from years of experience, scientific investigation and experiment in management methods. The members of the Committee, in earlier experiences with details of management affecting waste, and to a large extent in accordance with methods of objective science, had established indices of management with respect to waste; and then in this particular assay went out into the plants investigated, looked at the indices and appraised the waste in accordance with what these indices indicated.

The method was essentially the same as that of the medical diagnostician. He examines a patient, observes certain facts which to him are indices, and then makes a diagnosis which is a matter of estimate and judgment. His method *in actual diagnosis* is not the method of objective science; but behind his indices of conditions, and giving them dependability, has been a vast amount of pure science.

Now I do not wish to suggest that behind the work of the engineers of this Committee there was any such foundation of science as is behind the work of the medical diagnostician; my point is simply that the methods are the same, and to the extent that management engineering has used the scientific method in establishing indices of good management or of least waste, the scientific method of investigation was utilized indirectly or ultimately in this investigation, even though the immediate method was that of estimate and judgment.

A hypothetical case might make my point clear. Imagine that there were great necessity of making quickly an assay of the productive resources of agriculture in this state—a war of some duration is imminent, let us say, and it is necessary to make available what is now the loss of waste in poor agricultural methods. There is no method of objective science which is directly applicable. The most scientific statistical method is not available, for there are not dependable statistical data. But it would be possible to appoint a board of experts—expert because familiar with the methods and results of scientific investigation in detail in the field of agriculture—consisting of farmers who utilize scientific methods, professors of agricultural colleges and experiment stations, and so on. This board could agree upon a code of indices—based upon both research and experience (trial)—which would enable them rapidly to rate each farm with respect to the ratio of what it now produces to what it could produce under the most scientific methods of farming, with surprising accuracy. I would rather have that rating—and I understand Mr. Fisher to say he would—than the rating of any statistical study, because the methods of statistics, while scientifically refined, cannot find dependable data to work upon. The application of the method of evaluation by objective experiment would be utterly impossible.

You know that buyers of stock on the hoof are so expert in estimating the weight of animals by observing indices, that they can time after time estimate the weight of an animal to within a few pounds; timber cruisers become so expert that they can estimate with a small percentage of error the millions of feet in a tract of standing timber. That sort of estimating entered into the work of this Committee; but the tests agreed upon by the Committee had behind them also a large amount of purely scientific experiment in detail.

The signal achievement of Mr. Hoover was in the selection of a group of eighteen men who, better than any other group of eighteen men we can name, in using the method of judgment by observing indices, were able to establish indices which have behind them not only long experience but also development in detail to a large extent by the methods of objective science.

QUESTION FROM THE AUDIENCE: What interests me is not how to get the facts—that is comparatively easy—what I am particularly interested in is how those facts are to be used. Nothing succeeds quite so well as success; and as an illustration of what I mean I would like to ask, for instance, what weight was given to personality? I know one of the largest plants in the United States, usually considered one of the most efficient, with respect to which practically all of the questions under organization would be answered in the negative. I should like to ask, in a perfectly good-natured way, by what authority, any individual, no matter how broad his experience, cares to say that the fact one does not have functional organization, that one does not have individual job tickets—such things as that—should constitute a specific per cent of waste. What weight is given to the personality of the drive in the force of the manager which makes unnecessary some of those things which scientific managers like to think are necessary?

MR. PERSON: That is another searching question, comparable to Mr. Fisher's question about whether the methods of the Committee were scientific. There is no question about the importance—and the intangible quality, from the point of view of measurement—of personality. I should, however, answer the question

in this way:

With respect to the relation between personality and technical organization and methods, establishments may be classified broadly as follows; strong personality, combined with evidence of weak organization and methods, weak personality combined with evidence of weak organization and methods, weak personality combined with evidence of strong organization and methods, and strong personality combined with evidence of strong organization and methods. Now, although these combinations do not occur with equal frequency, in making a survey or assay of an industry, it may be assumed if the sample is sufficient, that personality cancels out and the evidence of good or weak organization and methods remains a fair index.

I have said that these combinations do not occur with equal frequency; weak personality combined with evidence of weak organization and methods and strong personality combined with evidence of strong organization and methods are likely to occur more frequently than the other two combinations; therefore, canceling out personality, considering the purpose of the investigation, is a conservative procedure.

It should be borne in mind that the assay of this Committee was *not an assay of individual business success or profits earned*—profits to the individual may occur simultaneously with waste of the materials of industry. It *was an assay of waste of materials, labor-energy, capital, and opportunity for production.* Technical organization and methods are a better index of such waste than personality, or individual business success or profits.

E. E. HUNT:[1] One of the things planned for in this report and reluctantly excluded was a series of evaluations of industrial plants made by their own managers and not by our outside investigators. And the reason that those were excluded was simply that we did not receive a sufficiently large number of them to give a representative view. We had hoped to have as many as thirty, and we thought it would be valuable to compare the evaluations made by insiders with the evaluations made by outsiders.

Those inside evaluations would have been the best possible answers to Mr. Fisher's question.

The managers of the plants in Worcester, Mass., who saw this questionnaire in March expressed admiration for it and anxiety to put it to use. It was they and not we who suggested the inside evaluations.

Any criticism from the point of view of the management of plants which has arisen since the report was published I think we should have in writing, to compare with the view of the plant managers in Worcester; but especially we should have it to make use of in the future revision of this questionnaire, which would seem to me one of the important tasks still to be undertaken by the Committee on Elimination of Waste.

I disagree radically with Mr. Knoeppel's encomiums on our accomplishment. In the first place, the questionnaire and evaluation sheet are only a part of the Waste Report. It is a mistake to overemphasize their importance. They happen to be the topics for discussion this evening, but it will give a totally false impression if they are presented to your consideration as anything but a first step. This questionnaire and evaluation sheet have about as much relation to a scientific mechanism for evaluating an industry as the anthropoid ape has to man. They are the merest beginning, important because they are a beginning. I for one have no illusions about them, and what I had hoped for here tonight was a severe technical analysis of these devices from the point of view of their applicability to industry today and tomorrow. Development of this device, not praise of it, is what we need.

From my experience as a member of the Committee on Elimination of Waste in Industry and as secretary of the recent Conference on Unemployment, I am convinced that we are just beginning to recognize waste in industry. Before the Unemployment Conference met, American industry, American civilization, had showed itself so careless about this great problem that we lacked even a method for determining the number of unemployed. Experts of the Department of Labor, estimating the unemployed only in terms of separations from hypothetical payrolls, set the figure at about 5,500,000. Experts of the Unemployment Conference set it at about 3,500,000 and not more than 4,000,000. Both figures were necessarily guesses, and this ludicrous difference was the result.

But unemployment is not confined to separations from payrolls in times of cyclical or seasonal depressions. Absenteeism is unemployment. Part-time is unemployment. Breakdowns of machines, failures of planning and administration, as the Waste Report shows—these things account for much idleness of workers during working hours—what Morris L. Cooke has called "unemployment within employment." There

[1] Secretary Committee on Elimination of Waste; Secretary President's Conference on Unemployment; Washington, D. C.