

how employer and employee could share profitably by actual cooperation in advancing their own ends. Speaking in a vein of idealism, he had in mind practical objects to be gained in the form of larger production and earnings and higher wages and fairer treatment. Capital, Mr. Green believes, is recognizing more and more that it can succeed and prosper with the cooperation of labor and the maintenance of high standards; and labor is recognizing more and more that better pay may be expected where management is alert and efficient and waste is eliminated. This is a hopeful view for the future, where in years past there has been so much strife, unreason and greed. Most notable is it that the foremost representatives of organized labor today, when pressing claims for high wages, justified the plea with the assurance that labor will more than repay what it may receive with goodwill and service."

BECAUSE Frederick W. Taylor and some of his methods were bitterly condemned by organized labor for years—we quote the *New Republic*—and because Mr. Taylor and some of his immediate followers apparently saw no place for the functioning of unions in industry, it was a historic occasion when William Green, President of the American Federation of Labor, addressed a joint meeting of the Taylor Society and the Management Division of the A. S. M. E. in a friendly vein, and was warmly welcomed by the members of the societies. The engineers themselves deserve great credit for the more intelligent conception of industrial relations which made such an event possible. The late Robert Valentine was the first who foresaw the possibility, but he was a voice crying in the wilderness. Little by little, however the idea of cooperative relationships spread, and the technique of establishing them began to be elaborated, by such men as Morris L. Cooke, Robert B. Wolf, and Otto S. Beyer. So Mr. Green could recognize the importance of management in improving the condition of the wage-earner, could argue for the necessity of genuine trade union cooperation in a program of improving the technique of industry as a public service, and could offer cooperation to those managements willing candidly to accept it. The conception has now been officially recognized by both parties—there remains the long and arduous task of establishing it in general practice."

Imagination in Science

THERE is no denying the assertion that there is not yet a science of management. There is scientific method in attacking the problems of management; there have been established a few basic principles, such as the separation of planning and execution under certain circumstances; but there is no substantial body of principles sufficient to eliminate uncertainty and chance in any considerable degree from managerial operations. What some are in a hurry to call a science of management is characterized by a large body of doubting observers as a collection of hypotheses, a creation of the imagination.

We believe the characterization is essentially correct; but is it, in the spirit of derogation in which it is usually made, a just characterization? Is not any science in its beginnings dominated by imagination; is not imagination essential to the development of a science? These questions must have come to the minds of those interested in a science of management who are fortunate enough to have read Pupin's fascinating autobiography, "From Immigrant to Inventor." Writing of the origins of the electromagnetic theory of light and matter, now fundamental in the physical sciences, and particularly of Faraday's part in those origins, he says (page 222):

The gradual development of this view was due to the gradual development of new physical concepts which were born in Faraday's mind and existed there as poetical vision. . . in every creative physicist there is hidden a metaphysicist and a poet; but the physicist is less apt to persist in his occasional errors as metaphysicist and poet, because the creations of his speculative mind and of his poetical vision can be subjected to crucial experimental tests. . . Faraday was a pioneer in science, and the descriptions of his explorations read like tales from a new world of physical phenomena, full of poetical visions which his discoveries suggested to his imagination. It must be said, however, in spite of his wonderful imagination and his free use of it, no investigator ever succeeded better than Faraday in drawing a sharp line of division between the new facts and principles which he had discovered and the visions which his imagination saw in the still unexplored background of his discoveries.

Faraday, one of the first laboratory physicists, discovered in his laboratory certain "precious morsels of the eternal truth"; then his imagination came into play and directed him to put certain hypotheses which he was never able to establish; "but his mag-

nificent effort to find his answer gave birth to new ideas which are the foundation of our modern electromagnetic view of physical forces." It was these ideas which set Maxwell on the way to mathematical proof and Hertz on the way to experimental proof of the existence of elements of the eternal truth in Faraday's speculations.

Imagination, speculation, theorizing—call it what you will—is essential to the development of any science. It is essential if industrial society is to succeed in discovering a science of management. That is why the Taylor Society, at its meetings and in its Bulletin, has been hospitable now and then to a paper speculative and sometimes "over our heads" in nature. Such speculations may inspire managers to modifications of managerial practice, and it is these modified managerial practices which constitute the objective data on which a superstructure of science is reared.

However, if imagination is to contribute to the development of a science of management, there are certain conditions to its exercise which must not be disregarded. These are explicit in the above excerpt from Pupin.

In the first place, imagination must have a basis of proved fact. It cannot be spun out of vague conjectures. The direction of Faraday's imagination was determined by substantial facts derived from his scientific experiments. Any imagination which contributes to the development of a science of management must have its basis of determined facts.

Taylor was the author of the scientific management concept because he had both imagination and critical, experimental disposition. His first job as foreman brought him immediately into conflict with workers. His capacity for observation, classification and analysis of experience gave him certain definite facts concerning the managerial conditions of the conflict. Then imagination came into play and he conceived the necessity of establishing a factual basis for human relations in industry. Then he proceeded by elaborate, critical experiments to discover that factual basis. From it he drew certain principles relating chiefly to management of mechanical processing. Then imagination entered again and he had vision of the verification of these principles with respect to distribution processes, and, before psychology had made itself known to industry, vision of a science of human conduct in industry.

In the second place, if imagination is not to lead us astray, is to play a dependable part in the development of a science of management, there must always be drawn a sharp line between, on the one hand, proved facts and established principles, and on the other hand, "visions in the unexplored background of discoveries." These visions should be presented merely as inspirations to experiment on the part of those concerned with managerial operations.

In the third place, errors of the imagination must be eliminated before they have led us astray, by subjection to "crucial and experimental tests." This is why the physical sciences have developed so much more rapidly than the social sciences—the physical sciences are concerned with data much more easily subjected to crucial experimental tests. This is a major reason why the development of the social sciences is so retarded, and why the modest beginnings of a science of management which we do have is concerned primarily with the management of equipments and mechanical processing. We have not yet a science of distribution or of human relations in industry. Conduct in industry may be observed, recorded, classified and analyzed as it appears by chance, but it cannot yet be subjected to the manipulation and control required by scientific experimentation. Therefore, while we should encourage imagination stimulated by determined facts and principles, we must be cautious in that respect, and we must be patient.

International Congress at Brussels¹

October 14 to 18, 1925

THE International Congress "de l'Organisation Scientifique de Travail" at Brussels has been a very great success.

It was held under the high patronage of the King of Belgium and under the auspices of the Belgian Government, in the Palais des Académies. The attendance was very large, including more than one hundred and fifty French engineers, many of them of high standing, and above all MM. H. LeChatelier and H. Fayol.

At the opening meeting, speeches were delivered by M. Canon Legrand, President of the Congress; M. Wooters, Belgian Minister for Labor and In-

¹Excerpts from a letter from M. Ch. de Freninville to H. S. Person.