THE LASTING INFLUENCE OF THE WORK OF FREDERICK WINSLOW TAYLOR ON AMERICAN INDUSTRIAL MANAGEMENT

A Thesis

Presented to the Faculty of

The Graduate School of Business Administration

The University of Southern California

In Partial Fulfillment

of the Requirements for the Degree

Master of Business Administration

by

James Seafield Grant

January 1961

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

This thesis, written by

JAMES SEAFIELD GRANT

under the guidance of the Faculty Committee, and approved by all its members, has been presented to and accepted by the Faculty of the Graduate School of Business Administration in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

Date 1/3/61

Approved

R. A. Goodell

ACKNOWLEDGMENTS

Robert A. Goodell, professor, University of Southern California Graduate School of Business Administration, has been a good friend and kind critic in the gathering and arrangement of the material in this thesis. What the work may have of merit is due to his enlightening counsel and his patient help and encouragement.

To my wife, Edith Crawford Grant, to my daughter, Edith Ann Grant, and to my sister, Jessie Katherine Grant--*sine qua non*.

J.S.G.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

CHAPTER I

THE PROBLEM

Modern management's approach to industrial production problems appears to offer many examples of a return, via adoption and/or adaption, to the basic ideas of the system of "scientific management" first presented by Frederick Winslow Taylor in 1903. Although the nomenclature of today's industrial operations systematizers may differ from that of Taylor and his disciples (and their imitators), a critical re-examination of what Taylor actually said and wrote may demonstrate that these differences may well be more contrived than real.

When Taylor's turn-of-the-century principles are related to late mid-century practices, with emphasis on a search for similarities rather than differences, there are indications that those who have said Taylor's system "as

such . . . had gradually disappeared by 1920"[1] might do well to review and perhaps revise their statements.

Taylor himself, as a classic example of the impatient innovating genius, may have judged his own work too harshly. It is a very human act to measure the limited success achievable by men against man's boundless aspirations. To such a dedicated perfectionist as Taylor, less than total acceptance of his proposals would probably be regarded as more of a personal than a professional failure. Viewed objectively and pragmatically, his new systems for industrial management had been outstanding professional successes, because they had attained their goals consistently. On the other hand, Taylor may have died unaware of the continuing influence of his work on the conduct of American industry or of the importance of his ideas.

He carried on his campaigns for his system until his death in 1915. During his lifetime some of the elements of his management programs were used in plants employing a total of about 87,000 workmen.[2]

---

[1] Gordon B. Carson (ed.), Production Handbook (New York: Ronald Press, 1958), p. 1.13.

[2] Frederick W. Taylor, Scientific Management (New

In January 1912, his reply to a question asked by a member of the Social Committee of the House of Representatives to Investigate the Taylor and Other Systems of Shop Management, was:

> Mr. Tilson: I should like to ask you one general question: How many concerns, to your knowledge, use your system in its entirety?
>
> Mr. Taylor: In its entirety--none; not one.[3]

In this statement, and others of like tenor, Taylor spoke only for himself and his comparatively small company of close associates, and he put into the record only their achievements. He chose to disregard similar work and the burgeoning influence of a host of unrecognized followers. To Taylor, these other men were "imitators" and "quacks" unworthy of his recognition, or defectors he had expelled from his elite group as punishment for deviation from the "pure" Taylor system.

Taylor refused to recognize the fact that others outside his own small circle might be capable of doing good work in what he regarded as his own proprietary field.

York: Harper and Brothers, 1911), p. 28.

[3] Ibid.

He was not willing to admit that the small, slow additions that experience would bring to the progress of a developing art could be made by anyone except himself and those he chose as his disciples. In this consistent denial to others of their capability to build upon his foundations, he was also denying to himself a capability and an opportunity to influence the future of the "scientific management" movement. By insisting on total acceptance of his system, as he had evolved it, Taylor appears to have attempted to exclude future betterment of his ideas through variations that would enable his system to be adapted to changing conditions.

But the changes have been made. Taylor's original concepts of the "one best way" for management were sound and broad enough to continue to endure as the foundation upon which "scientific management," under whatever name it bears, continues to build.

Statement of the Problem

The purpose of this study was to examine some specific methods employed by present-day industrial managers in an attempt to find out if today's procedures might not

be more similar to than different from those originally advocated by Frederick Winslow Taylor between 1890 and 1912.

If it can be demonstrated that this similarity exists, and has existed, then examination into the record may lead to some deductions as to reasons why producers of current business literature appear to desire to deny to the "father of scientific management" credit for an enduring rather than a transitory contribution to the art and practice of industrial leadership.

Limitations of the Problem

The facts of controversy in any account of the lives and works of two such men as Frederick Taylor and Samuel Gompers cannot be denied; the men seem to have been born to be antagonists.[4] Opposition on the part of

---

[4]"Mr. Dooley," spokesman for the opinions of Finley Peter Dunne (1867-1936), once expressed the opinion that there were very few things you had to do for a man--but if he wanted to fight, you had to oblige him. Gompers and Taylor appear to have agreed.

"Dooley's" further comment (in Dunne's Capital and Labor) on industrial relations was: "It's too bad that th' goolden days has passed. Capital still pats labor on th' back, but on'y with an axe. Labor rayfuses to be

individual workmen to Taylor's ideas of new ways of doing old jobs was, as he said, so natural as to be expected. Gompers, as spokesman for the new strength of united labor, regarded Taylor and what Taylor was attempting to do as a weapon specifically designed to destroy the organization to which he had devoted his lifetime.

This study, beyond offering as a basic belief the theory that each man represented movements so vital and valuable that society could not allow either to attain total, decisive victory, cannot presume to attempt a determination of which of these truly great men was "right." Perhaps the most important "right" involved was the right society appears to have exercised--to take in its own larger interest its own selection of the values offered.

If the industrial conditions of the times of Gompers and Taylor made controversy between them inevitable, then the changes in the conditions of later times required compromises by their aides and successors. For Taylor, personal participation in the contest ended with

---

threated as a friend. It wants to be threated as an inimy. It thinks it gets more that way." Christopher Morley and Louella D. Everett, (eds.), Familiar Quotations (Boston: Little, Brown and Company, 1946), 11th edition, p. 797.

his death in 1915, and continuation of the dispute by his followers seems, in general, to be based upon possibly biased opinions of what Taylor's viewpoint would have been, or should have been, in the changing circumstances. This resumé aims to present only those post-mortem developments which appear to have had their origin during his lifetime. Chronologically, the fact of compromise as a necessity and as a guide to the future appears to be inherent in Ordnance Department General Order No. 13, published in 1917.

Much of what has been written pro Taylor and the "Taylor System," and contra Taylor and "Taylorism" has had the effect of making the dispute itself so involved that the basic viewpoints, motives, principles, arguments, and assumptions become unknown (or half-known), or abandoned, or forgotten (or so Bowdlerized as to be unrecognizable). Taylor, as his own best exponent, needs no later (and perhaps lesser) man's conjectural apologia--what he said and wrote during his own lifetime have been taken to be the clearest resumé of his ideas and his philosophy of management. This thesis takes Taylor at his own words, as his own best source, and will attempt to

assess him against the background of his own times.

Taylor's own limitations of life are the limitations of this study. And it may be that 1915 was, in actuality, the year in which the socio-economic voices of businessmen themselves were first raised over the question of business conduct in relation to the nation's needs. It is probable that Robert G. Valentine's paper, The Progressive Relationship between Efficiency and Consent existed at least in manuscript while Taylor was still alive. It called upon the newly-named Taylor Society to treat two problems:

1. Those relating to the best way of performing an operation under a given set of conditions, and,

2. Those relating to the social, industrial and moral effects of putting into operation the organization or methods which scientific investigation has determined to be technically the best.[5]

Taylor's latest writings would seem to indicate that he died believing he had the best (if not, in fact, the only) answer to Question No. 1, and that he had

---

[5]Robert G. Valentine, The Progressive Relationship Between Efficiency and Consent (New York: The Taylor Society, 1915), p. 2. (Quoted by Gomberg, p. 1,129.)

expressed his views on Question No. 2, when he had said:

> All employees should bear in mind that each shop exists, first, last and all the time, for the purpose of paying dividends to its owners.[6]

Approach to the Problem

In the present study, what Taylor himself said and wrote about his systems of management has been taken to be the best "authority" in regard to what he actually meant and what his real intentions were. Reason for reliance upon the relatively meagre original material is that the great number of writings which aim to "interpret" Taylor are as varied as the viewpoints and the interests of the writers who produce them. The prejudice in the speeches and writings of his contemporary opponents, and the bias

---

[6]Taylor, op. cit., p. 143. Taylor's 1895 opinion was expressed in his "A Piece Rate System" in these words: "Personal ambition always has been and will remain a more powerful incentive to exertion than a desire for the general welfare" (p. 37). See also, Frank B. Copley, Frederick W. Taylor: The Father of Scientific Management (New York: Harper and Brothers, 1923), Vol. II, p. 416: "An establishment running under the principles of scientific management will confer far greater blessings upon the working people than could be brought about by any form of collective bargaining."

in the speeches and writings of his friends and followers, have persisted through fifty years. Today's writers, while perhaps more subtle, show as much one-sidedness of mind as did yesterday's; friend and foe alike continue to try to stretch and twist the fabric of Taylor to fit their own particular pattern of prejudice. It would seem to be natural, even inevitable, that Taylor and his ideas would be somewhat distorted in this process. It is to eliminate this distortion that reliance has been placed on what the man himself said and wrote.

Those circumstances and developments which appear to be fundamental reasons for past and present controversy are presented, quantum meruit, as logical developmental material.

Since much of today's management methodology and philosophy has been derived and devised to guide action in a business climate markedly different from that of the times of Taylor, it is perhaps inevitable that both the man and his methods are often judged "out of context." Such judgment of yesterday's man and yesterday's innovations, by those whose thoughts and actions are the products of later and different value systems, is seldom

completely fair and/or objective. Part of the paradox of Frederick Winslow Taylor is that too much, and too little, is known about him.

Too much is known to permit the student of the evolution of entrepreneurial management to disregard Taylor and his work. To provide a fair basis for comparative analysis and appraisal of the man and his work, a brief review of the socio-economic conditions of the time in which he lived is included. To "set the sociological stage" for the play to be enacted, as well as to attempt to describe some of the differences between the eras, some of the relevant history of the 1890-1910 period is included.

Biographical sketches of Taylor and of his great opponent, Samuel Gompers, are presented to point up the fundamental differences in background as one of the factors which may have resulted in the fundamental differences in viewpoint between these perpetually opposed spokesmen. Controversy between them was inevitable, and the "personalization" of their contest made any personal compromise between them a practical impossibility.

While no personal compromise was possible so long as the ideas the two represented were presented as dichotomous, each represented so much of genuine merit that compromise and synthesis became a social and economic necessity. The manner in which these compromises and syntheses have been accomplished by the lieutenants and successors of the two protagonists sheds some light on the current status of Taylor's memory.

Evolution of Taylor's "system" of business management establishes him as a true innovator of some ideas and as a masterly adapter in others. His completely pragmatic approach to what he conceived to be the most pressing problems of the industrial systems of his day and age were, in most instances, in full accord with the views of his contemporaries.

Some aspects of the course of the controversy between Taylor's successors, and Gompers and his aides, after the death of Taylor, are followed through McKelvey's "Period of Unmitigated Hostility"[7] to and including

---

[7] J. T. McKelvey, AFL Attitudes Toward Productivity, 1900-1932 (Ithaca: Cornell University Press, 1952), p. 126.

Nadworny's "Cooperation Fever"[8] to demonstrate the proposition that both controversy and compromise were inevitable. Compromise, and a modus vivendi that enabled the nation to benefit, were regarded as economic necessities if the long-term interests of the participants, their principals, and the public were to be served.

Interview reports on the question of the status of Taylor's basic system in industry today are included.

Importance of the Study

The public interest will be best served if an informed and impartial climate for examination and negotiation is preserved. Questions of means to be used, and of organizations which will sponsor these methods, are seldom settled by negotiators motivated by subjective viewpoints and interests.

Values, aside from considerations of seeing that justice is done to Taylor by business historians and of re-stating the persistent effects of his work on modern

---

[8] Milton J. Nadworny, Scientific Management and the Unions (Cambridge: Harvard University Press, 1955), p. 123, et passim.

industrial management practices, can be expected from further study of the course of controversy and compromise between Taylor and Gompers and their followers. Search for factors of similarity rather than difference in the ultimate objectives of employers and organized employees may be of value in discovering practices which may lead to desirable compromises and syntheses.

If questions having to do with the means to be used, and of the organizations which are to sponsor the methods, can be settled, it is possible that future industrial relations negotiations may benefit from a review of the controversy between Taylor and Gompers.

Cooperative re-study of questions of methods and means of accomplishing greater industrial output, undertaken in good faith by men of good will, should in all logic include investigations of ideas which have succeeded in the past. It is submitted that Taylor's systems, known as "scientific management," should be included in such a re-examination.

Governments capable of unilateral promulgation and enforcement of their own methods and means have declared themselves to be in complete and continuing opposition to

the "free economy" nations. This might serve to emphasize the urgency and challenge present in the problems of industrial cooperation for greater productivity.

Mayo's philosophy of the "desirability" of cooperation in the Twenties may have become "urgency" in the Sixties. He wrote:

> Better methods for the discovery of an administrative elite, better methods of maintaining working morale. The country that first solves these problems will infallibly outstrip the others in the race for stability, security and development. There is one important aspect of the employer-employee problems which has persisted through a century of change in industrial organization, in wages and in working conditions . . . It may be briefly expressed in a claim that at no time since the industrial revolution has there been, except sporadically here and there, anything of the nature of effective and whole-hearted collaboration between the administrative and the working groups in industry. To "take sides" immediately on an issue such as this and to assign heavy blame to one side or other is useless. The failure is due to our incapacity to define the actual problem with sufficient precision . . .
>
> In the United States we have travelled rapidly and carelessly from . . . simple social and economic organization to a form of industrial organization which assumes that every participant will be a devotee of systematic economics and rigid logic. This unthinking assumption does not "work" with us, it does not "work" in Russia; it has never "worked" in the whole course of human history. The industrial worker, whether capable of it or no, does not want to

> develop a blackboard logic which shall guide his method of life and work. What he wants is more nearly described as, first, a method of living in social relationship to other people and, second, as part of this an economic function for and value to the group. The whole of this most important aspect of human nature we have recklessly disregarded in our "triumphant" industrial progress . . .
>
> The urgent problem of the present is that our administrative elite has become addict of a few specialist studies and has unduly discounted the human and social aspects of industrial organization. The immediate need is to restore effective human collaboration . . .[9]

Definitions of Terms Used

Eclectic approach.--Application of selected elements of the Taylor system of management to a specific firm or establishment.

Functional foremanship.--A factor of the Taylor system, which subdivided the work of first line foremanship into four direct and four indirect elements, and which placed these defined responsibilities onto specialists who had direct authority over workmen insofar as

---

[9]George Elton Mayo, The Social Problems of an Industrial Civilization (New York: Macmillan Company, 1933), pp. 178-179.

these specialties were concerned.

Labor organizations.--Unions affiliated with the American Federation of Labor, unless the phrase is modified to designate prior or unaffiliated organizations.

Management.--Leaders of entrepreneurial enterprises, including professional managers.

Organized labor.--Synonym for labor organization(s).

Scientific management.--Systems of management for industrial production enterprises originated, adapted and/or synthesized by Frederick W. Taylor between 1880 and 1915, as well as elements of those systems used by his successors and professional competitors.

Systematizing.--Employment and implementation of the Taylor system of management in specific situations.

Taylor-Gompers controversy.--Expressions of opposition between the viewpoints of Taylor, as principal advocate of "scientific management," and Samuel Gompers, as chief spokesman for the craft unionism philosophy of the American Federation of Labor. The term occasionally

refers to expressions of controversy voiced by successors to Gompers and Taylor.

Taylor system(s).--Synonym for "scientific management."

Taylorism.--The Taylor system as anathematized by its detractors.

Organization of the Thesis

Chapter II, "The Protagonists," presents short biographical sketches of Taylor and of Samuel Gompers to point out those factors of family and educational background which prepared them to be opponents. If, as Milton said, "childhood shows the man, as morning shows the day,"[10] the tremendous differences between the careers of these authentically great Americans started when they were children. Both of them appear to have been completely sincere in their evident inability to understand the viewpoints of the other. Both were, in a sense, victims of,

---

[10]John Milton (1608-1674), "Paradise Lost," Book IV, line 220, in Complete Poems of John Milton, Harvard Classics, ed., C. W. Eliot (New York: P. F. Collier and Sons, 1909).

and victors over, the environments of their early years. As men, both were good trees from good seed, but the species and the soil which produced them were different from the start.

In Chapter III, "'Personalization' of the Contest of Ideas," changes in the socio-economic climate of the nation are set down in support of the proposition that these changes made complete victory impossible for either Gompers or Taylor. The essential social values, "personalized" to each man by his identification with an opposing side, were too great to allow "victory" to mean total defeat to either. While Taylor and Gompers were unable to conceive their controversy as anything other than a war to the death, the greater interests of society itself demanded compromise. Changes in social conditions begin with changes in social conscience; the synthesizing processes by which social progress makes symmetry out of apparent dichotomy are exemplified in the personalized contest between Taylor and Gompers.

Taylor's "other claim to fame"--his publication of "On the Art of Cutting Metals"--is presented in Chapter IV, "Interlude--and Bethlehem." Taylor's first venture

into the field of management consultation, his employment at Bethlehem Steel Company, his most widely-known experiments, and his abrupt dismissal are summarized to show his methods of investigation of problems. Chapter V, "Evolution of 'Scientific Management,'" reviews the work of some "systematizers" before Taylor's time. Taylor's career at Midvale Steel Company, marked by his publication of "Shop Management," and the influence of Henry R. Towne and William Sellers upon his personal and professional development are included as pertinent parts of the record.

What has come to be known as "The Eastern Rate Case," and the part of Louis D. Brandeis in making Taylor's ideas known generally, are set forth in Chapter VI, "Brandeis, 'The Eastern Rate Case,' and Emerson." In this hearing before the Interstate Commerce Commission, Brandeis' search for "the one best way" to present arguments against a proposed freight rate increase led him to the identifying phrase, "scientific management." His group of experts, testifying that improved railroad management would make rate raises unnecessary, was led by Harrington Emerson. Emerson, who was probably Taylor's greatest rival, became one of Taylor's greatest publicists.

Chapter VII, "The Principles of Scientific Management," is the record of the renovation of Taylor's original ideas (as set down in his earlier "Shop Management"), and their publication in The Principles of Scientific Management. This work, first published in American magazine, is generally regarded as Taylor's most complete presentation of his philosophy and methodology of industrial management. If publication of the book did not start Gompers' active opposition to "Taylorism," it intensified this opposition. Evidence that Taylor maintained his own stand against organized labor is noted here.

Intensification of opposition to Taylor and his management systems, and the first authoritative statement in recognition of the need of compromise are dealt with in Chapter VIII, "Opposition and the Investigations." Taylor's own testimony before the "Resolution 90 Committee" of Congress is reviewed. This definitive statement of his ideas, while designed by Taylor to fit the changed tenor of public thinking, is somewhat blunted by a letter which states his original opposition to union viewpoints.

Chapter IX, "Taylor's Last Years," tells of the beginnings of change in his systems, undertaken by his

followers and his professional rivals. Professor Robert F. Hoxie's report to the United States Commission on Industrial Relations, and further "defections" by Gantt and Gilbreth are milestones in the compromise-synthesize process which occurred before Taylor's death in 1915.

Continuation of the compromise-synthesize workings by which society rejects and retains the values it needs is discussed in Chapter X, "World War I--Acceleration of Cooperation." Gompers' appointment to President Wilson's National War Labor Board, and employment in key positions of informed followers (at least in part) of Taylor, hastened the trend toward compromise and conciliation. In pledging organized labor's best efforts for war production, leaders of the unions relinquished much of their demands for control over work methods. This relinquishment, for whatever purpose it is made, is at least tacit admission that standard work practices may hinder production. Once accepted as a standard work practice, more efficient production methods tend to continue. Ordnance Department Order No. 13, presumably written by Morris L. Cooke, acknowledges the social value and possibly greater efficiency of many union-sponsored labor aims.

Chapter XI, "Interview Reports," records answers found in a survey of current practices of ten area manufacturing establishments. A patterned interview system, designed to discover whether elements of the original Taylor system are still used, showed that modern industry continues to select elements of the system. This eclectic approach to the system is taken in various ways, and the elements utilized appear under many different names and sponsorships.

Chapter XII presents a summary, and conclusions.

CHAPTER II

THE PROTAGONISTS

Taylor's Background and Education

Frederick Taylor was born in Germantown, Philadelphia, March 20, 1856, the youngest son of Franklin and Emily Annette (Winslow) Taylor. He was a descendant of Samuel Taylor, who had settled in Burlington, New Jersey, in 1677. His father was a lawyer and litterateur; his mother was an active co-worker with Mrs. Lucretia (Coffin) Mott (1793-1880) in the Abolitionist movement in pre-Civil War days. The family was of the Quaker faith, and "was of some means," as Taylor said in his January 1912 testimony in the House of Representatives hearings.

Taylor was educated through the early years of his life by his mother; then, after two years of schooling in France and Germany and eighteen months of European travel, he became (in 1872) a member of the 1874 class at Phillips

Exeter Academy, New Hampshire. He had expected to study law at Harvard, but long hours of study (in his successful attempt to graduate first in his class) had put so much strain on his eyesight that he was advised by his family physician to give up this plan.

While a student at Exeter, Taylor demonstrated early devotion to the idea of "the one best way" of doing things by two "inventions"--pitching a baseball "overhand" for the first time, and building a curved tennis racket designed to add speed to the flight of the ball.[1] His innovation in baseball is credited with changing the game from an adaptation of cricket to an entirely new sport; his spoon-shaped tennis racket, while supposedly sound in its basic principles, failed because of difficulties in handling. Taylor was a lifelong devotee of tennis, and on August 31, 1881, he was a winner of the United States doubles championship at Newport, Rhode Island.[2]

---

[2]His partner was Clarence M. Clark. Frank G. Menke, Encyclopedia of Sports, ed. Stephen Tyno (2d Revised Edition; New York: A. S. Barnes and Company, 1960), p. 949. Clark, son of E. W. Clark, Philadelphia banker who was at one time a partner in William Sellers and Company, was a lifelong friend of Taylor. He was a chemist at Midvale, and married Mary Newbold Taylor, Taylor's sister.

Other "inventions" credited to Taylor by Copley included a handbrake for his sled, a strap harness to avoid nightmares which came to him when he slept on his back, and the introduction into the game of beanbag-tossing of a second beanbag to "liven it up and provide more exercise for the players. He was a member of the Exeter boat crew, a gymnast, and a fancy ice skater.[3]

With hopes of a legal career out of his mind, Taylor took the unusual course of becoming an apprentice pattern maker and machinist in the Philadelphia pump manufacturing plant of the Enterprise Hydraulics Works, which he always identified later as "Ferrell and Jones, a small shop."[4] At the end of his dual apprenticeship in the Autumn of 1878, he took a job as a common laborer at the Midvale Steel Company in Philadelphia.[5] The president of

---

[3]Frank B. Copley, Frederick W. Taylor: The Father of Scientific Management, Vol. I (New York: Harper and Brothers, 1911), p. 58. Taylor had passed his entrance examinations to Harvard "with honors" in June 1874.

[4]Frederick W. Taylor. The Principles of Scientific Management (New York: Harper and Brothers, 1911), p. 115. Taylor's pay at Ferrell and Jones was nothing during the first year of his apprenticeship, $1.50 per week during the second and third years, and $3.00 per week during his final year. Copley, op. cit., I, p. 8.

[5]"Times were dull." Midvale employment was about

Midvale, William Sellers, was a friend of Taylor's family, and this fact (almost invariably noted in biographies of Taylor[6]) may have had something to do with his advancements to the jobs of gang boss, assistant foreman, machine shop

---

400, down from about 600 two years before. Copley, op. cit., p. 114.

[6]He mentioned the circumstance himself in his "Testimony." Taylor, op. cit., pp. 86 and 112. Sellers (1824-1905), who started William Sellers & Company, Inc. in 1847 and Edgemoor Iron Company in 1868, reorganized the business of the Wm. Butcher Steel Works into the Midvale Steel Company in 1873. Midvale supplied all of the structural steel (except cabling) for the Brooklyn Bridge during its construction period (1867-1874). Sellers was the first to design machinery in "functional" rather than "architectural" style. He had investigated relative efficiencies of different shapes and angles of cutting tools, and had adopted standard shapes and angles for Midvale work in 1876. He was president of the Franklin Institute, 1864-1867, and his 1864 Presidential paper on Screw Threads and Nuts (Philadelphia: Journal of the Franklin Institute, 1864), Vol. I, p. 647, established the standard for the United States. He held more than 90 patents, including one issued in 1862 for a spiral gear planer. He (who had left school at 14) was elected to the Board of Trustees, University of Pennsylvania, 1868, and was named a chevalier of the French Legion of Honor in 1889. Carl W. Mitmore, "William Sellers," Dictionary of American Biography, Vol. XVI, ed., Dumas Malone (New York: American Council of Learned Societies, Chas. Scribner's Sons, 1936), pp. 576-577.

Midvale Steel Company was bought by Charles J. Harrah in 1886 for $415,000. Harrah "laughed at the United States Steel Corporation's invitation to merge" in 1901. The firm was sold by Charles J. Harrah in 1915 for $15,000,000. Copley, op. cit., p. 114, et passim.

foreman, master mechanic in charge of maintenance and repair, chief draftsman and, finally, chief engineer, in 1884.

Aside from the handwork connected with his duties as an apprentice at Ferrell and Jones, and experimental work as a lathe operator "the whole winter of 1895," Taylor's actual work career at the handwork level probably did not exceed two weeks. He was promoted to gang boss at the end of two months and, in that period, he was "laborer, clerk, lathe operator, then gang boss."[7]

In addition to his work at Midvale, Taylor also earned a degree in mechanical engineering from Stevens Institute of Technology, Hoboken, New Jersey, on study done mainly at his home, as a member of the class of 1883.[8] Henry Lawrence Gantt (1861-1919), who had graduated from Johns Hopkins in 1880, and who was to be membered as one

---

[7] Taylor, op. cit., p. 115.

[8] Taylor had taken Harvard home study courses in science and mathematics before he entered Stevens Institute; he went to Hoboken only to take his entrance and course examinations. He studied from two to five o'clock in the morning, while working at Midvale from 6:30 A.M. to 5:10 P.M. Copley, Vol. I, p. 72.

of Taylor's "disciples" (and later "expelled"[9]) was a fellow student at Stevens, graduating in 1884.

In 1906, Taylor received an honorary degree of Doctor of Science from the University of Pennsylvania, and in 1912 he was awarded an honorary degree of Doctor of Laws by Hobart College. The largest accumulation of his letters, article manuscripts, and early apparatus invented or adapted by him is in the Frederick Winslow Taylor Collection at Stevens Institute. During his career, Taylor

---

[9]"Henry Lawrence Gantt," Columbia Encyclopedia, ed. Clark F. Ansley (New York: Columbia University Press, 1946), p. 690, says Taylor "broke with Gantt over the humanistic attitude toward workers upheld in one of Gantt's addresses to their professional society." This was Gantt's 1908 ASME paper on "Training Workmen in Habits of Industry and Cooperation," which was the basis of his 1913 "Work, Wages and Profits," his 1916 "Industrial Leadership," and his posthumously published "Organizing for Work," 1919. Gantt did his last work as a member of Taylor's own organization in 1902. He had worked with Taylor at Midvale from 1887 to 1890; at Simonds Rolling Machine Company from 1897 to 1899, and at Bethlehem from 1899 to 1901. cf. "Henry L(awrence) Gantt," Dictionary of American Biography, ed. Dumas Malone (New York: American Council of Learned Societies, Chas. Scribner's Sons, 1936), Vol. XVI, pp. 576-577, which quotes from "Organizing for Work" as Gantt's statement of his philosophy: ". . . (W)e have proved . . . that the doctrine of service which has been preached in the churches as religion is not only good economics and eminently practical, but because of the increased production of goods obtained by it, promises to lead us safely through the maze of confusion into which we seem to be headed, and to give us that industrial democracy which alone can afford a basis for industrial peace."

obtained patents on more than 100 inventions, including, under issue date April 1, 1890 (U.S. Patent Office Number 424,939) one which covered the largest steam hammer to that time built in the nation.[10]

While Taylor was a fairly frequent contributor to such professional publications as Transactions, of the American Society of Mechanical Engineers (ASME), and Proceedings of the Society for the Promotion of Engineering Education (including, in 1909, an article entitled, "Why Manufacturers Dislike College Students")[11] his written expositions of his ideas, "Shop Management," and The Principles of Scientific Management, and his monumental technical effort, "On the Art of Cutting Metals," are generally regarded as most significant in the establishment of his renown. His second ASME (American Society of Mechanical Engineers) paper, "A Piece Rate System," which appeared in Transactions, Vol. XVI, 1895, was also the first published compilation of his views on production shop management.[12]

---

[10]Dumas Malone (ed.), Dictionary of American Biography (New York: Chas. Scribner's Sons, 1936), p. 324.

[11]In Vol. 17, p. 87.

[12]His first was "Notes on Belting," Transactions, Vol. XIV, 1893.

"Shop Management" was published in 1903 (Transactions, Vol. XXIV).

"On the Art of Cutting Metals" was Taylor's last ASME paper, and he read it as his presidential address before the December, 1906 meeting of the society. He had been vice president for two terms, 1904 and 1905.

"The Principles of Scientific Management" article, usually regarded as Taylor's definitive statement on management philosophy and which, in his biographer's opinion, proved his title of "the father of scientific management,"[13] was offered to the Meetings Committee of ASME in January 1910, but was held out of publication in Transactions. It was published originally in American Magazine, after Taylor had mailed a special edition of the article to all ASME members at his own expense.

Taylor's other more notable technical papers were written in collaboration with Sanford E. Thompson--"A Treatise on Concrete, Plain and Reinforced," in 1905, and "Concrete Costs," in 1912.

In 1900, Taylor was awarded a personal gold medal by the government of France, in connection with the Paris

---

[13]Copley, op. cit., Vol. I, p. 117.

Exposition, and the Elliott Cresson Medal of the Franklin Institute of Philadelphia.[14]

Experimentation which had developed the facts reported in "On the Art of Cutting Metals," and Taylor's patents (singly and with J. M. White), were the foundation of the personal fortune which allowed him, in 1902, to retire from money-getting and, as he said in his "Testimony" in 1912, to spend "more than one third of my income in trying to further the cause of scientific management, besides giving my whole personal time and work to the cause without pay."[15]

Taylor's empirical experiments to determine "the one best way" to cut each grade of metal were started during his days at Midvale, and were carried on over a period of 26 years in that plant and, between May, 1898 and May 1, 1901, in the plant of the then-styled Bethlehem Iron Corporation. Since many varying machine speeds, cutting angles, and feed rates were involved--"as many as eleven

---

[14] Albert N. Marquis (ed.), Who's Who in America, 1914-1915 (8th edition; Chicago: A. N. Marquis and Company, 1915), p. 2357.

[15] Taylor, p. 249.

independent variables" in some of the "30,000 to 50,000 experiments" performed on the 66-inch diameter vertical boring mill which cut up approximately 800,000 pounds of scrap steel and iron locomotive tires--Taylor's approach had to be, essentially, "cut and try," rather than mathematical. The experiments were financed by Midvale and Bethlehem, at a cost of "$150,000 to $200,000."[16]

Taylor and J. Maunsel White, Bethlehem metallurgist, developed the Taylor-White process of heat tempering and treating the tool steel cutting bits--Taylor's "the high speed steel"--in connection with these experiments. This development, which increased metal cutting capacities from 200 per cent to 300 per cent, actually brought to Taylor greater recognition in professional engineering circles than his writings on management had done. By 1907, the paper had been translated and published in France, Germany, Austria, and Russia.[17] High speed steel

---

[17]Milton J. Nadworny, Scientific Management and the Unions (Cambridge: Harvard University Press, 1955), p. 161. Before Taylor died in 1915, the book had also been translated and published in Dutch, Danish, Spanish, Lettish, Italian, and Japanese. After Taylor's death, a Chinese copy of the book was received at Taylor's home, "Boxley" (Copley, op. cit., p. xx).

patent rights were sold by Taylor and White, for English use, for $100,000, as an instance of the impact this new, scientific "speed and feed" metal cutting method had on machine shop operation all over the world.[18]

"On the Art of Cutting Metals" might have stood alone as Taylor's greatest contribution to American industry if it had not been for the typical genius of Louis D. Brandeis and his painstaking search for an advantageous legal position in what has come to be known as the "Eastern Rate Case," in 1910-1911, and Taylor's testimony, during January, 1912, at the "Hearings Before Social Committee of the House of Representatives to Investigate the Taylor and Other Systems of Shop Management Under the Authority of House Resolution 90."[19]

---

[18]"By means of these high speed tools the United States during the (first) World War was able to turn out five times the munitions that it otherwise could have done in the same time. On the other hand, if Germany alone had possessed the secret of the modern steels no power could have withstood her." Edwin E. Slosson, Creative Chemistry (New York: Century Company, 1919) p. 280.

[19]Brandeis, in his self-written life resumé, cites the "Eastern Rate Case" as one of the outstanding trials of his career. Albert N. Marquis (ed.), Who's Who in America, op. cit., p. 261. In the "Eastern Rate Case," Brandeis was appearing as "unpaid counsel" for Trades Associations of the Atlantic Seaboard. He was opposed by 50 lawyers of the railroads. Copley, Vol. I, p. 6.

Among other things, it was Brandeis' talent for the telling phrase which discovered the name "scientific management," and caused Taylor to change the title of the paper he had submitted to the ASME Meetings Committee from its original "The Laws of Management" (suggested to Taylor by Frank Bunker Gilbreth) to "The Principles of Scientific Management."

Taylor married Louise M. Spooner, at Philadelphia, on May 3, 1884. She, and their three adopted sons, survived when he died of pneumonia on March 21, 1915. Shortly after his death, the Society to Promote the Science of Management, founded in 1911 to spread Taylor's philosophies for industrial management, changed its name to The Taylor Society in his honor. The present Society for the Advancement of Management is its successor.

Taylor's Great Opponent: Samuel Gompers

Samuel Gompers, founder-president of the American Federation of Labor, who was to embody the opposition of organized labor to "inhuman and degrading Taylorism" during what McKelvey characterized as "a period of

unmitigated hostility--1911 to 1915"[20] lived a life of almost absolute contrast to that of Frederick Taylor. He was born as the first of nine children of Solomon and Sarah (Rood) Gompers, in a London tenement, January 27, 1850. His father, a cigarmaker, had recently immigrated to London from Holland.

Gompers' formal education consisted of attendance at a free Jewish school in London from his sixth to his tenth year. At that age he was apprenticed by his father to a shoemaker and, after a few months at that trade, he was apprenticed to a cigarmaker. In 1863, the family emigrated from London to New York's East Side, where he worked for his father for about a year before setting out for himself as a journeyman in his trade. He joined the

---

[20] However, McKelvey apparently changed his mind to backdate his "period of unmitigated hostility" to 1909, when he quoted Gomper's comment on the protest of employees of the Watertown (Mass.) Arsenal: "Systematization in getting materials ready for the ultimate workman on the final job is not novel, but building up the skilled mechanic himself . . . molding, hammering, filing and polishing him off in order to fit him for his theoretically best usefulness--that charms us unto the very soul." (In The American Federationist, 1909.) James T. McKelvey, AFL Attitudes Toward Production, 1900-1932 (Ithaca: Cornell Studies in Industrial and Labor Relations, Cornell University Press, 1952), Vol. II, p. 16.

Cigarmakers Union in 1864, and "carried his card" until his death on December 13, 1924. Gompers attended lectures and took part in debates at Cooper Union, in New York, but his real schoolrooms were the cigar shops where he worked at his trade.

In his "official" biography,[21] Gompers describes the cigarmakers' working rooms as "quiet, with work paid by the piece, and no rules against talking." Books, newspapers, and magazines, bought or lent by the employees, were customarily read aloud by members in turn, with the listeners setting aside enough cigars for the reader to allow him to turn in average production. Gompers, who "had a strong reading voice, always read more than his allotted share." He attributes the famed "intuitions" of his later career to the readings and discussions of his working days, with particular stress on the written ideas of Friedrich Engels (1820-1895), Ferdinand Lassalle, and the "real, true" Karl Marx (1818-1883), among other nineteenth century socialist authors.

"His greatest teacher" (to whom Gompers dedicated

---

[21] Samuel Gompers, Seventy Years of Life and Labor, Vol. I (New York: E. P. Dutton and Company, 1925).

his Seventy Years of Life and Labor) was Ferdinand Laurrell, whom he met when Laurrell came to New York from his native Sweden after his early career of activity in the Scandinavian Marxian socialist movement. It was Laurrell who advised Gompers to attend meetings of New York socialist discussion societies--"attend, but not join,"--and it is intimated that Laurrell's advice and influence were the deciding factors that turned Gompers' mind and energies toward a union labor career. Certainly, Gompers credits Laurrell with what became his life-long basis of judgment: "Study your union card, Sam, and if the idea doesn't square with that, it isn't true."[22]

Gompers, an inveterate attender of meetings and discusser of issues, was admitted to the society of the inner circle of socialist thought, die Zehn Philosophen, where he met the Irish refugee socialist, J. P. McDonnell, who had spent several years working in Karl Marx's London office.

From Gompers' "intuitive" examination (and rejection) of the basic ideas of the socialist movement, as he said, "came the purpose and initiative that finally

---

[22] Ibid., p. 60.

resulted in the present American Labor movement." Gompers' "intuition," as synthesized by Gomberg,[23] was his own "experimental method of considering and mentally testing theories to measure how far they'd work and not work."

In 1877, after the New York cigarmakers had lost a long, bitter strike, Gompers and Adolph Strasser undertook to reorganize the Cigarmakers Union to eliminate what they believed were the causes for the loss--"no money, no discipline, no inducement to stick together." Gompers, whose wife (nee Sophia Julian) and children (five) had lived on money borrowed from her family during the strike, became Member Number One in the new union, with Strasser taking the top title of "International President." (Gompers later became "lifetime president" of Local 144 of the Cigarmakers.)

Policy and strategy developed for the new cigarmakers union by Gompers and Strasser--to make officers of the "national" organization powerful over officers of the

---

[23]William Gomberg, "Trade Unions and Industrial Engineering," Handbook of Industrial Engineering and Management, ed. William Grant Ireson and Eugene L. Grant (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1955), p. 1126.

"locals," to increase dues to build up strike funds (with control of these funds in the hands of the national organization), and to control administration of planned sickness, accident, and unemployment funds--were quickly adopted by other union organizations.

Next step, which came only four years after Strasser and Gompers had induced the Cigarmakers to adopt their new plan, was the meeting which resulted in the formation of the "Federation of Organized Trades and Labor Unions of the United States and Canada" in 1881.

Gompers, as Chairman of the Committee on the Constitution of the Federation, used his "intuitive" shrewdness, and his planning genius, to secure adoption of these articles:

1. No "dual unions." Each trade could be represented by only one national organization, and only that national organization was eligible for Federation membership.
2. Federation voting power by the "nationals" proportionate to total number of members.
3. Self-government by each "national."

In 1886, when the first Federation was reorganized as the "American Federation of Labor," Gompers was elected to his "almost lifetime" position as president. In his first twenty years, his stubborn insistence that "labor was always right," and his reliance upon the "intuition" that appeared to guide his course to what was "workable," brought organized labor great new gains. His policies were based upon his distrust of the ideological "theorizers" and "intellectuals" who wanted to use the American union movement as a pawn in the Marxian plan of division into the "classes" which would fight in the battle to revolutionize the nation's economic system. He had planned and built the Federation on the remnants of Terence V. Powderly's Knights of Labor; he fought off the classic socialists in and of the movement until, in the years before World War I, their influence became more imagined than actual. The Federation did not win its battles without cost, nor did Gompers[24]--the single year gap in his continuous presidency occurred in 1895, when the socialists united to elect John McBride. In 1902, a convention

[24]Paul Sultan, Labor Economics (New York: Henry Holt and Co., Inc., 1957), p. 184.

resolution aimed at aligning the Federation on the side of socialism failed of passage by a mere thirty votes.[25] In 1914, "Big Bill" Heywood and his International Workers of the World tore holes in the Federation's national union coverage pattern.

Gompers' steadfast insistence that his "intuitive" knowledge of what was best for his craft-dominated unions came from his early estimate of just what the movement as he envisioned it actually would be capable of accomplishing. He said, for instance, that laboring men could not expect to make themselves over into a class of business or professional men and that such "substitutes for capitalism" as cooperative stores and workshops would always break down when operated under union auspices. To Gompers, his famous "More!" answer to a question on union aims meant (as he explained in his autobiography and in various articles in The Federationist) that the only sensible

---

[25]Richard E. Mulcahy (ed.), Readings in Economics from Fortune (Revised edition; New York: Henry Holt and Co., Inc., 1956), p. 29. "In 1893, the controversial tenth point of an eleven-point resolution advocating 'collective ownership by the people of all means of production and transportation' offered by the Socialists, was defeated by Gompers." Sultan, loc. cit.

direction for labor was "more money, more leisure, and more liberty." For organized unions "to try to go further was to be misled by fools," he said. His dedication to "business unionism" established the pattern which is (generally) followed by American unions to this era.

His insistence that organized labor eschew official political action as an organization also set the future course of the Federation into his simpler rule of "Reward your friends and punish your enemies." His policy of centralization of disciplinary power in the hands of officials of the "national" organization was aimed at "making unionism respectable" by forcing locals to honor their contracts.

Centralization of power also did much to enable Gompers to change the status of union organization from a disunited system of semi-baronial fiefdoms, headed by local and sectional leaders, into a federated and united system. His gradual emergence as the acknowledged "spokesman for labor" was probably inevitable.

Gompers' Federation was based on his belief that the most valuable asset was its members' possession of the "secrets of the craft." His "intuition" apparently made

it impossible for him to see any possibility that a labor organization could be built on any other basis than that of the separate crafts. An analysis of conditions--social, economic, and politico-demotic--might lend some weight to the proposition that Gompers was right in his belief that labor could not be organized on any other basis than that of the elite crafts during the double decade between 1890 and 1910.

Rapid industrialization of the United States in the post-Civil War era had created those conditions which (according to such thoughtful authorities as Beatrice and Sidney Webb) resulted in the establishment and/or quick growth of unions:

> . . . the great bulk of the workers had ceased to be independent producers, themselves controlling the processes and owning the materials and product of their labor, and had passed into the condition of lifelong wage earners, possessing neither the instruments of production nor the commodity in its final state.[26]

Frederick Jackson Turner's "hither edge of free land"--the western frontiers that had served to create and

---

[26]Beatrice and Sidney Webb, The History of Trades Unionism (London: Longmans, Green and Company, 1902), pp. 25-26.

perpetuate at least some degree of labor scarcity for three centuries--were, in his opinion, "about to terminate" when he read his new view of American history in 1893. While later (and perhaps lesser) historians might seek to dispute the statistical basis of Turner's statement (in effect, that only isolated instances remained in which population "density" was less than two persons per square mile[27]), there is no doubt that the sheer economics of farming made this traditional safety valve less attractive. While great areas of public lands remained "free," the costs of the competitively necessary mechanical equipment to insure survival and provide some chance of prosperity made entry increasingly difficult for the newcomers. Financial return from farming between 1890 and 1910 tended to decrease (with the notable exception of 1897, when "dollar a bushel" wheat was exported to fill a general European crop failure and produce the grain export total of

---

[27]Frederick Jackson Turner, The Significance of the Frontier in American History (New York: Henry Holt and Company, 1948), pp. 1-38. Read before American Historical Association in 1893; first published in Proceedings of the State Historical Society of Wisconsin, 1894. See also George Rogers Taylor (ed.), The Turner Thesis: Concerning the Role of the Frontier in American History (Boston: D. C. Heath and Company, 1949), passim.

$122,000,000 which ended the Depression of 1893). In this era, the "farm problem" stemmed from the fact that American farmers were selling in a world market--in competition with farmers in such other food exporting nations as Russia, the Argentine, Canada, and Australia--and buying in a market protected by tariffs enacted to protect manufacturers. As Nevins and Commager have written:

> In the years of greatest agricultural expansion, 1870-1890, the value of American farm products increased only half a billion dollars; in the same period the value of manufactures increased by six billion dollars. Prices of most farm products moved irregularly downward. Wheat that brought a dollar a bushel throughout the seventies fell to fifty cents in the mid-nineties. Cotton declined from seventeen cents a pound in 1873 to nine cents twenty years later, and then tumbled to six. Substantially the same story could be told for corn, oats, barley, tobacco, and other farm produce: the average value per acre of ten leading crops was fourteen dollars in the early seventies, nine dollars in the early nineties.[28]

Another factor that had its effect in confining actual labor organization efforts to craft groups during this period was the great increase in immigration. From

---

[28] Allen Nevins and Henry Steele Commager, The Pocket History of the United States (New York: Pocket Books, Inc., 1944), p. 371. (Copyright and originally published by Little, Brown and Company, Boston, 1942, as America: The Story of a Free People.)

a total of about five million during the 1850-1870 period, the incoming flood of "new Americans" grew to more than twenty million in the next forty years.[29]

Then, too, Gompers had watched the rise and fall of a union open to all workingmen, skilled and unskilled[30] --Terence V. Powderly's Noble Order of the Knights of Labor. This union, founded in 1869, but of little consequence until Powderly's election to its Presidency in 1879, passed from power when it allied itself with the Populist party in 1892 (public opinion, perhaps misled, generally blamed the Knights for the bomb that turned their mass meeting in support of their general strike for an eight-hour day into the deadly mess of the Haymarket Riots in Chicago in 1886).[31]

Consensus of authorities seems to indicate that, during this period, a generally deep suspicion concerning labor unions was held by many Americans, with an unwillingness to approach the problems of labor with the same sympathy with which they approached the problems of industry.[32]

---

[29] Ibid., p. 312.

[30] Ibid., p. 315.

[31] Ibid.

[32] Ibid.

In 1902, when George F. Baer, President of the Philadelphia and Reading Railway, wrote what has been called "the most unfortunate letter in the history of labor-management relations,"[33] editorial comment did not question the truth of his statement but his taste in saying:

> The rights and interests of the laboring man will be protected and cared for--not by labor agitators, but by the Christian men to whom God in His infinite wisdom has given the control of the property interests of the country.[34]

An editorial in the Boston Watchman a few days later said:

> The doctrine of the divine right of kings was bad enough, but not so intolerable as the doctrine of the divine right of plutocrats.[35]

Existence of a duality of legal rights, viewpoint, power, and willingness to act was another factor limiting consistent handling and solution of the new problems of

---

[33] At least in the opinion of Russell L. Caldwell, professor of history, University of Southern California, in a lecture during summer session, 1958.

[34] George F. Baer made the statement in a letter to W. Y. Clark, dated July 17, 1902. Gilbert Seldes, The Great Quotations (New York: Lyle Stuart, 1960), p. 66.

[35] Seldes, Great Quotations, loc. cit.

industrial relationships between a (generally) traditionally individualistic management and an expanding organized labor. Regulation of such basic issues as wages and hours was lodged, in this era, in the states alone. Federal intervention was seldom used, and the manner in which it was used during the period is exemplified by President Grover Cleveland and Attorney General Richard Olney to break the "Pullman Strike" of 1894. While, as Nevins and Commager continue,

> . . . subsequent investigations of Congressional committees and of students have sustained the strikers--and Altgeld[36]--on every point. The industrial feudalism of the town of Pullman was condemned, the strikers were largely acquitted of responsibility for disorder, the General Managers' Association was branded as arrogant and lawless, the policy of Olney improper, the use of the injunction of dubious legality, and the employment of Federal troops unnecessary and improper. This unhappy episode brought into sharp focus many of the forces that conditioned the position of labor all through these years: The insolence of the great corporation, the role of the sympathetic strike, the use of the Antitrust Act and the injunction to curb labor, the hostility of the courts, and the tendency of government

---

[36]John Peter Altgeld was Governor of Illinois at the time of the Pullman Strike. He had wired Cleveland that the Illinois Militia, which he had mobilized, could handle the situation and that federal troops were not required nor desired. He is the "eagle forgotten" of Vachel Lindsay's poem.

> authorities to side with capital rather than with labor, . . .[37]

at the time it happened the practical status of the matter was that, while labor might have sectional friends and might be able to count on local friends, the power to resolve industrial relationships rested upon the ability of the owners of capital to secure favorable federal action in widespread disputes.

Gompers' Days of Triumph

Gompers' great days of triumph were signalized by his appointments, by President Woodrow Wilson, to the United States Council of National Defense, shortly before America's entry into World War I, and as chairman-member of the Commission on International Labor Legislation, at the Peace Conference. He died shortly after presiding over the 1924 American Federation of Labor Convention, and was survived by his second wife (Grace Gleaves Neuscheler) and five children.

Besides numerous articles in The Federationist, and Seventy Years of Life and Labor (1925), Gompers' more

---

[37]Nevins and Commager, op. cit., pp. 321-322.

permanent writings include Labor in Europe and America (1910), American Labor and the War (1919), Labor and the Common Welfare (1919), Labor and the Employer (ed., Hayes Robbins, 1920), and Out of Their Mouths: A Revelation and an Indictment of Sovietism (with W. E. Walling, 1921).

Isidor Singer, editor of The Jewish Encyclopedia, seems to have been the first to call Gompers "Father of the American Labor Movement."[38]

Dispute between Gompers and Taylor over the issue of "scientific management" was inevitable, of course. Whether, as Gomberg says, "the issue was formally joined when the government introduced the Taylor Premium Pay Plan at the Watertown Arsenal in 1909"[39] or, as Nadworny says, "Gompers opened the battle in the April, 1911 Federationist, by a defense of Taylor's charge of 'soldiering'"[40] and his charge that Taylor's methods were no more than a "rehash of the old systems of force-work, tyrannical

---

[38]Isidor Singer (ed.), The Jewish Encyclopedia, Vol. VI (New York: Funk and Wagnalls Company, 1904), p. 43.

[39]Gomberg, op. cit., p. 1123.

[40]Nadworny, op. cit., p. 54.

supervision, and sweating under the guise of new terms." Gompers added that, as for Taylor himself, it was only natural that one "trained in the industrial slaughterhouse" of Midvale should devise such an "inhuman" system of management.

CHAPTER III

"PERSONALIZATION" OF THE CONTEST OF IDEAS

Changes in the Socio-economic Climate

Gompers' "intuitive" decision to switch the course of organized labor in America from its previously ideological orientation to "business unionism" may well have been as great a contribution as his organization for internal strength. While the origins of the labor movement may have been "more socialistic than the British,"[1] it was the sturdy opposition of Gompers that kept the American Federation of Labor out of the political path of the British and away from the Socialist-oriented sector led by John McBride and others.

---

[1] Richard E. Mulcahy (ed.), Readings in Economics from Fortune (Revised edition; New York: Henry Holt Company, 1956), p. 29.

Highest tide of success by the Socialists was the single-term election of McBride to the AFL presidency in 1895. Narrow defeat of the 1902 convention resolution endorsing Socialism and the series of strikes led by Heywood and involving his International Workers of the World may be likened to lesser waves of action by the ideological wing of the Federation. Gompers' leadership was never in serious doubt after McBride's brief occupancy of the seat regarded by most union members as Gompers' own.

Many reasons have been advanced for American labor's consistent refusal to enter the fields of politics as a party, or to follow a line of even modified Marxism by division into or espousal by any but some of the smaller and highly specialized separate unions. Professor Rossiter's analysis, which is essentially a tribute to the good sense of union members, is probably as realistic and factual as any. He says:

> However full of rough spots the history (of the United States)--depressions, upheavals, insurrections, wars, repeated acts of exploitation of men and nature--we have had less than our share of misery and frustration, more than our share of happiness and fulfillment . . . We are clearly the most fortunate and well-situated of the nations of the earth. The appeals of radicalism have gone unheeded in America because the

> promises of radicalism have been largely fulfilled. The isms of Europe have foundered, as the German Marxist Werner Sombart once noted, "on the shoals of roast beef and apple pie."
>
> Friederich Engels, the good Sherpa of Marx's assault on the summit of capitalism, put his reluctant finger on a related reason for the hard times of radicalism in the United States. In a letter of 1892 to Friederich Sorge, a German revolutionary who had settled down in Hoboken to teach music and spread socialism, Engels complained that the staying power of America's "bourgeois prejudices," which he found to be almost as "strongly rooted in the working class" as among businessmen. He saw clearly, as Marx apparently did not, that the bigness, uniqueness, success and freshness of the American experiment had created a popular state of mind unusually hostile to comprehensive radicalism.[2]

John Fischer, editor of Harper's Magazine, in commenting on Theodore H. White's "The View from the Fortieth Floor (in the June 1960 issue) credits the mass circulation magazines of the era as a great (and frequently overlooked complementary force. He says:

> Mass magazines grew out of a strange combination of circumstances which converged during the final decades of the last century. Those were the years when American industry discovered

---

[2]Clinton Rossiter, "Why Marx Failed Here," formerly appearing as "Adventures of the Mind," The Saturday Evening Post, August 20, 1960, p. 32, to be published in Professor Rossiter's Marxism: The View from America (New York: Harcourt, Brace and Co., 1960).

the techniques of mass production. A factory was no longer limited to serving a local market; it could now turn out enough shirts, or stoves, or soap to supply customers all over the continent. Moreover, the railroad network was completed at about the same time, so that the goods could be delivered anywhere.

. . . And . . . printers were developing high-speed rotary presses, capable of spinning out millions of copies of a magazine in a few days. The railroads, again, were now ready to deliver them promptly to every village. Public schools were turning out the first mass audience, creating the first nation where everybody could read --at least a little. For those who couldn't, including a swelling stream of immigrants, there were pictures--which now, for the first time in history, could be reproduced cheaply and fast, because somebody had just invented half-tone engraving.

The result was a sudden flowering of a new kind of magazine--McClure's, Collier's, The Saturday Evening Post, Leslie's, The Ladies' Home Journal, Munsey's, Cosmopolitan, and a few others . . . they reached everywhere, as no newspaper could . . . they carried a national message.[3]

Fischer quotes White thus:

For the past fifty years anything this country has done, the magazines kicked them into doing--the magazines closed up the trusts, cleaned up the cities, put through the food-and-drug act, amended the Constitution, closed off immigration . . .

---

[3]John Fischer, "The Easy Chair," Harper's Magazine, July, 1960, pp. 12-13.

After 1900, in Fischer's opinion, the mass magazines lost their place as "the Big Horn" of national advertising and merchandising, first to the radio (about 1925), and later to television (since about 1950).[4]

Another authoritative opinion which does not appear to be at any variance with the ideas of Rossiter and White is that of Philip Taft:

> It was not the worker who had the lowest bargaining power, but the one with the greatest sense of independence who pioneered the trade union movement.[5]

While these analyses may not give to Gompers the kudos of the "labor school" of sometimes too laudatory historians,[6] it would appear that if he did not, personally, defeat the Marxists, he could, and did, provide the kind of leadership most of his subordinates and most of

---

[4] Ibid.

[5] Philip Taft, "Theory of the Labor Movement," Interpreting the Labor Movement (New York: Industrial Relations Research Association, 1952), p. 5.

[6] It has been said this iconolatry paraphrases Evelyn Waugh's quotation of Msgr. Knox: "everything in Africa starts with Livingstone" (Evelyn Waugh, Monsignor Ronald Knox [Boston: Little, Brown and Co., 1960]), by substituting "labor" for "Africa," and "Gompers" for "Livingstone."

his rank and file members desired. Analysis on afterthought is a colder, calmer and easier task than assuming and adhering to a position when all must be risked in a touch-and-go situation. Whether it was the unique economic progress of the nation or a kind of "share the wealth" public attitude developed by manufacturing and merchandising to a truly national market that defeated the Marxist influence in the American labor movement, Gompers was always willing to stand up and be counted. The "moral power--persuasion, not force" he said he exercised was never non-directive nor weak.

A resumé of those inventions which are regarded as of importance to developments during the American industrial revolution would tend to support Rossiter's viewpoint. The nation was still essentially rural in 1860, and the Civil War had been held by some historians of the era to have been a contest between two sectors of Jefferson's "great rural republic"--King Cotton versus King Wheat.[7]

---

[7]Allen Nevins and Henry Steele Commager, The Pocket History of the United States (New York: Pocket Books, Inc., 1944), p. 280.

As Nevins and Commager continue, however:

> . . . in the end it was Hamilton who won, at least on the economic front. It was his opinion on the bank that was accepted, his brand of mercantilism that was adopted, his Report on Manufactures that became the American gospel. A century after . . . the United States was the greatest industrial nation in the world. It had uncovered more coal and iron ore, forged more steel, drilled and refined more oil, laid more tracks, built more factories, than any other nation on earth . . . the value of manufactured products was five times that of farm products . . .
>
> . . . . . .
>
> The bases of American industrial development were six: raw materials vaster and more varied . . . inventions and techniques for converting the raw materials into manufactured products; a transportation system of water and rail fully adequate to the demands of an expanding economy; a domestic market rapidly expanding with the increase in population and the growth of foreign markets; a labor supply constantly renewed through immigration; the absence of vexatious tariff barriers between states or sections; protection against foreign competition, and the maintenance of direct and indirect government subsidies. To these fundamental factors should perhaps be added the spirit of enterprise and the atmosphere of optimism . . .
>
> . . . . . .
>
> The industrial revolution was based on coal, oil, iron, and eventually electricity . . . By 1910 the nation was mining five hundred million tons a year, but less than one per cent of its available reserves had been tapped. In . . . oil . . . in no year since 1900 has American production been less than the total production

> of the rest of the world. . . . Iron ore . . . all around the rim of Lake Superior, in the South . . . in the West . . . greater potential water power than any other nation . . .
>
> . . . . . .
>
> By 1890 (steel) production surpassed that of Britain; by 1900 the United States was making more steel than Britain and Germany combined. By 1920 American blast furnaces were forging twenty-seven million tons of pig iron and forty-two million tons of steel . . .
>
> . . . . . .
>
> Americans probably patented more numerous and more ingenious inventions than any other people. Between 1860 and 1900 no fewer than 676,000 patents were granted.
>
> . . . . . .
>
> In the thirty years after 1870 the total number of wage earners increased from twelve to twenty-nine millions, but those engaged in manufacturing from less than three to seven millions.[8]

Professor Heffner, after enumerating the natural resources and distributive facilities that made American industrial progress possible, credits three other decisive factors as well: ". . . the personalities and genius of American business leaders, the constant assistance rendered business by a friendly national government, and the

---

[8] Ibid., pp. 280-294, et passim.

nation's acceptance of an ethic that transformed its social order into a business civilization."[9]

He names, as examples of these new holders of positions of prestige and power, Andrew Carnegie in steel, John D. Rockefeller in oil, Philip D. Armour in meat packing, J. Pierpont Morgan in finance, and James J. Hill, Leland Stanford, and Edward H. Harriman in railroads. He continues:

> These were the leaders of a new American aristocracy, the giants who controlled the nation's industries, its wealth and, some maintained, its very destinies . . . [A]lmost to a man they possessed aggressive personal traits and an unlimited capacity for business affairs that went far to secure them treasure in a brutally piratical age . . . They were hard-headed, hard-working, enterprising, domineering and imaginative men. Their extravagant visions of personal gain were seldom beclouded with concern for the welfare of their laborers or the many weaker competitors whom they frequently destroyed by fair means or foul. . . . And the business elite's thorough mastery of the art of monopolization was clearly evidenced by Rockefeller's consolidation of the nation's oil industry into the Standard Oil trust and Carnegie's domination of almost the entire steel industry.[10]

---

[9]Richard D. Heffner, A Documentary History of the United States (New York: New American Library, 1952), p. 159.

[10]Ibid.

CHAPTER IV

INTERLUDE--AND BETHLEHEM

Joseph Wharton--Linderman and Taylor

Taylor's new business card carried the slogan, "Systematizing Shop Management and Manufacturing Costs A Specialty," and his career as a management consultant started with assumption of duties as general manager of Manufacturing Investment Company, pulp and paper manufacturers, in 1890. He learned his trade in the field in work for such firms as Cramp's Ship Yards, Northern Electric Motors Company, Steel Motor Company, Johnson Company, and Simonds Roller Bearing Company. Of these early "Taylor companies," only Simonds is mentioned in any detail later by Taylor.

In May 1898, Joseph Wharton,[1] founder (in 1857 as the Soucon Iron Company) and principal stockholder of the then-styled Bethlehem Iron Works (it became Bethlehem Steel Company the following year), prevailed upon his fellow directors to hire Taylor to reorganize the Bethlehem shops in accordance with the Taylor system. Taylor told Robert P. Linderman, president of the company, that he would introduce a system which would guarantee prompt execution of management decisions, curtailment of "soldiering" by workmen, determination of "correct" work methods, production increases and a lowering of production costs (with an increase of wages by 25 to 30 per cent), and continuation of the Midvale metal cutting experiments.

Taylor's staff at Bethlehem, in addition to J. Maunsel White, included Henry Lawrence Gantt (1861-1919), who codified results of the metal cutting experiments,

---

[1]Wharton (1826-1909), while one of the founders and for 24 years trustee-chairman of Swarthmore College, donor in 1881 of $100,000 (later increased to $500,000) used by the University of Pennsylvania to establish its Wharton School of Finance and Commerce, and donor of funds to establish the Johns Hopkins University Psychological Laboratory that same year, is author of an undated paper entitled, "Is a College Education Advantageous to a Business Man?"

and Carl George Lange Barth, the mathematician who was able to make the vast accumulation of machine speed and feed data available for practical use by reducing it to a series of slide rules.[2] Without these "Barth Slide Rules" the expense of using the information might have made wide application of the information economically difficult.[3]

President Linderman, overawed (and perhaps "pressured") by the enthusiasm of his company's controlling stockholder, does not seem to have continued to be inclined to extend to Taylor that degree of cooperation to which Taylor thought he was entitled. While Taylor reported to Linderman, his continual reports, suggestions,

---

[2]Patent for the slide rules was in the names of Barth, Gantt and Taylor. Frederick W. Taylor, The Principles of Scientific Management (New York: Harper and Brothers, 1911), p. 248.

[3]Barth was born in Christiana, Norway, and had found his first job here (as a draftsman for William Sellers and Company) shortly after he arrived in Philadelphia in 1881. He became chief designer in 1891, and his title during his work with Taylor at Bethlehem was Machine Shop Engineer until they left in 1901. He lectured on scientific management at Harvard, and was employed as an expert in shop management by the United States Ordnance Department from 1909 to 1918. Albert N. Marquis (ed.), "Carl G[eorge] Lange Barth," Who's Who in America, 1920-1921, Vol. XI (Chicago: A. N. Marquis and Co., 1921), p. 326.

demands, and complaints were not so handled that full and wholehearted joint efforts were secured from the company's "middle management." Taylor was, in plain language, a new, unwelcome, and unsettling influence. Wharton had forced Linderman to accept him, but there were several in the upper echelons of Bethlehem management who could not (or would not) understand why Taylor's undertakings, and Taylor's presence, were necessary. Finally, when even Wharton gave up active advocacy, the way was open for Linderman to solve the problem.

Linderman's note to Taylor, dated 17 April 1901, read: "I beg to advise you that your services will not be required by this company after May 1st, 1901."[4]

With his patents profits, Taylor was able to say, later in 1901, "I cannot longer afford to work for money."

---

[4]Milton J. Nadworny, Scientific Management and the Unions (Cambridge: Harvard University Press, 1955), p. 11. Nadworny also quotes John Dos Passos' comment:

> Fred Taylor
> inventor of efficiency
> who had doubled the production of the
> stamping mill by speeding up the main
> lines of shafting from ninety-six to
> twohundred and twentyfive revolutions
> a minute
> was unceremoniously fired.

Henry L. Gantt, who had followed Taylor from Midvale to Bethlehem, was Taylor's first associate in his new career. Carl Barth, if not second member of the group, was another early "disciple."

Afterwards, Taylor expressed himself as "glad to go" from Bethlehem. His abrupt dismissal was, he stated, part and parcel of the arrangements made by Wharton and Linderman to bring Charles M. Schwab into the management of the company. Taylor intimated that Schwab had assured the Bethlehem board of directors that the pace of Taylor's production could be maintained without payment of worker bonuses. Taylor's tart tag line was his observation that bonus payments were resumed after the first of Bethlehem's "Schwab strikes."

The "Shovelling" and Pig Iron Experiments

Among Taylor's Bethlehem experiments were his famed "pig iron" and "shovelling" experiences. His story of the increase in work output achieved by "Schmidt," the 130-pound Pennsylvania Dutchman, in moving billets of pig iron has been told and retold. But an increase from an

average daily handle of 12-1/2 long tons per man to 47-1/2 tons, when it has been accomplished in accordance with a plan and estimate which had predicted the results, does bear repetition.

"Schmidt" had been "scientifically" selected by Taylor from a gang of 75 pig iron handlers, after an investigation into the characters, ambitions, and personal habits of the four finalists. "Schmidt" was chosen, Taylor said, because he "had been observed to trot back home for a mile or so after his work in the evening, about as fresh as he was when he came trotting down to work in the morning." "Schmidt," who also "placed a very high value on a dollar," was tempted to qualify as a "first-class, high-priced man" by being the first to try to handle 47 tons of pig iron in a single day. The inducement was an increase in his daily pay from $1.15 to $1.85.

"Schmidt's" task was to pick up from a pile of 92-pound billets, carry the pig an average of 36 feet, walk up an inclined plank placed against the side of a railroad car, and drop the pig into the car. He was to work when he was told to work, to rest when he was told to rest, and to work at a prescribed rate. Taylor's plan for

the task was based upon a 47 per cent load, 53 per cent rest schedule. "Schmidt" performed the task by half-past five in the afternoon.

Whether he trotted home that evening is not recorded in the notes, but he was able to duplicate his performance "practically always" during the three and a half years of Taylor's remaining time at Bethlehem. From the original gang of 75 men, "Schmidt" and seven others were able to measure up to the 47-ton-per-day work volume Taylor's calculations called for.

Taylor's "science of shovelling" was based on the method of trial-and-error, cut-and-try to discover the optimum pound weight of material that could be handled per shovel load. His determination that the shovel-load at which a man would accomplish the biggest day's work (21 pounds) is still a "standard load calculation," and his provision of eight to ten shovel sizes, for different kinds of material, is still standing operating procedure. Cost savings accomplished in the Bethlehem main yard were calculated by Taylor thus:[5]

---

[5]Taylor, op. cit., p. 54.

	Old Plan	New Task Work Plan
Number of yard laborers was reduced from between	400 to 600	About 140
Average number of tons handled per man per day	16	59
Average earnings per man per day	$1.15	$1.88
Average cost of handling one ton (2,240 pounds)	$0.072	$0.033

In this calculation, office and tool room expense, wages of all labor superintendents, foremen, clerks, time-study men, etc. are included. During the first year, materials handling expense was reduced $36,417.69. The following year, when the entire yard was worked in accordance with the method, costs savings were at the rate of $75,000 to $80,000 per year.

Taylor's basis of calculation of the amount of extra pay required to induce laborers to exert the extra effort needed to qualify as one of his "first-class, high-priced" men was, in its essence, another "cut-and-try" experiment. He explained it as putting the planned task before selected workers, and paying them only so much more in wages as would get the work pace he desired. Pay

increases ranged from 30 per cent to a top of 60 per cent.

On these foundations--the timed, planned "one best way" of performing a set task; assumption by management of all responsibility for expediting "facilities," training and direction; payment of wages high enough to induce performance of the assigned work; and complete, careful attention to details by managers--the "Taylor System" was constructed.

Ablest proponents of the system were probably Frank B. Gilbreth, friend and accepted associate, and Harrington Emerson, never accorded Taylor's acceptance but destined to draw to the "Taylor System" far more attention and popular interest than Taylor had been able to attract by his own efforts.

To Taylor, those men who were working to introduce some of his methods or adapt his system and philosophy to specific problems were either "his" men and friends, or they were quacks. Even in his own selected circle, there was little of primus inter pares in Taylor's estimation of his place, and his attempts to discredit any who disagreed with him (even among his "disciples") puts some blots on his record.

No record has come to light of Taylor's private or professional opinion of Harrington Emerson (who was neither Taylor's associate nor quack), but there are elements of irony in the fact that Emerson's recital of his success with a system that was, frankly, adapted from Taylor's, should have made the "Taylor System" and its creators the best-known names in the new business of "scientific management."

CHAPTER V

EVOLUTION OF "SCIENTIFIC MANAGEMENT"

Perronet, 1760; Charles Babbage, 1832; Oliver Evans, 1850; Henry R. Towne, 1893

It is probable that man started his search for the "one best way" about as soon as he started to manufacture his first tools or weapons. Evidences of "organization for production" have been uncovered by archaeological probings into Kentish flint mines believed to have been worked as early as 4,000 B.C., and in the 1700 B.C. Egyptian pyramids.

Earliest "time and motion" enquiries in the modern era appear to have been made by the Frenchman, Perronet, in 1760, who "made extensive studies on the manufacture of No. 8 common pins, and arrived at the standard

of 494 per hour."[1]

What might be referred to as a statement of the principles, or the philosophy of what was to become known as "scientific management," is cited by Alford and Beatty[2] as an 1850 Philadelphia publication addressed to millwrights:

> I. To investigate the fundamental principles of the theory, and process of the art, or manufacture, we wish to improve.
>
> II. To consider ways is the best plan, in theory, that can be deduced from, or founded on these principles, to produce the effects we desire.
>
> III. To inquire whether the theory be already put in practice to the best advantage, and what are the imperfections or disadvantages,

---

[1]Benjamin W. Niebel, Motion and Time Study (Revised edition; Homewood, Ill.: Richard D. Irwin, Inc., 1958), p. 6. Niebel continues: "Sixty years later an English economist, Charles Babbage, made time studies on No. 11 common pins, and as a result of these studies, determined that one pound (5,564 pins) should be produced in 7.6892 hours." cf. Herbert N. Casson, Creative Thinkers (New York: B. C. Forbes Publishing Co., 1929), p. 6, which states: "Babbage found, by visiting many factories in England and France, that manufacturers were wholly unscientific--that most of their work was guess work. He found, to his great surprise, that factories were run by traditional methods. He discovered that manufacturers made little use of science or mathematics, and that they relied upon old opinions instead of investigations and accurate knowledge."

[2]L. P. Alford and H. Russell Beatty, Principles of Industrial Management (Revised edition; New York:

and what plans are likely to succeed better.

> IV. To make experiments in practice, upon any plans that these speculative reasonings may suggest, or lead to any ingenious artist taking the foregoing steps, would probably be led to improvement on his own art; for we see in daily experience, that every art may be improved. It will, however, be in vain to attempt improvements unless the mind be freed from prejudices in favor of established plans.[3]

Most famous of the early inquirers into the question of what actually constituted a scientifically determined fair day's work by an employee was probably Charles Babbage (1792-1871), the Cambridge University mathematician, who had written On the Economy of Machinery and Manufactures in 1832. Babbage's interest in the question was based on his desire to "eliminate a source of friction between employer and employee" by finding out "scientifically" how much work a worker could do in a day, on an average.[4]

Ronald Press Co., 1951), p. 6.

[3]Oliver Evans, The Young Mill-Wright and Miller's Guide (13th edition; Philadelphia: Lea and Blanchard, 1850), p. 355.

[4]Charles Babbage, On the Economy of Machinery and Manufactures (London: Charles Knight, 1832). Quoted by C. Bertrand Thompson (ed.), Scientific Management (Cambridge: Harvard University Press, 1914), pp. 5-6. Babbage

Although Babbage did consider timing workers' actions with a watch, he believed that a better system was to ask employers what quantity of work was generally considered to be a "fair day's work." He also believed that a knowledge of production costs and of specialization and

---

(1792-1871), while holding the Lucasian Professorship of Mathematics at the University of Cambridge from 1828 to 1839, never lectured. In 1822, he suggested the idea of a calculating "engine" to Sir Humphrey Davy (1778-1829), who secured government backing for the project. In 1842, government support was stopped when the "almost successful" machine was adjudged unfeasible. He expended a good part of his personal fortune on further work until he abandoned the task in 1856.

Babbage also published Tables of Logarithms, in 1826, and was a founder of the Royal Astronomical Society (1820) and the Statistical Society (1834).

Geoffrey Cumberlege, Publisher, Concise Dictionary of National Biography (London: Oxford University Press, 1948), p. 43, gives 1834 as the publication date of On the Economy of Machinery and Manufactures.

cf. "Charles Babbage," Encyclopaedia Britannica, 11th ed., Vol. III (Cambridge, England: University of Cambridge Press, 1910), p. 91, which titles the work, Economy of Machines and Manufactures, and states Babbage was a graduate of Peterhouse College, Cambridge.

cf. Frank Moore Colby and Talcott Williams (eds.), The New International Encyclopaedia, Vols. 1-2 (2d edition; New York: Dodd, Mead and Co., 1928), pp. 473-474, which states Babbage was a graduate of Trinity College, Cambridge.

The monumental "labor of love," Alumni Cantabrigiensis, seems to have the last word. Venn writes that Babbage matriculated at Trinity April 21, 1810, "migrated" to Peterhouse April 7, 1812, received B.A. degree 1814, M.A. 1817. J. A. Venn, compiler, Alumni Cantabrigiensis (Cambridge: Cambridge University Press, 1940), Pt. II, Vol. I, p. 127.

division of labor, were essential in factory operation.

It is probable, according to Nadworny, that Taylor never heard of Babbage. It is undoubtedly true that, if he had, he would have regarded the "ignorant" employers as the last, and least authoritative, source of knowledge about what should constitute a fair day's work.[5]

---

[5]Babbage appears to have contradicted himself on this question. Copley quotes him as writing (in the 1832 Carey and Lea Philadelphia edition of On the Economy of Machinery and Manufactures) this opinion: "There is perhaps no trade or profession existing in which there is so much quackery, so much ignorance of the scientific principles, and of the extent of their own art, with respect to its resources and extent, as is to be met with amongst mechanical projectors." Frank B. Copley, Frederick W. Taylor: The Father of Scientific Management, Vol. I (New York: Harper and Brothers, 1911), p. 100.

Babbage's Lucasian chair of mathematics was held by Isaac Newton from 1669. Richard Tetley Glazabrook, Dictionary of National Biography, Vol. XIV, ed. Leslie Stephen (London: Oxford University Press, 1950), p. 373.

Babbage had conceived the idea of a "wheelwork" calculating machine in 1820, and had secured government backing (a grant from the Civil Contingencies Fund) on the recommendation of Sir Humphrey Davy (1778-1829) in 1823, when Davy was President of the Royal Society. His first model performed calculations on directions by two sets of perforated cards, one of which carried the numbers to be worked with, the second directing the sequence of operations to be performed. In 1842, when government support was withdrawn (after £17,000 of government funds and £6,000 of Babbage's had been spent), Babbage continued the work alone until 1856.

In his latter years, Babbage was best known to the London public as an "implacable foe of organ grinders," whose noises he deplored. Agnes Mary Clerke, Dictionary of National Biography, op. cit., Vol. I, pp. 776-778.

Taylor's Work at Midvale

Henry Robinson Towne, whose 1886 paper on The Engineer as an Economist placed the burden of industrial methods improvement on the shoulders of management,[6] is known to have been among the early guides and encouragers of Taylor. Towne, as an authoritative spokesman for the philosophical principles, and William Sellers, who provided the practical backing and background for Taylor's experimentation, appear to deserve recognition as the "godfathers" of the "father of scientific management."

When Taylor was promoted to gang boss at Midvale, as he said later "he was now working on the side of the management," and "now I have accepted a job under the management of this company and I am on the other side of the fence, and I will tell you frankly that I am going to try to get a bigger output from those lathes."

---

[6] "The beginning of the 'management movement' in the United States is generally marked as 1886, when Henry R. Towne presented his paper, 'The Engineer as an Economist,' at a meeting of the American Society of Mechanical Engineers." Edward H. Bowman and Robert B. Fetter, Analysis for Production Management (Homewood, Ill.: Richard D. Irwin, Inc., 1958), p. 13.

In his writings, Taylor reiterated his belief that the shortcomings in the production of his own shop, and of every other shop in the nation, were due to the fact that the workers, not the employers or their managers, were the ones who actually ran the jobs. "The workmen together had carefully planned just how fast each job should be done," he said, "and they had set a pace for each machine throughout the shop, which was limited to about one third of a good day's work."

On what seems to be a completely subjective judgment, based upon his experiences as an apprentice and less than two months of actual experience working with his hands, Taylor began the evolution of a complete scheme of "scientific management." A man less modest than Taylor might have felt, as Nadworny said, that "the fact that he did not know what was a 'good day's work' apparently did not prevent him from attempting to elicit it from the workers." Taylor's repeated assertions that the reason for the workers' ability to set their own pace--"the ignorance of employers as to the proper time in which work of various kinds should be done"--might well have included Frederick Winslow Taylor himself.

The new twenty-three year old gang boss used "every expedient" on his crew to induce them to work up to his own arbitrary standards, including firing "the stubborn ones," cutting piece work rates, hiring and training new men himself, and "the limits of the English language." He claimed ultimate victory in what he referred to as this "friendly war." On the basis of a great increase in production by his section, he was promoted to machine shop foreman.

It was while he was in this job at Midvale, in which he was forced to assume larger and longer term responsibilities, that the first steps toward a system which might properly be called "scientific" were taken.[7] Taylor took upon himself the task of determining the "fact" of what constituted a fair day's work. His aim was to use experimentally derived "facts" to replace management ignorance in an effort to obtain worker cooperation and to "harmonize" the interests of employees and employers. At long last, Taylor was on the long road of experiments that were to be used by him, and improved by others, to put

---

[7]Taylor, op. cit., passim.

some basis of factual information into what was at that time largely a "rule-of-thumb" system of factory production management. His investigations were to cover, among other items, such subjects as worker fatigue, shovelling methods, pig iron handling, and ball-bearing inspection. Results he attained, of tremendous immediate importance in themselves, were of even greater worth in that they formed a new and basic system of work investigation which enabled his contemporaries, and his and their followers, to analyze fairly and determine at least semi-objectively a logical pace for factory production work. Today, nearly seventy years after the first of Taylor's investigations at Midvale, controversy and conflict still exist (as, perhaps, they should exist in a free society), but the areas and extent of argument have been narrowed into acceptable and useful limits.

Taylor may have been completely sincere in his oft-repeated statements that his work was aimed as much at the eventual betterment of the lot and status of working men as it was at betterment of the tools of management. However, there is enough in the records of his private correspondence and his public dedication to the interests

of owners to prove that this sympathy for employees and their advancement was a secondary consideration. It probably could not have been otherwise, in the industries of America in the 1890-1910 period. Taylor probably could not have been able to secure backing for his empirical experiments without the motive of additional profits for those who financed his work.

In print and in speech, Taylor said his system of management sought to create employer-employee relationships based on "intimate, friendly cooperation." His idea of mutuality of "cooperation" meant that management should search out, and gather and formulate into what he called "laws," the knowledge and "know-how" of employees. It was, to Taylor (and, in truth to nearly all of turn-of-the-century management), completely natural that what management would include as "law" should be what management conceived to be most efficient and most productive in methods, work pace, and work order. Once these formulations had been reduced to the management idea of "the one best way," it was management's unilateral prerogative and duty to insist that the work be done that way. For the employee, Taylor's idea of "cooperation" meant that the

employees were "to do what they are told to do promptly and without asking questions or making suggestions."

When Taylor left Midvale in 1890, his first system had been in operation for about five years, and the start had been made on the tremendously long and expensive series of essentially "cut and try" experiments that led to "On the Art of Cutting Metals." His fundamental theories and philosophy of management had been presented in printed form, and his work had attracted enough professional attention that he felt he should broaden the base of his influence in a new career as "management consultant."

Shop Management--the First "Principles"

What were later to be called Taylor's "principles" were first published in his ASME paper on "Shop Management." In addition to his ideas on "cooperation," Taylor advocated:

> (a) A Large Daily Task. Each man in the establishment, high or low, should daily have a clearly defined task laid out before him. This task should not in the least degree be vague nor indefinite, but should be circumscribed carefully and completely, and

should not be easy to accomplish.

(b) Standard Conditions. Each man's task should call for a full day's work, and at the same time the workman should be given such standardized conditions and appliances as will enable him to accomplish the work with certainty.

(c) High Pay for Success. He should be sure of large pay when he accomplishes his task.

(d) Loss in Case of Failure. When he fails he should be sure that sooner or later he will be the loser by it.

(e) First Class Men. When an establishment has reached an advanced state of organization, in many cases a fifth element should be added, namely: the task should be made so difficult that it can only be accomplished by a first-class man.[8]

These "laws" of work performance standards, plus his ideas of "systematizing" were the foundations on which Taylor based his "middle career" as an advisor to management. His system called for a planning department to lay out work at least one day ahead; detailed, written work orders; a reporting system which would show success or failure by individuals in accomplishing the day's set task; routing of work to utilize the most efficient

---

[8] Ibid.

machines; a "time quota" statement showing the time allotted to each separate segment of the work; tool control to specify and issue drawings, jigs, fixtures, and other specialized tools and appliances; "functional foremanship," and specialization of labor carried to its (to Taylor) logical end of such dilution of skill that common labor could be taught to do parts of the work then done by skilled journeymen and master craftsmen. Taylor's "standard time" allotments for task performance were an arithmetic average of the "fastest times" achieved by experienced men, in a series of only twenty studied cases.[9]

Functional Foremanship

"Functional foremanship," generally cited as one of the "impossible" requisites of the Taylor system, was regarded by its originator as a reasonable facet of division of labor.[10] Taylor felt specialists in what he termed the four "bossing tasks" would provide more

---

[9] Ibid., p. 59.

[10] Taylor, op. cit., p. 99. He wrote: "The work of each man in the management should be confined to the performance of a single leading function."

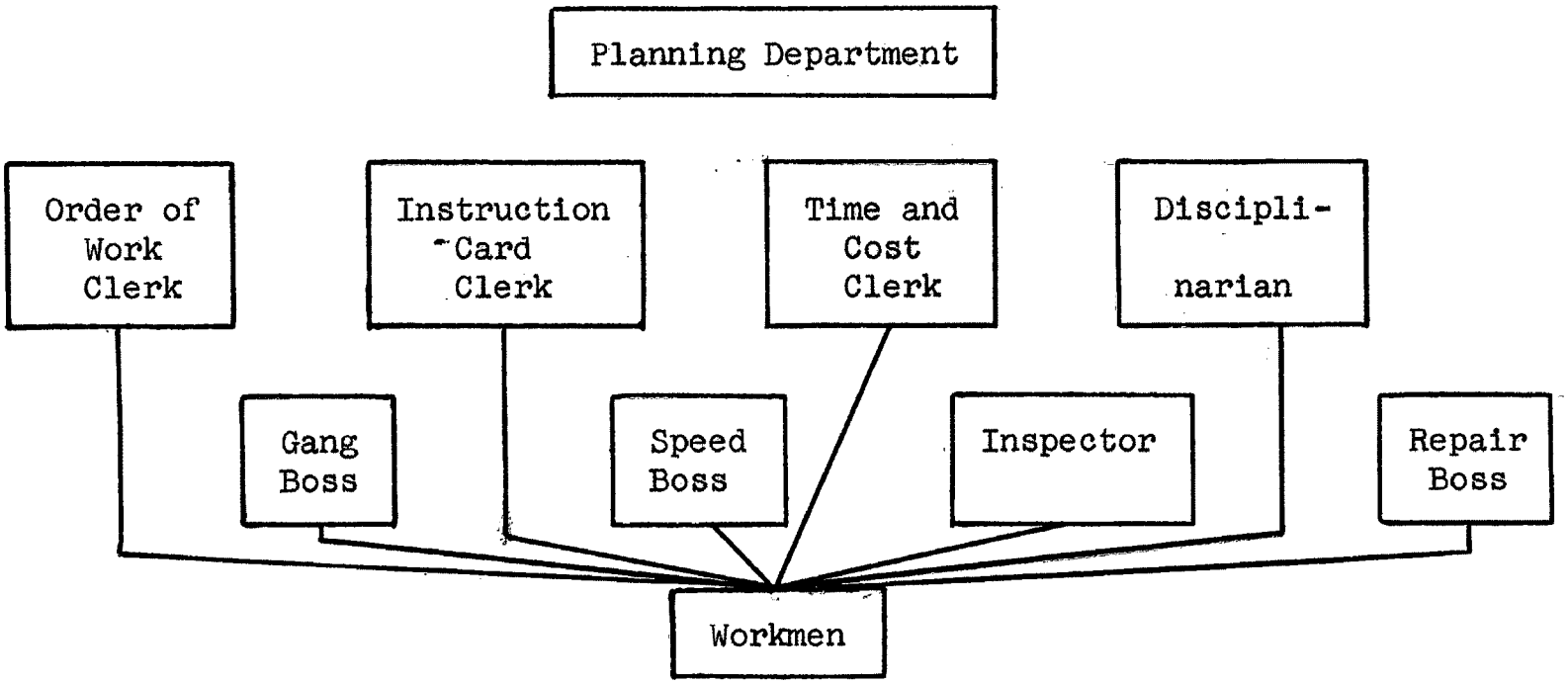
efficient supervision. In his system, not four, but eight specialists would have direct and immediate authority over each workman. In general, his organization would be diagrammed in the manner indicated by the chart on the following page.

Taylor's device of a "Differential Piece Rate Plan" differs from other incentive wage payments of the period only in its application of his "loss for failure" dictum, supra. On comparison with "The Halsey Plan," "The Rowan Plan" and the "Gantt Task and Bonus System," its schedule of total weekly wages to be paid superior workers calls for higher pay than all but the Gantt system. Illustrative tables, based upon identical production achievements, follow.

The last of the "Shop Management" "principles" was apparently eliminated from Taylor's later versions of his philosophy of management. Its early espousal by Taylor was not forgotten by critics--in the hands and minds of his Congressional inquisitors, and in the hand and mind of Samuel Gompers, it may well have been the "stone of stumbling" that has taken from Taylor much of the credit and recognition due him.

Figure 1

FUNCTIONAL FOREMANSHIP*



*Source: Dale Yoder, et al., Handbook of Personnel Management and Labor Relations (New York: McGraw-Hill Book Co., Inc., 1958, pp. 6-22.

TABLE 1

TAYLOR DIFFERENTIAL PIECE-RATE PLAN*

Data: Normal weekly wage, $40 (40 hours); standard output, 4 units per week, 10 hours per unit. Two piece rates: standard and above at $10 per piece; under standard, $7.50 per piece.

Employee	Units per week	Piece rate	Weekly earnings
A	3.6	$ 7.50	$ 27.00
B	4.0	10.00	40.00
C	6.0	10.00	60.00
D	8.0	10.00	80.00

*Dale Yoder, Manpower Management and Employment Relations, Handbook of Industrial Engineering and Management, William Grant Ireson and Eugene L. Grant, eds. (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1955), pp. 237-238.

TABLE 2

THE HALSEY PLAN*

Data: Normal weekly wage, $40 (40 hours); normal hourly rate, $1.00; normal output or production, 4 units per week, 10 hours per unit; earnings, time taken at hourly rate plus premium; guaranteed weekly wage, $40; premium, 50 per cent of time rate for time saved.

Employee	Units per week	Time taken per piece, hours	Time saved per piece, hours	Hours saved	Base wage	Premium for time saved	Weekly Earnings
A	3.6	11.1	-	None	$ 40	-	$ 40
B	4.0	10.0	-	None	40	-	40
C	6.0	6.7	3.3	20	40	$ 10	50
D	8.0	5.0	5.0	40	40	20	60

*Yoder, op. cit.

TABLE 3

THE ROWAN PLAN*

Data: Normal weekly wages, $40 (40 hours); normal hourly wage, $1.00; normal output or production, 4 units per week, 10 hours per unit; earnings, time taken at hourly rate plus premium; guaranteed weekly wages, $40; premium hourly rate is base rate plus percentage of time saved.

Employee	Units per week	Time taken per piece, hours	Time saved per piece, hours	Per cent Normal time taken per piece	Per cent Normal time saved per piece	Hourly rate	Weekly Earnings
A	3.6	11.1	-	111.1	-	$ 1.00	$ 40.00
B	4.0	10.0	-	100.0	-	1.00	40.00
C	6.0	6.7	3.3	66.7	33.3	1.33	53.20
D	8.0	5.0	5.0	50.0	50.0	1.50	60.00

*Yoder, op. cit.

TABLE 4

GANTT TASK AND BONUS SYSTEM*

Data: Guaranteed weekly wages, $40; standard output or production, 4 units per week, 10 hours per unit; standard time rate, $1.00 per hour; earnings, standard and above, time allowed at standard time rate plus premium; below standard, guaranteed weekly wages; premium, 20 per cent of payment for time allowed.

Employee	Units per week	Standard hours allowed	Wage for time allowed	Premium	Weekly earnings	Labor cost per piece
A	3.6	36	$ 40	-	$ 40	$ 11.11
B	4.0	40	40	$ 8	48	12.00
C	6.0	60	60	12	72	12.00
D	8.0	80	80	16	96	12.00

Considered from a strictly "scientific" viewpoint of the firm seeking individual competitive advantage, Taylor's cold-blooded selectivity theories may be perfectly sound. That such a statement could have been made (and, at least tacitly accepted as a statement of management policy by firms utilizing Taylor's services) was an indication of general management sentiment of his times. While, in the opinion of Professor Cochran, "the origins of public relations . . . go far back," he adds that the few trade associations which engaged in presenting their industries to the public in a more favorable light before 1910 ". . . were isolated instances."[11]

Taken in the context of contemporary comments, the lack of humanistic considerations in the original statement of the Taylor system is not remarkable. Jay Gould's statement, "Labor is a commodity that will in the long run be governed absolutely by the law of supply and demand,"[12] and an 1890 lead editorial in The Times of London

---

[11]Thomas C. Cochran, Basic History of American Business (Princeton: D. Van Nostrand Co., Inc., 1959), p. 83.

[12]Nevins and Commager, op. cit., p. 326.

which commented "that . . . to suggest that a man has a right to work or eat is a wild proposition"[13] can be taken with scores of others to show Taylor's attitude as typical rather than exceptional. His attitude did not change with the passage of the years--his statement in his 1895 "A Piece Rate System" that "personal ambition always has been and will remain a more powerful incentive to exertion than a desire for the general welfare"[14] squares with his 1912 testimony that "all employees should bear in mind that each shop exists, first, last, and all the time, for the purpose of paying dividends to its owners."

Heightened interest in the "public relations" aspects of business management after World War I[15] undoubtedly had much to do with the "failure" of "Taylorism" under its original name and its original sponsorship. Taylor's personal ineptitude (or, perhaps, his engineer's

---

[13]Quoted by Anne Freemantle, This Little Band of Prophets: The British Fabians (New York: New American Library, 1960), p. 11.

[14]Taylor, op. cit., p. 37.

[15]Thomas C. Cochran, Basic History of American Business (Princeton: D. Van Nostrand Company, Inc., 1959), pp. 82-84.

disdain) for this side of his campaign for increased production efficiency has certainly been a factor of some influence in what appears to be a widespread and persistent effort on the part of historians of industry to attempt, dehors, to deny him his due. It is, admittedly, a difficult assignment to present the dogmatic, dictatorial and "autocratic" personality of Frederick Winslow Taylor as the kind of man today's socially-oriented business author would prefer as the "Father of Scientific Management." But, what was done in his lifetime, and what is being done by business management today, backtracks, in general and in many specific instances, to ideas and practices first proposed and/or adapted by the first great management systematizer.

Such men as Taylor lack the "balance" and "objectivity" (and even the "patience" and "reasonableness") which observers nowadays would like to regard as the sine qua non of the so-called "modern" industrialist. To Taylor, such a term as "objective" meant what Taylor believed in; "subjective" (or the equivalent word of the '90's) was the kind of criticism a man like Gompers might make. To Taylor, his "law" was law (even if it might be wrong, or

based on statistically unsound observation), and the decision he made on his reasoning should override any other consideration.

To Samuel Gompers, who also lacked objectivity, Taylor's system must have appeared as a strange and powerful new weapon, forged for the specific purpose of destroying craft unionism. And Taylor's repeated public statements that, under his system, "organized labor unions" were "unnecessary" was (in addition to being untrue) an insult to be added to a planned fatal injury.[16]

[16] Taylor, op. cit., pp. 180-183.

CHAPTER VI

BRANDEIS, "THE EASTERN RATE CASE," AND EMERSON

Emerson's Experiences with the Santa Fe

Harrington Emerson had been called in by the management of the Atchison, Topeka and Santa Fe Railroad to direct a "betterment" of the road's personnel practices after an unsuccessful 1904 strike by machinists, boilermakers and blacksmiths. Reading between the lines of the Santa Fe's piously phrased plan for "freeing" workers from the "petty tyrannies of arbitrary officials" on the one hand, and "from individuality-destroying union domination" on the other, it would appear that the company had come to the decision that it had gone too far.

Emerson, using selected fundamentals of Taylor's system (work planning, routing, scheduling and

standardization), plus graphic representation of work progress and his own scaled-up bonus plan, had proved that higher wages, coupled with directed work, could reduce costs in railroad rolling stock maintenance shops. His system, which he called "efficiency engineering" was, between 1904 and 1910, second only to Taylor's in fame and extent of utilization. Up to that time, the two leaders had not met; Taylor's work was mainly in the northeast (the Rock Island, Illinois, U. S. Ordnance Department Arsenal was his westernmost "active" client), while Emerson's field headquarters were in the Santa Fe's shops at Topeka, Kansas.

Taylor, always a stickler for complete installation of all elements of his system, had been plagued by many eclectic imitators who were, he felt, little more than compromisers of his ideas. Emerson, different in background and philosophy, had established the proposition that adaption and addition, and piecemeal use of parts of a reasoned system, could attain spectacular results.

"The Eastern Rate Case," and Brandeis' Strategy

Early in 1910, the railroads operating in the area east of the Mississippi river and north of the Potomac and Ohio rivers had raised wages of all employees to avert a strike. They had then petitioned the Interstate Commerce Commission for permission to raise freight rates to maintain profit margins.

Louis Dembitz Brandeis (1856-1941), even then well known as "the People's lawyer," was retained by the organization formed by eastern shippers to oppose granting of the requested increase in rates. Brandeis, whose unorthodox socio-economic approach to what had previously been regarded as strictly legal problems is remembered as "the Brandeis Brief," was in charge of counsel associated in the case. Hearings before the Commission lasted from August to December, 1910, with briefs filed in January, 1911, and decision in February.

In his original estimate of the situation Brandeis had assumed that the railroads were being managed efficiently, and his plan had been to argue that some other

means be used to solve their problems, other than the increase in freight rates. He went to the first hearings with this thought in mind, but he soon found "an apparent ignorance of the costs of specific operations, and a disregard of costs in rate-making" on the part of railroad witnesses. He conceived the idea that the carriers were vulnerable to attack on the grounds of inefficient operations.

Brandeis sought out both Taylor and Emerson, among others. In searching for a name that would identify and include all of the various new-style management systems, the attorney met with Gantt, Gilbreth, Henry V. Scheel (of Brighton Mills, a Taylor client), and Robert T. Kent, editor of Industrial Engineering magazine, in Gantt's New York City apartment during October, 1910. It was at this meeting that the name "scientific management" was selected as an apt and ear-catching phrase.

On November 21, Brandeis introduced his new weapon --a direct allegation of inefficient railroad management-- at the end of testimony by a procession of railroad executives who had expressed the general view that, while it appeared inevitable that periodic wage increases would

have to be granted, such raises were a total financial loss. It was with this viewpoint that Brandeis took issue, thus:

> We say that this situation, this practical declaration of hopelessness which comes from the railroads, this incompetence to deal with the great problem of costs, is due to failure to regard that which the most progressive manufacturers in competitive lines of business have been led to adopt, namely, the science of management.[1]

This was his opening statement. He followed by describing Taylor's experiments in shovelling and pig iron handling as examples of results which could be attained when managers searched for better methods; and he noted the financial benefits which came to both owners and employees under a system of scientific management.

Emerson's Testimony--"a Million Dollars a Day"

Brandeis called eleven practitioners of the new movement for corroborating testimony--Horace K. Hathaway, James Mapes Dodge, Henry R. Towne, H. V. Scheel, Frank B.

---

[1]Milton J. Nadworny, Scientific Management and the Unions (Cambridge: Harvard University Press, 1955), p. 35.

Gilbreth, John H. Williams (of the Plimpton Press), Robert T. Kent, Henry L. Gantt, Charles B. Going (editor of Engineering Magazine), and Harrington Emerson.

Recital of Emerson's "million dollars a day" caught the eye and the ear of newspaper reporters covering the hearings. Emerson had been called to the stand two days after Brandeis had said:

> We will show you, may it please your honors, that these principles, applicable to all businesses, are applicable to practically all departments of all businesses, and that the estimate which has been made that in the railroad operation of this country an economy of one million dollars a day is possible is by no means extravagant; and you will see as we develop the science and application in varied businesses that that statement is, if anything, an underestimate instead of an overestimate.[2]

Emerson was the last of the witnesses for "scientific management" to be heard. While the hearings continued through December, his statement ended the decisive testimony. Daniel Willard (1861-1942), the newly-elected president of the Baltimore and Ohio Railroad,[3] said in

---

[2] Ibid.

[3] He was named president of the carrier January 15, 1910. Albert N. Marquis (ed.), Who's Who in America, 1914-1915 (8th edition; Chicago: A. N. Marquis and Co., 1915), p. 2550.

his testimony that a million dollars a day could be saved by the railroads, but only if half a million workers were fired, or wages reduced drastically. Brandeis turned Willard's words against him, as an admission that what Brandeis had sought to establish had been proved by Willard's argument.

Railroad executives, as witnesses, continued to denounce the Brandeis-Emerson proposition to the close of the hearings.

The railroad unions were on the side of the railroads during and after the hearings--one of the few times when "the People's Lawyer" was opposed by organized labor. Viewpoint of the unions was completely economic; they felt that if the freight rates were not increased, the wage raises they had received might be rescinded. Their stand against "scientific management" was, for the most part, voiced in emotional terms. It was "anti-union," and a "speedup." Finally, the unions announced complete faith in "the high efficiency of both the railroads and their employees."

The Decision, and Its Benefits to Taylor

Brandeis' brief was dated January 3, 1911. In February, the Commission denied the freight rate increase. The decision, written by Commissioner William Prouty, was not a complete endorsement of Brandeis' arguments. It stated that the new system of management was "everywhere in the experimental stage," and that its value to the railroads might be questionable at that time. However, the Commissioner took the railroads to task for not having given the subject of improvement of management the attention it deserved."

While Brandeis and "scientific management" had not won a complete decision, they had gained two side objectives which may well have been of greater long-term importance:

1. Taylor's system of management had been given the name by which the entire movement could be recognized, and
2. His system (and that of others in the field) had received a tremendous public recognition from generally

favorable newspaper and other media publicity.

"Scientific management," which had been to a great extent a matter for theoretical discussion and experimental application by a comparative handful of professional engineers was, by means of the "Eastern Rate Case," made into a subject of popular discussion. In explaining the system for their readers, newspaper reporters had been forced to write in terms which could be understood by the average reader. This elimination of the esoterica of engineering jargon made the essentially simple concepts of method and system available for discussion, consideration and debate, and for what might be termed "do-it-yourself" adaption on a national and international basis.

It also encouraged a great number of "do-it-yourself" imitators to bid for a place in the new profession.[4]

Harrington Emerson, regarded by many as Taylor's greatest competitor, was, in the "Eastern Rate Case," cast

---

[4]Edna Yost, in Frank and Lillian Gilbreth (New Brunswick, N.J.: Rutgers University Press, 1949), p. 188, says more than 150 articles on scientific management were listed in Readers Guide to Periodical Literature between 1911 and 1915.

in the role of the greatest benefactor of "scientific management" (as the witness who could prove what he testified). His own business was never promoted by any reference on his part to ability to provide "scientific management"--the Emerson Company organization stuck to its slogan of "Efficiency Engineering."[5]

[5]Emerson described the work of his company as "efficiency and standard practice engineers." Marquis, op. cit., p. 732. In 1924 he went back to his original "efficiency engineers."

CHAPTER VII

"THE PRINCIPLES OF SCIENTIFIC MANAGEMENT"

Re-statement, and Elimination of the "Fifth Law"

In January, 1910, Taylor had submitted to the meetings committee of the American Society of Mechanical Engineers the paper which was to be ranked with his "On the Art of Cutting Metals" as one of his outstanding professional contributions. This offering, which Taylor regarded as presenting the essence of the "philosophy of modern scientific management," had been urged by Frank Gilbreth as a means of taking some of the "expertise" out of the system, and re-stating its fundamental factors in more popular and understandable language. The original title, also suggested by Gilbreth, had been "The Laws of Management."

The committee held the paper for nearly a year, without indicating its intention of either accepting it for publication or rejecting it. After the "Eastern Rate Case" hearings before the Interstate Commerce Commission, American Magazine offered to publish the paper. Taylor withdrew his offer of the paper to ASME Transactions and turned the manuscript over to American and to the firm of Harper and Brothers, New York book publishers, for publication in more enduring form. Prior to magazine publication, Taylor had a special edition, under the title of The Principles of Scientific Management printed and distributed to all ASME members at his own expense.

Theme of the Principles was, in the main, an edited re-statement of Taylor's views as expressed in his "Shop Management," with inclusion of more autobiographical and illustrative material. Two notable sections of his earlier statement of general rules for his system were omitted in his 1911 recast. First omission was the "fifth rule" from his 1903 "Shop Management." He did not, after eight years of analyzing developments, continue to advocate "when an establishment has reached an advanced state of organization . . . a fifth element should be added,

namely, the task should be made so difficult that it can only be accomplished by a first-rate man."

He also dropped his previous "law" that a man not performing his set task should, sooner or later, suffer for the failure.

Taylor's re-statement of the "natural laws" of industrial production in his 1911 work are generally accepted as his final refinement, thus:

> First . . . they (the employers) develop a science for each element of a man's work, which replaces the old rule-of-thumb method.
>
> Second. They scientifically select and then train, teach and develop the workman, where in the past he chose his own work and trained himself as best he could.
>
> Third. They heartily cooperate with the man so as to insure all of the work being done in accordance with the principles of the science which has been developed.
>
> Fourth. There is an almost equal division of the work and the responsibility between the management and the workmen. The management take over all the work for which they are better fitted than the workman, while in the past all the work and the greater part of the responsibility were thrown upon the men.[1]

This final re-phrasing may also be said to be

---

[1]Frederick W. Taylor, The Principles of Scientific Management (New York: Harper and Brothers, 1911), passim.

an example of Taylor's ability (and perhaps, alas, his willingness) to "talk out of both sides of his mouth"--to fit his words to what he conceived to be the interests and desires of his current audience. Writing, as Gilbreth had recommended, as an "industrial philosopher" and for an audience he certainly knew would be differently motivated and less homogeneous than the smaller, professionally oriented membership of ASME, Taylor wrote as the teacher who was, speaking generally, against the sin of wasted industrial effort. This shift in emphasis makes his Principles considerably different in tone from the autocratic (even brutal) ideas he advocated in "Shop Management."

On the surface it might appear that Taylor had mellowed over the years between 1903 and 1911; perhaps his experience, and the experiences of his chosen disciples, had taught him that changes in the status of workmen from that of faceless, even mindless "hands" to that of "fellow employees" had caused (or been caused by) a change in the viewpoints and methods of managers themselves. Harrington Emerson's Twelve Principles of Efficiency, Henry L. Gantt's Work, Wages and Profits, and Frank Gilbreth's Motion Study (all of which were also published in the

1911 "bumper crop" of books on scientific management) have significant departures from Taylor's previously expressed attitude toward workmen. While most of the books of this era stem back to Taylor, they were aimed to be (or to appear to be) original statements on a general theme, while Taylor's Principles are, essentially, a new expression of ideas first expressed in an earlier, less socially-conscious period of management-employee relations.

Taylor's Continuing Opposition to Organized Labor

Instances of Taylor's propensity for double talk, with special reference to the subject of labor unions, are well documented by Nadworny. In public, Taylor's viewpoints appeared to have changed from his original opinion that, under scientific management, unions were not only unnecessary but contrary to his "laws," to a reluctant admission (in his "Testimony," in 1912) that they might have some secondary place as a means of communication, or a kind of collaborating consultative agency. Privately, as shown in his letters, Taylor continued to oppose unionism, and was quite energetic and ingenious in scheme and action

against the organized labor movement.

Pro or con, most criticism of Taylor is unfair. From the viewpoint of those who write as sociologists, he and his works are treated as the whipping boys of a system whose operations are deplored. Writers allied to organized labor, either by sympathy or direct connection, generally abandon objectivity in their attempts to overcome opposition to their ideas for today by belaboring yesterday's ideas as expressed by yesterday's man.[2] Nearly all who have written of Taylor seem to have imputed to him and his system of management more than was actually there,[3]

---

[2]An example of the persistent effort to make a thing different by applying a different name might be William Gomberg's discussion of wage incentive payment plans. He says: "The understanding is that as a reward, not a right, the worker will be paid an additional bonus for additional effort. A much healthier approach to this problem would be to change the name of this method of wage payment to something like "productivity wages." William Gomberg, "Trade Unions and Industrial Engineering," Handbook of Industrial Engineering and Management, ed. William Grant Ireson and Eugene L. Grant (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1955), p. 1159.

[3]An example of what might be termed less than complete objectivity on the part of those who would give Taylor a character more saintly than actual is the inclusion of his "Development of the First Rate Man" in the current Masterpieces in Management (New York: American Management Association, 1959), passim. The tone of this article is atypical to Taylor taken as a whole.

and nearly all of the more recent commentators bias themselves by basing judgment on today's standards of industrial conduct instead of regarding Taylor as himself, a man of his own times. He has been set aside, in the writings on business, as the unique personification of systems and philosophies of management which have, inevitably, grown and multiplied beyond his conception. In such a position--with "Taylorism" expanded into great evil or great good, and with Taylor himself envisaged as great devil or great saint--the "critic-with-cause-attached" can support almost any argument he chooses.

There appears to be little of practical value to an appraisal of Taylor's contribution to the art of industrial management in what researchers have uncovered of his persistence in his opposition to organized labor. On analysis, Taylor was an uncompromising advocate for his own system. If, on occasion, he varied the expression of his private views to fit a public occasion, he was, after all, merely wooing his prospects as his prospects wished to be wooed. What has been termed Taylor's "insincerity," as shown by changes in his expressions of his views, while of some interest to those researchers who see in it some

foundation for a priori viewpoints, has little place in consideration of the value of his basic ideas.

Taylor made no excuses for his opinions; he needs none now. If there was, as the record seems to indicate, some small public wavering in the 1890 attitude on labor unions by 1912, only a man blind to the trends of the times would not have changed. Among these changes (offered in explanation rather than in extenuation), consensus seems to hold the following as causative:

1. Samuel Gompers and his American Federation of Labor
2. Increasing labor mobility, and increasing labor voluntarism
3. Increased "de-personalization" of industry as individual establishments grew larger; technology more complex and range of products more diversified, with
4. Widening of the gap of "social distance" between employer and management

5. Beginning of true sustained "mass production" of consumer goods to supply an integrated national market, and
6. Last, but probably first in long-term importance and effect, the fact that "the worker had learned how to read."

CHAPTER VIII

OPPOSITION, AND THE "INVESTIGATIONS"

Gompers' Viewpoint--the Federationist, April, 1911

Samuel Gompers, president of the American Federation of Labor, organized and led union opposition to "Taylorism." In the Federation, as Gompers had organized it, he had a superb instrument to turn against any idea which aimed at upsetting the traditional relationships between the skilled craftsmen (the bulk of his members) and management.

Gompers' greatest contributions to unionism were two in number--he made unionism "respectable" and trustworthy in that it honored its contracts; and he changed the status of unionism from a feudal to a pseudo federated organization. The English-born cigar maker (1850-1924)

changed the labor movement from a power system of leadership by disunited "baronial fiefdoms" headed by petty sectional princelings. From the scattered pieces of the "Knights of Labor" of Terence V. Powderly, Gompers gradually gathered into his own hands the reins of direction. Gompers also spoke for the unions.

Basis of Gompers' power was his almost religious belief that the unions' most valuable asset (perhaps even greater than "solidarity") was their possession of "the secrets of the craft." He conceived the primary duty of the Federation to be increasing the economic income of its members. His famous "more" answer to a question on what the unions were after cut through the noble sounding (though unattainable) vagueness and mysteries of the Powderly period and the private armed warfare of John Purroy Mitchell's Miners. Gompers' outstanding talent, that of discussing the economics of "more" in emotional terms, approached genius. (It is hoped the parenthetical observation that the spokesmen of business have never mastered the trick may be pardoned.)

Gompers, and most of the labor leaders as well, had never before been faced with anything that constituted

such a direct threat to the fundamental basis of union solidarity and strength. While "Shop Management" had been in comparatively restricted circulation since 1903, it is probable that Gompers and his fellow Federation leaders actually neither knew nor recognized Taylor's ideas as an actual threat until the appearance of Principles in the American magazine.

To Gompers, the Taylor system seemed to be a weapon specifically fashioned to destroy craft organization and craft exclusiveness. Taylor's training course to upgrade common labor to perform a certain set of tasks included in the machinists' craft was only one of the points that Gompers did not like. Taylor's insistence that his "scientifically determined" "one best way" was the only permissible method, that the time study technician, with no advice and/or consent of the union, should determine wages, hours, working conditions, and pace of the job, and that there were opportunities for a general "speed-up" convinced Gompers that this "new mania misnamed 'efficiency'" was bent upon destroying the trade unions. Gompers opened the battle in the April, 1911 Federationist, by a defense of workers against Taylor's charge of

soldiering and a charge that Taylor's methods were no more than "a rehash of the old systems of force-work, tyrannical supervision, and sweating, under the guise of new terms."/ Gompers added that, as for Taylor, it was only natural that anyone trained in the "industrial slaughter-house" of Midvale should devise an "inhuman" system of management.

The Molders and the International Association of Machinists (IAM) were among the first Federation members to join the battle. Most notable contribution (at least the one that has attained the longest life and greatest acceptance) was the contention by John P. Frey, editor of the International Molders Journal (in the April, 1911 issue) that "the shortcomings of the management system sprang from the denial to the workers of the right to help determine the conditions under which they were to be paid."

IAM Opposition at Rock Island Armory

IAM was the first union that actually took action against expansion of scientific management. In 1911, a committee representing Machinists members employed by the

U. S. Ordnance Department's Rock Island (Illinois) Arsenal, acted. Their written objections, presented to General William Crozier, chief of Ordnance, and Secretary of War Jacob Dickinson, were the first full statement of the position of the unions. These points, among others, were cited:

1. The Machinists could not see the "necessity" of introducing a system "embodying . . . drastic measures and advocating . . . undemocratic principles,"
2. Overworking and enslaving of employees,
3. Elimination of the skilled mechanic,
4. "The tremendous unemployment problem which will be caused by the elimination of the workmen who cannot attain the maximum of efficiency,"
5. Denial to employees of a voice in determining working conditions, and
6. "The inhuman and unjust" use of the stop watch.

In this particular instance, the arguments were successful. While General Crozier told the delegation Rock Island Arsenal would eventually be placed under

Taylor methods, this move would not be made until the system had been tried at Watertown, Massachusetts and Frankfort, Kentucky. The General could probably envision union opposition as a factor which would probably end up as a political question, and he realized that Rock Island (as a part of the two-state "Rock Island Davenport [Iowa]-Moline" industrial triangle) was just twice as big a source of possible trouble as either of the other two.

At Mare Island, California, Navy Yard, union opposition was not successful in eliminating scientific management, although it was instrumental in a policy of giving premium work only to volunteers.

"House Resolution 90," and Taylor's Testimony

As General Crozier probably expected, the first political opposition came from the Rock Island area. Representative Irvin S. Pepper, from the Davenport area, introduced a resolution calling for investigation of the Taylor system of management. The House Committee on Labor, to which the resolution was referred, acted quickly; hearings were opened on April 28, 1911, just two weeks

after Irvin had first made his request. Nothing conclusive was done, but the first of many political attacks had been launched.

The first acknowledged strike in a plant in which the system was being used came in August, 1911, at Watertown. The strikers promptly sent a petition to all Massachusetts Senators and Representatives. The result was a new resolution to investigate the Taylor system further. The union involved was the Molders, and the incident which led to the walkout was an attempt to make time studies.

At the request of Representative Weeks of Massachusetts, House Resolution 90 authorized a committee composed of Congressmen William B. Wilson of Pennsylvania (and a former Secretary of the United Mine Workers), William C. Redfield of New York, and John Q. Tilson of Connecticut to "investigate the Taylor and other systems of shop management."

According to Resolution 90, the investigation was to include only government work, and was to determine the "effect (of working under the Taylor system) on the health and pay of employees, its effect on wages and labor costs, and such other matters connected therewith as may give a

thorough understanding to the results of the installation of the system."

The committee travelled the eastern seaboard to gather information, visiting arsenals and navy shipyards, and took testimony from all available sources. The issue, when everyone had been heard, was clear cut--organized labor was hostile to the Taylor system. Their principal point of opposition was on the subject of rate-setting, and John R. O'Leary, president of the Molders, put the union viewpoint into the record when he said: ". . . where the man does not have a voice in determining what the price of a certain piece shall be, we object to it." O'Leary also stated that Taylor's technique of training unskilled or semi-skilled workers to do craftsman's traditional work was a threat to the security of the craft-centered unions of the AFL. Expressions of humiliation of workers over stop watch work timing, and work at faster pace, were also read into the record of interviews with employees at the government shops.

Representatives speaking for scientific management maintained that their methods stressed "efficient" rather than "strenuous" work habits and pace, and that work costs

had gone down and employee pay and production had increased under the scientific system. Harrington Emerson, Gantt, Carl Barth, and David Van Alstyne (then at American Locomotive), Henry R. Towne, and General Crozier testified for the system.

This time, Taylor himself was present to present his own case. He was among the last of the long list of witnesses (the investigation was in progress from October 4, 1911 to February 12, 1912), and he played his role of star to the hilt. In his six-day appearance, he presented a re-hash of his "Shop Management" and Principles in prepared statements.

While Taylor might be said to have put on a sparkling performance while he was "reading his lines," he did not do so well when he was "being himself" in the ad lib question-and-answer section of the show. If one were to read only one resumé of Taylor in an attempt to find the strength and weakness of the man and his system, his "Testimony" would be the most fruitful source, simply because in it Taylor reveals not only his methods, but himself. (This statement disregards "On the Art of Cutting Metals," on the grounds that this great technical

contribution should be judged as incidental to the management system, rather than as fundamental to it. "Speed and feed" data for machinery and metal are a vastly different matter from the management of men.)

While Taylor may have been (as he said almost to the point of boredom) "very glad that you asked that question, Mr. Wilson" (or Mr. Redfield, or Mr. Tilson), most readers sympathetic to him found little to be glad about in the answers he gave. He repeated his ideas on the duties and powers of employer versus employee--that the employer had the duty and power to unilaterally determine and set the task, the method of accomplishing it, worker pay, and time; and that the employee's duty consisted of doing it as set, or "disciplining" an over-exacting management by quitting the job.

He would not concede any legitimate worker interest in job details. His reply to a question by Chairman Wilson epitomizes Taylor's lifelong viewpoint:

> The Chairman. Who is to determine what constitutes soldiering and what constitutes a proper amount of physical energy to be expended?
>
> Mr. Taylor. The determination of what is right for the man to do, of what constitutes

> a proper day's work, in all trades, is a matter of accurate, careful scientific investigation. It must be done by men who are earnest, honest, and impartial, and the standards which are gradually adopted by men who are undertaking this scientific investigation of every movement of every man connected with every trade establishes in time standards which are accepted by the workmen and the management as correct.
>
> . . . . . .
>
> The Chairman. The employer being a profiter by the expenditure of additional energy on the part of the workmen and not having the additional physical discomfort of the workmen to guide him in determining what constitutes a proper day's work, and what is soldiering--in what manner could the workman protect himself against an improper day's work being imposed upon him?
>
> Mr. Taylor. By simply refusing to work at the pace set. He always has that remedy under scientific management; and as you know under scientific management he gets his regular day's pay, whether he works at the pace set or not. When he falls short of the day's work asked of him he merely fails to earn the extra premium of 30 to 100 per cent which is paid for doing the piece of work in the time set.[1]

In this interchange, Taylor also displayed what many observers (especially Nadworny) characterize as a

---

[1] U.S. Congress, Hearings before the Special Committee of the House of Representatives to Investigate the Taylor and Other Systems of Shop Management, under Authority of House Resolution 90, 62nd Congress, 2d Session. Three volumes. Vol. III (Washington, D.C.: U.S. Government Printing Office, 1912), passim.

surprising naiveté about workmen. He testified (shades of Midvale!) that workmen were disciplined by an "increasing severity of the English language," and that workmen could, in turn, discipline a management that demanded too much by the act of quitting.

Taylor's distrust of the union, in its "useless" and "unnecessary" role as collective bargainer undoubtedly added to his failure to understand the union's ideas of what collective bargaining really was. Throughout his career, he insisted that labor-management relationships and negotiations were singular, not collective, undertakings. In "Testimony," he appears as he probably always was in his statement that scientific management provided for all the bargaining, be it collective or individual, that was necessary--the worker could complain any time he wanted to.

What was probably Taylor's clearest statement (it has been referred to most often as his "most famous") was his remark on the "mental revolution" needed to put a firm, lasting base under the operation of scientific management. He said:

> . . . in its essence, scientific management involves a complete mental revolution on the part of the workingmen engaged in a particular establishment of industry--a complete revolution on the part of these men as to their duties toward their work, toward their fellow men, and toward their employers. And it involves an equally complete revolution on the part of those on the management side--the foremen, the superintendent, the owner of the business, the board of directors--a complete revolution on their part as to their duties toward their fellow workers in management, toward their workmen, and toward their daily problems. And without this complete mental revolution on both sides scientific management does not exist.[2]

Letters written by Taylor on February 2 (to Naval Constructor D. W. Taylor, to Hollis Godfrey, a Taylor trained disciple who was serving as coordinator of witnesses for scientific management, later president of Drexel Institute, and to T. J. Wallis, on the same date), indicate that the statement was a slightly dishonest one, deliberately designed by Taylor to thwart Chairman Wilson's endeavor to get on the record the fact "that managers were at any time likely to abuse the power which they had under scientific management, and so make it a great injury to the workmen."

---

[2] Ibid.

It would appear that Taylor knew very well that his system was loaded in favor of management, and that he recognized (and feared) questions on what actually happened under it. His deliberate scheming to evade answering factual probes does him no credit, as to character certainly, and even less as to just plain horse sense. That he should plan to avoid danger is understandable, perhaps even excusable; but that he should think he was going to be able to get away with it is neither sensible nor pardonable. His failing is essentially a very human failing. Probably, if Moses had left a letter record of his private story of what his motives were while he was up on the mountain, even the Ten Commandments would be open to more question than they are.

Taylor, in his role as star witness, had thrust upon him the role of chief target for the opposition. Gompers and his lieutenants "personalized" their attacks upon all scientific managers or efficiency engineers by grouping every one of them under the single heading of "Taylorism," and blaming him for a movement that was, in retrospect, an inevitable part of the evolution of industry and which might well have taken place during Taylor's

lifetime if Taylor himself had never been born.

Testimony of David Van Alstyne

Besides Taylor's own testimony, the most notable was that of David Van Alstyne, vice president of American Locomotive Company. Van Alstyne had a long acquaintance with Taylor (since before 1906, when Taylor had written him of a plan to break a local of the Molder's Union by setting up a "dummy" molding shop near, but outside the Company's Schenectady plant. This plant, to be staffed with non-union labor, would then underbid the company's own department, enabling Van Alstyne to break the union either directly--by displacing the union molders--or indirectly--by scheduling all work to the "dummy" plant.) Van Alstyne, when he had been Superintendent of Motive Power on the Northern Pacific Railroad, had been instrumental in bringing Taylor and J. E. Sague, vice president of American Locomotive, together before Van Alstyne joined that company. In 1907, when Van Alstyne had been hired by American Locomotive, he consulted with Taylor, but when he chose the firm that was to introduce a new system of operations, he had called in Harrington Emerson. In his

previous jobs, Van Alstyne had expressed himself as being unconcerned whether his employees were or were not union members.

When his turn came to speak, Van Alstyne placed himself on Taylor's list of "unreliables" by declaring that:

> I believe labor unions . . . should oppose scientific management with all their strength unless it is made the basis of an agreement between employer and employee.[3]

Van Alstyne appears to have been the first of the actual practitioners of scientific management to realize (as he was to write in ASME Transactions in 1912) that "there is probably no greater problem before scientific managers than to convince labor unions that scientific management has advantages for them as well as employers."

The Committee Report, published March 9, 1912, found that scientific management had made progress in "working out details," and declared itself to be in favor of tool and part standardization, work planning and routing, and use of Taylor's "speed and feed" data. But it also said that the material welfare of workmen should not

---

[3] Ibid., p. 1674.

be allowed to rest upon an element so variable and unsubstantial as "the mere mental attitude of the employer."

The report did not regard the use of the stop watch as the last word in determining motion or job time. While the watch was valuable in finding out the time in which a job could be done, it alone could not determine the time in which the job should be done.

Aside from suggesting that workers be invited to cooperate by approving or disapproving time standards, the report accomplished little. Its conclusions were that use of any management system was, after all, a matter of administration. No legislation was recommended.

While union opposition to what it now referred to as "Taylorism" was continued, there was a balance of accomplishment, at least in government shops. What installations were lost in the Navy were evened off by gains with General Crozier's Ordnance Department.

In 1912, after the election of Woodrow Wilson, a new atmosphere of friendly interest in the growth and progress of unionism was injected into national political life. One of the first actions of Wilson's new Assistant Secretary of the Navy was to assure navy yard workers that

there would be no task management in navy installations. It was one of the first "official" government papers to bear the signature of Franklin D. Roosevelt.

CHAPTER IX

TAYLOR'S LAST YEARS

Dilution of the "Pure" System by Taylor's Disciples

During the period between Taylor's 1912 appearance before the House investigating committee and his death on March 21, 1915, he became more and more the type of "the grand old man" of scientific management. To his role of founding father and advisor of disciples, he gradually added that of "defender of the faith."

With Taylor, the faith he defended was the set of rules he had earlier defined as "laws" and "scientific facts." Aside from an occasional slip, Taylor never wavered in his implied belief that once he had spoken on the subject, there really was no reason (and certainly no authority) for anyone else to hold a contrary opinion,

much less to express one.

Nearly all the facts, most of what might be called the "spirit of the times," and much of the actual experience of the growing number of men who were in charge of operating the various systems of scientific management were against Taylor's insistence that the old original attitude and methods were the only legitimate way of getting on with the job. "Grand old men" have a tendency to get that way (perhaps because they cannot otherwise support or assume any other status--the leaders of the Old Guard apparently cannot be content as followers of anything new).

On analysis, Taylor's consistent refusal to admit possibility of improvement on his original pattern for management was, simply, unreasonable and inconsistent. The fact was, in 1912 and after, there were many men who knew more about the Taylor system and its possibilities, than Taylor himself.

This was a reasonable, even an inevitable, development. In explanation of that statement, these facts are offered for consideration:

1. Taylor's own experience with his system was limited to only two instances--Midvale and Bethlehem.
2. His "batting average" of success was .500; success at Midvale, but failure at Bethlehem.
3. His complete lack of understanding of the changed position of unions between 1901 and 1912.
4. His own early retirement from actual and active industrial management. After May 1, 1901 (date of his abrupt dismissal from Bethlehem), he announced: "I can no longer afford to work for money." His entire working career, from the end of his apprenticeship and his first job as a laborer at Midvale (1878) to his retirement, had covered 23 years, and three of those were his only actual experience as a "management consultant" during the interim of the end of his work at Midvale and the

beginning of his work at Bethlehem.

5. His own attitude. Taylor was an almost perfect example of the "either-or" mind.

Such men as Henry L. Gantt, Carl Barth, Dwight V. Merrick, Horace K. Hathaway, Morris L. Cooke, and Sanford Thompson (among others) who had been trained by Taylor himself, had found out by experience that the Taylor system was simply not workable in its "pure" state. Its proved values could be obtained only if the "pure" original principles were diluted down to a dosage human beings could be induced to swallow. In their own work, they made this dilution. They found out quickly that straight "Old Taylor" (while it has some avid devotees) is much more widely accepted when mixed with a larger or smaller dash of local branch water.

Taylor may have been completely sincere in his idea (or his obsession) that scientific management made labor unions "unnecessary," and that, once his scientific methods had determined the value of a piece of work, any bargaining, by anyone (worker or management, individually or collective), was in the nature of tampering with

nature. There is some evidence he was never completely convinced by his own argument; he was continually warning his followers that better results would be achieved if workers were unorganized. If he were fully convinced of his premise, he seems to be unconvincing because he always advocated avoidance of an actual test of his theory. In spite of Taylor's statements, his system was inimical to the interests of unions; there were strikes as a result of attempts to install his system, and there were many instances (some of which he detailed) of reductions in labor forces caused by use of his methods.

The intrinsic evidence can be interpreted to establish the fact that Taylor's system was known to be as antagonistic to labor unions as Taylor was. Taylor could not bring himself to admit that his concept of equality of bargaining power between a single individual and the management of a large industrial was, on examination, a simple distortion of the actual and practical truth.

To him, the identification of such objectives as employment, work conditions, wages and hours, and other "social" objectives with the American Federation of Labor program was an unnatural usurpation of function. Taylor

was, everything considered, a disciple of the economic and social status quo--labor came when it was called, did as it was told, and should aim at no higher place than the system gave to it. Industrial progress, as he would have defined the term, was based primarily on increase in profits as a result of use of his methods.

CHAPTER X

GILBRETH AND GANTT

Changes in the original format of Taylor's doctrines, even in its basic philosophy, had been made at an accelerating rate in the last years of his life. He spoke against these changes valiantly and voluminously, but the sad fact was that no one seemed to be listening. His attempts to make of himself the sole prophet of the "official" line, and sole promulgator of the one, the only and the unadulterated original dogma kept him busy and contentious, but the "Taylor" system's practitioners (and their rivals) had simply grown beyond his concepts.

Taylor clung to his viewpoint that unions and collective bargaining were unnecessary long after nearly every thoughtful observer had concluded they were in industry to stay. As his influence as an advisor waned, his fulminations against the organizers of labor became

shriller, and sillier. He, who had always insisted that others accept his "facts" and his "laws," was apparently unable or unwilling to admit that the developments in the industrial world had left him and his ideas behind.

Even Harrington Emerson had stopped using his favorite sales slogan that, under his system of efficiency engineering, management would be able to lure union members from their organizations and over onto the happier unorganized, pro-management side.

Frank Gilbreth, probably as dedicated an admirer as Taylor ever had, was always solidly sensible on the subject of unions. He accepted the idea that they were a permanent, even a useful, fact of industrial life and went about his business on that basis. In spite of occasional flare-ups (the 1908 strike on his Gardner, Massachusetts job over the introduction of Taylor methods, for example), Gilbreth came close to becoming (as he said then) "the best friend Union labor ever had."

Gilbreth, who had been a union member, and who was perhaps the only member of the Taylor coterie to attempt to secure union cooperation, was the "humanizing force" that eventually harmonized the differing viewpoints of

workmen and managements. Of all the men active in the work of scientific management before 1915, Gilbreth was the only one who had actually had much actual experience making a living with his hands. Until his death, he took pride in his ability to lay bricks. It is entirely probable that if Gilbreth, rather than Taylor, had been the shaper and enunciator of the "official" policies of scientific management, there would have been earlier, wider, and more peaceful progress.

In addition to Gompers, there were many American Federation of Labor leaders who realized that the sensible, productive portions of the scientific management program would ultimately be adopted by American industry. Their attitude seemed to be that, while they could not successfully oppose some of the ideas of Frederick Winslow Taylor, they could (and they did) trade their consent for management concessions. Their price for "cooperating with the inevitable" ranged from toleration of unions through recognition as bargaining agent and the preferential union shop. While it is seldom recognized today (since FDR's 1932 "first hundred days), before 1917, the fiercest fights and greatest victories of unions were on that

primary question of recognition. With recognition accomplished, nothing was impossible; without recognition, nothing could be done.

The United States Commission on Industrial Relations

In 1914, the United States Commission on Industrial Relations was organized to make official inquiry into all phases of industrial relations. Its hearings (a far cry from those of 1911) put into the record a change in the attitudes of both scientific managers and leaders of the unions. John B. Lennon, treasurer of the AFL (and a member of the Commission) made a tentative and generalized offer of union terms by which opposition to the whole plan of scientific management might be avoided. He asked that the unions "be invited to cooperate." His offer was backed by Gompers.

Witnesses on the side of the management engineers ("the regulars"--Taylor, Barth, Gantt, Emerson, Thompson, Dodge--plus Van Alstyne, Robert G. Valentine, and Brandeis) were divided, in both public and private. On the stand, most of them expressed themselves as receptive to

cooperation by the unions; in correspondence, they revealed that they did not mean what they said.

Van Alstyne, Valentine, and Brandeis were outspoken, in private as well as in public, in welcoming the chance to get the unions into the act.

The Hoxie Report

Robert F. Hoxie, professor of political economy at University of Chicago, was appointed by the Commission to gather more information on the subject of scientific management and labor. Hoxie, with a picked group of experts from both sides accompanying him, visited various plants to find facts and opinions on the effects of scientific management.

Hoxie's report, published in book form in 1915,[1] was pretty much a re-hash and re-argument of the traditional claims, counter claims, charges, and condemnations by both parties to the controversy. The book did, however, set forth its formal findings that there was little

---

[1]Robert F. Hoxie, Scientific Management and Labor (New York: D. Appleton and Co., 1915).

of uniformity in the manner in which scientific management systems were actually operated in the 35 plants visited. What the various managers were doing, it appeared, was very different from what they were writing. The report said the greatest variations and deficiencies were found in the application of time study and task setting! In other words, the "scientific" basis on which Taylor had built his system was, in practice, "the special sport of individual judgment and opinion, subject to all the possibilities of diversity, inaccuracy and injustice that arise from human prejudice." Time study, the report said, was being done arbitrarily, with no rules or procedures, by employees unqualified by temperament or training for this pivotal job.

Professor Hoxie added, in discussing the socio-economic effects of scientific management, that the method did tend to break down craftsmanship and skills by its reliance upon specialization. And, he said, the system was a threat to the existence of craft unionism. He felt, if the system was to be adopted generally, some other kind of worker organizations was probably going to be needed. His conclusion was that scientific management "at its

best" represented the highest development in the "sheer mechanics of production" and was a tremendous contribution to the wealth-creating capacity of the nation. However, the report said, scientific management seemed to be incapable of solving the social problems it created.

The report, after stating that "neither organized nor unorganized labor finds in scientific management any adequate protection to its standards of living, any progressive means for industrial education, or any opportunity for industrial democracy by which labor can create for itself a progressively efficient share in industrial management,"[2] also advocated continued union opposition to the system. Professor Hoxie had found that, as matters were then organized, the forces and interests of scientific management and labor were not compatible. He also thought, in the long run, that scientific management would win its battle against the craft unions. Hoxie believed that some new kind of union organization, perhaps industrial, would be needed to give workmen adequate representation.

---

[2] Ibid.

The report was regarded as a victory for the unionists. It jolted Taylor in its attack on his "science" of task setting and time study, and it did more --some of his customers invited union organizers into their plants, and/or asked shop committee participation in setting base rate and piece work prices.

While Hoxie's suicide, in June, 1916, was a great professional loss, his investigation and report had done much to establish a foundation of facts upon which management and labor could build some semblance of peace. He had not, overnight, eliminated the prejudices that had grown over the years, but he had contributed a reasoned and responsible way to lead two hard-nosed antagonists to the only possible solution, which was compromise. Some stubborn men on each side refused to abandon the battle, of course, but the real leaders of both factions heeded Hoxie's message. They realized that the third interest, that of the public, was greater than the single interest of either labor or management and that some means would have to be found to insure recognition of that paramount interest. In other words, what Hoxie said, in effect, was that the country could not afford to lose the values and

benefits represented by either organized labor or scientific management. What had to be done, he intimated, was to find a way by which the people of the nation would be sure to get the benefits of both.

CHAPTER XI

WORLD WAR I--ACCELERATION OF COOPERATION

Wilson's National War Labor Board

Professor Hoxie's report may be said to have ended the ideological phase of the controversy. That phase, based upon the prejudices inherent in the human animal when a change he fears is thrust upon him, was succeeded by the "era of enforced cooperation." During World War I, when Woodrow Wilson's policy of recognizing the claims of both sides as of equal weight was put into effect, scientific managers and labor leaders were willing to make the compromises necessary to increase production.

Formation of the National War Labor Board to handle labor disputes was, as an example, a triumph for the unions, since it spelled out labor's right to organize

and bargain collectively.

Scientific managers also proved their value in federal service on practically every production assignment. In nearly every instance (in the Ordnance Department, Emergency Fleet Corporation, U. S. Shipping Board, etc.), they were able to continue to employ the techniques of scientific management in their wartime work.

On the political front, where a good, vote-getting ideology is almost never allowed to die, the Tavenner Amendment preventing the use of stop watch or bonus payments to any federal employees became law in August, 1916. It was removed from the statute books in August, 1949.

In that interim, it is submitted, unions, management, and government had been able to follow Hoxie's blue print, and to develop a system which, in its essentials, has done those things he advocated. In 1960, in American industry, these are outstanding characteristics:

1. Under one terminology or another, "scientific management" methods are in use in all but the very small industrial production plants in the nation.

2. Constant research has led to constant improvement of the various kinds of measurement methods utilized in "scientific management." The vast body of information accumulated is being constantly refined to put more backing behind management's "scientific" claims.
3. Specialization of labor has increased to what are its current logical limits.
4. Union organizations, in most of the factory production trades, have changed their organizational basis from strictly craft to various kinds and degrees of industrial unions.
5. Management and unions regard each other as permanent fixtures in industry, and both recognize (at least generally) the validity of viewpoints held and functions performed by the other.

It would seem that Professor Hoxie pointed out the way by which both the Taylorites and the Gomperites could win.

It would also seem that those who have said, in effect, that the effects of the work of Frederick Winslow Taylor were of no real effect or importance after the 1920's may be victims of what might be called "semantic error" if not "semantic disease, variety Americanus." This nation succumbs to its propensity to believe a thing, or an idea is itself changed whenever the name by which it has been identified is changed. We are willing victims, it is submitted, to the delusion that a new nomenclature or a new feature "gimmick" really means the death of the real original ideas or articles. When we look beneath the many new labels in industrial management and search for the basic similarities, we are probably going to be convinced that what we have today is only variation on the ideas enunciated by Taylor in 1906, and first pondered by him in 1886.

This proposition is demonstrated graphically on a following page.

When the growing "expertise" of members of the "staff" organization is taken into account, the power of

the argument for recognition of Taylor as the father of modern management becomes even greater. The traditional view that "line" commands on its own responsibility, and that "staff" can only advise, simply is not true today. On many matters, personal as well as technical, "line" is in the practical position that it is obligated to do as it is "advised" to do by "staff." Most members of today's line organizations realize that, if they see fit to disregard staff "advice," they do so in peril of the consequences. Here, too, it seems, we prefer to use semantics to hide facts. With the Taylor system, if the facts are taken out from behind the new facade of the words, similarity becomes more striking than the semantic cloak can hide.

"Cooperation Fever"

At some time (which can probably never be established accurately, but which was, on a guess, at a point between 1915 and 1920) union economic thinkers evidently decided it would be easier to get Gompers' "more" if there was a bigger "more" to divide. While Nadworny places this era of "cooperation fever" as after 1921, the

factors and forces were at work for some time before that date. There is some undertone in his book of pressures arising from a general decline in union membership during the 1920-1930 decade.

The years of World War I, especially after America's entry as an active participant in 1917, were marked by a more friendly environment for development of cooperation. American Federation of Labor's early pledge of complete support for the war effort, plus the regulations which accorded complete "official" status to the unions as organizing agents and collective bargaining agents, was a real triumph. From their experience in this situation, most of the scientific management men in war service or production positions began to perceive the unions as a possible asset, rather than a danger to production.

Ordnance Department Order No. 13

An example of this change in thinking was the issuance of Ordnance Department General Order No. 13, under date of 15 November, 1917, by the U. S. War Department. Morris L. Cooke, in charge of Ordnance labor relations, is believed to have had the main hand in drafting the order,

which listed "suggestions" to Ordnance Department purchasing agents to insure that war products bought would be produced under good working conditions. Main provisions were:

1. Length of workday recommended was eight hours--"certainly . . . not longer than ten hours"--with eight hours preferred.
2. "Equal pay for equal work" as a policy governing employment of women. (With restrictions on the physical work required, and no night work for women.)
3. Banning of child labor (under 14 years).
4. "The need of preserving and creating methods of joint negotiations between employers and groups of employees."

CHAPTER XII

SUMMARY AND CONCLUSIONS

Summary

Modern industry, perhaps to a greater extent than is realized, is managed by application of some of the production techniques enunciated by Frederick W. Taylor during the quarter-century of his career--1890 to 1915.

Controversy as to Taylor's management methods, open during his lifetime, appears to have been carried on subtly and persistently by many who have written "authoritatively" between 1915 and the present time. This type of writing *contra* Taylor's ideas of scientific management has, in several instances, taken the less-than-fully objective course of utilizing his ideas without acknowledgment of their source.

This assumed "objectivity" of viewpoint, supported by large quantities of writing, has confused rather than

clarified the true sources of what is known as "scientific management" in the literature. There is some evidence in recent writing that this trend may be reversing.[1]

The eclectic approach to Taylor's basic principles of management has been followed, and is being followed, in American industrial practice. This approach, first developed by early group and individual competitors, is still followed. These "selections" from the Taylor system have a great variety of names but, on analysis and comparison, they occasionally appear to be "quotes without credit" to their original author.

This "eclectic approach" to use of Taylor's ideas was, in a sense, to be expected--by his own admission, he knew no other kind of application during his own lifetime.[2] If Taylor himself was not able to induce his own contemporaries to adopt all of his ideas, it could hardly be expected that his followers would be able to accomplish

---

[1] An example is Vance's statement: ". . . the principles, techniques, and objectives of operations research are simply a reiteration of Taylor's fundamental thesis." Stanley Vance, Industrial Administration (New York: McGraw-Hill Book Company, Inc., 1959), p. 205.

[2] Supra, p. 3.

what he could not. To Taylor, a use which selected only some of the features of his system was less than success. To the observer, a system which afforded enough features so that a selection could bring betterment seems to mean tremendous success.

It is probable that the very volume of systematization introduced into American industry after Taylor's death may have made full recognition of Taylor's contribution impossible. His own list of clients was so small, the "disciples" who worked with him were so few, and the changes he advocated were so contrary to established practice that his direct influence was necessarily limited.[3] The "variations" on Taylor's scientific management theme which went into subject literature between 1911 and 1915 were all contributions, more or less, to the movement.[4]

---

[3] C. Bertrand Thompson, in a 1917 study, wrote that in the 113 plants in which the Taylor system had been operated, 59 were regarded as completely successful; 20 were partially successful, and 34 were failures. C. B. Thompson, The Taylor System of Scientific Management (Chicago: A. W. Shaw Company, 1917), cited by Benjamin W. Niebel, Motion and Time Study (Homewood, Ill.: Richard D. Irwin, Inc., 1958), p. 7.

[4] "The first thing such men did for clients was to install some new incentive plan. By neglecting the preliminary standardization they could make a temporary

Taylor's much-maligned "functional foremanship," in which the tasks of foremanship were divided among various line and staff "specialists" appears to be gaining support. While its desirability may continue to be questioned by those organizational "purists" who insist on undivided power to the person who bears undivided responsibility, a steady increase in "expertise" of functional staff personnel has already made this question more theoretical than actual. Such personnel and industrial relations fields as wage and salary, discipline, hiring, testing, promotion, job assignment, job methods, among others, are examples of former duties of foremanship now handled by staff personnel on at least a tacit basis of almost complete authority. The fields of methods research, tool research, production planning and control, and industrial engineering generally are other examples of this trend.[5]

---

showing, collect sizable fees, and rush on to other clients before the real trouble had time to develop. Such experts sowed much bad seed and their better qualified successors had to suffer the results." Charles Walter Lytle, Wage Incentive Methods (Revised edition; New York: Ronald Press Company, 1942), p. 55.

[5]". . . Taylor's suggestion (functional foremanship) set the foundation for the present-day integration of staff and line authority." Vance, op. cit., p. 126.

It appears that re-study of Taylor's synthesis of his ideas and the ideas of others can be of real value in solving modern production problems. In spite of some conflict on the part of writers, there is evidence that the fundamental principles of Taylor's "systematization" have been put into effective practice in nations where modern productivity methods are comparatively new.[6]

While "justice" in Taylor's particular case continues to be a matter of opinion, it would seem to be a matter which should be of some concern to academic truth seekers. It would also seem that individuals interested in the real merits of the man might profitably review what he actually wrote rather than what has been written in comment by others. Some texts accepted as "standard authority" may lack complete objectivity on Taylor because

---

[6]It may be that Paul Sultan reported a later Lenin viewpoint when he wrote: "Lenin condemned Taylorism as a plan which reveals the decadence of bourgeoise capitalism," in his 1957 Labor Economics (New York: Henry Holt and Company), p. 259; but Copley records Lenin's earlier (and perhaps less slanted) opinion thus: "Lenin recommended Principles of Scientific Management in an article in Pravda, 28 April 1918, on 'The Urgent Problems of the Soviet Rules,' under the sub-heading, 'Higher Productivity of Labor.'" Frank B. Copley, Frederick W. Taylor: The Father of Scientific Management, Vol. I (New York: Harper and Brothers, 1911), p. xxii.

the opinions of their authors appear to have been formed in this second-hand manner. It is not particularly surprising that Taylor, rather than The Taylor Society,[7] is the best source on the actual thought and work of the man.[8]

Such men as Morris Cooke, David Van Alstyne, and H. L. Gantt were leaders in the group of "bridgers" in developing a practical modus vivendi between Taylor's

---

[7]". . . [T]he group around the Taylor Society became a sort of left wing management group which continued to develop an experimental approach to the theory of organization and administration of industrial enterprises and labor participation in these functions." William Gomberg, "Trade Unions and Industrial Engineering," in Handbook of Industrial Engineering and Management, ed., William Grant Ireson and Eugene L. Grant (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1955), p. 1130.

[8]Search for companies similar to the one reported in 1942 by Lytle might provide grounds for analysis of "pure" and "impure" Taylor, also. The author said: "An eastern company making mechanical counters is one of the few adhering to the original Taylor (incentive) plan without any modification. Out of 150 employees, 95 men and 33 women are included in the plan which has been in operation for eighteen years . . . Four clerks are required to operate the plan in the factory and two in the office. Careful job standards are established and individual production records are kept. The typical efficiency is 115% of task and wages 25% to 30% above day rates. The management claims that the employees are satisfied. We may add that they have very high grade mechanics and that the plan is especially suited for that type of employee." Charles Walter Lytle, Wage Incentive Methods (New York: Ronald Press Co., 1942), p. 181.

ideas and the growing power of the craft unions of the American Federation of Labor. Louis D. Brandeis, who worked with Cooke on setting down mutually acceptable codes of conduct for the garment workers' union, must also be numbered among those who adapted Taylor's program to the new conditions of the years of World War I and after.[9]

However, while it can never be shown on the record, the very merits of Taylor's proposals forced their adaption and/or adoption by American industry. Under

---

[9]There were those who continued to oppose the growing power of labor, of course. The classic intransigent in the record is probably Carl Barth, who, when asked if he had considered the part that organized labor might take in helping increase productivity, said: "Not much. I don't shake hands with the devil." James T. McKelvey, AFL Attitudes Toward Production, 1900-1932 (Ithaca: Cornell University Press, 1952), p. 19.

Professor Hoxie's report could hardly be considered as a "bridging" document. His opposition to Taylor is exemplified in the following statement: "It [scientific management] looks upon the worker as a mere instrument of production . . . [It] stimulates and drives the workers up to the limit of nervous and physical exhaustion . . . [It] holds that if the task can be performed it is not too great. It tends to set the task on the basis of stunt records of the strongest and swiftest workers without due allowance for the human element or unavoidable delay. It ordinarily allows the workman no voice . . . in the setting of the task . . . or the general conditions of employment." Robert F. Hoxie, Scientific Management and Labor (New York: D. Appleton and Company, 1915), p. 169.

whatever names they may be called, and under whatever auspices they may have been put into practice, what Taylor advocated as to methods is an integral part of the techniques of modern industrial managers. Continued opposition to "Taylorism," still a factor in the writings on the field of industrial production management, has not been effective in denying the game, notwithstanding some instances of success in either denying (or pre-empting) the name.

Conclusions

Taylor's ideas, in whatever disguise or alias they may be placed, appear to be in wide present use in those industries investigated in the Los Angeles County area. Such use on the part of local firms which are branches of national and international enterprises would argue for similar use of what are, in actuality, Taylor's original ideas on a national and international scale.

It is probable that Taylor's own nature was in itself the single most important factor that brought down upon him the combined opposition of all who disliked his systems. C. B. Thompson's description of him as an

"autocrat by birth, training, and experience . . ." is probably a true characterization.[10]

Sociologically, Taylor seems to have been unable or unwilling to understand or accept the changing tenor of his times. The latter years of his life were the years in which the social direction of the nation seemed to pause to assess its past, and to find itself unsatisfied. It was as though the national consciousness, aroused to self-searching by the "political accident" of Theodore Roosevelt, the Populist movement (and the "muck-rakers"), Woodrow Wilson and World War I, sought to assess the social cost of its great material progress. The national decision appears to have been that it had, perhaps, "paid too much for progress," and that its future course would have to include a greater diffusion of benefits for those in the ranks below its leaders.

---

[10]Thompson wrote this in "defense" of Taylor in answer to a Spring, 1914 article in the English The Sociological Review, which condemned overworking of laborers and the unemployment it felt sure would result from use of the Taylor ideas. Taylor, "furious," wrote three letters to Thompson denying that he was an autocrat; "merely a former workingman who was trying to help his fellows." Milton J. Nadworny, Scientific Management and the Unions (Cambridge: Harvard University Press, 1955), pp. 77-79.

Samuel Gompers, to a perhaps greater degree than Taylor, symbolized this new sociological trend. In their controversy, the times (and, in the long run, the new national conscience) were on Gompers' side.

If, in reviewing what has been written, what might strike a critic as a sort of bigotry is discovered, it should be remembered that neither Taylor nor Gompers was noted for ability to see both sides of a question. Certainly, the kind of person who would have been influenced by Taylor would have a hard time understanding Gompers. Both were, in some ways, devoted to obstructing some of the processes of social evolution--Gompers for what he believed to be the best interests of labor, Taylor for his disregard of the interests of labor in favor of greater productivity.

Engrossed as they were in the details of their conflict, they probably did not realize that both were spokesmen for a greater interest and a greater cause. In the final analysis, both spoke for the paramount public interest, and their controversy served that interest by demonstrating that everyone's interest is best served by all. Both Taylor and Gompers may have been guilty of

using a strong voice to hide weak logic, and of the kind of personal stubbornness that discourages new solutions. Between them, no compromise was possible.

But other men, less interested in "maintaining a position," were at work bridging the gap during Taylor's lifetime (and to even greater degree during the remainder of Gompers'). These men, from both camps, found the middle ground that served the public interest.

What appear to be attempts to establish a sort of counterfeit truth by petitio principii argument which seeks to minimize Taylor's contribution are regrettable. While few would expect objective judgment from participants in this controversy, it might be expected that errors in opinion (and, perhaps, in fact) would have been pointed out by those whose business it is to winnow the wheat of truth from the chaff of the myth-makers. More truly critical review of some of the literature seems to be indicated if complete frankness and true objectivity are to be established. In the present thesis, work still remains to be done before a sound basis for the operation of Brandeis' proposition is reached. "The people's lawyer" wrote:

> Like the course of the heavenly bodies, harmony in national life is a resultant of the struggle between contending forces. In frank expression of conflicting opinions lies the greatest promise of wisdom in governmental action; and in suppression lies ordinarily the greatest peril.[11]

[11] Louis B. Brandeis, in Gilbert v. Minnesota, 254 U.S. 325 (1920).

BIBLIOGRAPHY

BIBLIOGRAPHY

Public Documents

U. S. Congress. Evidence Taken by the Interstate Commerce Commission in the Matter of Proposed Advances in Freight Rates by Carriers, August to December, 1910. Interstate Commerce Commission Reports, No. 3400. Senate Document 725. Washington, D.C.: U.S. Government Printing Office, 1911.

_____. Hearings Before the Special Committee of the House of Representatives to Investigate the Taylor and Other Systems of Shop Management. Under authority of House Resolution 90, 62nd Congress, 2d Session. Three volumes. Vol. III. Washington, D.C.: U.S. Government Printing Office, 1912.

U. S. War Department. Ordnance Department General Order No. 13. November 15, 1917.

Books

Aitken, Hugh J. Taylorism at the Watertown Arsenal, 1908-1915. Cambridge: Harvard University Press, 1960.

Alford, L. P., and Beatty, H. Russell. Principles of Industrial Management. Second edition, revised. New York: Ronald Press Company, 1951.

Ansley, Clark F. (ed.). Columbia Encyclopedia. New York: Columbia University Press, 1946.

Bowman, Edward H., and Fetter, Robert B. Analysis for Production Management. Homewood, Illinois: Richard D. Irwin, Inc., 1958.

Brown, James A. C. The Social Psychology of Industry. Hammondsworth, Middlesex, England: Penguin Books, Ltd., 1954.

Carson, Gordon B. (ed.). Production Handbook. New York: Ronald Press Company, 1958.

Casson, Herbert N. Creative Thinkers. New York: B. C. Forbes Publishing Company, 1929.

Clerke, Agnes Mary (on Babbage). Dictionary of National Biography. Ed., Leslie Stephen. London: Oxford University Press, 1950.

Cochran, Thomas C. Basic History of American Business. Princeton: D. Van Nostrand Co., Inc., 1959.

Colby, Frank Moore, and Williams, Talcott (eds.). The New International Encyclopaedia. Second edition. New York: Dodd, Mead and Co., 1928.

Copley, Frank B. Frederick W. Taylor: The Father of Scientific Management. Two volumes. New York: Harper and Brothers, 1911.

Cumberlege, Geoffrey (pub.). Concise Dictionary of National Biography. London: Oxford University Press, 1948.

Frankfurter, Felix (on Brandeis). Dictionary of American Biography. Ed., Dumas Malone. New York: American Council of Learned Societies. Chas. Scribner's Sons, 1936.

Freemantle, Anne. This Little Band of Prophets: The British Fabians. New York: New American Library, 1960.

Glazebrook, Richard Tetley (on Isaac Newton). Dictionary of National Biography. Ed., Leslie Stephen. London: Oxford University Press, 1950.

Gomberg, William. "Trade Unions and Industrial Engineering," in Handbook of Industrial Engineering and Management. Ed., William Grant Ireson and Eugene L. Grant. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1955.

Gompers, Samuel. Seventy Years of Life and Labor. Vol. I. New York: E. P. Dutton and Company, 1925.

Heffer, Richard D. A Documentary History of the United States. New York: New American Library, 1952.

Hoxie, Robert F. Scientific Management and Labor. New York: D. Appleton and Co., 1915.

Lytle, Charles Walter. Wage Incentive Methods. New York: Ronald Press Co., 1942.

Marquis, A. N. (ed.). Who's Who in America. Various years. Chicago: A. N. Marquis Company.

Mason, Alpheus T. Brandeis: A Free Man's Life. New York: Doubleday, 1919.

Mayo, George Elton. Social Problems of an Industrial Civilization. Cambridge: Harvard University Press.

McKelvey, James T. AFL Attitudes Toward Production, 1900-1932. Ithaca: Cornell University Press, 1952.

Menke, Frank G. Encyclopedia of Sports. Second edition, revised. New York: A. S. Barnes and Co., 1960.

Mulcahy, Richard E. (ed.). Readings in Economics from Fortune. New York: Henry Holt Co., 1956.

Nadworny, Milton J. Scientific Management and the Unions. Cambridge: Harvard University Press, 1955.

Nevins, Allan, and Commager, Henry Steele. The Pocket History of the United States. New York: Pocket Books, Inc., 1944.

Niebel, Benjamin W. Motion and Time Study. Homewood, Illinois: Richard D. Irwin, Inc., 1958.

Rossiter, Clinton. Preprint from Marxism: The View from America. New York: Harcourt, Brace and Co., 1960.

Singer, Isidor (ed.). The Jewish Encyclopedia. New York: Funk and Wagnalls Co., 1904.

Slosson, Edwin E. Creative Chemistry. New York: Century, 1919.

Sultan, Paul. Labor Economics. New York: Henry Holt and Co., Inc., 1957.

Taft, Philip. Interpreting the Labor Movement. New York: Industrial Relations Research Association, 1952.

Taylor, Frederick W. The Principles of Scientific Management. New York: Harper and Brothers, 1911.

Taylor, George Rogers (ed.). The Turner Thesis: Concerning the Role of the Frontier in American History. Boston: Amherst College Readings in Problems of American Civilization. D. C. Heath and Co., 1949.

Thompson, C. Bertrand (ed.). Scientific Management. Cambridge: Harvard University Press, 1914.

Thompson, C. Bertrand. The Taylor System of Scientific Management. Chicago: A. W. Shaw Company.

Turner, Frederick Jackson. The Significance of the Frontier in American History. New York: Henry Holt and Co., 1948.

Valentine, Robert G. The Progressive Relationship between Efficiency and Consent. New York: The Taylor Society, 1915.

Vance, Stanley. Industrial Administration. New York: McGraw-Hill Book Company, Inc., 1959.

Webb, Beatrice and Sidney. The History of Trades Unionism. London: Longmans, Green and Co., 1894.

Yoder, Dale, et al. Handbook of Personnel Management and Labor Relations. New York: McGraw-Hill Book Co., Inc., 1958.

Yoder, Dale. "Manpower Management and Employment Relations," in Handbook of Industrial Engineering and Management. Ed., William Grant Ireson and Eugene L. Grant. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1955.

Yost, Edna. Frank and Lillian Gilbreth. New Brunswick, New Jersey: Rutgers University Press, 1949.

Articles and Periodicals

Fischer, John. "The Easy Chair," Harper's Magazine, July, 1960, pp. 12-13.

Gantt, Henry Lawrence. "Organizing for Work," Industrial Management, Vol. 58, pp. 89-93 (August, 1919).

Taylor, Frederick W. "On the Art of Cutting Metals," ASME Transactions, Vol. XXVIII (December, 1906), entire issue.

_____. "Shop Management," ASME Transactions, Vol. XXIV, pp. 1,337-1,480.

APPENDIX

INTERVIEW REPORTS

Interviews with spokesmen for operating management of various Southern California industrial concerns, and with officials of various local labor unions, were obtained during the Fall months of 1960. A patterned interview technique, designed to secure answers to questions dealing with what were regarded as essential elements of the original Taylor proposals, was employed.

Firms selected were chosen on a basis expected to provide data representative of the industries involved. With the exception of the firms engaged in the manufacture of women's clothing and metal machining, companies were either firms directed from Southern California headquarters, or large branches of companies with head offices in other sections of the nation. In all cases involving interviews with management representatives, the interviewees were selected by the companies as the persons best qualified to outline present management practice in its relationship to the Taylor system.

To secure information on a free, frank and informal basis, it was agreed that none of the persons interviewed, or their companies, or unions, would be identified in any but the broadest terms, and that complete anonymity of sources of information would be preserved.

Description of the Companies

"Company A" is the Southern California branch plant of a very large national corporation engaged in the primary metal industry. In its business of producing and forming metal shapes, it follows systems and procedures prescribed by its headquarters office.

"Company B" is a very large Southern California corporation engaged in the commercial and military airframe and space industries, and in related fields. Its headquarters in the Los Angeles area establishes policy and prescribes manufacturing procedures for divisional and branch plants located in other United States and world locations.

"Company C" is regarded as a typical middle-sized company engaged in designing, manufacturing and merchandising specialty women's clothing. It is operated by a

group of partners, and its permanent staff is augmented periodically by part-time employees supplied by the industry union. Its manufacturing methods, work practices, and related matters are, for the most part, out of the control of company management.

"Company D" is the Southern California branch plant of a very large corporation engaged in the electronics manufacturing-communications industry. This plant has practically no "local autonomy," since nearly all operating details and procedures are prescribed by national headquarters, and are inspected closely.

"Company E" is a Los Angeles area supplier of metal automotive components it manufactures to specifications for various assembly plants here and in northern California. While it establishes its own operating policies and procedures, it follows "Detroit practice."

"Company F" is a Los Angeles area automotive assembly plant. While its industrial engineering department was allowed a large amount of theoretical authority in planning local operations, it was "understood" that radical deviation from methods favored by its headquarters office were not performed. Close and frequent liaison

was maintained with headquarters during the time the interview was had, since it was during the annual model changeover period.

"Company G" was a large company engaged in the soap and detergent manufacturing business. Due to the comparatively small number of firms engaged in this business in the Los Angeles area, a more precise definition cannot be given without breaking the promise not to divulge information which might identify the company.

"Company H" was a medium-sized Los Angeles area firm engaged in the general electronics industry. It operates a military and government agency products division, and a division which manufactures products sold to the general public. Operating policies and procedures for both divisions are established by a single company department. The company is a closed corporation.

"Company I" was an oil refinery operated by a very large integrated petroleum company. Refinery operations were carried on as a "divisional" activity, and refinery operating management was given a large amount of "independent" authority in establishing methods and procedures in its own area.

"Company J" was a medium-sized general metal working plant, operating as a "job shop" on orders for standard and special order work. It was owned and operated by its founder, assisted by members of his family and a few remaining "original" employees.

Number of Employees of Companies Represented in the Interviews

Firms with which interviews were obtained ranged in size of local work force from less than one hundred to more than 25,000 employees. Those firms which were affiliated with "national" concerns (either as branches or with branches) represented work forces of approximately 600,000 employees. While these total figures undoubtedly include a large number of employees not engaged in direct production activities, it is felt that the sample is large enough to be representative of at least "general practice" in the lines of businesses investigated.

There is some reason to believe that these local interviews are indicative of "general practice" in most of the industries represented. In only two cases were any doubts expressed that the practices of individual firms

represented a fair cross section of industry practice. Estimated total sales figures for the parent companies involved are at an annual rate of about $25 billion.

Age of companies represented in the interviews ranged from less than three years to more than seventy years. Business capitalizations ranged from less than $100,000 to more than $10 billion.

Union Representatives Interviewed

Four union officials were interviewed. Offices held by these union representatives ranged from "shop representative" to the president of one of the three largest local unions in a very large "international." While some discrepancy as to nomenclature was noted, there appeared to be no other factual differences in the interviews. Two of the union officials had been trained in industrial engineering; one had been employed as an industrial engineer in the company his union now served.

"Mnemonic Tooling" Question Eliminated

While a few interviewees were familiar with Taylor's scheme for mnemonic identification of tools, it

became apparent that modern tool identification and call-out procedure does not include this feature of Taylor's system. The question was eliminated from the interviews, and is not reported in the tabular presentation of interview results which appears in the table on the following page.

TABLE 5

"TAYLOR SYSTEM" ELEMENTS IN PRESENT USE BY SOME BUSINESS FIRMS IN SOUTHERN CALIFORNIA

Code:

x - Element in use
a - Not in general use; used where fair comparison is practicable
b - Performed and/or controlled by union
c - Not regarded as practicable in assembly line operations
d - Not regarded as practicable in continuous flow chemical operation
e - Company hires only completely skilled machinists
f - Comparative "merit" considered in pay raises and promotions
g - Group accomplishment rated against group standards
h - Piecework priced on records of previous similar work

Elements	Companies									
	A	B	C	D	E	F	G	H	I	J
Individual production records	a		x			c	d	d	d	x
Employee selection	x	x	b	x	b	b	x	x	b	x
Job methods training	x	x	b	x	x	x	x	e	x	e
Specialized staff organization	x	x		x	x	x	x	x	x	x

TABLE 5--Continued

Elements	Companies									
	A	B	C	D	E	F	G	H	I	J
Written job instructions	x	x	i	c	x	c	d		x	x
Production control organization	x	x		x	x	x	x	x	x	x
Production standards enforced	x	g	b	x	x	x		x	d	h
Rewards for above average performance	x	f		a	x			x		x
Penalties for sub-standard performance	f	f								x