Sonnenfeld mentioned that the Relay Assembly Test Room experiments looked at “the social organizations of the group with which [the employees] worked and [their] position in that group.”62 As the five female employees worked together in the Relay Assembly Test Room, their position within the social group affected their output. Furthermore, in interviews with the subjects, the workers noted that they “all became close,” forming friendships that extended outside of the plant.63 Researchers recorded an increase in the employees’ productivity, attributing the change in output to the positive daily interaction amongst coworkers and formation of friendships.

The positive effects of social groups on worker productivity have direct managerial applications within contemporary business and organizational settings. Small group work within a business or organization is the third technique that can be developed from the findings of the Hawthorne experiments and that will benefit managers and their corporations. The benefits of the implementation of working within teams can be seen in the Relay Assembly Test Room experiments. Researchers noted an increase in productivity as the workers grew into a cohesive team. However, small group work remains one undisclosed way in which managers can apply the Hawthorne experiments today.

63. Ibid. 126.
In order to successfully implement this small-group method, managers must allow their employees to work within a relationship-oriented environment. While organizations continue to divide their work environment into offices and cubicles, the results of the Relay Assembly Test Room experiments suggest that employee interaction leads to increased employee productivity. Therefore, managers who wish to increase the output of their workers should consider the Hawthorne related technique of dividing employees into small work groups. This managerial method requires employees to work alongside their colleagues, forming connections and increasing their job satisfaction through daily contact and the development of group unity. By providing their employees with the opportunity to improve job satisfaction through the development of relationships and the formation of cohesive groups, managers will increase the productivity of their workers.

Apart from developing cohesion through the relationships between co-workers, managers themselves must also make an effort to become a part of the small group. While researchers recorded an increase in output in the Relay Assembly Test Room experiments as the workers became a more cohesive group, they also noted the importance of the group’s relationship with its manager.64 As the employees grew closer to their managers through daily supervision and communication, the overall cohesion of the workers increased dramatically. Therefore, modern managerial techniques must incorporate small group dynamics with managerial supervision in order to achieve maximum productivity from workers. The interaction between co-workers

allows the employees to form friendships which results in high job satisfaction, while the
inclusion of managers within groups allows for additional cohesion amongst the workers. The
contact between workers and their manager is necessary as well because employees work to
please their superiors, or at least to not displease managers. Therefore, employees work for the
benefit of the manager, increasing their productivity to fulfill the instruction of their supervisors
if compelled. The group increases its productivity as the cohesion amongst workers and
managers develops, motivating workers through the formation of relationships and other social
factors including the innate desire to work at a standard pace and to satisfy managers.

As a result of the necessary interaction between workers and managers as seen in the
Relay Assembly Test Room experiments, managers must remain active in the day-to-day
activities of their employees. As managers apply this technique of small groups, there is an
additional benefit that comes from managers monitoring and interacting with the groups. As
managers supervise they are able to regulate the workers. Consistent management is necessary
because group work may be threatened by poor team dynamics as “an inability to work together
towards a common goal comes from lack of commitment, lack of interaction, and a lack of
interest in constructively resolving conflict.” Commitment, interaction, and interest to resolve
conflict constructively are important components of the technique of small-group work.
Although these elements were not tested for in the Relay Assembly Test Room experiments,
each directly affects the production of employees and can be monitored and improved by
managers.

66. LaBrosse, Michelle. “Know How: The Project Manager’s Guide to Getting it Done.” Supervision. 70.3 (Mar
By combining managerial observation techniques addressed in Part I of the Application section with the small group techniques addressed throughout this section, managers can successfully improve employee efficiency. However, in order to successfully implement this small group method, managers must achieve a careful balance of employee interaction and managerial supervision. As mentioned previously, macro-managing is harmful to the productivity of workers, which includes the productivity of small groups. While managers must supervise their workers in order to develop group cohesion and keep the employees focused, managers must also be aware of the adverse affects of micro-managing. In order to avoid this dilemma, managers must achieve a balance between over and under supervision. Once a balance is established, the manager can effectively supervise employees, thus ensuring high productivity as workers increase their output as group cohesion increases under observation.

Therefore, the third managerial technique that can be derived from the Hawthorne experiments, and specifically from the Relay Assembly Test Room experiments, is the implementation of small group work within an organization. The organization benefits directly from increased employee productivity. The small work group technique benefits businesses and organizations because it is essentially cost free. The manager must devote a certain amount of time to restructuring the work environment in order to encourage small-group work. However, once developed, the small work group method will continue to produce benefits for the business or organization, the most important of which remains increased worker productivity.

Technique IV: The Hawthorne Experiments and Relaxed Work Environments

Additional information regarding the effects of the work environment provides the third technique that managers can capitalize on in order to increase worker productivity. A large portion of the subjects’ increase in productivity when working in the Relay Assembly Test Room resulted from the relaxed work environment. This increase in employee productivity when working within the Relay Assembly Test Rooms or a different, less demanding setting occurs because “an uptight environment does not promote the relaxed atmosphere that is conducive to creativity” and higher outputs.68 Because of this, researchers have recognized that the work environment plays an important role in employee production. Additional modern research suggests that “a more relaxed and supportive work environment” leads to increased employee productivity.69 Therefore, the final management technique developed from the findings of the Hawthorne experiments requires the development of relaxed work environments in order to increase employee output.

Similar to the second and third techniques discussed previously, this technique is derived from the findings of the Relay Assembly Test Room experiments. In interviews with the Relay Assembly Test Room experiment subjects, Sonnenfeld noted that the interviewees described the differences in work environment between working on the main floor of the plant and within the test room. Interviewees observed that the main floor of the plant was rigorous and stressful. Conversely, the Relay Assembly Test Room environment was more relaxed. For example, one

difference that the subjects pointed out between the plant floor and the test room was that the workers had “the freedom to talk more freely while working.”

Since employees felt more comfortable within the less-regulated environment, their productivity increased as stress level decreased. However, modern work environments are often the opposite, driven by competition and the threat of job loss or pay cuts. This stress leads to poor employee performance. Furthermore, recent research suggests that “occupational stress affects employee turnover, productivity, and firm performance.” Additionally, occupational stress causes low motivation, decreased performance, increased sick leave, accidents, low job satisfaction, low quality production and service, and poor internal communication. Each of these side effects of stress negatively impacts the success of businesses and organizations. However, managers can correct this issue by working to create a less stressful environment. One example of this was observed within the Relay Assembly Test Room as the supervisors inadvertently created a less stressful environment by allowing workers to socialize.

In order to successfully implement this technique, managers must follow two fundamental steps. The first step of this management technique requires the manager or supervisor to observe the work environment of the employees. Additionally, the observation phase requires managers to examine the job requirements of the employees and determine the most stressful environmental and occupational factors. The second portion of this technique requires managers to use the information gathered in order to determine how the stress level of

72. Ibid. 125.
employees can be reduced and to correct the issue at hand. Although unintentional, the researchers at the Hawthorne electric plant followed these two steps as well.

Throughout the Hawthorne experiments researchers and supervisors monitored the environment of the electric plant as well as the job requirements. These two factors were important to the experiment as the researchers hoped to discover a relationship between supervision and employee productivity. However, the development of a more relaxed environment was unintentional and occurred because the atmosphere in the Relay Assembly Test Room was different than the atmosphere on the plant floor. The more relaxed environment played a significant role in the increase in employee productivity. However, today’s managers remain unaware of this explanation as the majority of management text books do not discuss the Hawthorne experiments. The few books that discuss the experiments highlight the Hawthorne effect and its applications but fail to inform the reader about the remaining applications of the Hawthorne experiments. This relaxed environment technique applies the unfamiliar findings of the Hawthorne experiments to modern management. If implemented successfully, this management technique will result in a more relaxed environment which will, in turn, increase the productivity of workers.

Throughout the first step of this technique, managers must thoroughly analyze the work environment and job requirements. Modern work environments tend to be competitive, time pressured, deadline driven, and achievement oriented, which increases the anxiety and amplifies the nervousness of employees. Managers can gather information regarding these

environmental characteristics through interviews with their employees, surveys, and other interaction and observation. After collecting information about the environment and job requirements, the manager must determine the areas that are most stressful to employees. Most often, “difficult deadlines and the feeling of having a lack of control over different work requirements are major contributors to stress.”

However, occupational stress is also frequently caused by perceived job loss, sitting for long periods of time, heavy lifting, unsafe environment, repetitive actions, lack of autonomy, and other facts such as poor work schedule or unpleasant organizational climate. With a wide variety of factors, managers must invest sufficient time and effort into the analysis of the work environment and job requirements in order to determine the principal causes of stress on employees.

Therefore managers must accurately identify worker stress. In order to properly complete this step of the relaxed work environment technique, managers should pinpoint and categorize the different components of organizational stress from which their workers are suffering. One way to classify is to divide the symptoms of stress into five categories as Cohen and Single recommend: emotional, physical, behavioral, mental, and health. When evaluating employee stress, managers must classify the symptoms of stress into these five categories. For example:

Emotional stress would include factors such as anxiety, nervousness, worries, depression, anger, and irritability; physical stress factors include: employee restlessness, uptightness, jumpiness, high blood pressure, and tension; behavioral stress factors are impatience, impulsiveness, hyperactivity, short temper, aggression, alcohol abuse; mental stress factors include memory loss, negativity, and being overly critical; health stress issues include physical complaints such as head and back aches, digestive problems.77

By categorizing the factors of stress into separate categories managers can better determine the causes and effects of certain environmental or organizational stressors. Additionally, by conversing with employees and observing the daily work environment, managers can develop a better understanding of the stressors within their work atmosphere.

After determining the main stressors, managers must constructively implement the second step of the technique: reducing the stress level within the organization’s environment. This is a proactive approach in which the manager reduces the stress hazards in the worker’s environment through the following methods. Depending on the type of stress, managers should make changes such as encouraging open communication, improving the physical workspace, limiting repetition, assisting employees with time management training, delegating to employees to provide a sense of accomplishment, and possibly offering employee counseling and wellness programs.78 In order to reduce the stress level of employees, managers must make changes that will directly improve the stressors such as overly demanding work, poor lighting, staring at a computer screen too long, and repetitive motions.

The first method that managers must consider when looking to create a more stress-free environment is to analyze their communication style. Not surprisingly, managers can actively reduce the stress level of their workers by simply altering the language that they use when communicating. However, the majority of managers refuse to consider altering their communication methods. Poor communication can lead to increased employee stress as managers act unpleasantly and disregard the mental and emotional health of their employees. The improved managerial communication was a direct cause of the increased worker productivity in the Hawthorne experiments as the subjects openly stated in interviews that the overseer of the relay assembly test room treated the employees much more politely. The five female workers explained that the “different sort of supervision” created a more enjoyable work environment. Therefore, by simply changing and improving their communication techniques, managers can create a more friendly work environment which, in turn, increases employee productivity.

Apart from changing their language, managers should consider providing short breaks to better the physical and mental health of employees. Managerial writings suggests that while “it may be tempting to let your staff grab lunch at their desks,” the organization must “force [their workers] to take breaks.” With a short amount of time to recollect their thoughts and rest their bodies, employees will be able to perform better once returning to the task at hand. Short breaks allow the supervisor to prevent the psychological absenteeism caused by job repetition. Additional health benefits include the avoidance of carpal tunnel and other repetitive stress

syndromes and the protection of vision as employees need to rest their eyes. The benefits of forcing employees to take breaks result in a more relaxed work environment which increases the overall productivity of workers.

Another proactive solution to improving the work environment is to offer physical activities that are not job related. In doing so, companies allow employees to unwind, thus improving the physical and mental health of employees by providing gym memberships or other options. Many organizations are moving in this direction as managers discover that “losing an employee for a sick day is worse than losing them for an hour at the gym. Start a wellness program or subsidize gym memberships, start an informal walking group, or start a firm team for a sports league.”

While companies may hesitate to provide workout facilities or gym memberships because of the initial expense, organizations must realize that the cost of absenteeism is much higher than that of a gym membership. However, by reducing the stress level of employees the organization will benefit directly through increased employee productivity. Toshiba has followed this technique by issuing discounted gym memberships at a number of health clubs. In this way, the company has shifted its focus towards trying to “improve employee well being and reduce pressure throughout the organizations.”

Similar to Toshiba, companies will also benefit from

this solution as employees take fewer sick days because of their improved physical and mental health, once again increasing employee output.

Short breaks and gym memberships allow employees to take physical breaks from their responsibilities. However, managers that want to avoid employee work breaks while still improving the mental health of employees may consider other options. For example, managers can utilize the concept of casual workdays by implementing casual Fridays or office socials. Setting aside a specific day of the week for employees to lighten up keeps the overall environment more relaxed while helping the workers unwind.

In order to increase employee productivity, managers should implement this technique in order to create a more relaxed work environment. By adhering to the process and reducing stress, managers demonstrate to employees that they are concerned about their wellbeing and happiness, which motivates the employees to work harder. In Canada alone, researchers estimated that the lost productivity from stress costs Canadian organizations close to twelve billion dollars annually. This unacceptable loss is a direct result of stress as statistics reveal higher accident rates, greater absenteeism, and low employee retention throughout Canadian organizations. However, Canada only provides one example of the lost profit of organizations throughout the world as a result of employee stress. By following this technique and applying the findings of the Hawthorne experiments in modern managerial environments, organizations can increase employee productivity through the development of more relaxed work environments.

84. Ibid.
V. Concluding Thoughts Regarding Modern Applications

Despite the passage of time between the Hawthorne experiments and contemporary management, today’s managers can benefit greatly from understanding the Hawthorne experiments and their modern applications. The modern applications offered by the Hawthorne experiments are numerous and provide great advantages to organizations and business that wish to improve their workforce. The aforementioned managerial techniques apply to findings of the Illumination and Relay Assembly Test Room experiments to contemporary employee-related problems that are causing lower production rates. By effectively implementing each technique, managers can achieve an increase in employee productivity. These techniques include that of managerial supervision, managerial discipline, the development of small work groups, and the development of more relaxed work environments. Each of these techniques reflects a significant discovery of Mayo, Roethlisberger, and Dickson throughout their nine years of experimentation. Furthermore, these techniques combine the findings of the Hawthorne experiments with modern research and current difficulties caused by underachieving employees. By developing and altering the techniques to fit the needs of separate organizations, the managers and organizational leaders will greatly improve employee productivity. For example, while casual work apparel may be appropriate within an office setting, manufacturing facilities and factories may face legal consequences if they allow their employees to neglect dress codes. Additional research and experimentation is necessary in order to broaden the contemporary applications and understanding of the Hawthorne effect and the Hawthorne experiments’ findings.
Future Needs

Suggested Additional Research

The Hawthorne experiments can be successfully applied to organizations and management practices today, as demonstrated in the previous techniques included in the application section. However, additional experimentation is necessary in order to expand on the original findings and to develop contemporary data. In response to remarks that suggest more research regarding the Hawthorne effect was necessary, Sonnenfeld pointed out in 1970 that the Hawthorne studies were analyzed in academic journals and professional association conferences. While this remains true, the lack of supplementary experimentation is surprising. Academic journals and professional conferences continue to critique the Hawthorne experiments and provide academic literature regarding the Hawthorne effect and its interdisciplinary uses. However, journal articles provide contemporary analysis without suggesting that modern research be conducted in order to eliminate existing uncertainty concerning the Hawthorne experiments. Therefore, modern experimentation is necessary in order to expand on the results of the Hawthorne experiments.

By developing and executing modern experiments, researchers can validate and elaborate on the uses of the Hawthorne effect. Because the Hawthorne effect suggests that workers increase their productivity when under supervision, companies can directly benefit from concrete proof of the phenomenon. While additional research will provide contemporary examples and

evidence of the Hawthorne effect, modern experimentation will also ensure that the standard, current experimental procedures are used. Future research will follow experimental procedures, increasing the accuracy of the results while simultaneously increasing reliability. Currently, experts doubt the accuracy and statistical reliability of the experiments for various reasons. These reasons include the small test group of five female employees, different lengths of experimental periods, and low validity as the original intention of the experiment was not to determine the effects of observation on worker productivity.86 Because the Hawthorne experiments remain controversial amongst researchers, there is a great need for contemporary research. New experiments and results are necessary in order to eliminate the uncertainties of experts and to further prove the effects of managerial observation and discipline on a worker’s productivity.

While the small test groups and questionable procedures have created controversy over the reliability of the Hawthorne experiments, future research will eliminate these criticisms. The development and execution of the future experiments will ensure that follow strict procedures are followed. These experimental procedures require control groups, hundreds of subjects (workers), and regulated time periods in order to guarantee the reliability of future research. These highly regulated tests will also allow for reliable statistical analysis as the consistent procedures and analytical methods should continuously obtain similar results throughout testing and across various fields (factory work, office work, etc).

However, there are various challenges to overcome when developing experiments that fit the aforementioned criteria. Researchers must carefully develop and execute future experiments, showing equal vigilance when gathering and analyzing the data. If completed correctly, prospective studies can avoid the same criticism that surrounds the Hawthorne experiments. One potential source of data that researchers can make use of is daily production records. As businesses and organizations continue to improve the monitoring of employee productivity, researchers have access to comprehensive data from various organizations. After obtaining the employee production data, researchers can compare the production statistics before and after managerial changes. Managerial changes may include, but are not limited to, the addition or removal of a supervisor, changing the daily supervisor, altering the amount of daily supervision received by employees, or hiring and firing managers.

Companies and organizations may choose to alter their managerial practices for a variety of reasons, most of which directly originate from the desire to increase employee productivity. Regardless of the reason for modifying the management routines, most companies record the changes made with regards to their management and supervision. One example of the concurrency of record keeping and tracking of managerial change comes from Sprint, a world renowned cell phone company and prominent Fortune 500 corporation. In 2007 as the company’s stock price slipped, Sprint transferred the president of Sprint’s FON division, Len Lauer, to the presidency of its PCS division while simultaneously tracking the company’s
success based on stock price. Researchers were then able to compare the company’s efficiency and success before and after the change in management. While this example demonstrates the increase in Sprint’s overall stock price as a result of a managerial change, it provides a framework for potential analytical methods. As companies track their employees’ outputs as well as managerial shifts, it becomes possible to statistically analyze the changes in productivity.

In order to compare the data, companies must maintain precise records of changes in management practices and employee output over the course of weeks or months. This method would require managers to obtain employee consent as the company must remain aware of workers’ rights as protected under law. After collecting the necessary data, researchers can run statistical analyses of the two variables: management and output. In this way, researchers can determine the potential benefits (or possible disadvantages) of managerial changes on employee productivity. However, by analyzing the effects of managerial changes on employee output in this manner companies can account for additional variables. For example, if the company notifies employees that they will be partaking in an experiment or asks for employee consent, the accuracy of this experiment is lost. This is because when the employees are made aware of their participation in an experiment, it may cause increased productivity. Instead, the purpose of the experiment is to focus on the relationship between changes in management and productivity. In order to accurately test for this relationship researchers must eliminate confounding variables, such as awareness of participation. By analyzing preexisting productivity data and management

technique records, researchers would eliminate ‘participation’ as a reason for fluctuating productivity.

Provided that companies can analyze employee productivity and managerial alterations through the use of preexisting data, researchers can then demonstrate the existence and usefulness of the Hawthorne effect in other occupations and disciplines. As stated in various scholarly journals, the Hawthorne effect was a “great stimulus for more research in the field of human relations” by providing additional research on human factors such as managerial discipline, small work-groups, and relaxed work environments. 88 The Hawthorne effect is relevant throughout most professions. Beyond its significance within factory environments, “the insights gleaned from these experiments provide a basis for most current studies in human relations as well as for subareas such as participation, organizational development, leadership, motivation, and even organizational design.” 89 While other areas of study have benefited greatly from the discoveries of the Hawthorne experiments, the most important applications remain those of the business world.

Future research will provide additional support for the managerial applications of the Hawthorne experiments and the Hawthorne effect, as well as the additional interdisciplinary uses. While many scholarly journals repeat previously discussed theories, research, and critiques, it has become increasingly important for companies and organizations to develop the

modern applications of the Hawthorne experiments. In doing so, these groups can effectively apply the concepts discussed in the application section to their daily business practices.
Conclusion

The contemporary managerial applications of the Hawthorne experiments can be beneficial to businesses and organizations. Because the primary goal of these groups is to gain a competitive advantage over their competitors, improving employee efficiency is paramount. Through the four techniques of managerial observation, managerial discipline, development of small work groups, and the development of relaxed work environment, managers can increase the efficiency of their workers. As managers work to improve the work environment, the positive managerial interaction increases the job satisfaction and retention of employees.

The findings of the Illumination experiments imply that by increasing managerial supervision, employees will increase their productivity. Employees will alter their work behavior when under observation because of psychological and human factors. By using the first technique offered in the application section and altering the level of direct and indirect managerial supervision, managers will purposefully increase the productivity of their workers. Furthermore, when executed correctly, managers can combine the technique of managerial observation with the technique of managerial discipline discussed in part II of the application section order to achieve an even higher level of employee efficiency. Because the first step of the technique of managerial discipline requires observation, these two steps have a synergetic relationship as each step naturally benefits the other. The last two techniques discussed work to correct specific issues within the business or organization in order to please workers. The introduction of small work groups allows for more social activity and the development of cohesive groups, both of which increase job satisfaction and productivity. Furthermore, the idea
of reducing stress within the work environment also works towards improved job satisfaction and employee output.

Both large and small organizations and businesses will benefit from managerial alterations as managers incorporate these techniques into their daily routines. Each of these techniques is directly supported by the Hawthorne experiments and interviews conducted with the subjects of the Relay Assembly Test Room experiments. By improving their managerial techniques, managers work towards creating more positive environments, employee attitudes, and human relations. Proper supervision, discipline, group work, and relaxed environments are necessary in order to achieve the greatest level of employee productivity. Supported by historic and contemporary research, these techniques lead to an increase in worker output, which in turn benefit the business and allows for a competitive advantage.
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