to them were based on experience, but an experience not documented, and were unconvincing. There was no solution for the controversy in argumentation, and labor was not disposed to investigate the facts. From the point of view of the historian in 1928, it was necessary for the course of events to bring its own enlightenment through larger experience. That is what has come to pass.

The first ground of opposition disappeared during the war. Employers and leaders of organized labor laid aside their differences as they worked side by side on war committees. They learned to understand each other better as human beings and to value each other's motives. An organized labor observed that the scientific management group was the most consistent of all employing groups in regarding and promoting labor's interests and in the desire to conserve labor's gains after the war.

The second ground of opposition disappeared through gradual observation of the facts. A "science for each operation" does not destroy craft skill; it may modify its content sometimes, but it as frequently gives it wider scope. Labor has observed also that the procedures of scientific management require in addition to old skills, a skill in co-operation through understanding of purpose and methods. A scientific management plant strives to bring all workers in a craft to the level of skill of the best, and is more dependent on uniformly high intelligence and skill within a craft than any other kind of plant.

The third ground of opposition also disappeared through observation of facts. Labor saving through better management, as distinct from labor saving by an occasional epoch-making invention, although easily described, takes research, education and time to achieve. One can tell in one minute about a saving of labor energy which has taken a year or more. Savings are generally by small increments through a long period, and adjustments are effected during the period. The rate of saving rarely amounts to the normal rate of voluntary quits.[13] Scientific management may involve reassignments —and for the first time in the life of many workers assignments on the basis of investigated capacity —but it does not often involve discharge.

The fourth ground of opposition also gradually disappeared with experience. Improvement and standardization of machine conditions and of methods may or may not result in increased speed of production, and with or without increased speed of the operative; it depends upon the particular machine, the particular operation and the particular circumstances. It should be borne in mind that machines and operations vary greatly in the relation of workers' handling time to machine time, and that the problem of speed and of fatigue varies accordingly. In operating a punch press, for instance, the worker is active all the time, fatigue becomes an important element of the situation, and experiment may disclose that a reduction of speed or introduction of rest periods will increase productivity; but in the operation of a large lathe the worker is but a watcher and adjuster for a major portion of his time, and increase in the speed of the machine has only remote fatigue relation to the worker. And in many instances the increase of speed is merely a mathematical result of dividing the total output into the total time taken and securing an average time per piece; for when conditions are improved so as to eliminate waiting and other idle time, speed may be increased mathematically per piece without any increase of actual speed. It has come to be understood that speed and fatigue are problems of each particular operation, and the more carefully a correct speed is sought by experiment and measurement, the more reasonable, just and permanent will be the standard of output agreed upon.

The opposition of leaders of labor to bonafide scientific management has practically disappeared, and during recent years there has been noteworthy co-operation between scientific management leaders and labor leaders. The first striking evidence of labor's interest in good management and increased productivity was the association in 1920 as editors of a volume entitled "Labor Management and Production,"[14] of Samuel Gompers, President of the American Federation of Labor, Morris L. Cooke, an outstanding disciple of Taylor, and Fred J. Miller, President of the American Society of Mechanical Engineers and an exponent of scientific management. A few years later other labor leaders[15] contributed to a similar volume. In December, 1925, William Green, successor to Gompers as President of the American Federation of Labor, participated by a noteworthy address in a meeting of the Taylor Society,[16] and a few months later other representatives of labor participated in another meeting of that society.[17] In the spring of 1927 the General Labor Union of Philadelphia had a two-day conference on co-operation between management and labor in the development of better methods of production, in which scientific management was sympathetically discussed and scientific management engineers and executives were active participants. This led to other similar conferences under the auspices of organized labor. In the Cleveland, Ohio, ladies' garment market organized employers and organized workers have agreed upon a program involving measured standards of output, and the stop watch is the accepted instrument of measurement. On the Baltimore and Ohio, the Canadian Northern and two other railroads there is organized co-operation between management and workers in the development of better methods and the workers have a methods engineer on their payroll.

Misunderstandings and disagreements concerning scientific management as a doctrine have given place to co-operative inquiry into conditions and methods of its utilization.

Scientific management had its origin nearly fifty years ago in an inspired effort to solve serious problems of productivity and personal relations in a capitalistic regime of industry already becoming highly mechanized. It has become a philosophy and a body of practices pertaining to management *per se*, independent of any particular regime of industry, and usable in whatever system of industrial society men and women may desire to work together in specialized co-operative efforts toward a common objective. And because it endeavors to base policies, plans and procedures on scientifically determined facts of human nature as well as of mechanics, it is a great force for amelioration of human relations in industry.

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[13] The December, 1927 report of the Metropolitan Life Insurance Company, New York, of the average annual voluntary quit rate of more than 300 reporting companies is 14.9 per cent.

[14] *Annals of the American Academy of Political and Social Science*, Vol. XCI, September, 1920.

[15] *Annals of the American Academy of Political and Social Science*, Vol. CXI, January, 1924.

[16] *Bulletin of the Taylor Society*, Vol. X, No. 6, December, 1925.

[17] *Bulletin of the Taylor Society*, Vol. XI, No. 1, February, 1926.

EMPLOYERS in general are feeling out toward a wider conception of their duties and responsibilities. There are few deliberate applications of "Scientific Management" in the sense of a complete application of the Taylor system and methods. Indeed the day for a directly imitative policy is past. Taylor's contribution is beginning to be recognized for what it really is, not a series of devices, but a new philosophy, a fresh attitude of mind, in approaching problems of industrial management of all kinds. The opposition of organized labor to the conception of scientific methods is following the example of the American Federation of Labor, and rapidly changing.

In short, while, with important exceptions, the majority of British employers would confess ignorance of F. W. Taylor's work and deny any intention of applying scientific management in their factories, the undertakings which remain entirely immune from the general effects of his teaching are a rapidly decreasing minority. On all sides there is a growing recognition that the problems of industrial administration can and must be studied on scientific lines. The new knowledge and powers derived from such study may, it is true, be abused, and even directed to anti-social purposes; but properly applied and with adequate safeguards for labor, they must result not only in lower costs and increased productivity, but in higher earnings for the individual worker, a more interesting task, and greater security under an improved standard of life for the community. (Report on Great Britain compiled by Miss S. M. Bevington, B.Sc., from Report of First Triennial Congress of I. R. I. held at Cambridge, England, July, 1928, on the subject of *Fundamental Relationships Between All Sections of the Industrial Community*, pp. 173-174.)