

10

SOME PRACTICAL USES OF STATISTICS  
By Doctor Donald H. Davenport  
October 10, 1939.

Colonel Miles, Gentlemen:

It is a real pleasure to be with you this morning, and as I look down I see some faces that are friendly faces and familiar faces. It was a pleasure to have some of your members as students in the Business School, years ago.

My first introduction to The Army Industrial College occurred about seven years ago at a time when economists were greatly concerned over the breakdown in American business conditions. Shortly after the collapse in 1929 we began to reappraise our analysis of business conditions, to reappraise factors that affect the continuity of business operations, and at that time some of us began to think in terms of national economic planning and it was quite natural that we should come to The Army Industrial College, an institution which was charged with the responsibility of preparing for national economic planning in the event of emergency.

You men are charged with the responsibility that is probably greater than that which rests upon any other single group of men in the country. Economists realized that. We came here to find out something about the techniques which you were applying; to learn what we could of those techniques for application to a peace-time economy, to an economy which was disrupted by the depression, an economy essentially a peace-time economy put on

something of a wartime basis to fight depression, and we learned a great deal from your instructors who were here at that time. Therefore, it is a particular pleasure to return something of that debt of gratitude to you this morning.

Colonel Miles has asked me to talk with you about the practical application of Statistics to the problem of business control. As I thought over what I would say this morning, I decided to organize my talk into two parts. In the first part, I shall stick to what I know, practical applications of statistical techniques to the control of business enterprises. In the second part I will diverge from what I know and try to put myself in your position and ask how statistical techniques can be applied to the responsibilities that you and the generations of students that have preceded you here must bear; in other words, the role of statistical methodology in industrial control during an emergency. That, frankly, is an area<sup>in</sup> which I am on unfamiliar ground. When I come to that part of the talk you will understand that I am not speaking from experience; I am merely trying to translate the limited experience I have had in a study of the applications of statistics to business control to your particular problem.

The term, "Statistics" is used in two senses, you probably already realized. In the first sense, Statistics relates to a collection of factual information presented in quantitative terms. We speak of statistics of population, statistics of income, statistics of production, or the statistics of school attendance - we use it in that sense.

In the second sense, the term is used to describe the principles that govern the collection of quantitative information, the collating of that information so that its significance can be studied and understood, and the presentation of that quantitative information so that others may understand the significance of the facts that are so presented.

It is important that you understand some of the statistical principles that govern the collection, collation, and presentation and analysis of quantitative information. In that sense of the word statistics is the grammar of a language employed by scientists whether they are natural or social sciences, whether they are economists or military scientists, and that language, that grammar is a common denominator for the interchange of precise information. In one sense talking about statistics is like talking about words. They are words but they are words in this vocabulary, words that have precise meaning, or perhaps I should say they should have precise meaning, because in the course of discussion this morning I shall show you some instances of improper use of statistics or improper interpretation of statistics where an ignorance of the precise meaning of certain terms or ignorance of principles that should govern collection of information, the presentation of that information has led to error. We consider the typical business enterprise today. We can see that enterprise as a much more complex enterprise than it was in the days of our fathers. The growth in the complexity of the business enterprise, growth in its size and scope has made the problem

12

of control a much more difficult problem than it was when the man at the top knew from first hand experience every operation that was involved in his business. In the days of our fathers and our grandfathers, the typical way to develop a business executive was to put him at the bottom and let him rise to the top and acquire the experience necessary for him to operate as an executive. That procedure is no longer possible in our large corporations. It must be short circuited. A limited amount of experience is still necessary but the time element requires that we develop a technique of management, a technique of control that doesn't involve spending a lifetime acquiring that information. That information is needed but today it is assembled in a flow of facts, figures, reports that must be organized with the time element in view so that they flow over the executive's desk in a continuous stream so that the executive can focus on reports, on statistics of operations, in such a way that he can make his decisions and formulate his policies intelligently.

A typical business enterprise involves certain definite functions which we could easily recognize. We might designate those functions as the function of procurement of raw materials; function of personnel management, hiring of labor to work on those raw materials to do the things necessary to produce the finished product; marketing, or the distribution of the finished product to consumers through various channels of distribution; finance, control of expenses involved, distribution of profit if any, securing of capital as needed. Procurement, personnel, marketing, finance -- those are the large divisions in which a

typical business enterprise finds its chief functions.

Now under each one of those functions we find statistical techniques, statistical methodology, and statistics in the sense of the body of facts presented in quantitative terms playing an important role. Briefly, I shall try to give you a few high spots, illustrations of the ways in which statistics are employed in those various functions.

Let's take procurement, the purchase of the raw materials that are necessary for the operation of a typical business enterprise. If you were to go into the office of the purchasing agent of any one of the large organizations, let's take the Western Electric Company, for example, you would find that the purchasing agent keeps a detailed statistics on the chief commodities that are employed by that company. What are those statistics? They are statistics of production monthly, yearly, by year over a period of years of copper, sulphur, rubber, etc., so that the purchasing agent has in his possession in an organized, collated assembly, the facts which enable him to determine at any particular time the statistical position of the commodity in which he happens to be interested. What do we mean by statistical position?

If you were to talk to the economists of the large corporations, the economists of Wall Street, they use that term constantly - statistical position of a commodity, of a security. By that they have in mind an appreciation of the significance of the movement of production of stocks on hand, of prices. They have in mind a knowledge of the usual, typical, seasonal swing in the production

18

of certain commodities; the seasonal swing in the prices of those commodities. They have in mind a norm or a standard, a standard figure for stocks of copper on hand, at a particular moment, and they can tell you if those stocks were larger than they should be or smaller than they should be. A knowledge of the fact that the stocks of copper were larger than normal would have an effect upon the purchasing policy with respect to copper. They have in mind the general level of prices - Is the price of copper at the present time relatively higher or lower, or in line with what they should expect as a result of their knowledge of the general level of prices. If the general level of prices goes up then you'd expect copper prices to be going up, other things being equal. If copper prices are going up more than or less than they should enables the purchasing agent to bring into sharper focus the factors that affect his purchasing policies, whether to buy then or to make a long term commitment at that particular figure. Perhaps that is enough to indicate the kind of statistical information that the purchasing agent of a large corporation would make use of. He must know the sources from which to obtain those facts; he must know how he wants those facts assembled so that he can read them quickly. It may mean that he must put those figures in index number form. He certainly will compare them with index numbers of general prices; he must know what index of general prices to use in this connection. He must be familiar with the existing body of statistical tools that are at his elbow.

Let's proceed to the personnel. I could give you a number of examples here. One case recently presented to me by a gentleman

whom some of you fellows know, a man who was up at the Business School at Harvard when Colonel Miles was there, Mr. Cress, who is in the National Electrical Manufacturers Association. Mr. Cress has just finished a piece of research, statistical research, which will have a very great effect upon the labor policies of many of our large corporations.

He felt that the wage rates paid per hour for particular jobs should bear some relationship to the requirements of those jobs on the individual. He developed a method of equating each job in statistical terms to a scale developed, a rating scale for jobs, not men, jobs. Certain jobs require a higher degree of skill ; certain jobs require a greater degree of educational background; ability to read blue prints; ability to draw plans for others to follow; there are jobs that require the ability to direct personnel. After analyzing out some twelve or fifteen separate factors and weighing those factors in a way that met with the agreement of personnel officers he devised this job rating scale and then by means of correlation he applied this job rating scale to the hourly wage rates paid people occupying those jobs. In the best and most efficiently operated plants, correlation. Personnel management of those organization had sensed the necessity of relating wage rates per hour to the requirements of the jobs and there was a higher degree of correlation in the plants that had high efficiency, higher degree of correlation between wages paid per hour and the scale on the job rating scale. In the plants in which there was a low degree of efficiency and a great deal of unreat disparity was revealed between these two, and the indicated correction was to bring the rates per hour into line

with the rating scale. When that was done a great deal of the disaffection on the part of labor vanished. I might mention a few very common examples of the use of statistics in assisting the executive to formulate wage and labor policies. Alert executives realize that wages must bear some relationship to the level of living costs, so we find a number of concerns in the country that constantly watch changes in index number of the cost of living in this community and when that index number rises, they realize that they must raise their wages; if they don't they're in for trouble, and that trouble is apt to be much more expensive to them in the long run/ if they automatically or without the insistence of organized labor, changed the wage rates accordingly.

One interesting statistical tool that you will learn something about is an index of turnover. We have applied this concept to the study of merchandising and also applied it to the study of labor. Labor turnover figures, index numbers, a statistical tool which has a definite significance. When the labor turnover index rises, it is an indication to the personnel manager that something is wrong. If it is normal or low, it is an indication that that particular factor needs no great amount of attention at the moment. Perhaps that is enough to indicate a few of the tools that are used in the management of personnel functions.

Let us turn to the problem of production where we apply the labor to the operation of machinery working on the raw materials. Here we find that the manager is forced to use statistics to an ever greater and greater extent. He is interested in the

utilization of machinery, the extent to which machines are not used to their capacity, so automatic recording devices are put on individual machines; these recordings are read, statistics are accumulated as a result of those recordings, and it is possible for the manager to determine which machines are working in a normal fashion, which machines have fallen down, and thereby focus attention on the problem which needs correction. In a similar fashion, in the control of waste of raw material or waste of finished products as a result of discord in the inspection line. Accurate recordings are kept day by day, job by job, man by man, department by department of waste. A certain amount of waste is unavoidable, we will mark that as normal, but when that waste index rises above the norm it is an indication that something is wrong and wrong right there. The use of statistics enables the manager then to focus attention to the factor which needs correction. In the complicated production of machinery which requires the assembly of a large number of parts, it is necessary to coordinate the production figures of these different departments in such a way that we know in advance that there will be no missing parts, that there will be an even, coordinated, integrated flow of those parts to the assembly line. The only way that is possible<sup>is</sup> to set up such control, such statistical tools that the man who formulates the policies and makes the decisions will know in advance he is going to come out even and on time.

In the marketing of the product we find in recent years an increasing interest in the use of statistics. This was one of

27

the last areas to yield to a scientific analysis. The collection of figures in a scientific manner, their assembly and analysis was first applied in the field of production and probably the biggest single series of experiments ever conducted in the field of production was the series which used statistics as a scientific tool. Frederick W. Taylor's experiments that resulted in the enunciation of laws of cutting metals ran over 30 years; over 50,000 experiments were conducted, each one yielding statistical results. As a result of those experiments, the collation of those experiments gave us the secret which has been responsible in large part for the perfection of our mass production industry. But when you attempt to measure human reactions, consumer reaction, consumer preferences, willingness to part with his purchasing power for a commodity, you get into an area where facts that are measurable are not as precise, as capable of measurement as in the case of cutting metals. In cutting metals, we can measure accurately the hardness of cutting tools. We can describe accurately the angle of incidence of that tool on the moving metal, describe statistically the speed at which that metal moves across the cutting tool. We can measure statistically the hardness of the metal being cut. Those things can be reduced to rather accurate statistical series, but when you attempt to measure the performance of a salesman who has charge of territory, probably has three or four salesmen working under him also on the same product at the same price, when you try to measure whether he is doing a good job or a bad job or as good a job as some other man, you introduce a number of imponderables which makes it exceedingly

difficult and in this area we can speak with less satisfaction as to results than we can in the field of production or personnel or procurement. Nevertheless, considerable has been done and a great deal of attention has been focused on this problem. It is not a problem, however, that interests you particularly and I shall pass over it with one reference.

Some years ago the Detroit Steel Products Company made a study of their distribution of the Fenestra Steel Sash, the kind of windows that you see in this building. The study was instigated by the Detroit office. The sales manager in the Detroit office was particularly concerned a particular area which showed declining volume of business, and one area, the New England area, was the worst offender. He was about to fire the sales manager in the New England territory. The man had been with the Company for some time and he felt that he was getting a little old and perhaps wasn't quite on his job. His own territory, the sales manager of the company was in direct charge of the Detroit area, was growing rapidly and he was particularly satisfied with his own performance. Fortunately for the company, and certainly fortunately for the Boston manager, no decision was made until after the study was made. It was possible to obtain a very nice, I mean that in the sense of exact measure, index of potential demands for Fenestra Steel Sash by states. Statistics that were compiled by the F.W. Dodge Company, obtained by their representatives from contractors, architects, building concerns, enabled us to get a very accurate measure of the potential demands and the past demands for this particular product by states. A mere representation of the curve of sales

by districts of the Detroit Steel Products Company, along with the index of potential demands for those respective districts indicated quite clearly that the Boston man had been fighting a losing battle, that the demand for Fenestra Steel Sash had been declining more rapidly than his sales. The conclusion from that was he was getting a larger and larger percentage of the Steel Sash business in the New England territory. Whereas when he started some 12 or 15 years before his concern was getting perhaps forty per cent of the total, when the study was made he was getting sixty per cent. New England was going down industrially, it was going down as a center of population and industry, and under those circumstances the new buildings in which you could put steel sash were fewer and fewer each year. Business volume was of course going down, but it wasn't going down as fast as the potential. Under those circumstances, the sales manager revised his opinion of the man in charge. He wasn't fired. He also revised his opinion of the efficiency with which his own organization was covering the Detroit area. While the Detroit area sales had been going up rapidly, an analysis of the index of potential demands and their sales clearly indicated that whereas when they started they were getting forty per cent of the total, at the time the study was made they were getting about thirty per cent of the total. They had been slipping in their own home territory and allowing their competitors to come in and take business away from them. Perhaps that is enough emphasis on the marketing end. We can go on to the finance end.

7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

Here we find another tool, a tool other than statistics that is of primary importance - the tool of Accounting. Statistics isn't the only tool used by executives. Accounting figures are quantitative figures presented in numerical form, but typically they relate to dollars and cents rather than to things, men, production, prices - they relate to dollars and cents; this particular area has a technique, a system of principles all of its own; but in the Comptroller's office of the large corporations you will find assembled a great body of facts that are not accounting facts, statistical facts and treated statistically because the Comptroller must know not only the most important things about his own company but he must know a great deal about the economic environment in which his company is operating. He is concerned with what we will call <sup>general</sup> "business statistics", the external tools as well as the most important statistics relating to his own company. In one office, I shan't mention the name of the company, it is one you all know, we find a well developed statistical unit that watches business conditions throughout the world. Our exports and imports are watched closely; economic conditions in the chief foreign countries are watched closely because this country has branches all over the world, and it sells its products all over the world. It is very much concerned about getting its balances back from certain countries, so it watches the fiscal conditions of these countries. It is a problem at the present time to get money that belongs to you here in the United States out of even as near a neighbor as Canada. It has been a problem for a long time to get money out of France and Germany. They focused their

26

attention on those jobs and they watched the statistics - they collected statistics of exchange rates and balance of trade between countries. This man in charge of this office sits up in his office and receives daily telegraphic reports from agents in various strategic places over the country. He receives more detailed reports from those same agents and then from a much wider area and a larger number of representatives detailed monthly reports that are all statistical in character from all over North and South America. And this country is not unique. You could go into the office of General Motors or General Motors Acceptance Corporation; General Electric; International General Electric; International Tel and Tel and find the same functions performed through the use of the same statistical tools. Changes in price policies, changes in credit policies, in sales effort, emphasis in advertising, changes in long term financial programs are all made as the result of an objective study of these statistical facts. Now men make these decisions and formulate these policies, but we have passed the time when those decisions and policies can be made on the basis of mere hunch. The quality of the decisions and policies can be insured only on the basis of adequate, accurate, and timely facts. Now perhaps you can see why it is important for you, charged with the responsibility that may some day be on your shoulders should an emergency arise, should it be necessary to put this country upon a planned control industrial basis, perhaps you can see if General Electric, DuPont, and General Motors, if these companies have to use statistical techniques to get the facts in their hands promptly enough, to get intelligent decisions,

you men must know all that you can acquire about the economy of this country. You must be familiar with the sources of statistical information; you must have an appreciation of their reliability, of what they mean. You have to acquire a realistic conception of how this economy of ours operates and how you can tell how it is operating. You can visualize, you should visualize our economy as a stream of interrelated rivers, lakes, reservoirs, through which flow the raw materials, the semi-manufactured goods, the finished products on their way to ultimate consumption. It seems to me that statistics assists you very greatly in getting a conception of the problem that faces you. It is essential, therefore, to understand the A,B,C of statistics, the principles to guide the collection, collation, presentation, and analysis of those figures.

There is nothing difficult about these techniques. I am always reminded of a quotation in the introduction to Silvanus P. Thompson's book, "Calculus Made Easy" - "What one fool can do, another can." Statistical methodology can be made difficult and some of my colleagues in the teaching profession like to make it appear that they are very erudite and it requires an Einstein to understand statistics. That is all bosh. It is straight-forward common sense pretty well thought out by people who had the common sense point of view in mind. There is an accepted definition of most of these concepts, an accepted, an approved method of reducing concepts to a language which means the same thing when two men who understand that language get together. That is not so in ordinary words. Words have a variety of shades of meaning. You can say "yes"

26

in seventeen different ways, with seventeen different shades of approbation, but when you compute an index number and I agree as to the methods that you employ, that index number - let's say it's the Federal Reserve index number of industrial production - it means a perfectly definite, concrete, precise thing to me and to you and to everyone else who understands that language. Statistics is the language of science. This problem that you face is a scientific job that is necessary to understand that language, but I assure you that if you will approach it without fear you will have no difficulty in understanding that language and understanding procedures.

Now I understand from Colonel Miles that you'd like to have a shot at me with questions that you have concerning your own problems. I have used up the 45 minutes allotted to me with the formal presentation of my talk. I shall be at your disposal as long as Colonel Miles permits.

27

DISCUSSION FOLLOWING LECTURE

By Doctor Donald H. Davenport  
October 10, 1939.

Q. What acceptance generally has been accorded Dr. Shewhart in his control of manufactured products by statistical methods?

A. I know he was well accepted in England, rather less in this country.

He is a pioneer in the application of statistics to the control of measurement of quality of products. He has had a growing acceptance of his techniques. To my knowledge, there have been three conferences held in the last two or three years which purchasing agents and production managers have attended and listened to Shewhart and his colleagues, some English mathematicians who have come over to pool their experiences on this subject of quality control. His work basically is the establishment of margins of tolerance and the determination of the extent to which it is necessary to conduct destructive tests to determine the quality a particular material may or may not have and they have been able to pick out the industrial concerns that are tops in producing uniform quality of products and by studying their methods have been able to pass on that technique to others on whom they rely for their materials.

Q. I don't know whether time will permit, but will you give us some examples of the misuse of statistics?

A. When things are presented in quantitative terms they look God-awful accurate. One business man cries - "If I could only have it in print. The figures look so much more authoritative in print. Then I could convince the bankers to finance this organization."

3

You have to be on your guard; the mere fact that it is printed is no assurance that you can put any reliance on it. You must know the sources. I've had some painful experiences myself. Make no compromise with accuracy. There are a few statistical organizations that have kept to that policy. The Federal Reserve Board has about the highest record, because their figures are, I am told, compiled by two separate groups and they must check or they are not published. It is dangerous to check your own figures and rely on your own checking of your own figures. We all have blind spots, biases, which we are not conscious of; we all have tendencies in the matter of transposition of figures. Steel yourself in compilation to a great discipline of constant checking and rechecking, constant questioning; development of a healthy scepticism is very important. Let me give you a few illustrations:

Some years ago I was working on an analysis of <sup>the cost of</sup> government in towns, villages, cities in New York State. Fortunately for us, we thought, the figures were all published, assembled, collated by the Comptroller of the State of New York. It was necessary to go back over a period of ten years. We found a figure of \$4,000 or \$5,000 for four or six years, then \$40,000, and then back down to \$4,000. It aroused our scepticism - it wasn't an isolated example, there were too many to be isolated. We got out the old records and we found that figure of \$40,000 was wrong, it was \$4,000. When we checked up we found that although the State Legislature had appropriated a certain amount for the compilation

31

of the figures it had not appropriated an amount for proofreading, and the book was published every year without being proofread. The difference was a mere typographical error. Be on your guard, don't accept any item without scrutiny.

I worked on the 1934 census of Massachusetts, a house-to-house census of the entire population of Massachusetts as well as an enumeration of the number who were unemployed. Certain discrepancies were found between the population reported and that of/in the United States census of 1930. The situation was simply impossible. The explanation was that the census of 1930 was taken by paid enumerators who got paid so much a name; there was no sufficient checking on those to reveal the enumerators who were chiseling. Our enumerators were paid so much a week. It was not to their advantage to report more people in a house than actually lived there.

In a study made out in California it was necessary to determine the relationship between taxes paid on properties and their value. Fortunately, we thought, the tax appraisers have recorded the value of every parcel of real estate in the State of California and those are at our disposal and the law definitely states appraisals must be made at the market value. That is what the law says. Write to the tax commission and ask them - appraisals must be made at the market value. Ask any appraiser and he has to say that he appraises at market value, but don't be fooled. They don't, any of them, do it at market value. They'd reveal they were not obeying the law if they reported otherwise. It was necessary to spend four or five thousand

34

dollars making sample appraisals.

The statistician should be a scientist; he should be objective, he shouldn't approach his problem with preconceived ideas of what he is trying to prove. Too much statistics are used to prove a point. Too many statisticians are like lawyers, accept clients, and then go to bat to prove their clients are right. That is the greatest misuse of statistics. Distortion coming from attaching too much weight to the wrong fact, or distortion from presenting your facts erroneously in graphic form may lead to very serious errors.

In your use of statistics you want to be realistic, scientific, objective. It is necessary for you to know, then, the specific tools that are quite freely misused.

The use of the arithmetic average when it is the median you want - the best measure of central tendency - you must know when to use one and when not to use it.

The greatest misuse of statistics, I believe, is in their erroneous presentation in graphic form. There is the greatest danger. You must know most of the typical cases where the unwary are misled by the improper presentation of figures graphically.

I have shortchanged you a little bit on part two. I think you fellows have the greatest need for statistics in the shouldering of the responsibility that is yours and nobody else's. I suggested that you must have a realistic concept of what our economy is, how it works, and how you can determine how it is working. That sentence is capable of elaboration into about four lectures, but we haven't time for that. You will have to use your imagination a little.

I think I am right in my conviction that the successful termination of any major war depends without question upon our capacity to produce not men but materials. We have the man power without question; it is a question of being able to produce and reproduce food, clothing, munitions, ships, airplanes, locomotives, railroad cars, trucks, tractors - to reproduce those in a flow that will constantly replace the destruction and exhaustion of the existing supply of those things and at a time when the civilian needs will continue. The biggest job is the job, it seems to me, of making your adjustments, making, formulating your orders, changing the traditional ways of doing business as little as possible, disrupting the existing economy as little as possible to accomplish your objective. Now you fellows know it is your job to determine how many airplanes, how many rifles, how many tractors will be necessary to conduct a war on the scale which you plan, and you have done that job, I am sure, with efficiency. Now you have to step down the requirements of raw materials, of man power, of machine productive capacity, you have to know what this existing economy is capable of doing, what bottlenecks exist, enlarge those bottlenecks; lay out the bill of goods that has to be produced. You can lay it out in quantities per day, per month, per quarter, but the big job is the job of the realist, of the economist, the job of the man who has a knowledge of business as it is conducted to translate those orders, those arrangements, those flows, into the fulfillment of your requirements without

24

disrupting our economy too much.

After the war, what? The fear that dominates economists today is the fear that putting our economy upon what amounts to a dictatorial basis for the duration of an emergency will result in implanting that dictatorship so firmly on our shoulders that we will have lost our democracy. That would be a catastrophe, if to preserve democracy, we relinquish it temporarily and find we have abandoned it permanently. No one of us wants that. We must guard against that contingency and the best way to guard against that contingency is to make those adjustments, formulate those policies with a knowledge of what our economy is, knowledge of the detailed, intricate, integral agencies which exist among the business enterprises of this country, which are essential for operating a democratic system. That is a big problem, I think it is on broad shoulders; I think you fellows have the capacity to do it, but don't do that with the thought: "What one fool can do, another can".

The statistical tools are simple. I have had experience teaching statistical tools for twenty years and it is a pretty low grade moron that can't acquire the statistical tools necessary, but this other job is a job that calls for the intelligence and capacity of the best we have got in the country.

Col. Miles -

I have talked with Dr. Davenport many times and I think he realizes that in our attempt to arrive at means and methods for war procedure ~~that~~ we are doing just what he has suggested. We are attempting to build our methods in such a way that we will preserve democracy. We have no axes to grind from military

50

service. We all know that our economy here is built around democracy and we are going to be just as zealous in the preservation of democracy as any group in the country. The danger is not that we will formulate plans which will result in dictatorship but that the plans we develop will be perverted by people who have the power which is in common with those plans and who, seeing the opportunity, are unable to overcome the temptation to use that power so as to abrogate democracy. I, in the school here, always try to put emphasis on having plans but not carrying those plans too far in the matter of promulgation in the matter of too wide spread a consideration of those plans because, inevitably, whether we will or not, the person who reviews those plans says, "These people are going farther than they should." We want to go only as far as necessary to assure military victory. We are not concerned with carrying any of our plans to those logical, far reaching, conclusions unless it is necessary to obtain military victory. We would much prefer to use existing methods of this country, but personally I don't believe that any other plans which have been developed so far by military people in this country are any more liable to produce dictatorship at the end of the next war than plans made effective in the last war produced dictatorship at the end of the last war. It is a good military principle to always have reserves, and in our planning we have reserves we are only going to use to push over the top and we all hope the use of those reserves will not be necessary. We are going to do the

thing as simply and naturally, with as little modification as possible.

Q. I'd like to have a general appraisal of the use of statistical tools in the national polls published today.

A. I have thought quite a little about that. At times I have been a little alarmed. I wish there were more Gallup Polls conducted by more independent institutions. When there is only one that has prestige, as Gallup, and he makes pronouncements on such statistics, I should like to be reassured that he is not drawing his conclusions on too small or too biased a sample and I should welcome further details from Dr. Gallup as to the methods used and the size of samples employed in each case when he makes pronouncements of great public interest. When people learn more and more people are favoring a certain policy, that policy gets momentum and attaches to it the opinions of a great many others who were on the fence. I think there is a grave danger in having only one Dr. Gallup. I'd like to see three or four attacking the same problem at the same time, independently, but the fact remains that it is a potential influence in shaping public opinion; it is now an influence far greater than justified. The use of polls of that sort is being experimented with and has been experimented with in the last ten years by private industry. Listerine Toothpaste has reached the consumer by jury tests where they picked out samples of communities, ~~these of people~~ sent the people two tubes of toothpaste in plain white containers, one marked with red band, one marked with white band. Sent them to the persons who were responsible, dentists, and doctors, and

27

asked them to fill in questionnaire after using both tubes of toothpaste, which gives them a clue to the reaction of the public on the score of qualities of that product taste, smoothness, etc. As a result of the tests they have perfected their formula so that they get a preponderance of votes in favor of their brand, they have effectively indicated a preponderance of votes in favor of Listerine toothpaste

Q I get the impression here the better a statistician is the more suspected he is, or **vice** versa. If you are working to draw conclusions from a series of statistical surveys, and are able to give the sources would that satisfy you or would you go further?

A. Right technique, angles, number of angles you use depends upon the importance of the decision to make.

Q. I'm getting back to the Gallup Poll. Aren't a great many of the questions submitted to the public impossible of correct or reasonable answer by being too technical in nature?

A. A great many of them are. One illustration which illustrates your point -

This was one of the early forerunners, the Old Gold Blindfold tests. The secret of the results/<sup>which</sup> was almost always favorable to Old Gold, except where the tests were conducted at Harvard, where they are different anyway, the secret was that a large number of people who submitted to this test couldn't determine whether they liked No. 1, 2, 3, or 4 the best. When you are blindfolded, you are supposed to be an intelligent smoker, one whose fine tongue detects the difference. You must indicate which one of these you like the

5

best. No one recorded he couldn't tell. The cigarette No. 3 always gets more than 25% and usually around 40%. Why? It is deep-seated in our conscience, the mass conscience has a preference for 3; 3 is a preferred number, why, I don't know. I have tried it out on classes, not with Old Gold Cigarettes, have asked them whether they wanted to meet me in Room 101, 102, or 103. I was trying to find out if No. 3 had any preference - they would say they would meet me at 3 00 in Room 103. You fellow who doesn't have the facts at his disposal to answer will take "X" in XYZ 60% of the time. In "RED, WHITE AND BLUE", RLD comes through with flying colors every time. When we vote for people whom we don't know, we either vote for names that sound honest or take certain positions. No 1 has a preference position and a candidate for office could well afford to make sure his name is either first or last on the list but not buried in the middle

I have answered some of those polls. I was able to fill out the questions in five minutes, but to be honest it took a good solid hour of tough thinking and I am convinced that very few people do any tough thinking in answering these questions.