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OCCUPATIONAL ABILITIES

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OCCUPATIONAL ABILITIES:

A Study of Unemployed Men.

by

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INTRODUCTION.

This volume by Dr. Morton, based upon researches carried on during the last four years under my general supervision, is the first to be issued of a number of psychological studies within the field of employment research which we expect to publish in the McGill Social Research Series.

When proposing as one of the projects for research by this department, a survey, by psychological methods, of the abilities of the unemployed, I had in mind three main problems:—

(1) To what extent is the current unemployment problem a permanent one, not merely one for the duration of the depression?

(2) Can we, by psychological test methods, discover any measurable differences in intelligence, mechanical or clerical skills, educational level, or any character traits, between representative groups of unemployed and employed persons, so as to reveal the relative importance of the various phases of personality for securing and keeping jobs?

(3) Can we, by test methods, acquire more exact knowledge of the requirements for success in a wide range of specific occupations,—the requirements not merely in general intelligence level (already known to a fair degree of approximation), but in as many aspects of personality as are now readily in some sense measurable?

The first of these problems appears to have come now into public notice, since it has become apparent that public relief cannot be discontinued as soon as it had been expected a few years ago. It is plain that the answer depends upon (a) the percentages of the population of working age at the various ability levels; (b) the birth rates at these levels; (c) death rates; and (d) the trends towards or away

from mechanization, or changes in the nature of mechanization, of various lines of production, with corresponding changes in the demand for labour at the various ability levels. While the sample groups of unemployed which yielded the data reported here are not as adequately representative of the total unemployed population as could be desired, the results, when weighted to secure more nearly proportionate representation of the known totals of unemployed in different lines of work, offer at least a rough indication of the true distribution of the traits measured by the tests (Cf. Chapter VI).

Granting that the test scores are not direct measures of industrial capacity, but only fairly reliable estimates of abilities which appear to be of some importance as phases of that capacity, the data, when evaluated in terms of previous experience and summed up in the variants of the Taussig occupational scale, are of value as a means of estimating the true occupational status of the men examined. There is no reason to suppose that the previous occupations reported, or ambitions expressed by the men, represented accurate placement in accordance with real abilities, so the overlapping of the distributions of test scores of the different occupational groups based on the Taussig scale need hardly be taken as invalidating the tests. In general, and especially in the case of the unemployed—some of whom at least must have been industrial misfits—a man's standing in the tests as a whole probably shows approximately the occupational level at which he is most likely to succeed. The data cannot alone solve the problem set; but, when interpreted in the light of evidence from other sources bearing upon the items listed above, they will help to make estimates of the long-run needs for relief or readjustment of the conditions of employment at the different occupational levels something better than guesswork.

Turning now to the question of the occupational signifi-

cance of the various personality traits measured, the data do not offer any clean-cut evidence that test measures are adequate to differentiate between individuals, at any given occupational level, as likely to keep or to lose jobs under such conditions as have prevailed during this depression, but the group comparisons are at least suggestive. Obviously, a very large proportion of the unemployed must have had no defect in skill or personality sufficient to account for their status; they must have lost, or never obtained, jobs simply and solely because there was no work for them to do. If it had been possible to secure from various business establishments sample groups of those employees first discharged, and comparison groups from those retained through the depression, much more striking differences in test scores might have been expected. Local conditions did not permit any such detailed study; indeed, except in the case of clerical workers, Dr. Morton found it impracticable to get employed comparison groups at all. However, the tests appear to have been reasonably adequate to their purpose as psychological measures; so, even though the results are limited, the demonstration of method here offered is of definite value.

In considering the practical value of the techniques herein discussed, it should be stressed that, although some use was made of individual tests, it was deliberately planned to use as far as possible the relatively inexpensive group tests. This necessitated completion of my revision of U. S. Army Beta, and "try-out" testing of various groups of children and adults by Dr. Morton, to secure norms, so that we might have a workable non-verbal general intelligence test. As our ultimate aim was not merely to secure insight into current local business conditions, but to develop personnel methods that may be of real service in industry, economy both in time and in the cost of materials was an important consideration, as also was ease of administration and evaluation of results.

For a more complete theoretical study of individual adaptability for employment, as well as in actual employment procedure, the results of a medical examination should be linked up with the test data. Some medical studies of the unemployed have been undertaken by the McGill Department of Public Health in contribution to the general programme of which our psychological studies are also a part, but, unfortunately, it was not possible to arrange for such study of the groups investigated psychologically.

There are many other aspects of the problem of individual employability concerning which such a psychological study as this has little to say, but which could not be neglected in any complete theoretical treatment of the causes of unemployment, or in any worth-while attempt to make practical suggestions for relief and reform. For example, while it is perhaps true that a study of large sample groups from different races or religious sects might reveal significant differences in the averages with respect to certain special interests and aptitudes, it is quite plain that the overlapping of the distributions would be so great as to preclude prognosis of individual abilities on the score of race or sect. Yet who can claim that under existing circumstances these matters should be ignored by a vocational counsellor? Discussion of such factors as are not amenable to study by psychological methods is hardly appropriate here, but it is essential to recognize their existence and importance, and to insist that a successful approach to such a broad social problem as that of unemployment requires the close co-operation of all the social sciences.

The McGill Social Research Council is an embodiment of the realization of this fact. The organization and its general programme of research, having been fully described in the introductory volume of this series, need no discussion here. Instead, and by way of indicating from the standpoint of the psychologist the part played by the present

volume, and others in the course of preparation, in a comprehensive study of unemployment, I reproduce, somewhat abridged, a memorandum offering a rough analysis of the problems in this field, written in the spring of 1930, when we were first considering the possibilities of co-operation in research.

"Unemployment is due to such causes as lack of adjustment of individuals to jobs in accordance with mental level, temperament, etc; lack of vocational education; child labour; fluctuations in economic conditions; difficulties in adjustment of immigrants; overproduction, in some cases seasonal, but a new factor is present world overproduction. . . . The causes concern several departments, and a solution can be found only by co-operative investigation, since the problems open to study by the various departments are so closely interrelated. E.g.,

Biology and Medicine.

Eugenics, public hygiene, epidemiology, immunity—racial and individual, school hygiene, industrial hygiene, etc.

Psychology.

Individual, sex, and race differences in intelligence, temperament, etc; special aptitudes and defects, with a view to educational and vocational guidance; efficient methods of learning in both education and industry; scientific management; industrial relations—employment, wage scales, relationship between age and efficiency, etc; advertising and salesmanship.

Education.

Reform of teaching methods so as no longer to drive children out of school into employment; adjustment of education to allow for individual differences in ability and interests; education for harmless enjoyment of leisure on the part of persons of average ability and less—instead of merely the superior; practical development of vocational guidance and less expensive methods of vocational education; extension of education for *all* through adolescence—putting a stop to child labour both for the sake of the children and to lessen adult unemployment.

Sociology.

Studies in educational sociology, adult education, social service, etc; problems of recreation, preservation of rural community life, treatment of immigrants, influence of employment of women on family life, social factors in industrial relations, etc.

Economics.

Industrial re-organization to take advantage of scientific methods; the low-wage low-production versus the high-wage high-production system; question of further reduction of hours of employment; craftsmanship in modern life; unemployment insurance schemes that will not penalize the industrious in favour of loafers; co-operative ownership, etc.

Law and Politics.

Simplification of legal terminology and procedure to inculcate respect for law on the part of a shifting population with more time for leisure; the question of residence requirements for voting, poor relief, etc., as related to seasonal labour; public works to take up the slack in employment; tariffs, immigration, etc."

A companion study to the present one is nearing completion by Mr. Kenneth E. Norris. Dealing largely with the same groups or subjects, it will link up some of the data reported by Dr. Morton with a more detailed analysis of the vocational significance of knowledge and skills in the various branches of the elementary school curriculum.

A comparative study of employed and unemployed female clerical workers, along lines similar to those followed by Dr. Morton with male clerical groups, has been completed by Miss Barbara M. Robertson, and will probably be published in the near future, as one of a series of bulletins planned to supplement this series of larger volumes.

An extended study of the problems and possibilities of vocational guidance, supervised by Dr. William D. Tait, Chairman of the Department of Psychology, has been carried on for some years by Mr. E. C. Webster, whose work is now being prepared for publication. While the other investigations have attempted to throw light on the nature of the individual differences in abilities required for success in various occupations, Mr. Webster's problem is to discover whether such differences can be revealed at an early stage in the development of the individual, and by what

methods this can most conveniently and economically be accomplished.

Concerning the psychological requirements of the many specific occupations, the third of the problems mentioned above, the evidence offered by the present report is very meagre. Dr. Morton is planning to carry on with work in this field. Much superficial information about the duties and requirements of various jobs is of course already available. Thorough analysis in terms of fundamental abilities is another matter, and will require many years of intensive research by students in different regions who have access to sufficiently large samples of workers. Piecemeal research is tedious, but there seems to be no alternative, short of a most marked and rather unlikely change in the social recognition of the importance of psychology.

Everyday experience justifies the expectation that the results of further research will show that the types of human ability required for vocational success are much less numerous than the specific kinds of employment in industry, business, and professional life; also that the abilities of individuals, especially in regions where "division of labour" is marked, will in general meet the demands of more than one type of occupation—when these are eventually defined in psychological terms. Successful transfer from one occupation to another apparently quite distinct has not been unfamiliar. More adequate knowledge of basic requirements should facilitate such transfer, and so help to relieve the overcrowding in some lines of work. In dealing with adults, whether unemployed or employed but desirous of a change, it is plain that in the case of all the more skilled occupations, attention must be given not only to basic capacities, but to the actual degree of relevant knowledge and skill possessed by each applicant. Accordingly, such tests as those used in the present study should be supplemented in actual employment-office practice by

specific trade tests. In our further studies of various occupations, efforts will be made to improve upon existing trade tests or devise new ones as required.

As training has in the past been mostly aimed at specific occupations, complete flexibility of employment in accordance with basic capacities cannot reasonably be hoped for in the case of the present adult population. We must therefore look to the future for realization of such an ideal. In the course of a memorandum dealing with educational and vocational guidance, set down shortly after the one cited above, I proposed:

"A statistical and job-analysis study of occupations, and the working out of a complete classification of occupations with reference to nature of abilities required, pay, number of openings, stability of employment; etc., so as to establish groups of related jobs for which pupils might be given a broad technical and cultural training.

"A study of economic trends and vocational opportunity,—the probable results of mechanization upon industry in coming years; can invention be guided towards the mechanization of jobs that people do not like, and away from the mechanization of work that people enjoy doing? Can similar account be taken of the number of persons possessing and jobs calling for various abilities, so that more people can find jobs they can do well, and fewer will have to stay in work not suited to their real capacities?"

Obviously, these questions remain open. We may be confident that research will eventually yield the requisite information. Application of this information in practical life presupposes the recognition of business leadership as a profession—the evaluation of success in business on the score of achievement for the general good, as in medicine, teaching, engineering, and other professions, instead of on the score of financial receipts. This granted, we may hope for reasonably continuous employment in some socially useful activity on the part of all citizens except the feeble-minded, insane, or otherwise incapacitated, not merely as a right, but as an obligation to contribute in return for benefits received. This implies the practical abolition of seasonal unemployment, either by changes in technique or

trade practices, or by seasonal transfer of individual workers from one occupation to another requiring similar abilities—with due provision for maintenance of rights to seniority, shares in reserves for unemployment benefits and pensions, citizenship rights and obligations despite changes in residence. Stabilization of employment also presupposes the establishment of a decent standard of living for all members of the community, with due allowance for differences in cultural level and in the expense of preparation for and maintenance of efficiency in the various occupations. Such general reforms cannot of course be based merely upon psychological researches. They require technical contributions from all the social sciences and the collaboration of experienced business men, labour leaders, and government authorities. But in the system of labour exchanges which is essential to secure continuity of employment, psychological methods must play an important part. This volume represents the first stages of an attempt to improve upon earlier techniques, and will accordingly be of interest and, we hope, of considerable practical value to personnel managers, employment-office workers, and others who are concerned with the perfecting of employment methods. In this connection, special attention is invited to the case studies presented on pages 193-233.

In conclusion, I wish to add to those of Dr. Morton my grateful acknowledgements to those whose co-operation made this study possible, and to Mr. Leonard C. Marsh, who as general editor has given us much valuable assistance in preparing this volume for the press.

CHESTER E. KELLOGG.

Montreal,
November, 1935.

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The management and employees of nine firms in Montreal assisted actively in permitting the examination of employees often as well placing at the investigator's disposal facilities for testing employees on company property and within company time. These firms, whose sympathy and co-operation is gratefully acknowledged, are as follows: The American Can Company, the Canadian National Railways, the Canadian Pacific Railway Company, the Dominion Rubber Company Limited, the Montreal Tramways Company, Murray's Lunch Limited, the Northern Electric Company Limited, the Star Company Limited of Montreal, and the Sun Life Assurance Company of Canada. To the last-named company an additional debt is owing as well for providing facilities for administering tests to certain groups of unemployed men.

The Imperial Tobacco Company of Canada Limited and W. C. Macdonald Incorporated very kindly furnished a

large number of packages of cigarette tobacco for use as rewards to the men to whom tests were given at the Day Shelter for Unemployed Men.

Lastly must be recorded the thanks of the investigator to the subjects of the investigation themselves—the many anonymous individuals, employed and unemployed, who so willingly gave their time and energies to a pursuit which must often have been of none too great an immediate interest to them, but without whose aid this report would not have been possible.

N. W. M.

PART I
THE NATURE OF THE STUDY

CHAPTER I

INTRODUCTORY: INDUSTRIAL PSYCHOLOGY AND THE UNEMPLOYMENT PROBLEM

THE progressive increase in the complexity of modern commerce and industry and a ceaseless change in its forms, scope and volume have given rise to innumerable pressing problems in social and industrial management. We have become accustomed to a growing mechanization of the means of production and distribution, to more and more intricate forms of management and finance, to the specialization of occupations and the ever-increasing degree of social interdependency that this implies, to the periodic inflation and deflation of monetary credit which accompanies the alternation of prosperity and depression, to the rise of new and wider kinds and methods of academic and vocational education, and to many other characteristic features of present-day life. We have recently begun to realize, as well, the immediate urgency of securing some insight into the factors which bring about these tremendously significant changes and movements, lest in their very complexity and unforeseen character they prove our social undoing. The idea has been conceived, moreover, of seizing some measure of control over the forces involved, of turning them to use instead of allowing them to operate unchecked and unguarded, and of planning and building the future rather than of allowing it to develop as it may. This notion of social control is one which permits of application over virtually the entire range of human life. It may comprehend the study and management of forms of government, of the processes of trade and industry, of education, of the distribution of incomes and wealth, of the use of leisure, of the development of the arts and sciences, of social customs and conventions, of law. It commends itself readily to our reason. There is abundant

evidence of the effect that lack of such study, planfulness and control has had upon the civilized world: widespread unemployment, the existence in striking parallel of immense wealth and utter poverty, inefficient and wasteful means of conducting industry as a whole, crime, vice and ignorance, purposeless education, and many other social stigmata.

This concept of a planned organization of industry and society serves as the best foundation from which to view initially the problems and methods which are presented in this and the following chapters. These problems are concerned, in the main, with certain aspects of unemployment, and the implications of the latter for research in psychology. They owe their existence in no inconsiderable degree to the fact that the problem of unemployment is very largely the negative aspect of the problem of adjusting our stock of human brains, effort and labour to the demands that exist for goods and services and to the physical means available for satisfying them. A brief discussion of these problems, and of the methods which may be developed or adapted to cope with their difficult features, is desirable before proceeding to the consideration of the bearing of such problems and methods upon research in industrial psychology, and the probable nature of such research.

The industrial picture both over a long period of time and within a short interval is, as regards its personnel and manpower, a constantly changing one. Long time secular trends result in the advancement of certain industries and in the retrogression of others; the progress of invention and science brings about fundamental changes in methods of production; cyclical changes alternately quicken and check the quantity of output; seasonal fluctuations add to the total volume of change. All of these shifts, cycles, and fluctuations result in a constant turnover of personnel, in the opening up of new occupations and in the obsolescence of old ones, in changes of demand for skills of various kinds. To the effect of these must be added the personal and inci-

dental factors which contribute substantially to the total volume of turnover. They include hirings and dismissals owing to changes in company management and policy, financial failure and company organization and reorganization, mobility induced by the essential nature of the work (as in building construction), occupational readjustments of the individual through the drive of personal ambition or through unfitness for the present work, and the constant accretion of new, young workers to the labour market. The net result of the total of these factors is not only change and shift of work, but also unemployment, ranging from that of a merely temporary nature to that of long duration. This unemployment continues for a greater or less time because the employer seeking personnel and the individual seeking work are not brought together efficiently, or because the peculiar services that the individual worker can offer are not in demand, or because there is actually not enough work under existing conditions to go around. In times of deep economic depression, as at the present and on various occasions in the past, the reason, so far as the worker is concerned, is principally the last: utter lack of work. This condition of lack of work represents a joint social, economic and political problem into which it is not the business of the present study to enquire. Beyond this fundamental condition, however, it may safely be said that there always exists a group of occupationally maladjusted individuals, and that there is always some degree of dislocation of employer-employee relations. It is toward these latter and special aspects of the total unemployment situation that this study is directed.

What, in the face of these circumstances, can be offered in the way of a plan? How, in view of these shifting industrial trends and this constant displacement and re-attachment of personnel, is it possible to evolve satisfactory means of securing for the displaced worker new employment of the most adequate kind, and how can new workers best be

introduced to the labour market? In the past, it is not altogether unfair to say that this problem has been left to solve itself—that is, it has not been solved at all. Recent writers, however, have become fully conscious of the existence of this multiple problem, and have even ventured to offer certain broad suggestions for its solution. These recommendations are embodied in the main by the following:¹

- (1) There should be instituted the forecasting by competent organizations of the trades and industries in which a displacement of labour is likely to occur and of the probable degree of displacement which may be expected.
- (2) There should be developed an efficient system of public employment offices which will help to find a job for the displaced workers in other industries or occupations.
- (3) There should be brought about an overhauling of our systems of vocational training so that juveniles who are being trained may be given some preparation which will fit them for alternative industries and so that displaced adults may be prepared for new or different types of work.

In recent years considerable attention has been paid particularly to the development of an efficient system of public employment offices as a means of connecting employer with employee.² So, too, the question of the relation of industrial trends to occupational opportunities and occupational distribution has received preliminary study.³

Suggestions such as these, as has been remarked in a previous paragraph, bear certain implications for industrial psychological research. Within the recent past of psychology three outstanding facts about occupations and occupational success have been noted: first, that occupations differ considerably in the psychological demands (regarding personality and character, abilities and experience) which they place

¹Cf. Douglas, P. H. and Director, Aaron. *The Problem of Unemployment*. Macmillan, N.Y., 1931, pp. 151-155.

²Cf. Harrison, S. M. and Associates, *Public Employment Offices*, Russell Sage Foundation, N.Y., 1924; Stewart, A. M. and B. M., *Statistical Procedure of Public Employment Offices*, Russell Sage Foundation, N.Y., 1933; and the publications of Industrial Relations Counsellors, Inc., on this subject.

³Cf. Slocombe, C. S., "Occupational Distribution: Past and Future", *Personnel Journal*, Vol. 12 (1933), pp. 198-203; Bingham, W. V., "Abilities and Occupational Opportunities", *Psychological Bulletin*, Vol. 30 (1933), p. 732.

upon the worker; secondly, that individuals vary as well in respect of these same traits; and thirdly, that it is possible, by taking account of both the requirements of the job and characteristics of the worker, to predict within broad limits of error his success at a certain job, and perhaps also the general type of work for which he is most suited. The first of these three facts, while of a degree of importance equal to that of the other two, requires perhaps less evidence for its vindication. There is, for example, little doubt that a major business executive to be successful requires specific qualities which are different in some respect from those requisite in a filing clerk, or that the essential skills of a watchmaker or lens-polisher differ from those of an automobile salesman. Very frequently there is no precise notion of what these differences are or how far they extend—indeed, as will be seen, it is this ignorance which poses the problem of occupational analysis and classification—but there is abundant reason for belief that they exist.¹ Similarly, evidence may be adduced to show that human beings differ significantly one from another in the various traits which may bear upon the individual's success at a particular type of work. Moreover, it matters not a great deal for the present enquiry just in what proportions these individual differences are native and endowed, or a result of the nature of the individual's environment. In any case, individuals do differ, although as the differences are more nearly conditioned by environmental forces, they may more easily be modified through training.

The third consideration, namely that certain advantages, both economic and personal, are to be derived from an efficient linkage of varying vocational requirements with similarly varying human qualities, is most soundly supported by its embodiment in the modern practices of vocational guidance and vocational selection. To these techniques of psychology which are allied to education and industry more

¹For further discussion of this point in psychological literature, see Chapter II.

complete reference will be made in a following chapter. It is sufficient to say for the moment that these advantages become apparent in increased human happiness and satisfaction with work, in greater industrial efficiency traceable directly to personal factors, and in diminished labour turnover.

Bearing these facts in mind, the manner in which technique of industrial psychology may be applied to schemes for dealing with such aspects of the problem of unemployment as are cited above becomes apparent. The application consists in the use among unemployed workers of accredited psychological methods of assessing the personal qualities which bear on work-fitness. Further, it involves their use in the evaluation of jobs and occupations through the study of individuals working in such occupations, as well as in the measurement of the work-qualities of persons seeking or preparing to seek employment. Finally, it implies the interpretation of available data on industrial trends and occupational opportunities in terms of the skills and personal qualities for which there will be a probable demand. If the efficiency and adequacy of psychological methods of individual appraisal and adjustment can be demonstrated, they may be adapted to the use of employment exchanges in two ways: first, in estimating the qualities of the individuals offering their services for employment, and secondly, in setting up work-standards in terms of such qualities. This involves the application with increased technical efficiency if possible of procedures of vocational guidance and selection which are already current. Again, it is reasonable to infer that changing industrial trends will involve in the future, as they have involved in the past, the development of new occupations and the obsolescence of old ones. This being so, there is in the same sense the possibility of shifting demands for various industrial qualities, with a degree of emphasis upon certain skills, or combinations of skills, and relative

neglect of others. Inasmuch as trends of occupational ascendance and decline are logically to be related to the service which systematized employment exchanges offer, it is desirable that wherever possible such trends be translated into terms of those industrial qualities which may satisfactorily be evaluated and measured.

It has been suggested that procedures of vocational guidance and education, training and re-training, might be applied to advantage in coping with the general problem of employment adjustment. It should be noted as well in relation to this proposal that an intimate connection exists between training procedures and methods of individual diagnosis, for ordinarily the kind and amount of training that an individual receives is gauged by his capabilities and by the requirements of the work. Thus the proposal raises such problems for research as the following: How can training best be adapted to personal capacities? How far is training in alternative occupations practicable for a given individual, in view of the flexibility of his interests and aptitudes? What occupations may be considered as alternative, from the point of view of the personal capacities required in each? Do lines of least resistance in terms of overlapping job-requirements and relative ease of training follow conventional divisions, or do they cut across such arbitrary boundaries? What occupations fall together in natural groups, in such a way as to offer greatest scope for re-training of the adult worker?

From the point of view, then, of the desirability of developing the closest possible relationship between contemplated methods of employment adjustment and methods of evaluating psychological capacities requisite in industry, the recommendations cited above (p. 6) may be re-stated in the following terms:

- (1) There should be developed a system of job specifications indicating whatever abilities, temperamental qualities and interests are fully relevant to the requirements of each job.

- (2) The prediction of industrial trends should be conceived for the present purpose in terms of changing demands for unitary occupational abilities and traits.
- (3) There should be brought together through an audit of the general distribution of occupational abilities adequate information as to the nature of the present supply of these factors among the employed and unemployed groups in industry.
- (4) In the interests of its greater efficiency, information of the kind specified above should be at the disposal of the employment exchange system.
- (5) There should be available for this system of exchanges an advisory technical service to assess whenever necessary the industrial qualities of the unemployed individuals with which the exchange would deal, and to make recommendations for the selection of individuals for employment.
- (6) There should be coupled in close relation with such facilities for individual diagnosis a training and re-training programme for the handling of workers whose skill and experience are such as to suggest the advisability of re-equipment for work.
- (7) Parallel with the above projects there should be a unified programme of vocational guidance and education, interlocked with sources of current information on industrial requirements and opportunities, and readily modifiable from time to time as circumstances might dictate.

All such recommendations as these, however, predicate the existence or development of satisfactory methods for the measurement of occupational abilities. Furthermore, they imply the use of such methods in a thoroughgoing programme of research into the nature of occupational specifications and the status of existing groups of employed and unemployed workers. These topics are discussed in the chapters which follow. Before dealing with them, however, and before reporting in detail the methods and findings of the present investigation, a résumé will be made of the chief facts concerning previous studies of the problems of job classification and the adjustment and re-training of unemployed workers.

CHAPTER II

THE BACKGROUND OF OCCUPATIONAL MEASUREMENT

WHILE one of the first steps taken in the development of a project of vocational selection or guidance may consist in choosing or devising suitable tests for the purpose, it is eventually necessary to determine appropriate standards in the light of which the qualifications of each tested individual may be considered. Such standards may be determined either by finding the average status of a representative group of individuals in the occupation in question, or by defining a minimum level of performance which will serve as a criterion for success. The process of discovering these and other significant facts about a job is known as *job analysis*; the citation of these facts or requirements in some orderly fashion is known as *job description* or *job specification*; and the systematized or comparative arrangement of the specifications for various jobs or vocations may be termed *occupational classification*.

The literature on the related topics of job analysis, job specification, and occupational classification may be conveniently divided into two fairly distinct categories, according as the description of the work deals with psychological and non-psychological characteristics. As Viteles has pointed out in a discussion of the relationship between vocational guidance and job analysis,¹ a distinction must be made between the extrinsic and intrinsic qualities of a vocation, namely, between description of occupational requirements based upon ordinary observation of hours, duties, wages, etc., and statements of the mental abilities and other traits (their level and relationship) which are necessary for success. The latter constitute psychological characteristics, the former

¹Viteles, M. S., "Vocational Guidance and Job Analysis". *Psychological Clinic*, Vol. 15 (1924), pp. 157-182.

non-psychological characteristics. These two approaches toward occupational description and classification have of course a close bearing upon one another. It is intended, however, that they shall be complementary: that each shall form a separate unit of the total job description. In the present discussion of the development of occupational classification, reference is made only to specifications based upon test or other psychological data, as denoting those qualities of mind and of behaviour which are of importance in the successful performance of the job.

The general concept of the classification of occupations into "non-competing" economic groups has been outlined by Taussig.¹ He suggests that these groups may be considered as being five in number:²

- A. "The class of the well-to-do; those who regard themselves as the highest class, and certainly are the most favoured class. Here are the professions, so-called—the lawyers, physicians, clergymen; teachers of the higher grades, salaried officials, public and private, in positions of responsibility and power; not least, the class of business men and managers of industry, who form in democratic communities the backbone of the whole group".
- B. "Next comes the group that approaches the well-to-do; the lower middle class, which avoids rough and dirty work, and aims at some sort of clerical or semi-intellectual occupation. Here are clerks, book-keepers, salesmen, small tradesmen, railway conductors, foremen, superintendents, teachers of the lower grades".
- C. The skilled—"the aristocracy of the manual labouring class", such as carpenters, bricklayers, plumbers, and machinists.
- D. The semi-skilled—"who, while not needing specialized skill, yet bear some responsibility and must have some alertness of mind". Street-car motormen and miners form examples of this class.
- E. The unskilled—such as labourers and farm-helpers.

Some indication of the degree to which a scheme of intelligence levels may be applied to this scale is given in a report by Flanders,³ who correlated the Stanford Binet

¹Taussig, F. W., *Principles of Economics*. (Second Edition, revised, Macmillan, N.Y., 1920), pp. 134-137.

²This order is the reverse of that in which Taussig cites the five groups.

³Flanders, J. K., "Mental Tests of a Group of Employed Men". *Journal of Applied Psychology*, Vol. 2 (1918), pp. 197-206.

mental ages of 47 workers, mostly office clerks, with the ranking of each individual's father's occupation. The coefficient of correlation was $+0.35$.¹ Moreover, the connection being one generation removed, and the dispersion of test scores not being so great as would be the case if a sampling of the entire industrial and commercial population were used, this figure in all likelihood understates the case.

The first really generous and significant body of data regarding the mental qualities characteristic of various occupations resulted from the testing of United States Army recruits during 1917-18.² Quantitative study was for the most part limited to the classification of occupations by intelligence test scores (Alpha and Beta Examinations) and while it was observed that the occupations represented arranged themselves in hierarchical fashion (Fig. 1), yet considerable overlapping existed between groups placed adjacent in the scale. Although a broad classification of groups was possible, the spread of data did not lend itself to a finer analysis which would be very useful or reliable in the grading of the individual. Kelley³ showed that while intelligence test scores and vocational choice correlated to the extent of $+0.484$, yet if there were other factors at work conditioning this choice, their collective correlation with the choice might be as high as $+0.875$.

Despite the fact that such a conclusion indicated that further research into occupational classification must go beyond the single variable of "intelligence" in the study of the factors involved, the majority of later researches and discussions concerning occupational classification have dealt with intelligence or some closely related function alone. For this two main reasons may be assigned: first, that as most of these studies are unrelated, it is reasonable at least to begin

¹For an explanation of the meaning of the term "coefficient of correlation", see Appendix B.

²Yerkes, R. M., (Editor). "Psychological Examining in the U. S. Army". *Memoirs of the National Academy of Sciences*, Vol. 15 (1921), pp. 819-839.

³Kelley, T. L., "Principles Underlying the Classification of Men". *Journal of Applied Psychology*, Vol. 3 (1919), pp. 50-67.

OCCUPATIONAL ABILITIES

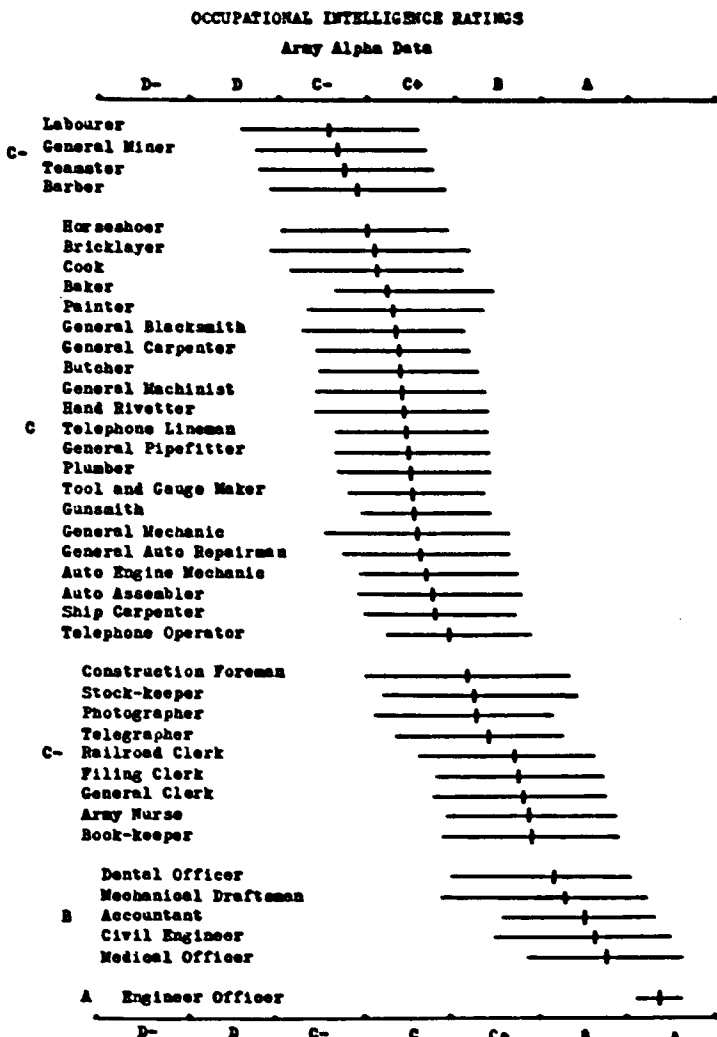


FIG. 1.—Distribution of Scores upon Army Alpha Intelligence Examination, by Occupations (after Yerkes). For each occupation, the horizontal line indicates the range of scores and the vertical line the median score.

with the study of the intelligence factor; and second, that many of the theoretically residual factors are of such a nebulous character, and are for the present, at least, less amenable to quantitative treatment. A general survey of the character of these post-war studies is, however, worth while.

Yoakum¹ in 1922 in a discussion of future developments in vocational guidance technique indicated the necessity for further knowledge regarding occupational requirements in terms of abilities other than general alertness, and pointed out certain contemporary researches in that direction. Fryer² slightly later suggested the existence of five occupational levels determined with intelligence as a standard, not dissimilar to those delineated by Taussig:

- (1) Professional occupational level (superior intelligence required).
- (2) Technical occupational level (high average intelligence required).
- (3) Skilled occupational level (average intelligence required).
- (4) Semi-skilled and low-skilled level (low average intelligence required).
- (5) Unskilled occupational level (inferior intelligence required).

Fryer provided in his report mean intelligence test scores and their range for each of 96 occupations. These data were obtained from the testing of a group of 3598 applicants to the vocational department of the Central Branch Y.M.C.A. at Brooklyn, N.Y.

The use of classified indices of the personal qualities of workers in the construction of wage scales, promotion charts, and job standards has been discussed by several writers. Bills³ suggested the usefulness of rating scales of the graphic type for this purpose, and emphasized the apparent success

¹Yoakum, C. S., "Basic Experiments in Vocational Guidance". *Journal of Personnel Research*, Vol. I (1922-23), pp. 18-34.

²Fryer, D. A., "Occupational Intelligence Standards". *School and Society*, Vol. 16 (1922), pp. 273-277.

³Bills, M. A., "Job Classification and Personnel Rating". *Journal of Personnel Research*, Vol. I (1922-23), pp. 384-393.

of the method. Pruette and Fryer¹ have outlined what they call a "functional classification" of occupations, based largely upon group feeling, attitudes, and habits, and have suggested its use for general classification and promotion purposes. Hopwood² has proposed a cross-classification of occupations within a single industry or plant, based upon "service grades" (which parallel intelligence levels) and "functional classes", denoting different types of work of comparable complexity in different departments or divisions. These latter might be based, so far as differentiation of the individual is concerned, upon variations in interests and in specific abilities other than intelligence, as suggested by Viteles. Scott, Clothier and Mathewson,³ in a discussion of the use of tests in personnel work, have pointed out the possibility of devising mental alertness standards, in terms both of average and critical score,⁴ for various types of office work. (Fig. 2).

Cyril Burt,⁵ in a discussion of the necessary procedures in vocational guidance, has emphasized the need for an analysis of the qualifications required for particular occupations, and especially the psychological qualifications, rather than those of a more nominal and perhaps superficial character. Among the qualities to be assessed are the physical characteristics of the individual, his educational attainments, and a number of psychological capacities among which general intelligence is the easiest to measure. The task of measuring specific abilities, according to Burt, be-

¹Pruette, L. and Fryer, D., "Group Problems of the Executive". *Journal of Personnel Research*, Vol. 3 (1924-25), pp. 39-45.

²Hopwood, J. O., "The Grades of Labour". *Personnel Journal*, Vol. 8 (1929-30). pp. 114-124.

³Scott, W. D., Clothier, R. C. and Mathewson, S. E. *Personnel Management*. McGraw-Hill, N.Y., 1931, pp. 256-257.

⁴For the meaning of the terms "average score" and "critical score", cf. Scott, Clothier and Mathewson, *op. cit.*, p. 256, thus: "The so-called average score is the actual average for the company, and the critical score is the score below which almost no one succeeds in that particular occupation". Cf. also Viteles, M. S., *op. cit.*, p. 254 and Burt H. E., *Employment Psychology*, Houghton Mifflin, Boston, 1926, p. 209.

⁵Burt, Cyril. "The Principles of Vocational Guidance". *British Journal of Psychology*, Vol. 14 (1923-24), pp. 336-352.

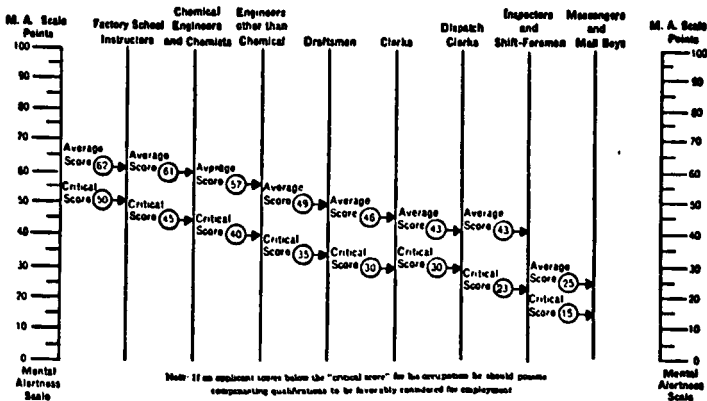
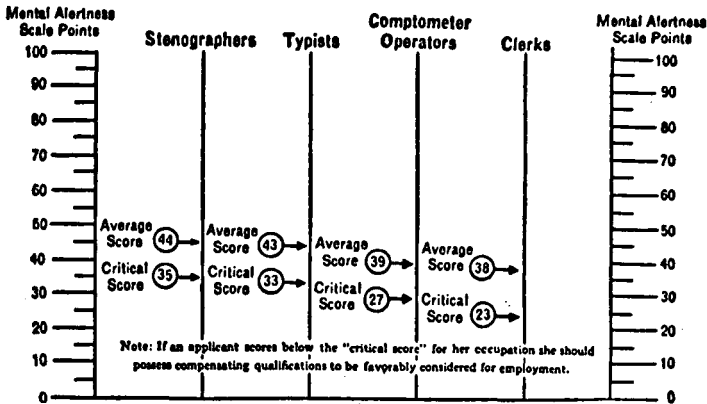


FIG. 2.—Occupational Standards on a Test of Mental Alertness, for male and female employees. (After Scott, Clothier, and Mathewson, *Personnel Management*, McGraw Hill, N.Y., 1931).

comes especially important in the case of the large group of individuals of mediocre intelligence, because there is at this level much more need for differentiation.

In a later publication,¹ Burt and Spielman set forth a tabular representation of vocations according to the degree

¹Industrial Fatigue Research Board, Report No. 33. *A Study of Vocational Guidance*. London: H. M. Stationery Office, 1926. Part II. Spielman, W. and Burt, C. "The Estimation of Intelligence in Vocational Guidance".

of intelligence required, together with a statement of the incidence in percentage terms of these classes among the general population. (Table I).

Table I. THE DISTRIBUTION OF INTELLIGENCE AMONG CHILDREN AND ADULTS IN RELATION TO EDUCATIONAL STATUS AND OCCUPATIONAL LEVEL.

(AFTER SPIELMAN AND BURT).

Mental Ratio	Scholastic Status	Occupational Status	P.C. of School Population	P.C. of General Population
Over 150...	Scholarships (university honours)	Highest professional and administrative work: lawyer, teacher, broker, etc.	0.1	0.2
130-150...	Scholarships (secondary)	Lower professional, technical and executive work: dentist, accountant.	3.0	2.0
115-130...	Central or higher elementary.	Clerical and highly skilled work: book-keeper, nurse, patternmaker.	12.0	10.0
100-115...	Ordinary elementary.	Skilled work: tailor, bus-driver, policeman, farmer.	26.0	38.0
85-100...	Ordinary elementary.	Semi-skilled repetition work: barber, bricklayer, cook, waiter.	33.0	38.0
70-85....	Dull and backward classes.	Unskilled repetition work: farm hand, porter, packer, labourer.	19.0	10.0
50-70....	Special schools for the mentally defective.	Casual labour: simplest routine work, and occasional employment on purely mechanical tasks under supervision.	7.0	1.5
Under 50..	Occupation centres for the ineducable.	Institutional: unemployable (imbeciles and idiots)	0.2	0.2

The term "mental ratio" is used here as an index of intelligence, and appears in its conception to be similar to the intelligence quotient (mental age divided by chronological age \times 100). If compared with Terman's table of distribution of I.Q.'s among a school population¹ it will be noted that Burt's distribution (whether for children or adults) is perceptibly more platykurtic, i.e., there are a larger percentage of cases at each extreme. Furthermore, all Burt's occupational requirements appear to be inordinately high, if considered in terms of the I.Q. The specifications for "higher professional and administrative work", namely, a mental ratio of over 150 and averaging 165, seem rather excessive in view of Terman's classification of I.Q. 120-140 as indicating very superior intelligence, and over I.Q. 140 as "near" genius or genius. Some light is cast on the matter, however, by the footnote observation that since a mental ratio was not directly calculable for individuals above the age of sixteen, in such cases the measurement of intelligence was first obtained in terms of standard deviation units or percentiles,² and then translated into the mental ratio. Such a procedure would be likely to result in the situation described for two reasons. First, there is some tendency for a distribution of I.Q.'s derived indirectly through a group intelligence test to be scattered toward the extremes to a greater degree than is the case when the I.Q.'s are secured directly from an individual examination.³ It appears that the data of which Burt and Spielman make use were obtained largely through the use of group tests of intelligence.⁴ Secondly, the theoretical median mental ratio of 100 has been placed, in relation to occupational level, at the mid-point between the groups of skilled tradesmen and semi-skilled repetitive workers. It is reasonably certain that the median

¹Cf. Freeman, F. N., *Mental Tests*. Houghton Mifflin, Boston, 1926, pp. 99-100.

²See Appendix B for an explanation of these terms.

³Otis, A. S., *Manual of Directions for the Otis Self-Administering Tests of Mental Ability*. (World Book Company, Yonkers-on-Hudson, N.Y., 1928), p. 5.

⁴*Op. cit.*, pp. 14-17.

I.Q. of individuals at this occupational level would be less than 100, if it were based upon the Stanford Revision of the Binet-Simon scale, or upon any comparable verbal test.¹ As this is the case, it seems probable that the mental ratio of 165, typical of the highest professional level, is paralleled by an intelligence quotient lower than this figure.

Viteles reported in 1922 a study involving the development of job specifications and diagnostic tests of job competency² which is of considerable interest in the present connection because it was found that a number of jobs which differed in duties were similar in mental requirements. Nineteen different jobs in the auditing division of a street railway company were investigated to note the mental requirements of each. From the analysis of the mental qualities desired, eight "standard specifications" were drawn up, of which one covered seven jobs ordinarily regarded as distinct, a second covered six such jobs, and the remaining six one job each. On the basis of these standard specifications a number of tests of job competency were devised, and these tests, when used in various combinations and with various weightings for the eight different groups of jobs, correlated with job proficiency to the extent of $+.65$ to $+.72$. Fig 3 shows a graphic method of indicating the specifications for a particular job. Viteles suggests that the use of these standard specifications provides five principal advantages:

- (1) The problem of the selection of employees by the Employment Department is simplified, especially when such selection is to be made on the basis of standard psychological tests. One series of tests covers a number of different jobs in which the oper-

¹In the case of tested groups of the United States Army draft, the median scores of skilled and semi-skilled tradesmen fell within "C" grade of Alpha Examination. This would correspond to a median mental age of about fourteen years, two years lower than the average adult level suggested by the results obtained with the Stanford-Binet standardization group of 40 adults. Cf. Yerkes, R. M., *op. cit.*, pp. 621, 829; and Garrett, H. E. and Schneck, M. R., *Psychological Tests, Methods, and Results* (Harper, N.Y., 1933) Part Two, pp. 33-35.

²Viteles, M. S., "Job Specifications and Diagnostic Tests of Job Competency Designed for the Auditing Division of a Street Railway Company". *Psychological Clinic*, Vol. 14 (1922-23), pp. 83-115.

ations differ, but for which the qualifications essential to properly carrying out the different operations are the same.

- (2) Clerks who are hired on the basis of similar qualifications can be readily transferred from one job to another as the circumstances require. This is especially desirable in such a division

	1	2	3	4	5	Remarks.
1. Energy			X		XX	
2. Rate of Discharge.....					XX	
3. Endurance.....			X			
4. Control.....			X			
5. Co-Ordination A.....				X		
6. Co-Ordination B.....			X			
7. Initiative.....		X				
8. Concentration.....		X				
9. Distribution.....				X		
10. Persistence.....				X		
11. Alertness.....		X				
12. Associability.....			X			
13. Discriminability:						
a/V.....			X			
b/A.....	X					
c/T.....	X					
d.....	X					
e.....	X					
A. Space Perception.....	X					
B. Form Perception.....	X					
14. Accuracy.....					XX	
15. Memory:						
a/V.....				X		
b/A.....	X					
c/K.....		X				
16. Understanding.....		X				
17. Understanding.....	X					
18. Observation.....					XX	
19. Planfulness.....		X				
20. Intelligence.....	X					
21. Intellect.....			X			
22. Judgment.....	X					
23. Logical Analysis.....	X					
24. Language Ability.....	X					
25. Executive.....	X					

FIG. 3.—“Job Psychograph” for Analysis of Qualifications Required for Job (After Viteles). (Reproduced from *Psychological Clinic*, Vol. 14, 1922-23).

as the Auditing, where the nature of the work is essentially "fill-in".

- (3) On the basis of a grouping under standard specifications, training courses can be established which cover the fundamental requirements for a number of different jobs listed under a single standard specification.
- (4) Lines of promotion can be established within the scope of a single standard specification and among the jobs of different standard specifications.
- (5) Insofar as a standard specification is a statement of the similar qualifications covering a wide variety of jobs, it can be used in equalizing wages on the basis of similar abilities, experience and knowledge brought to different jobs.

Considerable attention has been paid, especially by German students of vocational psychology, to the division of occupations according to psychological types of interest. Lipmann¹ cites a number of classifications proposed on this basis. An experimental study by Fryer,² however, with a division of vocations into "humanic" and "mechanic", with sub-types of "concrete" and "abstract", leads to the conclusions that "Individuals are unable to make any generalized distinction of value for vocational prognosis", and that "As psychological types of work, these classifications appear to be of little significance".

Research workers have sometimes attempted to estimate the degree of an ability required for, or present in, specific jobs, in order to form a quantitative rating scale. The Barr scale used by Terman and his associates³ in the study of gifted children is of this type. The scale value of each job in terms of the amount of intelligence required was based upon the average estimate of thirty judges, and was expressed in probable error deviations from zero. A similar scale was drawn up in connection with the Minnesota mechanical

¹Lipmann, O., "Psychologie der Berufe", in *Handbuch der Vergleichenden Psychologie* (edited by G. Kafka). Munich, 1922. Vol. 2, p. 478 ff.

²Fryer, D. A., "Types of Work". *Journal of Applied Psychology*, Vol. 9 (1925), pp. 394-410.

³Terman, L. M. et al. *Genetic Studies of Genius*. (Stanford University Press, 1925). Vol. I, pp. 66-72.

ability research project by Paterson, Elliot, and their co-workers.¹

Something of an indication of the agreement between rankings of this type is furnished in a recent study by Pond.² This investigation dealt with the distribution of intelligence test scores, age, and schooling in a factory population of 9,075 men, divided into 44 occupational groups. These occupations, ranked by eight persons according to the degree of intelligence required to do the work involved, correlated in their order with general intelligence scores to the extent of +.768. The reliability of the judges' ratings was .984. The correlation of occupational rank with mean schooling was +.741, and with age, +.002. As in the case of the Army intelligence test classification of occupations, there was much overlapping.

Cattell, in a current article dealing with occupational norms of intelligence,³ discusses in some detail the factors which bring about the large scatter of scores from the mean intelligence test score for each occupation. He suggests that the factor of age may be in part responsible, as it is known that scores upon tests of intelligence tend to decline with increasing age. Also, the range of test scores for those individuals who are actually well adjusted to the demands of the occupation may not be nearly so great as the total range. Thus, it is possible that those persons in the lower section of the intelligence distribution may not be meeting the demands of the occupation adequately, while the labours of those in the higher section may be wasted on an occupation of too simple a nature. Further, a wide scatter may be due to a wide variation in the complexity of jobs within a single occupation. Lastly, there are probably many temperamental

¹Paterson, D. G. et al. *Minnesota Mechanical Ability Tests*. (University of Minnesota Press, Minneapolis, 1930), pp. 136-140.

²Pond, M. "Occupations, Intelligence and Schooling: Their Relationship and Distribution in a Factory Population". *Personnel Journal*, Vol. 11 (1932-33), pp. 373-382.

³Cattell, R. B. "Occupational Norms of Intelligence, and the Standardization of an Adult Intelligence Test". *British Journal of Psychology*, Vol. 25 (1934-35), pp. 1-28.

and character qualities which exert a strong influence in narrowing the variation in capability, or which have a compensating effect upon any great deviation in intelligence from the norm of the group.

An interesting conclusion is attached to the findings of a comparative study of the relation between intelligence and clerical jobs carried out by Pond and Bills.¹ This study was a compound of two separate investigations, in which different tests of intelligence were used. Both studies found that there was a fair positive relationship between job success and test scores and between job ranking and test scores, and that "To secure comparable results within broad occupational limits, it is not necessary that test structures, conditions of work, nor criteria of advancement should be precisely identical". Thus there is a hint that the grouping of jobs by the mental functions involved may be valid in spite of local differences of working conditions or methods of promotion.

APPRAISAL AND ADJUSTMENT OF UNEMPLOYED WORKERS

Until recently the problem of the level of mental abilities of unemployed men has scarcely been touched. Two pre-depression studies have been published: an investigation by Johnson of unemployed men in Portland, Oregon, in 1914-15,² and a study of applicants of the Dayton, Ohio, and Columbus, Ohio, Free Employment Offices, made by Pintner and Toops in 1916-18.³ The former used the Stanford Revision of the Binet-Simon scale and found about 21 per cent. to be feeble-minded. The latter employed several short-scaled tests: Whipple's Cancellation Test, several tests of the Woodworth-Wells series, and the Knox Cube

¹Pond, M. and Bills, M. A. "Intelligence and Clerical Jobs: Two Studies of the Relation of Test Scores to Job Held". *Personnel Journal*, Vol. 12 (1933-34), pp. 41-56.

²Johnson, B. R. "Unemployment and Feeble-mindedness". *Journal of Delinquency*, Vol. 2 (1917), pp. 59-73.

³Pintner, R. and Toops, H. A. "Mental Tests of Unemployed Men," *Journal of Applied Psychology*, Vol. 1 (1917), pp. 325-341 and Vol. 2 (1918), pp. 15-25.

Test. Ninety-four men at Columbus and forty at Dayton were examined, and a considerable amount of information concerning each individual's experience and education was secured. The samples obtained from the two cities were dissimilar, there being 28.7 per cent. feeble-minded at Columbus, and only 7.5 per cent. at Dayton. The distribution of mental ages paralleled the distribution of cases according to their employment status: whether (1) unemployed, although normally at work; (2) casuals; (3) of the odd-job type, who work fairly steadily upon short-time jobs; and (4) unemployables. Certain of the conclusions of the study are worthy of mention:

- (1) "There seems to be a distinct relationship between the mentality and the industrial class to which a man belongs, the unemployed class ranking highest, followed by the casuals, the odd-jobs men, and the unemployables. No men of normal mentality were found in the unemployable group".
- (2) "On the whole the older men among the applicants seem to be more retarded than the younger men".
- (3) "The grade in school achieved by the men, according to their own statement, is higher than their mentality in general would warrant, although it bears out the poor mental endowment of the class".
- (4) "The best position ever held, as given by the men themselves, shows that few have ever held positions requiring any considerable degree of responsibility".

On the whole, these investigations have little more than historical interest for the present study and other current studies, because the conditions of unemployment are now distinctly different and because the test results are comparable only in the most general manner.

The industrial depression which commenced in 1929-30 has given impetus to many studies of the rôle of industrial psychology in the solution of employment problems. In March, 1931, a conference was held under the joint auspices of the Personnel Research Federation and the Social Science Research Council to discuss the effects of part-time work and

lay-off on the worker.¹ It was suggested by members of the conference that a comparative study of the contemporary group of unemployed should be made from a genetic point of view. The question of how the working force of industry could best be re-established as conditions improved was broken down into problems such as the following:²

"What lessons do the experience of workers with various efforts to provide a livelihood during the depression teach as to methods and types of re-training necessary for rehabilitation or re-employment at new occupations"?

"Can more generally useful and standardized job descriptions be prepared as a basis for the more advantageous placement of workers and a means of forecasting personnel requirements"?

"How can employment exchanges best study the individual applicants and advise them as to opportunities for specialized training in line with the probably future demand as well as in line with their individual talents and interests"?

In the autumn of the same year, a committee of the Social Science Research Council undertook to investigate the trend of job specifications and job classification and the feasibility of instituting more broadly applicable standards in this field.³ The nature of the thought displayed in this connection illustrated the possible usefulness of methods of industrial psychology in such a project, since "what is required is a systematic enquiry into the component elements of individual jobs and into human qualifications and physical conditions necessary for performance".⁴

An address delivered by Dr. M. S. Viteles in May, 1933, to the Association of Consulting Psychologists⁵ pointed out that increasing flexibility of training in industry was becoming necessary, and that this need implied more detailed re-

¹*Effects of Part Time and Lay Off: The Need for Research During Industrial Depression: Report of Conference of March 21-22, 1931.* Social Science Research Council, N.Y., 1931.

²Hersey, R. B. *Is Industrial Psychology Making the Most of the Depression?* *Personnel Journal*, Vol. 10 (1931-32), pp. 157-166.

³*Job Specifications as a Basis for the Operation of Employment Exchanges.* Social Science Research Council, N.Y., 1931.

⁴*Ibid.*, Appendix I-1.

⁵Viteles, M. S. "Training and Unemployment". *The Human Factor*, Vol. 7 (1933), pp. 307-311.

search into the fundamental psychological problems involved. He suggested investigation of such questions as the following:

"Is there a small number of basic capacities underlying motor skill which can be developed in order to create in the individual a set of fundamental skills that can be used in many jobs, thereby providing for rapid adaptation to rapidly changing forms of work"?

"Is there a transfer of skill? How can it be used in promoting a better adaptation to work"?

"Is it possible to make, early in the life of the individual, an analysis of specific abilities and other traits as a basis of outlining a training programme best adapted to his needs, to avoid placement in an occupation in which he can attain only the proficiency level of the "marginal worker"?"

After considering this problem of industrial adaptability at some length, Viteles concluded that "When facts on occupational trends are available, when ordered economic planning becomes an established practice, when these basic questions on the nature of skill are answered, progressive training of men for new forms of work, through public employment or other agencies will undoubtedly be one of the most important therapeutic devices for preventing and overcoming the effects of economic insecurity".

A recent discussion by Parker of the aims and methods of the Public Employment Centre at Rochester, N.Y.,¹ outlines many of the problems of occupational abilities and their relationships which occur in connection with the advising and re-training of unemployed men. Parker points out the barren character of an emphasis upon the minute details of job specification to the neglect of broader and more easily comparable psychological qualities. He suggests as a practical scheme a classification of jobs, whether superficially similar or dissimilar, into broad groups according to common elements of operations and related skills. He states further: "If we succeed in making such groupings of jobs, it should greatly aid us in the process of transferring workers from job

¹Parker, W. E. "Methods of the Public Employment Centre of Rochester". *Personnel Journal*, Vol. 10 (1931-32), pp. 307-317.

to job and in stabilizing the flow of workers from one seasonal occupation to another”.

In 1931 the University of Minnesota set up an Employment Stabilization Research Institute to investigate the

Examiner's Initials	Measure Employed	Score	Percentile Rating	GENERAL PROFILE	
M. S. 59 D.	SUMMARY RECORD of INDIVIDUAL DIAGNOSIS*			Age 20	Number of Children 0
				Sex m	Other dependents 0
				Per Cent of Total Population Lower	
F. F.	Schooling: Age 17 Grade 9	..	86		
F. G.	Classification Test	X.7	87		
F. G.	Verification Test	IX.9	87		
F. G.	Clerical Aptitude: Numbers		87		
F. G.	Clerical Aptitude: Names		81		
F. G.	Dexterity: Finger Test	3.63	97		
F. G.	Dexterity: Tweezer Test	5.77	86		
F. G.	Dexterity: Manual Test	2.18	88		
F. G.	Mechanical Assembly A B C	3.77	71		
F. G.	Spatial Relations A B C D	3.34	80		
F. G.	PERSONALITY INVENTORY				
	Neurotic Stable	-111	78		
	Dependent Self-sufficient	71	81		
	Introvert Extravert	-71	77		
	Submissive Dominant	86	70		
F. G.	STRENGTH TESTS				
	Right Hand	88	8		
	Left Hand	78	9		
	Back	800	8		
	Legs	850	1		

F. G. Vocational Interests: Claimed Forest ranger, cabinet maker, radio operator, electrical engineer.

Tested Highest in Physician (B), Engineer (B-), Lawyer (B-), Farmer (B-), Editor (B-).
Trade Claimed None. Test Rating.....

F. F. Occupational History: Sorting lumber and checking stock, June-Dec., 1928; looked for a job, Nov. 1928-May, 1929; measuring and wrapping sandpaper for shipment, June-Dec., 1929.

GENERAL ASSETS

Unusually high speed and dexterity of fingers.
Excellent mechanical aptitudes, combined with definite mechanical interests.
Stable, self-sufficient personality.
Fairly good intelligence.
Likes woodwork.

GENERAL LIABILITIES

"Hunchback," deformed chest but not noticeable in street clothes.
Little clerical aptitude.
Slightly deaf in both ears.
Dental caries and pyorrhea.
Untidy appearance of clothing and hair.
Not strong physically.

* Examiner's cabin on printed in Roman.

FIG. 4.—Individual Diagnosis Record Card used in University of Minnesota Employment Stabilization Research Institute.

(Reproduced, by permission, from Vol. I, No. 1 of the Institute's bulletins).

causes, conditions, and effects of unemployment within three cities, Minneapolis, St. Paul, and Duluth, in Minnesota.¹ Included in the research programme was a project of individual diagnosis and re-training of unemployed workers. This project had two specific aims: to determine the predominant and contributing causes of the individual's employment, and to classify each person with respect to his actual and potential usefulness. To this end a clinic was instituted, which offered a thorough psychological and medical examination. For each individual measures were made of his educational status, educational ability, clerical aptitude, vocational interests, mechanical ability, manual dexterity, physical strength, personality traits, trade skill proficiency and sensory acuity. The data obtained were recorded in a manner illustrated in Fig. 4. The graphic method of indicating levels of performance in various tests, similar to the scheme used by Viteles in his early study of job specifications, was employed considerably. Such a graphic representation, whether for an individual or a group, has been called by Trabue an "occupational ability pattern". Trabue has demonstrated that these occupational ability patterns, as shown in Fig. 5a, may display reasonable stability for workers from different localities, and that (Fig. 5b) they may be differentiated for individuals graded for efficiency in the occupation under consideration.²

Several reports of investigations of employed and unemployed workers have been published by the Employment Stabilization Research Institute at the present time. One of these has dealt with the employment status, from both the psychological and medical aspects of a group of 300 unemployed casual labourers.³ It was found that this group,

¹Paterson, D. G. "The Minnesota Unemployment Research Project". *Personnel Journal*, Vol. 10 (1931-32), pp. 318-328.

²Trabue, M. R. "Occupational Ability Patterns". *Personnel Journal*, Vol. 11 (1932-33), pp. 344-351.

³Hansen, A. H., Trabue, M. R. and Diehl, H. S. *The Duluth Casual Labour Group*. Bulletins of the Employment Stabilization Research Institute of the University of Minnesota, Vol. 1, No. 3, Minneapolis, March, 1932.

DEPARTMENT STORE SALESWOMEN IN DIFFERENT CITIES

Employed Control Cases

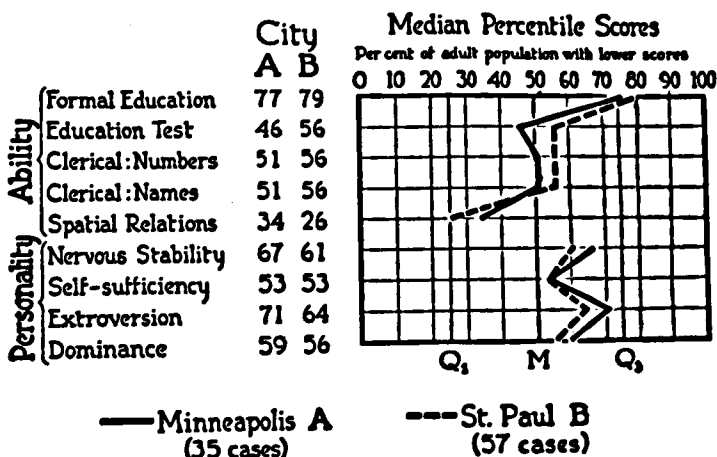


FIG. 5a.—Occupational Ability Patterns (after Trabue) as applied to two different groups of department store saleswomen.*

with a median age of 49 years, was of such a character that even under the most favourable circumstances about a third would probably not be self-supporting at any type of work. Large groups of employed and unemployed clerical workers (stenographers, book-keepers, bank tellers, etc.) have also been investigated, and detailed findings have been reported.¹ Particular attention has been paid to the development of techniques of individual diagnosis for use in public employment offices.² The tests and other measures used in

¹Andrew, D. M. and Paterson, D. G. *Measured Characteristics of Clerical Workers*. Bulletins of the Employment Stabilization Research Institute of the University of Minnesota, Vol. 3, No. 1, Minneapolis, July, 1934.

²Darley, J. G. Paterson, D. G., and Peterson, I. E. *Occupational Testing and the Public Employment Service*. Bulletins of the Employment Stabilization Research Institute of the University of Minnesota, additional Publication No. 19, Minneapolis, September, 1933. Green, H. J., Berman, I. R., Paterson, D. G. and Trabue, M. R. *A Manual of Selected Occupational Tests for Use in Public Employment Offices*. Bulletins of the Employment Stabilization Research Institute of the University of Minnesota, Vol. 2, No. 3, Minneapolis, July, 1933.

*Figs. 5a, 5b reproduced by permission (from reference in footnote 2, p. 29).

CITY POLICEMEN

Effectiveness rated by Senior Captain

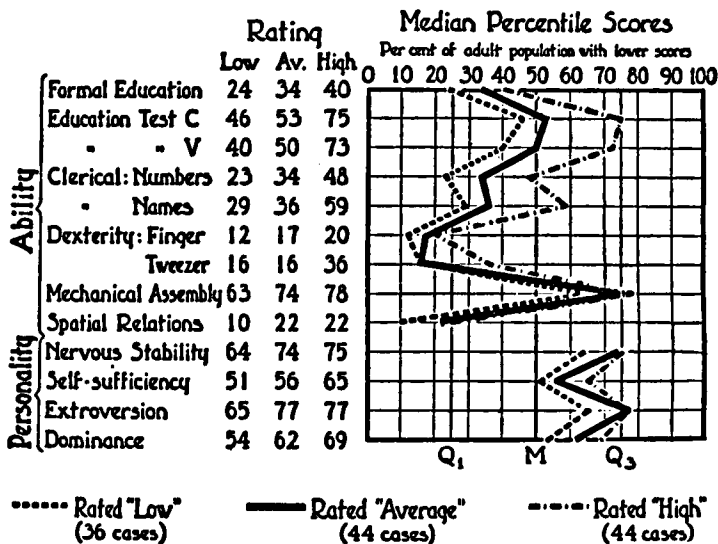


FIG. 5b.—Occupational Ability Patterns (after Trabue) as applied to an occupational group sub-divided by efficiency ratings.

the investigations have been given special study in order to single out those most adequate for individual differentiation.¹

The effects of unemployment upon the individual's opinions and attitudes have been subjected to research by O. M. Hall.² Scales of attitudes toward employers and religion and of occupational morale were developed and were used with 300 employed and 360 unemployed engineers, matched for age, nativity, education, marital status, religion, earnings, and licensing. It was found that 68 per cent. of the unemployed were more bitter toward employers, that 75 per cent. had poorer "occupational morale", and that 58 per

¹Paterson, D. G. (Editor). *Research Studies in Individual Diagnosis*. Bulletins of the Employment Stabilization Research Institute of the University of Minnesota, Vol. 3, No. 4, Minneapolis, August, 1934.

²Hall, O. M. "Attitudes and Unemployment". *Archives of Psychology*, No. 165. March, 1934.

cent. were more critical of religion, than the median employed man. There was shown also, among the unemployed group, that morale tended to become lower, and the attitude toward employers more antagonistic, as the period of unemployment increased. In the case of the employed group, it was shown that the "occupational morale" tended to be higher as the individual felt that his job was more secure. Unfortunately, it could not be demonstrated whether opinions and attitudes tended to change with unemployment, or whether the differences found were originally presented when the unemployed group had been employed, as it was necessary to extend anonymity to all individuals who recorded their opinions.

CHAPTER III

TESTS OF INDUSTRIAL QUALITY: TYPES AND METHODS

A PSYCHOLOGICAL test may be defined as an instrument for measuring in quantitative terms some psychological capacity or trait, such as the ability to perform specific clerical tasks quickly and accurately, to appreciate certain intricate mechanical relationships, or to handle small tools or objects dexterously. The measure which is thus derived is always a relative one; that is, the score obtained by an individual in a test does not indicate the absolute amount of a trait possessed, from zero to the uppermost limit, but is an index which gains its meaning only from comparison with similarly derived indices for other individuals. A test, moreover, always involves a sampling of the essential elements of the behaviour which it is desired to measure or predict. The sampling may be accomplished either by reproducing in the test one or more of the fundamental qualities of the behaviour to be appraised (the "analytic" test) or by devising a test which requires in a miniature setting the same total of performance or actions that are required in the "real" situation. Since various traits may differ markedly as regards the kind of behaviour to which they refer, it is apparent that tests of such traits may likewise bear little resemblance to one another in form or content. Thus a test of clerical ability, constructed for the purpose of prophesying success or failure at tasks predominantly clerical, has a form and content significantly different from those of a test of, say, aptitude for engineering. In illustration of this point, compare the tasks represented on pp. 38 and 39. One shows a portion of a typical test of ability to carry on routine clerical work, such as filing; the other illustrates the O'Connor "Wiggly Blocks", intended as a measure of mechanical aptitude.

Since a psychological test by its nature deals with a sampling of the essential elements of the behaviour which it is desired to predict, its usefulness for prediction (that is, its "goodness" as a test) will vary with the thoroughness and degree of discrimination with which it samples these elements. It will be more or less effective the more or fewer functions of the appropriate type it samples. Its value for prediction is usually indicated by what is known as a *validity coefficient*—a coefficient of correlation derived through a statistical comparison of the test measures with some criterion, such as ratings by qualified judges of the persons tested, production records, etc. The criterion itself is of course seldom faultless as a standard,¹ but is selected as the best available means of checking the predictive value of the test. In addition to being more or less valid, a test should also be as "reliable" as possible; that is, it should measure whatever it does measure with relative consistency. This, too, is indicated by a coefficient of correlation (*reliability coefficient*), which is derived by intercorrelating two halves or different forms of a test, similar but not identical in content, or by intercorrelating the scores on a form of the test given to the same persons on two occasions some time apart.² In theory the validity coefficient of a test can never be higher than its reliability coefficient, and it is generally considerably lower in practice. In addition to these two principal standards for a test there are certain secondary ones: that the test shall not require too long to administer, or be unduly fatiguing or distasteful to the persons tested, or demand too much time or trouble in scoring, and others.

Psychological tests may be divided roughly into four main types, according to their content and form of administration:

¹Farmer, E. "The Reliability of the Criteria Used for Assessing the Value of Vocational Tests" in *British Journal of Psychology*, Vol. 24 (1933), pp. 109-119.

²Or by the method of tetrad differences. Cf. Dunlap, J. W.: "Comparable Tests and Reliability," *Journal of Educational Psychology*, Vol. 24 (1933), pp. 442-453.

- (1) *Individual tests verbal in character.* Such a test is the well-known Binet-Simon general intelligence examination, in any one of its revisions. The material involved in the test is presented verbally to a single subject at a time. In the case of the Stanford Revision of the Binet scale (year eleven) the subject is, for example, required to detect the absurdity of a series of statements, to build a sentence out of three words, to name any sixty words in three minutes, to define certain abstract words, and to make a meaningful sentence out of a number of words which have been disarranged.
- (2) *Group tests verbal in character.* Tests of this variety, in addition to being verbal, are distinguished mainly by the fact that they may be administered to a number of individuals at one time. They are usually "pencil and paper" tests; that is, the content of the test (questions, problems, etc.) is presented in printed or mimeographed form, and the subject completes the test in accordance with the general instructions given by the examiner by writing his answers or recording his work in a test booklet.
- (3) *Group tests non-verbal in character.* These also are administered in group fashion, but are non-verbal in their mode of presentation. The material of the test involves no direct usage of words or verbal symbols, and the test may even be given without the use of language at all. This feature of the test facilitates its use with illiterate persons or with persons who do not speak the language of the examiner.
- (4) *Performance tests.* The differentiating feature of these tests is the fact that the subject is not required to make verbal or written responses or to use pencil and paper, but must solve some problem through the manipulation in some logical sequence of certain objects or materials. Thus, the test may consist in directing the subject to fit together pieces of wood or metal in such a way as to attain some demonstrable result (as in the case of the O'Connor Blocks), to assemble parts of a tool or other mechanical appliance, or to operate a piece of apparatus in a prescribed manner. A performance test must usually be administered individually, although occasionally it is adapted for group usage as well.

In the case of almost all tests, except those of a questionnaire variety designed to deal with traits of personality, temperament, attitude or interest, *time* enters more or less directly into their administration. Very frequently, the problems must be completed within a specific time, in which case the number of items completed correctly forms the basis for the subject's score; or conversely, the length of

time which the subject takes to perform the task may be used as an index. In either case, speed in solving the problem or doing the task is a direct factor in the measurement of an individual's test performance. In view of this fact, it has frequently been objected that tests measure, not the level of organization of an individual's ability ("power" of response), but rather the quickness with which he is able to perform the task in question. This is especially applicable to tests of "general intelligence", in which it is alleged, the slow but meticulously accurate and deep-thinking person is placed at a disadvantage relative to the quick but perhaps more superficial individual. Evidence on this point, however, does not suggest such a conclusion. It has been demonstrated, for example, that there is a high relationship between scores upon an intelligence test with a normal time limit and scores upon the same test with no limitation upon time at all.¹ It may also be shown that there is a fairly high correlation between scores upon an intelligence test with a normal time limit and scores upon another test of the same verbal type without any limitation of time.² Further, where a test is scored in terms of both time and accuracy, a positive correlation may be found between the two scores.³ The height of this correlation will probably vary, however, with the relative level of difficulty of the test as a whole, and also with the gradation of the items.

Valid test administration presumes adequate conditions of testing. Light, temperature, desk-space, quiet, in fact any physical accompaniment of normal work, must be favourably controlled if there is to be unhandicapped test performance on the part of the subject. Moreover, instruc-

¹Ruch, G. M. and Koerth, W. "Power' versus 'Speed' in Army Alpha." *Journal of Educational Psychology*, Vol. 14 (1923), pp. 193-208.

²The Otis Self-Administering Test (Higher Examination), for example, correlates $+ .75 \pm .07$ with the Zytve Stanford Scientific Aptitude Test, which has a time limit allowing almost all subjects to finish.

³In the case of the Thurstone Clerical Examination, time and accuracy scores correlate $+ .30 \pm .06$ for a group of office workers. For such a group, however, the test content is not of a high level of difficulty.

tions or directions given by the examiner must be clear and definite, because difficulty of understanding directions should not be allowed in any way to handicap the work of the subject. Similarly, the subject should be put at his ease, as much as possible, to avoid the handicap of shyness or nervousness. It is safe to say that with reasonable care and forethought most of these conditions may be provided for. In dealing with possible nervousness or self-consciousness on the part of the subject, it is frequently feasible to have him begin with some simple or familiar task the response to which is neglected in determining his score but which serves to set him at his ease.

Test scores are not necessarily to be used as indicators of an individual's capacity in any final sense of the word. While the basis for a specific ability may be inherited, and while individuals may tend to vary in accordance with the richness of this legacy, nevertheless the *tested* function is a trait overlaid with a heavy coating of environmental modifications.¹ Therefore, in any given instance, the individual's score must, wherever possible, be considered in the light of his personal background. In any case, present-day tests vary considerably in validity and reliability, and in no case approach perfection. That is, they are never really pure indices of a function. The reliability coefficient of a well-constructed test may be from .80 to .95 (equivalent to 50 to 70 per cent. better than chance correspondence), while a coefficient of validity of .60 to .70 (involving an accuracy of prediction 20 to 30 per cent. better than chance) is relatively speaking quite high.² In spite of this fact, however, there is good evidence for the conclusion that a well-authenticated test having a validity coefficient of .60 and a reliability coefficient of .90 or over forms as a rule a much better basis for judgment than any other known means of prediction.

¹Cf. Freeman, F. S.: *Individual Differences* (Henry Holt, N.Y., 1934), pp. 138-143.

²Hull, C. L.: *Aptitude Testing* (World Book Company, Yonkers, N.Y., 1928), pp. 268-278.

TEST III

Below are 9 lists of 6 names each.

Look at List A first.

Write the figure 1 in the parenthesis () before the name that would come first on an alphabetical list; the figure 2 before the name that would come next, 3 before the next, 4 before the next; 5 before the next, and 6 before the last.

Then do List B, then C, and so on.

Work carefully. If you make a mistake, cross it out but do not take time to erase.

LIST A

- () S. G. Broadwell
- () R. A. Blythe
- () Buach & Sons
- () J. E. Calhoun
- () N. L. Burrows
- () Chapman Bros. Co.

LIST B

- () J. M. Yearley
- () H. B. Vincent
- () Walker & Co.
- () G. R. Ulrich
- () Wm. Ziegler
- () S. D. Wadsworth

LIST C

- () M. E. Keene
- () Wm. Shaffer
- () A. E. Danett
- () L. F. Jarvis
- () T. L. Quimby
- () Gilmore Sons Co.

LIST D

- () Merchants Co.
- () R. C. Otter
- () D. W. Ridgway
- () P. G. Mulroney
- () G. N. Merrill
- () Parsons & Bros.

LIST E

- () W. F. Boardman
- () Bliss Bros.
- () A. L. Bonaparte
- () N. F. Boarder
- () E. V. Brennan
- () E. K. Blahaly

LIST F

- () J. S. McAlpin
- () H. E. Robertson
- () McMahon & Sons
- () A. W. Harrington
- () Chan Uhlman
- () L. E. Lendon

LIST G

- () Talbot Mfg. Co.
- () Wingfield & Jones
- () Talking Machine Co.
- () Chan E. Sprouts
- () A. F. Ulrich
- () B. L. Thecher

LIST H

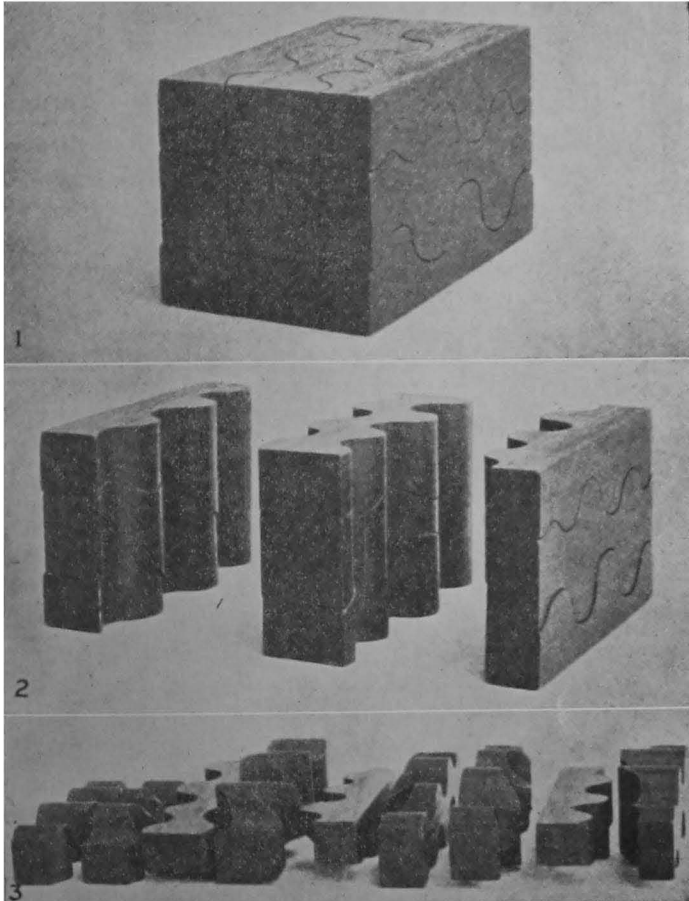
- () Uhl Bros.
- () S. W. Pries
- () N. R. Wright
- () Egan Sons Co.
- () L. A. Seabrook
- () Wm. E. Quarry

LIST I

- () A. A. Klinger
- () Holmes Steel Co.
- () Jan E. Kling
- () F. L. Linderman
- () Jamison Bros.
- () Geo. Lindley

Sample Section of Test of Clerical Aptitude.

(Reproduced, by permission, from Scott, Clothier and Mathewson, *Personnel Management*, p. 240).



O'Connor Wiggly Block Test of Mechanical Aptitude.
(Reproduced, by permission, from Scott, Clothier and Mathewson,
Personnel Management, p. 228).

Before leaving the subject of the absolute character of test measurements, it must be stated that often, particularly in the case of vocational guidance or selection procedures, the incidental behaviour of the subject may be of considerable significance in influencing the judgment which is made of the individual's status with respect to the trait measured or some other relevant characteristic. Not all qualities of the individual have been found to be measurable, but they often reveal themselves in certain recognizable forms to an experienced examiner while the subject is working at some appropriate task.¹ Tests of performance, in particular, have been found to be of use in providing clues to the subject's tendencies in approaching and attacking a difficult problem. In short, the careful psychological examiner does not by any means administer tests in a routine manner with his eyes closed to everything but numerical scores.

The enormous body of research which has gone into the construction and use of psychological tests in the last forty years has inevitably been followed by certain theories as to the nature of the inter-relationship and the systematic character of the abilities and traits measured. It is possible, of course, to think of individual traits as being fundamentally unrelated, but at least in the case of "abilities" (that is, qualities directly underlying and governing performance in a task) the measures derived have nearly always been found to exhibit some degree of correlation, although sometimes of a very low order. In order to explain the relationships that exist, resort has been had in the past to several hypotheses. It has been supposed that an ability may have as its basis (a) a factor specific to itself and also (b) a factor or factors in common with other abilities in a restricted group. On this theory, there may be much correlation among abilities owing to the overlapping of factors of the latter type ("group factors"). It has been suggested also,

¹Cf. Earle, F. M.: *Methods of Choosing a Career* (G. G. Harrap, London, 1931), pp. 107-110.

on the basis of a great deal of experimental evidence, that through all abilities runs a general element or factor (known generally, to avoid undue specificity, as "g") as well as a factor unique to each one.¹ These two theories have also been co-ordinated to form the supposition that any ability (or test giving a quantitative measure of that ability) may have basic to it three factors: a general factor ("g"), a group factor (or more than one) extending over several abilities, and a specific factor which is absolutely unique for that ability.² In actual practice, it is found that many tests are fairly consistent in the degree to which they are related to others. That is, certain tests, even though they are used by different examiners and with different groups of subjects, will invariably show a tendency to "hang together", to be highly inter-related; while others under the same circumstances will consistently show no inter-relationship of any practical significance. If, for example, three tests of general intelligence, three tests of mechanical ability, and three tests of manual dexterity are given to the same group of subjects, it will generally be found that the tests of intelligence will correlate to the extent of about +.70 or +.80 with each other, while the tests of mechanical ability will correlate about +.50 or +.60, with each other and the tests of manual dexterity about +.15 or +.20. Moreover, it is likely that correlations will be higher between tests of the same type (involving one of the three kinds of ability aforementioned) than between tests of different type. In this instance a general or group factor of significant importance would be anticipated in the case of tests of intelligence, as well as a factor specific to each test. On the other hand, a general or group factor of relatively much less weight would be attributed to the tests of manual dexterity, and to each test a high degree of specificity. Sometimes such dif-

¹Freeman, F. N: *Mental Tests* (Houghton Mifflin, Boston, 1926), Chap. 18.

²Cf. Alexander, W. P: "Research in Guidance", *Occupations*, Vol. 12 (1934), pp. 75-91.

ferences in communality are due to parallel differences in reliability. Frequently, however, differences in reliability are small, and have no bearing on the question. It may be concluded, then, that certain abilities are heavily saturated with the general factor ("g"), or overlapping group factors, or both; while, passing through a series of gradations, others contain nothing but factors specific to themselves. In addition, it seems probable that the influence of these factors underlying correlation of abilities may vary with the general mental level of the individual, and with the level of development of the individual at different stages of growth.¹

It is possible, in any given instance where the correlation of each test with every other of the series is known, to resolve the table of correlations into the minimum number of independent factors which will account for the observed relationships within the scope of the errors of measurement. This process, known as "multiple factor analysis", makes possible also a determination of the relative importance of each of the factors discovered for each of the tests.² Being based on the elements common to any group of tests, however, such factors and factor loadings take no account of whatever is specific to each test, whether specific in an absolute sense or specific only with respect to the given series of tests. A further difficulty lies in the fact that an infinite number of slightly different multiple factor solutions is derivable from any correlation table, and consequently some choice must be made among these.³ In sum, it is quite apparent at present that a great deal more research is necessary before it will be possible to speak with any precision about the "unitary abilities" governing test performance.

¹Spearman, C: *The Abilities of Man* (Macmillan, London, 1927), pp. 216-220.

²Thurstone, L. L: *The Theory of Multiple Factors* (Edwards Bros., Ann Arbor, Michigan, 1932).

³Thurstone, L. L: "Unitary Abilities". *Journal of General Psychology*, Vol. 11 (1934), pp. 126-132. Thurstone has recently suggested that when the factors and factor loadings for a battery of tests have been found, the geometrical axes in terms of which these factors are conceived should be rotated in such a manner that the description of a test by the factors underlying it will permit the least variance from one battery of tests to another. Cf. pp. 86-7.

TESTING IN VOCATIONAL GUIDANCE AND SELECTION

Two of the most important fields of test application lie in vocational guidance and selection. By vocational guidance is meant the assessment of the individual's work-qualities in the light of standards and opportunities of work, with the objective of directing him toward that occupation or type of occupation which will best fit in with his capacities, interests, training, and opportunities. By vocational selection, on the other hand, is meant the choice of potential workers or employees in such a manner as to secure those best suited to the work at hand. While the two practices are obviously similar, they differ in certain significant respects. Both involve an estimate of the individual in relation to work, and both must include some study of his fundamental capacities and traits and his training and experience. They differ in that for the purposes of vocational guidance the assessment of the individual must take into account his fitness for *all possible* available careers, while vocational selection may be concerned only with the acceptance or rejection of the individual for the particular job at hand. Moreover, vocational guidance in its current application refers generally to the guidance of youths for whom a substantial period of training, of moulding of character and outlook, awaits, while vocational selection more frequently deals with the somewhat older, perhaps quite mature, individual in the light usually of his status at the moment.¹

The major objectives of both vocational guidance and vocational selection coincide, however. They aim at promoting individual efficiency in industry and individual satisfaction in work. These objectives are important not only in themselves, but in view also of the effects which their attainment may be expected to achieve: better social adjustment of the individual through increased satisfaction in his work, elimination of heavy economic waste through faulty work

¹This distinction may be expected to become less sharp as the concept of adult adjustment and re-training gains more prominence.

and personal accidents, reduction of the cost of turnover and of training new workers. Concrete studies of vocational guidance and selection practices have shown that, where carefully and scientifically applied, they can and actually do increase the degree of personal satisfaction in the work and the level of efficiency with which the work is carried on. Macrae, for example, cites recent follow-up studies of vocational guidance in England as showing that where the advice given was followed, approximately eighty per cent. of the advisees experienced satisfaction and success in their work, as against a significantly lower percentage in cases where the advice was not taken.¹ Various other investigations, of clerks and sales-workers, of street-railway and electric sub-station operators, have shown that suitable vocational selection practice may make measurable contributions toward the adjustment of the individual to his work.²

For the purposes of vocational guidance, and for the purpose also of such a selective agency as a public employment office, it is necessary to have access to a systematically arranged fund of information concerning the requirements of different occupations. This outline of requirements should be based on a set of common denominators for all the occupations included. Otherwise—if the requirements are conceived for each occupation in terms of its own individual setting—the standards for occupational adjustment tend to lapse into a state of incoherency and unrelatedness. That this would be a most unfortunate condition may be judged from the amount of time and effort that it would require to examine each candidate for guidance or adjustment in the light of all such qualitatively different standards. It may, of course, be the case that the comparison and classification of occupations on the basis of common denominators of re-

¹Macrae, Angus: *Talents and Temperaments* (Appleton, N.Y., 1933), pp. 179-191.

²Cf. Viteles, M. S: *Industrial Psychology* (Norton, N.Y., 1932), pp. 113-322.

quirements, while wholly desirable, can only in part be achieved. It is logically conceivable that the requirements of different occupations, in the sense of the psychological demands placed upon the worker, are unique, or nearly so, for each separate vocation. To make any generalization concerning the extent to which such uniqueness of occupational requirements exists, if at all, is impossible pending the pursuit of further research along the lines of concrete enquiry and the acquisition of data bearing on the point. In view of the practical implications which the results of such an analysis would have for guidance and employment-transference, however, the enquiry would be distinctly worth while. It is clear that the question cannot be settled on the basis of *a priori* examination, but necessitates a more concrete consideration.

To make this analysis it is necessary not only to compare occupations and classes of occupations for a given series of traits, but also to determine the importance of each trait for success in each kind of work. This may be done satisfactorily only if it is possible to examine groups of workers who are themselves graded on the basis of their general fitness for work—preferably, although not necessarily, through ratings by superiors or through evaluation of the quantity or quality level of productiveness of each individual. In addition to making this check, it is necessary in some way to take into account the training, practice and technical knowledge which have modified the original capacities of the individual for the work he has undertaken. It is the usual practice, in attempting to set up test standards for a given type of work, to administer a battery of tests to a group of beginners in the work, the nature of the tests being determined roughly in advance by the operations involved in the work that they are called upon to do.¹ Test scores are then correlated with whatever criteria are later available on the progress and level of achievement of each member

¹Hull, C. L., *op. cit.*, Part Two: Methods.

of the group. Such a procedure is of course superior to the testing of individuals already trained (though in varying degrees), because in the latter case the factors of training and experience are not held reasonably constant, and may perhaps radically distort the data. Where the more exact method is not employed, it is either with the assumption that possible effects of differences in training are non-existent or insignificant, or because the alternative is not possible.¹

A classification of occupations on the basis of fundamental traits of work-capacity, if feasible at all, may readily cut across ordinary formal lines of distinction. Two jobs customarily differentiated through superficial distinctions of duties, training, or wages, may be practically identical in the industrial qualities which each demands from the successful worker. Thus, there may be little essential difference in these respects between, say, a machinist and a bench electrician, although these two occupations are ordinarily clearly distinguished. Similarly, it may be found that different portions of what is usually regarded as an integral job differ appreciably in the types of skill required in their performance, and that it may be more serviceable to redistribute duties according to the qualifications of the personnel and the essential character of these duties. Differences in training and experience may be found to be less important than these individual differences in skill. Sometimes it may happen that an individual whose capacities most nearly approximate the requirements for a given type of work will be

¹This point has been clearly stated by C. S. Myers (*On Educability*, V^{mo} Conférence Internationale de Psychotechnique, Utrecht, 1923, p. 104), as follows:

"In vocational guidance, on the one hand, we apply tests of general and other mental ability, and tests of motor and mechanical ability, on the assumption that those persons who made the highest scores will on the whole retain their high position after training (in one or other special ability). We have no adequate evidence at the present of the general truth of this assumption. In vocational selection, on the other hand, we estimate the value of tests of general and special abilities for any given occupation by applying them to persons already trained in that occupation. Here we have the converse assumption that those persons who make the highest scores after training (not in the tests but in their occupation) would have done so likewise if the tests had been applied before training. But here again we have no proof how far this assumption is justified".

more profitably assimilated within that work, in spite of lack of experience, than the trained individual lacking in original fitness; sometimes, the converse. All of these are practical problems on which much research waits to be done.

OBJECTIVES OF STUDIES OF THE PRESENT TYPE.

The study of which the results are here presented is designed as an investigation of the differential occupational traits—or rather such of them as can most easily and quickly be differentiated—possessed by employed and unemployed workers of various types and grades of skill. As a preliminary survey of both these groups, and of the nature of occupational resemblances and differences, it does not go further than to make the necessary initial evaluations and comparisons. A study covering every angle of the investigation would include topics such as the following:

- (1) The general scheme of classification of occupations on the basis of unitary traits.
- (2) The relative importance of each trait in determining the potential degree of adjustment of the individual to his work.
- (3) The extent of overlapping (or, on the other hand, the unique character) of occupational requirements.
- (4) The relationship of training to initial capacities, in the satisfaction of job requirements.
- (5) The extent to which training and experience can be transferred from one job to another, and the relationship of this transfer to basic skills.
- (6) The relationship of the height of development of abilities to age.
- (7) The distribution of occupational abilities among the general population.
- (8) The status of special groups within the general population such as handicapped or institutional groups and the so-called unemployable.

7 In the present study, however, it has been impossible to attempt to touch upon all these problems, owing to the breadth of their scope and the detailed analysis and investigation which each would necessitate. It was thought, in designing the project, that the most important initial

problem lay in making a general survey of as typical samples of unemployed workers in Montreal as it might be possible to secure. In addition, it was intended to secure wherever feasible control-groups of employed workers, thus permitting a comparison of employed and unemployed. This total approach was considered the most useful one that could be made, for three reasons. First, unemployed workers are the clientèle of the employment offices, and thus present as a group a special problem of adjustment and rehabilitation. Secondly, a comparative study of the level of occupational traits of employed and unemployed groups may serve as a partial means of identifying trait-differences which are significant in employment adjustment. Thirdly, and incidentally, unemployed workers are more accessible for such research work than groups of employed workers, mainly on account of the time factor involved in testing.

The initial problem in this study is the level of abilities of unemployed workers, compared with the level of the general population and with that of control groups of employed workers. Along with this problem lies that of the inter-relationship of the traits measured, and of the factors which may be held responsible for such relationships. In order to study likenesses and differences in occupational characteristics, comparisons of mean test scores have been made for workers who were formerly employed at different jobs or who fall into different occupational classes. The factors of age and recency of employment have been considered in relation to test scores. Groups have been distinguished on the basis of receipt or non-receipt of unemployment relief, in order to determine whether such a distinction implies a difference in measurable psychological characteristics. The influence of nativity upon test scores has also been studied, in order to discover whether foreign-born groups tend to form a different grade among the unemployed.

Certain important considerations bearing directly upon the significance of the present data have not been pursued in any great detail on account of the additional time and expense that their study would involve. Perhaps the most important of these is the question in the case of each individual tested of his trade status, training, and experience. The use of a trade title may convey little precise notion of the extent to which the individual is justified in claiming it, nor of the grade (such as expert, journeyman, apprentice) in which he may be classed, nor whether he is good, bad, or indifferent in his working efficiency. The assumption of the title of a "carpenter", "auto mechanic", or "accountant", for example, provides no indication of the extent to which the person is what he purports to be. This difficulty may be expected continually to obscure group comparisons. Where, for instance, a group of electricians is compared with a group of mechanics, it may happen that half the electricians and half the mechanics are vocationally quite inferior and maladjusted, and this will tend to rob the comparison of much of its possible precision. While in the present study an effort has been made wherever possible to confirm the individual's status (by enquiring as to his success, satisfaction, duties, and experience, and by checking his registration at employment bureaus, and to exclude from entrance into any comparison group all those whose qualifications for inclusion seemed unreliable, nevertheless there have doubtless been some cases of inaccuracy or misplacement. If further and perhaps more narrowly-focussed investigations of this type can be undertaken, the matter of trade titles, trade status, and trade efficiency will merit careful attention.

Because this investigation has been made more or less quantitative, and has been based upon test data handled statistically, the deduction should not be made that the significance of conclusions derived from the clinical study of the individual is in any way minimized or disregarded. As previously noted, a great deal may be derived from in-

telligent and informed study of the individual through systematic observation and interviewing.¹ Data of this kind, however, are considerably more difficult to obtain in any quantity than are test data, and are less amenable to objective comparison and statistical treatment. The results of psychological tests will probably never suffice as a complete basis upon which to evaluate the individual, for many reasons. Nevertheless, they can frequently be used as an initial framework upon which to build further conclusions about personal aptitudes. It is the task of such studies as the present one to discover to what extent test measurements can serve as a foundation for systematizing what is known, or can be discovered, about occupational abilities and traits.

TYPES OF TESTS USED

From a functional point of view, psychological tests are divisible into three main types. First, those tests which aim at some measurement of "general intelligence" or the general capacity to assimilate and handle, quickly and effectively, new forms of experience. Secondly, tests the object of which is to measure special aptitudes or skills, such as various kinds of mechanical aptitude or manual dexterity. Thirdly, tests which are employed for the purpose of dealing with some aspect of the attitudes, interests, personality, temperament, or character of the individual. When a test is spoken of as measuring any one of these three types of traits, it is assumed, unless the appropriateness of the test is completely obvious, that evidence is forthcoming that the test is adequately reliable and valid for the purpose.

In the present investigation, three tests of general intelligence were used. All three were of the group type, two (Army Alpha Examination and the Otis Self-Administering Test of Mental Ability) being verbal in form of presentation, and one (Revised Beta Examination) non-verbal. It

¹Cf. the case studies appended, (p. 193).

was intended that the non-verbal test should be employed throughout the investigation with all subjects, and the verbal tests with all literate, English-speaking individuals. In addition, a test of school achievement in the subjects of reading, grammar, spelling, geography and arithmetic was used to secure an index of the elementary educational attainments of each literate English-speaking person tested. It was expected that this test, the New Stanford Achievement Test, would correlate strongly with the tests of general intelligence used.

Three tests of the ability to execute clerical tasks accurately and quickly were administered. These were the Thurstone Clerical Examination (Form A), the Moore Revision of the National Institute of Industrial Psychology Clerical Test, and the Scott Company Filing Test. The first of these, which is scored in terms of time and accuracy, includes sub-tests of checking numerical and spelling errors, letter checking, transposition of letters to numbers by a given code, filing of names, filing of documents by a three-fold classification, solving of arithmetical problems, and interpretation of proverbs. The second, scored by accuracy alone, but having definite time-limits for each sub-test, involves the reproduction of oral instructions, the classification of items in a financial account, copying of names and symbols, checking of names and numbers, filing, and arithmetical and other problems. The third test deals with similar functions.

Among tests of mechanical ability were four tests of the capacities involved in perceiving and manipulating (either abstractly or concretely) two- and three-dimensional forms or shapes. The first of these, the Minnesota Paper Form Board, requires the marking of a series of fifty-four plane geometrical forms to show the way in which they would have to be cut to correspond to sections already made. A second, the O'Connor Wiggly Blocks Test, involves the assembly of nine pieces of wood, cut in an eccentric fashion, to form a solid block. The score upon this test was the

weighted mean of the time required for each of the three trials.¹ In a third test, the Kent-Shakow Form Board (Form 4b), the subject fits twenty regularly-cut pieces of wood, which are given to him in a jumbled order, into five recessed forms. A fourth test of this group was the Cube Construction Test of the National Institute of Industrial Psychology. It, too, involves the problem of insight into form relations, and consists in fitting together small cubes, painted on different numbers of sides, in a prescribed fashion.

The Minnesota Mechanical Assembly Tests (Sets I and II) were employed in some cases to secure a measure of facility in putting together disassembled parts of small mechanical appliances and tools, such as a spark plug, an air gauge valve, or a rim lock. In addition, a picture test (the Stenquist Mechanical Aptitude Test I) was given to test familiarity with ordinary mechanical devices and objects. This requires the pairing of 190 mechanical objects, presented in sets of five pairs, so as to indicate those which normally go together (as a screw and screw-driver, brace and bit, etc.). The Cox Mechanical Aptitude Test (Form M1) constituted a third member of this group of measures of mechanical ability. It differs from the other two tests in that it involves no familiarity with the workings or construction of tools or appliances. The subject of this test is required to select, after observing a working wooden model (involving pulleys, levers, etc.), the model's essential operating features. He is provided with a plan of each model which includes many irrelevant additions in working parts, and has to pick out just those parts without which the mechanism could not operate, specifying them by number. Nine models of increasing complexity are included in the series.

In order to secure possible measures of skill in handling

¹O'Connor states that this weighting is necessary to compensate for practice effect in the second and third trials. The weighting is accomplished by multiplying the time for the first, second, and third trials by 1.0, 1.4, and 1.7 respectively. One-third of the sum of such weighted times is taken as the subject's score.

small objects dexterously and quickly, two tests of manual dexterity were used. One of these, the O'Connor Tweezer Dexterity Test, involves picking up one hundred small brass pegs, one at a time, with a pair of sharp-nosed tweezers, and inserting them into a like number of small holes drilled in a metal plate. One trial was given, and was scored in minutes and hundredths. A second test, one of a series used by the National Institute of Industrial Psychology for measuring manual dexterity, consists in having the subject assemble as rapidly as possible ten small bolts and ten corresponding nuts. This test is also scored by time.

Two scales of personal interest and personality tendencies were used extensively. One of these, the Allport-Vernon Study of Values, is designed to measure the relative strength of certain basic interests in the individual: theoretical, economic, aesthetic, social, political, and religious. Separate scores are given for each of these six tendencies or interests. The second scale employed for measuring personality trends was the Bernreuter Personality Inventory. This consists in a list of 125 questions concerning personal attitudes, interests and behaviour, to which the categorical responses "Yes", "No", or "Doubtful" are made by the subject. On the basis of these responses, numerical scores are elaborated for four scales:

- (1) Neurotic tendency. "Persons scoring high on this scale tend to be emotionally unstable. Those scoring low tend to be very well balanced emotionally".¹
- (2) Self-sufficiency. "Persons scoring high on this scale prefer to be alone, rarely ask for sympathy or encouragement, and tend to ignore the advice of others. Those scoring low dislike solitude and often seek advice and encouragement.
- (3) Introversion-extroversion. "Persons scoring on this scale tend to be introverted; that is, they are imaginative and tend to live within themselves. Those scoring low are extroverted; that is, they rarely worry, seldom suffer emotional upsets, and rarely substitute day-dreaming for action".

¹Bernreuter, R. G: *Manual for the Personality Inventory*. (Stanford University Press, 1931), p. 1.

- (4) Dominance-submission. "Persons scoring high on this scale tend to dominate others in face-to-face situations. Those scoring low tend to be submissive".

In practice, scores on the first and third scales correlate very strongly, so that scores have been given in the present study only for the first, second, and fourth scales. Of these, for the first scale, a negative score indicates emotional stability, a positive score, instability; while for the second and fourth scales a positive score indicates self-sufficiency and dominance, respectively, and a negative score, the opposite.

Several other scales of temperament and personality were used in the investigation, but in so few cases that the data from them were not worthy of inclusion in any section of this report. These were the Allport Ascendance-Submission Reaction Study, the Psychological Corporation Revision of this Study, the Neymann-Kohlstedt Diagnostic Test of Introversion-Extroversion, the Woodworth-House Mental Hygiene Inventory, and the Thurstone Neurotic Inventory. The Hepner Vocational Interest Scale, employed as an aid in summarizing the individual's occupational interests, was used in a number of cases, but was not found to be of any great assistance in diagnosis.

Measurements were thus made for five main types of traits: general intelligence, clerical aptitude, mechanical aptitude, mechanical dexterity, and personality trends. These traits, from what evidence exists, appear to be of considerable importance in determining individual success in various types of work, and hence are useful in judging individual employability. The acquisition of data to show precisely how important they are for specific jobs, and thus how these jobs tend to differ from and resemble one another in their requirements, is contingent upon further research. It cannot be assumed, of course, that these traits are the only ones which need be considered in relation to employment.

Job success is influenced by a great many factors, of which some are measurable, others not, and still further ones are subject to the plain dictate of chance. Having regard to the difficulties of quantitative and objective treatment, however, the traits here singled out for study provide a reasonably representative group of test-measures for a wide group of workers.

CHAPTER IV

TESTING THE UNEMPLOYED MAN: PROCEDURE OF THE STUDY

2. UNEMPLOYMENT AMONG WAGE-EARNERS IN MONTREAL

MONTREAL CITY had at the inception of this study in 1931 a population of 818,577. The City of Montreal proper, however, is surrounded by a number of towns, villages, and smaller cities which together form a large part of the metropolitan area generally known as "Greater Montreal". The four smaller cities lying adjacent to Montreal City, namely, Lachine, Outremont, Verdun and Westmount, had in 1931 a total population of 132,251. In addition, a number of towns, villages, and other municipalities on the eastern and central section of the island on which Montreal is situated, and on the south shore of the St. Lawrence River directly opposite Montreal, had a total population of 49,169. The sum of all these populations, about one million persons, represents approximately the population of "Greater Montreal". In Montreal City in 1931 there were 250,503 males of age ten years or over gainfully employed, of whom 224,075 were wage-earners (that is, normally in receipt of income in the form of wages or salary).¹ The age-distribution of these groups in 1931 is shown in Table VII.

The distribution of unemployment through the various occupational classes, either for wage-earners or gainfully employed, cannot be stated exactly for the period 1929-1934. Precise data are provided for 1930-31, however, by the Dominion Census. The figures selected as most relevant to the purposes of this study are those of the time lost (in weeks) by reason of lack of work ("No Job") during the period June 1, 1930, to June 1, 1931, by male wage-earners

¹Cf. L. C. Marsh: *Employment Research* (McGill Social Research Series, No. 1); Appendix C and Appendix B, Table 3.

of Montreal City.¹ A summary of these data, showing by occupational classes (after Taussig)² the number of wage-earners, the number losing some time, and the total number of weeks lost, is made in Table II. There are shown also (column 4) the percentage which each occupational class forms of the total wage-earning population of Montreal City, the percentage of persons of each class who lost some time, the average time lost in each class by those losing some time, and the average time lost in each class in relation to the total number of persons forming that class.

Only 8,344 wage-earners were found to fall within Class A, comprising 3.7 per cent. of the total wage-earning group. Relatively equal numbers, ranging from 53,400 to 54,330, fell within Class B to E. The percentage of wage-earners within each class who lost some time during the period under review varied greatly, however, from 12.8 per cent. in Class A to 68.3 per cent. in Class E. Relatively few (18.5 per cent.) of those in Class B lost any time, while the numbers in Classes C and D sustaining some loss were much higher (56.0 and 40.4 per cent., respectively). The number sustaining some loss of time within the entire group of 223,715 was 99,857, or 44.6 per cent.

The average loss of time (in weeks) of those in each class who lost some time during the period was not subject to great variation from one occupational class to another, the range being from 21.5 weeks (Class B) to 27.1 weeks (Class E). The average for all five occupational classes was 23.7 weeks. Inasmuch as the loss of time, for those persons losing any time, was more or less equally distributed among all five occupational classes, the distribution of time lost in relation to the total number of persons in each class (column 6 of Table II) tended to vary with the number of persons in each class who lost some time (column 4 of Table II).

There are thus two main conclusions to be drawn from

¹Census 1931, Unemployment (Main Cities) Series, No. 9, Montreal. (1933).

²Cf. pp. 10-11, *supra*.

Table II. UNEMPLOYMENT ("NO JOB") AMONG MALE WAGE-EARNERS OF MONTREAL CITY, JUNE 1, 1930 TO JUNE 1, 1931, BY OCCUPATIONAL CLASS.

Occupational Class	Number of Wage Earners	P.C. of Total	Number Losing Some Time	P.C. of Occupational Class	Average Unemployment	
					Those Losing Time	All Wage Earners
	(1)	(2)	(3)	(4)	(5)	(6)
A. Professional and Managerial	8,344	3.7	1,071	12.8	weeks 23.4	weeks 3.0
B. White Collar.....	53,400	23.9	9,901	18.5	21.5	4.0
C. Skilled.....	53,688	24.0	30,041	56.0	21.8	12.2
D. Semi-skilled.....	54,330	24.2	21,914	40.4	21.7	8.8
E. Unskilled.....	54,063	24.2	36,930	68.3	27.1	18.5
Total.....	223,715 ^a	100	99,857	44.6	23.7	10.6

Table III. UNEMPLOYMENT ("NO JOB") AMONG MALE WAGE-EARNERS OF MONTREAL CITY, JUNE 1, 1930, TO JUNE 1, 1931, FOR CERTAIN OCCUPATIONS.

Occupation	Number of Wage Earners	Number Losing Some Time	Per Cent. Losing Time	Average Unemployment	
				Those Losing Some Time	All Wage Earners
	(1)	(2)	(3)	(4)	(5)
Brick and Stone Masons.....	1,567	1,296	82.71	weeks 25.39	weeks 21.00
Truck Drivers.....	5,416	2,382	43.98	20.86	9.17
Office Clerks.....	14,238	2,528	17.76	21.59	3.83

Source: Adapted from Dominion Census Data, 1931.

^aThe discrepancy between this total and the total for wage-earners in Table VII (p. 73) is owing to the absence of 360 cases in the former which could not readily be classified by occupational class.

these data. First, within the period under review, there was considerable inequality in the number of persons in each of five occupational classes who lost some working time through the lack of a job, relative to the total number in each class. Quite decidedly, those within the upper occupational classes (the professional and managerial, clerical and commercial groups) suffered the least in this respect. The largest percentages of persons who were unemployed at some time during the period fell within the class of skilled workers and unskilled workers. The class of semi-skilled workers occupied an intermediate position between these extremes. Secondly, the average number of weeks lost by those who sustained some loss (that is, were at some time unemployed) varied little from one class to another, although this average was highest for the class of unskilled workers. It must be remembered, however, in drawing these conclusions, that they apply, so far as these data go, only to male wage- or salary-earners of Montreal City within a period of twelve months early in the depression. Data for a later period might differ in many significant respects from these. Similarly, some differences might be found for the entire group of males gainfully employed (not necessarily in receipt of an income in the form of wages or salary). Such differences would most probably attach to persons within Class A (professional and managerial occupations), since the greatest percentage of gainfully employed other than those in receipt of salary or wages is to be found within this class.

It may be observed also, from Table III, that there was considerable variation from one occupation to another in the extent of unemployment. These data are for three typical occupations in Montreal City for the twelve-months period June, 1930 to June, 1931.¹ While 82.7 per cent. of all brick and stone masons who were wage- or salary-earners suffered some loss of time from work owing to lack of employment, only 17.8 per cent. of all office clerks were

¹Dominion Census of 1931, Bulletin No. 9 (1933).

similarly affected. There was less inequality, however, in the number of weeks lost by those sustaining some loss, the mean loss for the three occupations cited here being 25.4 weeks (brick and stone masons), 20.9 weeks (truck drivers), and 21.6 weeks (office clerks).

b. TESTING OF UNEMPLOYED GROUPS

Three main groups of unemployed men were examined over a period of two and three successive years (1931 to 1933, 1931 to 1934). These men were obtained from three corresponding sources, but as the methods by which they were secured varied with the circumstances of the situation at the time, these groups must be sub-divided and treated separately in considering the test data and the procedures involved in testing. Through this sub-division by sources and years there are seven groups:

Group I. These men were secured from a registration bureau for unemployed office workers operated by the local Y.M.C.A. With the full co-operation of the management of this bureau, there was sent to each individual registered from October, 1931, to March, 1932, a letter of invitation from the McGill Department of Psychology, requesting him to be present at the University on a date several days later for the purpose of taking a number of psychological tests. The extent to which the test data could be interesting and useful to him as personal information was emphasized, and a personal conference in which to talk over and explain the test results was promised to all individuals completing the entire series of tests. Approximately 20 per cent. of the 1,500 persons registered at the bureau responded to this invitation. They were not altogether office workers, as the bureau had accepted as a registrant any individual who wished to place his name upon its files. Those persons who were not engaged in a "white collar" occupation were segregated from the others in the office files, however. The testing was almost entirely of a group character, and took

up from five to eight hours for each test group, of which there were nine. The testing of each group of twenty-five to forty men was split up into three or four periods in the afternoons, a day or two apart.

The general questionnaire (described in Appendix I) and a general intelligence test were always given in the first period, since the drop in attendance from the first period to the second was usually from 15 to 30 per cent., and it was desired to have these initial data for all comers. On the following days the other tests were given. After the tests had been scored and the test data recorded, each man completing the series was sent a request to appear on any day between certain hours to discuss his test scores and their possible implications. To most of the men who re-appeared singly in this way the O'Connor Wiggly Blocks Test was administered, and the personal information given in the general questionnaire was checked as well. Altogether, some 150 of the 300 men partaking to any extent as subjects in the testing programme were thus interviewed.

Group II. These were men registered at the same bureau for office workers from March, 1932, to May, 1933. To these, approximately 300 in number, were given, under a parallel project in the Department of Psychology dealing with educational testing, a series of tests of educational achievement, and in addition, the Otis Test of Mental Ability and the Bernreuter Personality Inventory. To the last two groups covered under this project there were administered also Revised Beta Examination, the Thurstone Clerical Examination, and the Stenquist Mechanical Aptitude Test I.

This group of 300 unemployed men differed from the preceding group derived from the same source in several respects. It was secured a year later than the earlier group, so that the individuals included had registered for employment during a different period of the depression. In addition, the tests were administered in a large room adjacent

to the registration bureau office instead of at the University, and were spoken of as tests of educational achievement. Moreover, there were in the second group a large number of persons who derived unemployment relief assistance through the bureau, whereas this had been the case in comparatively few instances in the earlier group.

Group III. This comprised men registered at the same bureau from May, 1933, to December, 1933. As in the case of the preceding group (Group II), this group, which numbered about 200, was given a battery of educational achievement tests, and in addition, the Otis Test, Revised Beta Examination, the Bernreuter Personality Inventory, and the Stenquist and Cox Mechanical Aptitude Tests; in the case of one sub-group several individual tests, including the O'Connor Wiggly Blocks Test and Tweezer Dexterity Test, the Minnesota Mechanical Assembly Tests (Sets I and II), and the N.I.I.P Cube Construction and Nuts and Bolts Assembly Tests.

Group IV. This group was secured in 1931-32 from men attending educational classes at the Montreal Day Shelter for Unemployed Men, an institution which was sponsored by a number of Montreal citizens during the winters of 1931-32, 1932-33, and 1933-34.¹ The Shelter was housed in a disused school building, and was capable of sheltering several thousand persons at a time. It was provided with rough wooden tables and benches, and included a library and facilities for playing cards and other games. The maximum attendance of any one day was probably in the region of 5,000. No analysis of the nationality of the individuals making use of the building was regularly carried out, but since almost all were registered at a refuge maintained by the city which provided food, and shelter at night, certain data for 1931-32 for the latter institution are probably typical of the former. At the latter, of a total of

¹Cf. footnote 1, p. 63.

19,117 men, approximately 36 per cent. were French-Canadian, 18 per cent. English-Canadian, 16 per cent. British other than Canadian, and 30 per cent. foreign-born and for the most part non-English-speaking.¹

The group secured for testing was judged to be in all probability atypical, since the majority of subjects were English-speaking, and moreover were for the most part attending educational classes, with which only about 750 of the entire population of the institution were in any way concerned. It was felt, however, that they furnished material for a beginning. Revised Beta Examination was given to 300 subjects, while in a smaller number of cases the Stenquist Mechanical Aptitude Test I and Army Alpha were also given.

Group V. A further group of men were obtained in 1932-33 from the Day Shelter from which Group IV had been secured the previous winter.² Having secured some experience in dealing with the men sheltered at this institution, a beginning was again made in October, 1932, on a more thorough basis. During the two-week period following the opening of the Shelter, all men entering the building were required to be registered in a room a portion of which was set aside for the purpose. Several interviewers were on hand to carry on the registration, and as one or another of them spoke one or more of the various languages likely to be required, it was usually possible to speak to each registrant in his own tongue. In the hands of the interviewer a modified form of the previous year's questionnaire was filled out. To each registrant was given a registration card, which he was asked to keep in his pocket, on pain of non-admission to the shelter, and which was numbered to correspond to the completed questionnaire. Following the first fortnight during which the Shelter was open, new entrants decreased

¹Cf. Adams, F. D: *The Day Shelter for Unemployed Men in Montreal*. Montreal, 1932, p. 7.

²Cf. Adams, F. D: *The Day Shelter for Unemployed Men in Montreal*. (Second Year, 1932-33). Montreal, 1933.

sharply in number, but for a period of several weeks all newcomers were required to register, as were all unregistered persons who were later tested. Thus nearly 4,000 men were registered by May, 1933, when the institution closed.

For testing purposes there was set apart a room which could be used from 9.00 to 10.00 a.m. on any week-day, and from 9:00 a.m. to 12:00 noon on Saturday. It was removed from the other main rooms, was for the most part reasonably warm and well-ventilated, and contained two or three rough tables, with benches and chairs to correspond. At one corner was placed a small table, screened off from the rest of the room, and used for individual tests. Through the generosity of two local manufacturers of tobacco products there was secured an ample weekly supply of packages of cigarette tobacco, one of which was offered to each man who completed a single test. Since practically all the men were destitute, and since if the recipient did not smoke, the tobacco had a certain commercial value in kind, this offer had a fairly wide appeal. Thus, during the course of the winter of 1932-33 approximately 1,000 persons were given one or more tests, each of which was marked with the registration number, in order that it might eventually be matched with the general questionnaire previously completed.

No one man was, as a rule, allowed to complete more than one test at a single sitting. This rule was for the purpose of avoiding the effects of fatigue, but it unfortunately prevented a good many men from completing more than one or two tests, since the population was in part a floating one. On each occasion the subject's card was punched in such a manner that the number and kind of tests he had taken might be known at a glance. In spite of this precaution, however, a number of men "repeated" for a test, although these "repeats" were eventually culled out. As a rule, some fifteen to thirty men could be accommodated at once for group tests, while for the O'Connor Blocks Test from one

to three persons could be handled at a time, depending upon the number of examiners present.

Group VI were registrants at a second employment bureau, during March to May, 1933. This bureau was limited to the use of Protestants, and had a total registration at the time of nearly 7,000, of whom 3,591 had been registered within the previous twelve months. In securing subjects for testing from this source, two methods were used:

(a) Notices were posted inviting men interested to act as subjects for tests, with a promise of personal discussion of the results afterwards.

(b) As it was found that the supply of subjects that could be secured in this way was strictly limited, and as there was considerable danger of obtaining a typical group only, names were selected at random from the files, and to these men were sent letters of invitation. Approximately ten per cent. of the men circularized in this manner responded.

By these joint methods a total group of 140 was secured, a number of whom dropped out after the initial session. In all, about 60 per cent. completed the entire series of tests. The members of this self-determined residual group were interviewed individually, and were given at the time the O'Connor Wiggly Blocks Test.

Group VII were 129 men drawn from the same source as Group VI. These men, who were tested in sub-groups from September, 1933, to January, 1934, were secured by letter of invitation, in the same way as for the majority of the preceding group. Somewhat more time was spent in administering individual tests than in the case of Group VI, however. These tests were the same as those used with the one sub-group of Group III.

Following testing, the completed test blanks were scored, and whenever possible the data of the questionnaire were checked and corrected. Such checking was usually possible in the case of men secured through one or other of the employment bureaux, which sometimes had full records dating back several years. The final data for each person were then recorded upon a filing card indicating source, sub-

group, name, age, main and subsidiary occupations, length of time unemployed (adjusted to a fixed base for each group), country of birth, occupation of father, education, etc., as well as all test scores. A specimen record card is shown in the Appendix.¹

C. VALIDITY OF THE SAMPLES

One of the chief disadvantages of the method which was used to secure sample groups for testing was the fact that each man who presented himself did so quite voluntarily. The invitation to him was always worded in such a way as might be expected to make it most attractive, but no direct coercion or marshalling of subjects was possible. A number of motives might influence the individual in his decision to be tested or not to be tested: on the one hand, curiosity, introspective self-interest, desire to curry favour, or the thought of better chances of getting a job; on the other, self-consciousness, circumspection, a fear of possible exhibition of inferiority, or an antagonistic attitude toward testing procedures. All such factors may have affected the selectivity of the sampling.

The need of checking the accuracy of the samples of unemployed could not be completely satisfied. To verify the random character of a sample, not only was it necessary to know the extent to which the test group was typical of the source from which it came, but also it was necessary to know the relation of this source-group to the entire body of unemployed men in Montreal. No recourse to source-data was possible in the case of test scores, as the data on hand were themselves original. Checking the accuracy of sampling could then be carried out directly for personal data only, and for the remainder, by analogy. That is, it could be assumed that if the tested sample were typical of the source group from which they came as to age, education, and nationality, then they would probably tend to be typical

¹p. 249.

as to aptitude test scores. Such analogies might also be employed in relating the test data to whatever data existed for the entire body of unemployed. It was felt that this test of sampling was a decidedly imperfect one, yet the only one possible under the circumstances. Accordingly, it was made wherever possible.

The extent to which the tested groups (with the exception of Group IV) were satisfactory samples of their sources may be judged in part from the comparative data presented in Tables V to VI. In the case of Groups I-III there was available an analysis of the clientèle of the employment bureau based on a random selection of cases from its files. Records for 600 cases were amassed, covering the period from October, 1931, to February, 1933. Comparison between the three tested groups and this group was possible for age, country of birth, and education (Table IV). Group I appeared to be appreciably younger, on the average, than the sample group. The median age of the tested group was 23.7 years, and of the sample group, 31.0 years. Groups II and III, on the other hand, conformed very well to the sample group as regards age. The approximation for countries of birth was on the whole fairly good, with a slight tendency in the test groups to "underpopulation" of men born in the British Isles, and "overpopulation" of men born in countries other than Canada, the British Isles, and the United States. The rough educational groupings showed no great difference between the sample group and the tested groups, apart from a somewhat poorer representation in the latter of men with a college or university education.

As a check upon Group V there were available absolute and percentage distributions of age and country of birth for some 3,350 men who were interviewed in accordance with the procedure of general registration at the Day Shelter in 1932-33. This group of 3,350 cases constituted more than 85 per cent. of the total number registered. The comparison of the distributions for the registration group and Group V

is shown in Table V. The tested group tended to be four or five years younger than the registration group, the median age for the former being 34.0 years, and for the latter, 38.7 years. As regards country of birth, the registration group contained in percentage terms only half as many English-speaking Canadians as the tested group, half as many individuals born in the British Isles, and more than twice as many men born in countries other than Canada, the British Isles, and the United States. The proportion of French-speaking Canadians was the same for each group. It is apparent that, apart from French, there were certain language abnormalities in the sampling, as there were too many English-speaking men, and too few speaking languages other than English and French. The European group (other than the British Isles), a large proportion of the total, had received relatively poor representation.

In the case of Groups VI and VII, there was at hand a sample record of the main body of individuals from which the tested groups were secured. This sample had been obtained through tabulating the data of every tenth case filed in the employment bureau, until 800 in all had been accumulated. The tested groups were very little different in respect of age from the sample group, and the median of each group fell within a two-year range of the others. (Table VI). As in the case of Group V there were a greater proportion of English-speaking persons tested than the sample indicated there to be in the population at the source. In the case of Group VI, there was a remarkably close adjustment as regards education. The fit was less good for Group VII, where the average number of grades of schooling completed was somewhat higher.

To summarize the relationships which were found between the sample and the tested groups, it may be said that there was apparent a general tendency for the latter groups

to be somewhat younger than the former. This tendency did not always hold good, however, for in two or three instances the difference between the sample group and the tested group was so small as to be insignificant. There was apparent also a tendency for a greater proportion of English-speaking men to be included in the tested groups than non-English-speaking. A reasonably good sampling was achieved as regards education, in terms of years of schooling, and in one instance (Group VI) the fit between the sample and tested groups was most precise. The relatively close correspondence for years of schooling was regarded as being perhaps of the greatest significance, since this factor is known to have an important correlation with scores upon a number of tests (Chapter V).

OCCUPATIONAL ABILITIES

Table IV. COMPARISON OF SAMPLE GROUP AND TESTED GROUPS I, II, AND III FOR AGE, COUNTRY OF BIRTH AND EDUCATION.

<i>Age Groups</i>	Sample Group		Group I.		Group II.		Group III.	
15-17.....	1	0.2	17	5.7	9	3.2	8	4.0
18-20.....	29	4.9	60	20.3	36	13.0	31	15.5
21-22.....	51	8.6	40	13.5	33	11.9	12	6.0
23-24.....	55	9.3	31	10.5	16	5.8	19	9.5
25-29.....	115	19.6	56	18.9	34	12.2	35	17.5
30-34.....	99	16.8	25	8.5	29	10.4	21	10.5
35-39.....	79	13.4	27	9.1	37	13.3	15	7.5
40-44.....	66	11.2	17	5.7	32	11.5	19	9.5
45-49.....	42	7.0	13	4.4	23	8.3	18	9.0
50 & over.....	54	9.0	10	3.4	29	10.4	22	11.0
Total.....	582	100.0	286	100.0	278	100.0	200	100.0
First Quartile...	24.4 yrs.		19.7 yrs.		21.5 yrs.		21.8 yrs.	
Median.....	31.0 yrs.		23.7 yrs.		30.9 yrs.		28.3 yrs.	
Third Quartile..	39.6 yrs.		31.1 yrs.		41.3 yrs.		41.4 yrs.	

<i>Country of Birth</i>	Sample Group		Group I.		Group II.		Group III.	
Canada.....	277	46.2	140	48.3	136	46.8	98	50.0
U.S.A.....	12	2.0	11	3.8	5	1.7	7	3.6
Br. Isles.....	257	42.8	111	38.3	115	39.5	63	32.1
Other.....	54	9.0	28	9.6	35	12.0	28	14.3
Total.....	600	100.0	290	100.0	291	100.0	196	100.0

<i>Education*</i>	Sample Group		Group I.		Group II.		Group III.	
Elementary.....	194	34.1	103	35.4	107	37.9	76	39.6
Elementary, plus High School.....	308	54.1	163	56.0	150	53.2	102	53.1
College or University.....	67	11.8	25	8.6	25	8.9	14	7.3
Total.....	569	100.0	291	100.0	282	100.0	192	100.0

*Attendance, but not necessarily graduation.

Table V. COMPARISON OF SAMPLE GROUP AND GROUP V, FOR AGE, AND COUNTRY OF BIRTH.

<i>Age-Groups</i>	<i>Registration Group</i>		<i>Group V.</i>	
15-17.....	7	0.2	6	1.1
18-20.....	74	2.3	37	6.5
21-22.....	94	2.9	31	5.5
23-24.....	97	3.0	30	5.3
25-29.....	387	11.9	82	14.4
30-34.....	511	15.7	98	17.2
35-39.....	486	14.9	80	14.1
40-44.....	423	13.0	77	13.6
45-49.....	357	10.9	53	9.3
50 and over.....	821	25.2	74	13.0
Total.....	3,257	100.0	568	100.0
First Quartile.....	30.5 yrs.		26.3 yrs.	
Median.....	38.7 yrs.		34.0 yrs.	
Third Quartile.....	49.0 yrs.		43.0 yrs.	

<i>Country of Birth</i>	<i>Registration Group</i>		<i>Group V.</i>	
Canada:				
English.....	320	9.6	103	18.0
French.....	1,418	42.3	242	42.2
United States.....	47	1.4	9	1.6
British Isles.....	313	9.3	128	22.4
Other.....	1,252	37.4	91	15.8
Total.....	3,350	100.0	573	100.0

OCCUPATIONAL ABILITIES

Table VI. COMPARISON OF SAMPLE GROUP AND GROUPS VI AND VII, FOR AGE, COUNTRY OF BIRTH, AND EDUCATION.

<i>Age Groups</i>	Sample Group		Group VI.		Group VII.	
18-20.....	17	2.1	6	4.2	12	9.4
21-22.....	21	2.6	2	1.4	6	4.7
23-24.....	32	4.0	13	9.1	3	2.4
25-29.....	135	16.9	22	15.4	22	17.3
30-34.....	135	16.9	25	17.4	10	7.9
35-39.....	125	15.6	21	14.7	23	18.1
40-44.....	113	14.1	22	15.4	16	12.6
45-49.....	100	12.5	12	8.4	18	14.2
50 and over.....	122	15.3	20	14.0	17	13.4
Total.....	800	100.0	143	100.0	127	100.0
First Quartile.....	28.8 yrs.		27.4 yrs.		26.4 yrs.	
Median.....	36.4 yrs.		34.8 yrs.		36.3 yrs.	
Third Quartile.....	45.1 yrs.		43.2 yrs.		44.5 yrs.	

<i>Country of Birth</i>	Sample Group		Group VI.		Group VII.	
Canada:						
English.....	151	18.9	45	31.7	43	34.4
French.....	108	13.5	10	7.1	12	9.6
United States.....	15	1.9	2	1.4	3	2.4
British Isles.....	312	39.0	79	55.6	62	49.6
Other.....	214	26.7	6	4.2	5	4.0
Total.....	800	100.0	142	100.0	125	100.0

<i>Education</i>	Sample Group		Group VI.		Group VII.	
Grades 1-4.....	81	22.5	31	22.6	12	10.6
Grade 5.....	31	8.6	12	8.8	9	8.0
Grade 6.....	86	23.9	31	22.6	18	15.9
Grade 7.....	102	28.3	37	27.0	53	46.9
Grade 8.....	28	7.8	13	9.5	8	7.1
Grades 9-11.....	30	8.3	12	8.8	11	9.7
University.....	2	0.6	1	0.7	2	1.8
Total.....	360	100.0	137	100.0	113	100.0

Table VII. DISTRIBUTION OF TOTAL MALE WAGE EARNERS
AND GAINFULLY EMPLOYED BY AGE, MONTREAL
CITY, 1931.

Age Groups	Wage Earners	Gainfully Employed
Under 18.....	10,116	10,404
18-19.....	11,070	11,424
20-24.....	31,948	33,476
25-34.....	65,022	70,795
35-44.....	50,452	57,710
45-54.....	33,546	39,887
55-64.....	16,380	19,813
65-69.....	3,701	4,568
Over 69.....	1,840	2,425
Total.....	224,075	250,502
First Quartile.....	24.4 years	24.9 years
Median.....	33.1 years	33.9 years
Third Quartile.....	43.9 years	45.0 years

Source: Dominion Census data, 1931.

CHAPTER V

THE INTER-CORRELATION OF TEST SCORES

IN any investigation employing a battery of psychological tests, it would be a gratuitous assumption that each test, no matter what its reliability or validity, measured nothing in common with any other test. Usually, in fact, one test correlates with any other test to some extent, although the coefficient of correlation may not be high enough, in comparison with errors of random sampling, to be regarded seriously. It is therefore desirable, in order to know how much each variable shares something in common with others, to ascertain the exact degree of overlapping by computing the coefficients of correlation. The results of this procedure are contained in the present chapter. While these are of considerable interest to the psychologist, the latter portion of this section may be passed over by those not familiar with the mechanics of correlation and the interpretation of correlation data.

In the present investigation, the data of nineteen variables, including age and the number of grades of schooling completed, were available for a sufficient number of unemployed men to make possible the study of their inter-correlation.¹ The rectilinear Pearson product-moment coefficients are shown in Table VIII, together with the probable error of each correlation.² In no case did it appear that there was sufficient deviation from linearity of relationship to make it necessary to substitute the correlation ratio for the

¹A few gaps are present in the table, where no cases were common to the two tests.

²The probable error acts as an index of the amount of fluctuation that may be expected in the correlation coefficient through the influence of chance sampling of cases. The correlation coefficient plus and minus the probable error demarcates the limits within which there is a fifty per cent. chance of the "true" correlation coefficient falling.

correlation coefficient. In several instances where the Minnesota Mechanical Assembly Test and the Kent-Shakow Formboard were concerned the number of cases involved was so small that the rank correlation coefficient was first derived. This was then translated into the product-moment coefficient by the use of Pearson's formula¹ for the correction of Spearman's ρ .

In noting the size of each correlation coefficient, it must be remembered that the coefficient is not ordinarily regarded as significant unless it is four or more times its probable error. Where this is not the case, it is usually wise, unless there is other and corroborating evidence of the reality of the relationship, to assume that the degree of inter-relationship is no higher than zero. No inter-correlation can be assumed, for instance, in the case of 1 and 14 (Table IX); nor can it be said that the relation is inverse, for this coefficient, being less than its probable error, might easily occur by chance, and might fluctuate in either positive or negative direction.

Age, it may be observed, tends to correlate negatively, and frequently significantly, with nearly every variable. So generally is this true, that age must be considered as a "spurious" factor tending to dilate the other coefficients.²

¹Cf. Kelley, T. L: *Statistical Method*. (Macmillan, N.Y., 1924), p. 193:

$$r = 2 \sin \frac{\pi}{6} \rho.$$

²By a "spurious" element, as the expression is used here, is meant an influence which, through its correlation with each of two variables, tends to raise the correlation *between* those two variables. Thus, if two tests are given to a group of adults who differ considerably in age, the mere fact that the older persons tend to get lower scores on each of the two tests will induce some correlation *between* the two tests, apart from any intrinsic relation which they may bear for each other. The influence of the age factor may ordinarily be eliminated by breaking down the total group of subjects into several age groups and then finding the correlation within each group. This procedure, however, is laborious, and has the further defect of reducing the population for each correlation. Substantially the same result may be achieved without these difficulties by reducing the variance of age to zero indirectly, through

the use of Yule's partial correlation formula: $r_{12.3} = \frac{r_{12} - r_{13} \cdot r_{23}}{\sqrt{(1 - r_{13}^2)(1 - r_{23}^2)}}$

where variables 1 and 2 represent the tests, and variable 3 represents age.

In actual fact, however, while this spurious element is present, it does not seem to be powerful. When age is held constant by partial correlation, the greatest shrinkage in correlation is about .08, with an average diminution of about .03.

Several variables, namely, the Otis Test, Revised Beta Examination, Test 4 of Beta Examination, the Thurstone Clerical Examination, the N.I.I.P.¹ Clerical Test, and the New Stanford Test tend as a group to inter-correlate relatively strongly, and it is apparent that they may have an appreciable factor in common. For this group (Numbers 3-8) the average coefficient of correlation is about +.70. The various tests of mechanical aptitude and information, dexterity, and insight into form relations (Numbers 10-17) inter-correlate to an average extent of about +.40, and correlate with those of the first group (Numbers 1-6) to a slightly less degree, about +.35. The three scales of the Bernreuter Personality Inventory, while relatively independent of the other sixteen variables, show significant correlations among themselves, from +.582 to +.807, and of about the same size as those discovered by Bernreuter with his trial group.²

There appear then to be several possible groups of variables, several constellations of tests which exhibit appreciable inter-relationship. To form a more exact notion of the extent to which this is the case, it becomes necessary to make use of the technique of factorial analysis referred to previously. This technique makes possible a determination of the least number of independent statistical factors which, within the scope of chance variation of the correlation coefficients, will serve to account for the entire table of coefficients. The most serviceable system for this purpose is the Thurstone "centre of gravity" method.³ Only those vari-

¹The National Institute of Industrial Psychology (London). This abbreviation is used throughout.

²Bernreuter, R. G: *Manual for the Personality Inventory*. (Stanford University Press), 1933, p. 4.

³Thurstone, L. L: *A Simplified Multiple Factor Method*. (Chicago University Press), 1933.

ables for which there is a complete set of intercorrelation coefficients may be included, however. In addition, it was thought wise to eliminate the effect of age upon the correlations. This was accomplished by the use of partial correlation coefficients. The factorial analysis was thus made for only fourteen variables, corresponding to "education" in Table VIII and tests 1-13 in Table IX.

Three factors, of which the loadings for each variable appear in Table X, will account for the table of correlations with a mean discrepancy of .048, which is less than the mean probable error of the coefficients. As the principal axes of the sphere in terms of which the co-ordinates (factor loadings) of the fourteen variables have been given are arbitrary, being determined for this particular battery of tests, a rotation of the co-ordinate axes has been made.¹ This rotation serves to bring as many as possible of the factor loadings close to zero, and tends, according to Thurstone, to provide a factorial description of the tests in terms of "unitary abilities".² The factor loadings for each test in terms of the rotated axes are given in columns 1-3 of Table XI. In column 4 of this table is given the communality of each test, and in column 5 its probable or minimum reliability. In column 6 of the same table is shown the probable

¹Where the factorial analysis yields a solution in three factors, these may be represented as the three axes of a sphere, at right angles to one another. Each test is then denoted as a point within the sphere, which may be located by its distance from each of the three planes. These three distances are respectively equal to the three factor loadings of the test. The communality of each test, or the extent to which its variance is accounted for by the three independent factors, is denoted by the square of the distance of the point representing the test from the centre of the sphere. It is equal to the sum of the squares of the factor loadings of that test. The reliability of the test, on the other hand, is greater than the communality, for it is equal to the communality plus any specificity which may be inherent in the test. When the axes of the sphere are rotated as above-mentioned, this is with the object of bringing as many as possible of the points (marking the tests) into or near, one or more of the planes. No matter what rotation of the orthogonal axes is made around the origin of the sphere, the communality of each test remains the same, for the point denoting the test is always the same distance from the origin. The single factor loadings will vary with the rotation, however.

²Thurstone, L. L: "Unitary Abilities." *Journal of General Psychology*, Vol. 2, (1934), pp. 126-132.

or minimum specificity of each test, with respect to the battery used for the group in the present study.

The initial interpretation of the second of the three factors is relatively easy, as its test loadings are of consequence only in the case of the three scales of the Bernreuter Personality Inventory. It has been labelled as P, to denote a factor of personality. It accounts almost completely for the known reliability of the "emotional stability" (B1-N) and "dominance-submission" (B4-D) scales of the Bernreuter Inventory, but leaves something to be desired in the case of the "self-sufficiency" (B2-S) scale. In the case of the factor labelled as G, there are significant loadings for all tests with the certain exception of the three Bernreuter scales and the possible exception of the two tests of clerical ability, where the loadings are small. The loadings are of greatest weight for Beta Examination, Test 4 of Beta and the tests of mechanical ability and dexterity. Turning to the remaining factor, which is given the symbol V, it may be seen that its loadings are highest for the Thurstone and N.I.I.P. clerical tests, the Otis and New Stanford tests, and the Beta Examination. The loadings of this factor for the "emotional stability" and "dominance" scales of the Bernreuter Inventory, for the Stenquist Mechanical Aptitude Test, and for the O'Connor Blocks and Tweezer Dexterity Test closely approach zero.

The clothing of the G and V factors with psychological meaning is not simple. The G factor might be regarded as representing some form of mental alertness or penetration, or capacity to deal with the relations involved in a complex problem or situation, apart from the mediation of this through language. The V factor might then be considered as a factor of verbality. It would certainly be reasonable to expect a strong verbal factor in the measure of education, and in the four tests for which the V loadings are greatest. Some loading for this factor in the Cox Mechanical Aptitude Test might be expected also, as one defect of this form

(Form M1) of the test lies in its long and complicated directions. In the G factor, on the other hand, it is difficult to see just how any form of mental alertness or insight would be requisite for performance in the Tweezer Dexterity Test, which appears to demand nothing more than mere speed of manipulation. Wanting further clues, however, the G and V factors may tentatively be regarded as factors of intellectual penetration and verbality, respectively.

It may be observed by comparing columns 4 and 5 of Table X, that there is in several instances considerable difference between the communality and the reliability of the test. While the three factors account almost completely for the total variance of the Thurstone Clerical Examination, they leave a quite appreciable specificity in the case of the Otis test, the formboard test of Beta Examination, the "self-sufficiency" scale of the Bernreuter Inventory, the Stenquist Mechanical Aptitude Test, and the two O'Connor tests. For this reason, it cannot be said that the three factors, or "unitary abilities", which have been derived sum up the fourteen variables thoroughly. They account, it is true, for the correlations observed, within the scope of sampling errors. They do not account, however, for that portion of the variance of each of several tests which does not overlap with the variance of one or more of the other thirteen.

While it is logically desirable to make use of the foregoing analysis of the correlation data into three independent factors in further study of test results, it is impossible to do so to any great practical advantage. It might be supposed, for example, that where in some special context a significant difference is found between two groups in respect of mean scores upon a given test, such a difference could then be interpreted in terms of the underlying and independent factors. Such would be the case if the variance of that test were accounted for largely by one factor of "unitary ability"; if, in other words, the test scores and the measures of the factor were practically identical. It is not often that

such practical identity occurs, however. This may be observed from Table XI, which shows that the majority of tests must be represented by significant loadings for two or more factors. Further, it has been indicated that for several of the present tests there is present in each case a specific factor of some importance. As the total variance may be attributed in most cases to several influences (the independent factors plus a specific factor), it cannot be determined which of these is the active influence in the case of a difference between two groups such as is mentioned above. Again, the effective factor cannot wholly be identified owing to the possibility that it may vary from one individual to another. As Earle¹ suggests, "it often occurs . . . that a person with a high endowment of intelligence, who lacks a high degree of the specific ability needed for a particular job, will succeed in the task equally with one who possesses only low intelligence but greater specific ability". Thus it is for practical purposes impossible at the present time to carry through to its logical completion the use of the analysis into "unitary abilities". The analysis which has been made must be permitted to stand virtually for purposes of record only.

Apart from systematic relationships represented by the three "unitary abilities" involved, some of the single correlation coefficients are of interest. The O'Connor Blocks correlate to the extent of $.569 \pm .111$ with the Kent-Shakow 4b Formboard, which is a figure rather less than the .76 quoted by O'Connor and queried by Remmers and Schell.² The Minnesota Mechanical Assembly Test correlates $.795 \pm .053$ with the Stenquist Mechanical Aptitude Test I (both may involve appreciation of the relation of parts of a mechanical device to the whole), and, curiously enough, $.854 \pm .058$ with the N.I.I.P. Nuts and Bolts Test. This latter correlation, however, is based on 17 cases only. The

¹Earle, F. M.: "Vocational Testing in Relation to Professor Spearman's Theories". *Journal of the National Institute of Industrial Psychology*, Vol. 3, (1927), p. 416.

²Remmers, H. H. and Schell, J. W.: "Testing the O'Connor Wiggly Block Test". *Personnel Journal*, Vol. 12 (1933), pp. 155-159.

Nuts and Bolts Test, regarded as a measure of manual dexterity, correlates $.540 \pm .075$ with O'Connor's Tweezer Dexterity Test, and $.470 \pm .085$ with the "self-sufficiency" scale of the Bernreuter Personality Inventory. It is suggestive also that the N.I.I.P. Cube Construction Test correlates highest ($.530 \pm .075$) with Test 4 of Beta Examination (paper formboard). Its relation with the Kent-Shakow Formboard is unknown, but that with the O'Connor Blocks is $.326 \pm .088$. The highest inter-correlation coefficient is that between the Thurstone Clerical Examination and the N.I.I.P. Clerical Test, $.896 \pm .024$, which is very high for two tests, even though they purport to measure the same function. Of the two, the Thurstone test appears to correlate somewhat higher with the Otis and Beta intelligence tests.

Table VIII. COEFFICIENTS OF CORRELATION BETWEEN TEST DATA AND AGE AND NUMBER OF GRADES SCHOOLING COMPLETED: UNEMPLOYED MALE WAGE EARNERS, MONTREAL.

Test	Correlation ^a		Test	Correlation ^a	
	Age	Education		Age	Education
1. Otis, Higher Form (Mental Ability).....	-.226 ± .054	.276 ± .053	10. Stenquist Mechanical Aptitude Test I.....	-.274 ± .038	.206 ± .051
2. Revised Beta (General Intelligence).....	-.519 ± .026	.621 ± .027	11. Cox Mechanical Ability Test M1.....	-.183 ± .055	.514 ± .037
3. Beta, Test 4 (Formboard).....	-.306 ± .033	.437 ± .036	12. O'Connor Wiggly Blocks (Mechanical Aptitude)...	-.151 ± .039	.081 ± .056
4. Thurstone Clerical Examination.....	-.350 ± .047	.574 ± .036	13. O'Connor Tweezer Test (Dexterity).....	-.301 ± .068	.240 ± .071
5. N.I.I.P. Clerical Test ...	-.198 ± .043	.517 ± .034	14. N.I.I.P. Nuts and Bolts Test (Assembly).....	-.027 ± .105	-.310 ± .095
6. New Stanford (Educational Achievement) ...	-.265 ± .040	.535 ± .035	15. N.I.I.P. Cube Construction Test (Form Relations).....	-.179 ± .096	.019 ± .101
7. Bernreuter B1-N (Emotional Stability).....	-.182 ± .048	.030 ± .049	16. Kent-Shakow Formboard 4b.....	-.363 ± .113	.187 ± .131
8. Bernreuter B2-S (Self-Sufficiency).....	+.051 ± .049	.028 ± .049	17. Minnesota Mechanical Assembly Test (Sets I and II.)	-.229 ± .136	.338 ± .127
9. Bernreuter B4-D (Dominance-Submission).....	-.009 ± .049	.108 ± .049			

^aLinear product-moment coefficients, and probable error.

Table IX. COEFFICIENTS OF CORRELATION BETWEEN TEST-DATA:^a UNEMPLOYED MEN,
MONTREAL.

Tests	Otis	Revised Beta	Beta Test 4	Thurstone Clerical	N.I.I.P. Clerical
	1	2	3	4	5
1. Otis.....	—	.622 ± .047	.552 ± .053	.804 ± .025	.674 ± .039
2. Revised Beta.....	.622 ± .047	—	.757 ± .015	.794 ± .022	.675 ± .028
3. Beta, Test 4.....	.552 ± .053	.757 ± .015	—	.595 ± .038	.416 ± .039
4. Thurstone Clerical.....	.804 ± .025	.794 ± .022	.595 ± .038	—	.896 ± .024
5. N.I.I.P. Clerical.....	.674 ± .039	.675 ± .028	.416 ± .039	.896 ± .024	—
6. New Stanford.....	.757 ± .025	.723 ± .024	.566 ± .034	.827 ± .017	.795 ± .020
7. Bernreuter B1-N.....	.000 ± .060	.097 ± .059	.070 ± .053	.054 ± .056	.094 ± .051
8. Bernreuter B2-S.....	.208 ± .058	.048 ± .060	.050 ± .054	.130 ± .055	.203 ± .049
9. Bernreuter B4-D.....	.006 ± .060	.123 ± .059	.031 ± .054	.064 ± .056	.035 ± .052
10. Stenquist.....	.198 ± .049	.581 ± .028	.529 ± .031	.278 ± .052	.300 ± .055
11. Cox.....	.545 ± .063	.557 ± .051	.522 ± .045	.256 ± .111	.490 ± .044
12. O'Connor Blocks.....	.312 ± .065	.296 ± .040	.428 ± .035	.272 ± .054	.134 ± .072
13. Tweezer Dexterity.....	.350 ± .100	.533 ± .072	.390 ± .066	.300 ± .107	.293 ± .074
14. Nuts and Bolts.....	-.063 ± .119	*	.407 ± .089	-.193 ± .119	-.163 ± .103
15. Cube Construction.....	.452 ± .088	*	.530 ± .075	.234 ± .113	.153 ± .098
16. Kent-Shakow.....	*	.550 ± .090	.511 ± .096	*	.321 ± .147
17. Mechanical Assembly.....	*	.508 ± .106	.611 ± .090	*	*

^aLinear product-moment coefficients, and probable error.

Table IX. COEFFICIENTS OF CORRELATION BETWEEN TEST DATA: UNEMPLOYED MEN,
MONTREAL (continued).

Tests	New Stanford	Bernreuter B1-N	Bernreuter B2-S	Bernreuter B4-D	Stenquist	Cox
	6	7	8	9	10	11
1. Otis.....	.757 ± .025	.000 ± .060	.208 ± .058	.006 ± .060	.198 ± .049	.545 ± .063
2. Revised Beta.....	.723 ± .024	.097 ± .059	.048 ± .060	.123 ± .059	.581 ± .028	.557 ± .051
3. Beta, Test 4.....	.566 ± .034	.070 ± .053	.050 ± .054	.031 ± .054	.529 ± .031	.522 ± .045
4. Thurstone Clerical...	.827 ± .017	-.195 ± .052	.130 ± .055	-.245 ± .053	.278 ± .052	.256 ± .111
5. N.I.I.P. Clerical.....	.795 ± .020	.094 ± .051	.203 ± .049	.035 ± .052	.300 ± .055	.490 ± .044
6. New Stanford.....	—	.027 ± .052	.123 ± .051	.039 ± .052	.334 ± .045	.495 ± .053
7. Bernreuter B1-N.....	.027 ± .052	—	.582 ± .032	.807 ± .017	.047 ± .058	.058 ± .060
8. Bernreuter B2-S.....	.123 ± .051	.582 ± .032	—	.611 ± .031	-.007 ± .059	.166 ± .058
9. Bernreuter B4-D.....	.039 ± .052	.807 ± .017	.611 ± .031	—	.064 ± .058	.086 ± .060
10. Stenquist Test.....	.334 ± .045	.047 ± .058	-.007 ± .059	.064 ± .058	—	.536 ± .056
11. Cox Test.....	.495 ± .053	.058 ± .060	.166 ± .058	.086 ± .060	.536 ± .056	—
12. O'Connor Blocks.....	.199 ± .049	-.067 ± .050	.004 ± .050	.052 ± .049	.416 ± .038	.427 ± .066
13. Tweezer Dexterity...	.496 ± .061	-.038 ± .086	-.173 ± .084	-.038 ± .086	.427 ± .080	.333 ± .081
14. Nuts and Bolts.....	-.136 ± .117	-.081 ± .109	-.470 ± .085	-.247 ± .103	.854 ± .058	.336 ± .095
15. Cube Construction...	.331 ± .100	.145 ± .102	.063 ± .104	.116 ± .103	.527 ± .154	.284 ± .092
16. Kent-Shakow.....	.223 ± .123	-.292 ± .135	-.428 ± .120	-.247 ± .138	.378 ± .111	.409 ± .156
17. Mechanical Assembly	.561 ± .101	.348 ± .179	-.292 ± .186	-.136 ± .200	.795 ± .053	•

Table IX. COEFFICIENTS OF CORRELATION BETWEEN TEST DATA: UNEMPLOYED MEN,
MONTREAL (continued).

Tests	O'Connor Blocks	Tweezer Dexterity	Nuts and Bolts	Cube Con- struction	Kent- Shakow	Mechanical Assembly
	12	13	14	15	16	17
1. Otis.....	.312 ± .065	.350 ± .100	-.063 ± .119	.452 ± .088	*	*
2. Revised Beta.....	.296 ± .040	.533 ± .072	*	*	.550 ± .090	.508 ± .10
3. Beta, Test 4.....	.428 ± .035	.390 ± .066	.407 ± .089	.530 ± .075	.511 ± .096	.611 ± .09
4. Thurstone Clerical...	.272 ± .054	.300 ± .107	-.193 ± .119	.234 ± .113	*	*
5. N.I.I.P. Clerical.....	.134 ± .072	.293 ± .074	-.163 ± .103	.153 ± .098	.321 ± .147	*
6. New Stanford.....	.199 ± .049	.496 ± .061	-.136 ± .117	.331 ± .100	.223 ± .123	.561 ± .10
7. Bernreuter B1-N.....	-.067 ± .050	-.038 ± .086	-.081 ± .109	.145 ± .102	-.292 ± .135	.348 ± .17
8. Bernreuter B2-S.....	.004 ± .050	-.173 ± .084	-.470 ± .085	.063 ± .104	-.428 ± .120	-.292 ± .18
9. Bernreuter B4-D.....	.052 ± .049	-.038 ± .086	-.247 ± .103	.116 ± .103	-.247 ± .138	-.136 ± .20
10. Stenquist.....	.416 ± .038	.427 ± .080	.854 ± .058	.527 ± .154	.378 ± .111	.795 ± .05
11. Cox.....	.427 ± .066	.333 ± .081	.336 ± .085	.284 ± .092	.409 ± .156	*
12. O'Connor Blocks.....	—	.293 ± .074	.324 ± .093	.326 ± .088	.569 ± .111	*
13. Tweezer Dexterity...	.293 ± .074	—	.540 ± .075	-.175 ± .099	.284 ± .127	.092 ± .21
14. Nuts and Bolts.....	.324 ± .093	.540 ± .075	—	.254 ± .097	*	*
15. Cube Construction...	.326 ± .088	-.175 ± .099	.254 ± .097	—	*	*
16. Kent-Shakow.....	.569 ± .111	.284 ± .127	*	*	—	.378 ± .19
17. Mechanical Assembly	*	.092 ± .212	*	*	.378 ± .193	—

INTER-CORRELATION OF SCORES

Table X. MULTIPLE FACTOR SOLUTION FOR FOURTEEN CORRELATED VARIABLES, BY THE THURSTONE CENTRE OF GRAVITY METHOD.

Test	Factor Loadings			Communality
	I	II	III	h^2
1. Education.....	.556	-.134	.137	.346
2. Otis (Mental Ability).....	.720	-.209	.249	.624
3. Revised Beta (General Intelligence).....	.857	-.291	-.013	.819
4. Test 4 of Beta (Formboard)...	.704	-.234	-.215	.597
5. Thurstone Clerical Examination.....	.787	-.236	.546	.973
6. N.I.I.P. Clerical Test.....	.770	-.177	.442	.820
7. New Stanford (Educational Achievement).....	.798	-.271	.285	.791
8. Bernreuter B1-N (Emotional Stability).....	.256	.849	-.058	.790
9. Bernreuter B2-S (Self-Sufficiency).....	.346	.645	.142	.556
10. Bernreuter B4-D (Dominance).....	.350	.828	-.102	.818
11. Stenquist Test I. (Mechanical Aptitude).....	.490	-.155	-.484	.498
12. Cox Test M1 (Mechanical Ability).....	.655	-.183	-.288	.545
13. O'Connor Wiggly Blocks (Assembly).....	.367	-.151	-.407	.323
14. O'Connor Tweezer Test (Dexterity).....	.409	-.301	-.250	.320

Table XI. MULTIPLE FACTOR SOLUTION FOR FOURTEEN CORRELATED VARIABLES, AFTER ROTATION OF CO-ORDINATE AXES.

Test	Factor Loadings						
	G	P	V	u ²	Reliability	s ²	s
	(1)	(2)	(3)	(4) (a)	(5)	(6) (b)	(7)
1. Education .....	.298	.054	.504	.346	—	—	—
2. Otis (Mental Ability) .....	.342	.033	.712	.625	.930 (d)	.305	.552
3. Revised Beta (General Intelligence).....	.641	.014	.639	.819	.987 (g)	.168	.410
4. Test 4 of Beta (Formboard)...	.671	.026	.382	.597	.841 (g)	.244	.494
5. Thurstone Clerical Examination	.180	.016	.971	.975	.975 (ce)	.000(c)	.000(c)
6. N.I.I.P. Clerical Test.....	.229	.071	.873	.820	.910 (cf)	.090(c)	.300(c)
7. New Stanford (Educational Achievement) ..	.384	.000	.802	.791	.950 (d)	.159	.399
8. Bernreuter B1-N (Emotional Stability).....	-.019	.888	-.043	.791	.880 (g)	.089	.298
9. Bernreuter B2-S (Self-Sufficiency) ..	-.049	.716	.201	.555	.850 (g)	.295	.543
10. Bernreuter B4-D (Dominance)...	.079	.900	-.005	.816	.880 (g)	.064	.253
11. Stenquist Test I. (Mechanical Aptitude).....	.704	.041	.031	.498	.740 (h)	.242	.492
12. Cox Test M1. (Mechanical Ability) .....	.678	.061	.286	.545	.640 (g)	.095	.308
13. O'Connor Wiggly Blocks (Assembly).....	.568	.000	.000	.323	.570 (h)	.247	.497
14. O'Connor Tweezer Test (Dexterity).....	.523	-.134	.170	.320	.560 (cf)	.240(c)	.490(c)

^aThe total variance of the test accounted for by three factors.

^bThe specificity of the test with respect to the factors G, P and V; equals the reliability of the test minus the communality.

^cAt least.

^dMethod of correlation of two forms.

^eFrom the communality.

^fBy correlation with other variables

^gBy the method of split halves.

^hBy correlation of test and re-test scores.

PART II

RESULTS OF THE STUDY

CHAPTER VI

THE SHOWING OF THE CONSTITUENT GROUPS

THE seven groups of unemployed men who were tested represented different strata of the total group of Montreal unemployed, sampled at different times. The extent to which they differed in the distribution of classes of occupations may be noted in Fig. 6, where the percentage distribution of the five occupational classes and of those who had not worked¹ is shown for each group. Fig. 6 provides also a measure of the central tendency of each group with respect to occupational class termed the "mean occupational index".² This index varies in size among the seven groups from 1.7 to 3.8, indicating correspondingly a trend toward the lower or upper occupational classes. It has a value of 2.6 for the total group of Montreal wage and salary earners referred to in Table II, and a value of 2.2 for the group of unemployed shown in the same table. When all male workers gainfully employed in Montreal City are included, the mean occupational index rises to approximately 2.7.³

¹Individuals falling in the category of those who had not worked were boys who had left school but who had not yet secured regular employment.

²In deriving the "mean occupational index" the five occupational classes were allotted values as follows: A, 5; B, 4; C, 3; D, 2; and E, 1. The weighted average was then found on this basis for each main group. The procedure involved two assumptions: that the occupational classes could thus be ranked on a linear scale, and that the difference between each successive class was equal. These assumptions are of course conjectural; but the index serves to show the main trend of each group. It is not implied that an average value of the index is 3.0 (arithmetic mean of the extremes of 1 and 5). In fact, on the basis of the statistics referred to above the average value for the male working population of Montreal tends to be rather lower than this. Neither can it be assumed that two groups having the same index are fully comparable, as the actual distributions may qualitatively be quite different.

³Marsh, L. C., *op. cit.* p. 319, Table 23 (b). In securing this average, Groups I and II of Table 23(b) are taken to constitute jointly Class A; while Groups III, IV, V and VI of Table 23(b) are considered as equivalent to classes B, C, D, and E, respectively.

Tested Groups I, II and III were predominantly of the clerical and commercial ("white collar") class, and had mean occupational indexes of 3.8, 3.6 and 3.8 respectively. The proportion of Class B occupations represented diminished over the three successive years in which these groups were tested, however, while there was an increase in the proportion of Class A occupations, and of individuals falling in the "not worked" category. The proportions of Classes C, D, and E seemed to show no trend from year to year. Group IV, having a mean occupational index of 2.1, was composed in the main of men whose occupational classes were C, D, and E, in approximately equal numbers, but this group was known not to be a fair sample of its source. Group V, which was a much better sample of the main group, was made up of a majority of Class E men, with only 4.2 per cent. of A and B together. It had a mean occupational index of 1.7. Groups VI and VII, which were closely similar in make-up, were composed of approximately 75 per cent. Class C and D occupations, and appear to be at a stage intermediate to Groups I, II and III, on the one hand, and Group V, on the other. The mean occupational indices of Groups VI and VII were each 2.6.

The general data for the age, education, period unemployed, and test scores for each group are shown in Tables XII a-g, and include the population, mean, and standard deviation for each variable. In Table XIII are grouped the mean data for the entire seven groups, in order to facilitate ready comparison of the standing of one group with another. It will be noted that there are some fairly extensive differences from one group to another, varying largely with the source from which each was obtained. Groups I, II and III (from the office workers' registration bureau) had the highest educational status, and the highest intelligence, clerical and scholastic achievement scores. Group V had in general the lowest test scores. Differences in Bernreuter Personality Inventory scores were present, but were not pro-

DISTRIBUTION OF OCCUPATIONAL CLASSES IN THE SAMPLE GROUPS EXAMINED IN THE STUDY

ESTIMATED APPLICATION TO ALL MONTREAL UNEMPLOYED WAGE EARNERS
1934

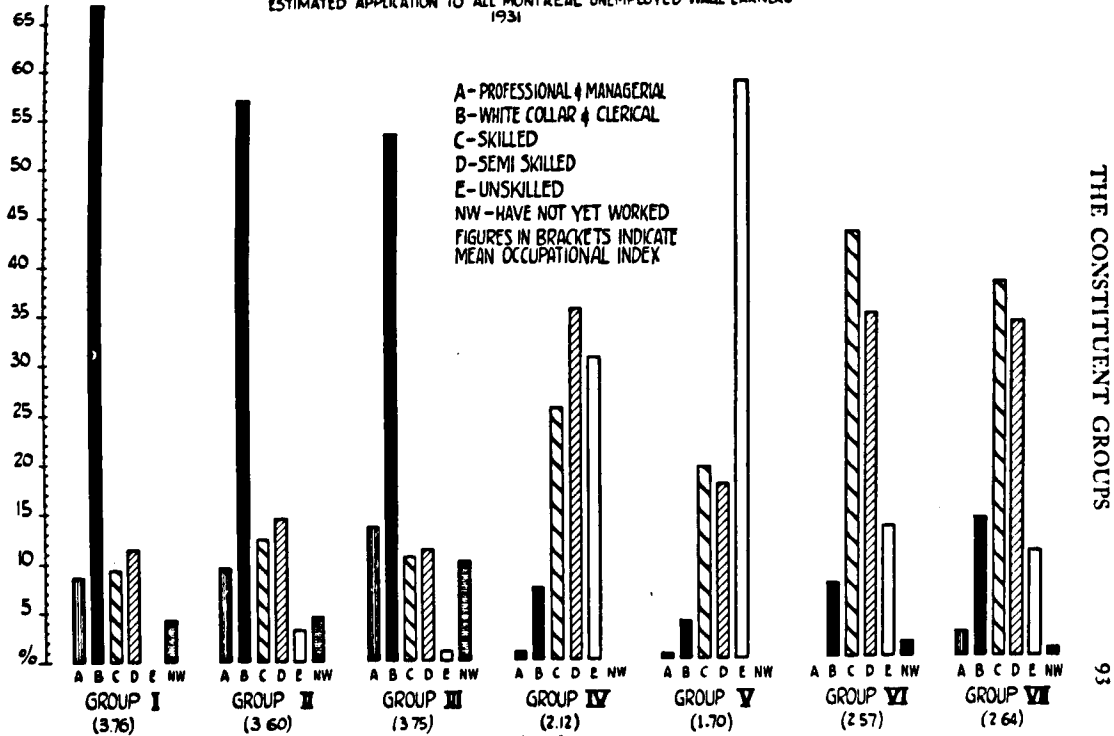


FIG. 6.

THE CONSTITUENT GROUPS

nounced. The distributions of O'Connor Blocks Test scores varied from one group to another, tending to be the lowest (that is, best) for Group VI and highest (poorest), for Group III. No conclusions can in general be drawn from this regarding the levels of ability of the source-groups of which these tests groups are samples, however, as Group I having the same origin as Group III, differs somewhat from the latter in O'Connor Blocks Test scores, and Group VI is rather different from Group VII. Differences for the Stenquist Mechanical Aptitude Test scores were slight for Groups I, III, VI, and VII, but the mean score of Group V was considerably lower than these, while that of Group IV, coming from members of an automotive mechanics class, was considerably higher.

It is of some interest to compare part of the data obtained for Group V (of whom 58.5 per cent. were of the general labouring class) with the results obtained by other investigators for a group of casual labourers in Duluth.¹ The educational attainments of the Montreal and the Duluth groups appear to be roughly the same, making allowances for educational grade divisions in the two countries. The Duluth group had attained an average of 7.2 grades (American), and the Montreal group an average of 6.7 grades (Quebec). The tested Montreal group (Group V) had a mean age of 36.0 years, approximately three years less than that of the source group, and some 13 or 14 years less than the mean age of the Duluth group. In spite of the fact that the average age of the Montreal group was considerably less than that of the Duluth group, the mean hand dynamometer score was also less, although dynamometer score was found in the Minnesota study to vary inversely with age to an appreciable degree. The mean score for the Montreal group, right hand, was found to be 90.8 pounds, and for the left, 85.7 pounds; while for the Minne-

¹Hansen, A. H., Trabue, M. R., and Diehl, H. S. *The Duluth Casual Labour Group*. Bulletin of the Employment Stabilization Research Institute of the University of Minnesota, Vol. I, No. 3, March, 1932, Minneapolis.

sota group the mean was, for the right hand, 98.8 pounds, and for the left, 96.0 pounds. Less variation from the mean was also exhibited by the Montreal group. It would seem that although the Duluth group was itself judged to be markedly inferior in physical strength, the Montreal group was even more so.

It may be observed that in general no one of these groups of Montreal unemployed is lacking in individuals with good potential ability. Groups I-III possess an average educational status better than the average for Quebec, which is about Grade 7 (that is, the year before entrance to high school). Mean Otis Test scores for these three groups are rather better than average for individuals of average education, as Otis cites a score of 42 as being the mean for individuals of age seventeen and a half or above, within a school population.¹ Mean Beta scores for Groups I-III are above average,² while mean New Stanford Achievement Test scores are those of individuals of approximately Grade 8 or 9 status (Quebec).³ The mean scores on the Thurstone Clerical Examination (105.9 and 102.7) are within the range of 87 to 111 cited by Thurstone as being "average".⁴ The mean N.I.I.P. Clerical Test score for Group III is slightly lower than that quoted by Moore for a group of office clerks.⁵ No data are available on the mean score of the average individual for the Stenquist Test, but it is thought by the writer to be approximately 50 to 60. The mean Tweezer Dexterity Test score for Group III of 6.45 is somewhat higher, (that is, worse) than the median score of 6.00 cited by investigators of the Employment Stabil-

¹Otis, A. S: *Manual of Directions for the Otis S-A Tests of Mental Ability*. World Book Company, Yonkers, N.Y., 1928, p. 6.

²Kellogg, C. E. and Morton, N. W. "Revised Beta Examination". *Personnel Journal* No. 13 (1934) 94-100.

³Norris, K. E. *Characteristics and Abilities of Evening High School Pupils*. (Unpublished M.A. Thesis, McGill University, 1931).

⁴Thurstone, L. L: *Directions and Key for Examination in Clerical Work: Form A*. World Book Company, Yonkers-on-Hudson, N.Y., 1922.

⁵Moore, H: "The Institute's Clerical Test in America". *Human Factor*, Vol. 7 (1933) pp. 407-409.

ization Research Institute of the University of Minnesota.¹ Mean Bernreuter Inventory scores are slightly divergent from the median scores provided for adult males by Bernreuter,² the unemployed groups being slightly more neurotic, self-sufficient, and submissive. The distribution of O'Connor Blocks Test scores are such that the median score lies approximately between the B and C grades, which is of about average level.³

In the case of Group V, the mean Beta Examination score is probably rather less than that of the average individual,⁴ while the mean New Stanford Achievement Test score is probably close to the normal level (this test could be given, however, only to men who read and wrote English). The mean Stenquist score is probably also below average. The educational status of Groups VI and VII (6.6 and 7.2 grades of schooling, respectively) is possibly slightly lower than the average. New Stanford Achievement Test scores for these groups range around the Grade 7 level. Mean Beta Examination, Stenquist, and Bernreuter Personality Inventory scores are approximately average. The mean Thurstone Clerical Examination score for Group VI is definitely inferior, according to Thurstone's norms.⁵ The mean O'Connor Tweezer Dexterity Test score for Group VII is above (worse than) the Minnesota median of 6.00. Median O'Connor Blocks Test scores for Groups V, VI and VII range about the average level, being somewhat better for Group VI, and worse for Group VII.

¹Green, H. J., Berman, I. R., Paterson, D. G. and Trabue, M. R. *A Manual of Selected Occupational Tests*. Bulletins of the Employment Stabilization Research Institute of the University of Minnesota, Vol. II, No. 3, 1933, Minneapolis.

²Bernreuter, R. G. *Manual for the Bernreuter Personality Inventory*. Stanford University Press, 1931.

³Keane, F. L. and O'Connor, J. "A Measure of Mechanical Aptitude". *Personnel Journal*, Vol. 6 (1927-28) pp. 15-24.

⁴Kellogg, C. E. and Morton, N. W., *op. cit.* p. 100.

⁵This may or may not mean that such a score is inferior to that of the average unselected individual. It is not stated explicitly in connection with Thurstone's norms whether they apply to clerical or general groups. If they apply only to the former, then a mean score of 145.0, although "Very Inferior" for a group of clerical workers, might be normal for an unselected sample of the population.

Three groups then (Groups I, II and III) afford a picture of a generally average or above-average level of education and abilities. One group (Group V) is rather inferior throughout. Two groups (Groups VI and VII) tend toward a normal level of schooling, intelligence, and mechanical ability, and show no marked deviation from normal in the Bernreuter Personality Inventory, but may possess less clerical ability than the individual of normal education.

ESTIMATED DISTRIBUTION OF SCORES FOR ALL MONTREAL
UNEMPLOYED MEN

Without further evidence, these tentative conclusions cannot be extended to bear upon the general group of unemployed men of Montreal. It is impossible, for example, lacking valid grounds for so doing, simply to combine the data of the several test-groups and to generalize on the basis of the aggregate distributions of test-scores. Before such a procedure can be used, it must be shown first that the test-groups include for each existing unemployed group in the city a sample which is representative as regards such qualitative factors as age, occupational level, period of unemployment, etc. Secondly, the proportions in which the test-groups are combined must eventually be equivalent to the relative sizes of the various groups constituting the total unemployed population of Greater Montreal, of which the test groups are samples. Thirdly, it must be satisfactorily demonstrated that the acquisition of the test data for the several groups at different periods of the depression has had no influence upon the nature of the sampling or the results. All such evidence is not forthcoming. In fact, it is a not unreasonable supposition that all existing unemployed groups were not tapped, and that the time element did have some effect on the results gained. Similarly, it is apparent from Fig. 6 that certain large test groups included unreasonably large percentages of certain classes of workers, as, for example, those of Class B in Groups I-III, so that if all data

were merely pooled, they could scarcely be representative.

If the data of these groups cannot simply be aggregated to show total distributions of any significance, could a weighted combination be made which would conform with most of the requirements? Even such a weighted combination could hardly meet in full the third requirement cited above, unless any shift in age and occupational distributions, etc., throughout the course of the depression were known. It might, nevertheless, go far toward meeting the other two requirements, for a given year. In fact, however, the only available data relating to total unemployment in Montreal are the Census statistics for unemployment among wage-earners of Montreal City in 1930-31. These data, which show the amount of unemployment (in weeks lost) by occupations, have been treated by the writer to show this by occupational classes (Table II).¹ On the basis of the distribution of test-scores by occupational classes (the material of Chapter Seven, *infra*) and the proportions which these classes may be expected to form in the total unemployed population (Column 3 of Table II), it is possible to construct a tentative set of weighted distributions of test-scores for the unemployed wage earning population of Montreal City of 1930-31.

By calculation from Column 3 of Table II, it may be found that of a total of 99,857 men without jobs for some period in 1930-31, 1.1 per cent. were in occupational class A, 9.9 per cent. in B, 30.1 per cent. in C, 21.9 per cent. in D, and 37.0 per cent. in E. Combining the distributions of scores by occupational classes of the tested groups of this study, and in the proportions of the percentage figures above, the distributions of Figs. 8 to 15 are obtained. These distributions, which are reduced to an equal area basis, afford some suggestion as to the level and spread of abilities of the jobless wage-earners covered by the Census figures of 1931, so far as the present tests go.

¹Pp. 56-58.

The distribution of grades of schooling completed (Fig. 7) has a mean of 7.2, a standard deviation of 2.3, and shows some slight skew toward the lower end of the scale. 1.5 per cent. of the individuals included would have professional or academic training beyond high school, 7.8 per cent. would lie at the level of high school graduation or

**DISTRIBUTION OF NUMBER OF GRADES
OF SCHOOL COMPLETED**
WEIGHTED TOTAL OF ALL GRADES
MONTREAL 1931

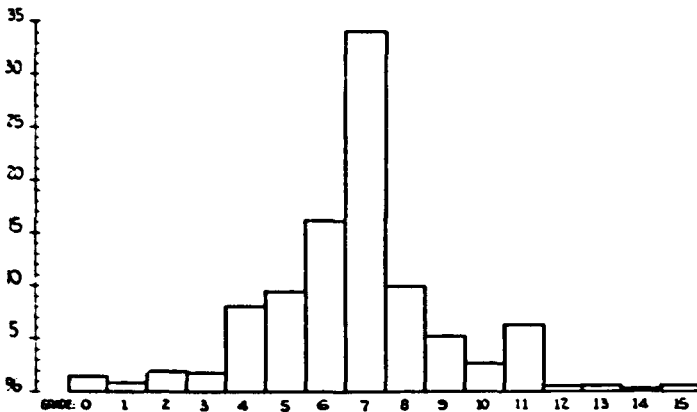


FIG. 7.—Distribution of Number of Grades of School Completed; estimated application to all unemployed male wage earners, Montreal, 1931.

above, and 59.8 per cent. would show Grade 7 standing or higher. The distribution of Beta Examination scores has a mean of 72.9, a standard deviation of 21.5, and is negatively skewed (i.e., shows a higher proportion above than below the mean). There is a more or less symmetrical distribution of scores upon Test 4 of Beta Examination, with a mean of 8.8, and a standard deviation of 4.0. The New Stanford Achievement Test distribution has a long negative skew, a mean of 91.0, and a standard deviation of 19.4. The distribution for the Stenquist Mechanical Aptitude Test

tends toward a symmetrical form, with a mean of 53.0 and a standard deviation of 19.8. These distributions suggest a level of educational achievement, intelligence, and mechanical aptitude (using as an index of this last the Stenquist Test) which do not represent any highly significant departure from normality.

The distribution for the N.I.I.P. Clerical Test (Fig. 11) is markedly skewed toward the upper end of the scale. It has a mean of 37.5, a median of 30.0, and a standard deviation of 24.8. Using Moore's figure of 80 as a critical point below which an individual probably does not possess sufficient clerical ability for completely satisfactory office work, only 5 or 6 per cent. of the population of unemployed, as represented here, could qualify for employment as office clerks.

The distribution of the Cox Mechanical Ability Test scores is positively skewed to an even greater degree than the N.I.I.P. Clerical Test, and has a mean of 6.2, and a standard deviation of 7.0. The median score on the O'Connor Blocks Test is 3.92, which is approximately a normal score. The distribution of scores is positively skewed. The distributions for the three Bernreuter Personality Inventory scales are roughly symmetrical, with mean scores of -37.8, 38.7, and 41.7. The median scores of -34.1, 36.6, and 44.5 (for the neurotic tendency, self-sufficiency, and dominance-submission scales, respectively) fall at the 66th, 52nd, and 43rd percentiles of Bernreuter's norms.¹ This would indicate that the present theoretical group were slightly inclined toward emotional instability and submissiveness but were normal as regards self-sufficiency.

The data thus treated suggest an average level of education and intelligence not far removed from normal.

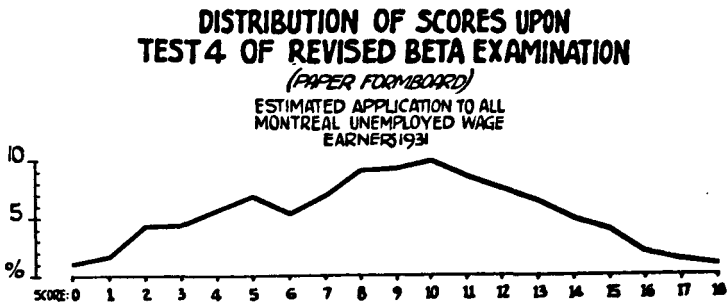
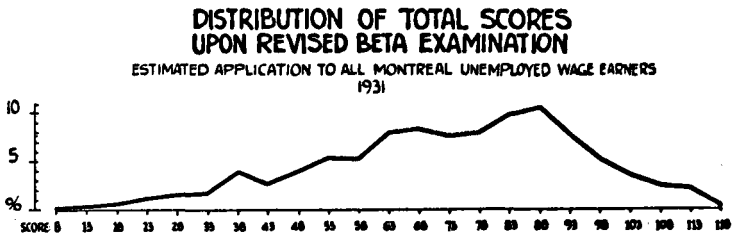
¹Bernreuter, R. G: *Tentative Percentile Norms for the Personality Inventory*. Stanford University Press, September, 1932.

Clerical ability may be inferior: at least, only a very small percentage appear to be qualified for clerical work. There seems to be a normal acquaintance with mechanical operations, as judged from scores upon the Stenquist Test. Scores upon the Cox Mechanical Ability Test accumulate at a very low level in the scale, but the level of intelligence necessary to master the instructions of this test and to follow through its procedure certainly cannot be below a respectable minimum. A normal level of mechanical ability is indicated by the O'Connor Blocks. As regards personality deviations, there may be some slight trend toward emotional instability, but the deviation is certainly not great.

It is apparent, however, that these conclusions must be regarded as being provisory only, for the data upon which they have been based have been assembled in a rather arbitrary manner, of necessity leaving out of account many factors which it would be desirable to include. In addition, there is lacking adequate knowledge of general norms for a number of the tests, which makes comparison difficult even when the data at hand are themselves satisfactory.

Nevertheless, it seems possible at least to indulge in one generalization with some degree of safety. It has been often remarked that the contemporary group of unemployed workers contains a majority of individuals who are "unemployable". Severe doubt is cast upon the truth of this statement by the facts resulting from the present enquiry. It is quite possible that the general mental level and the degree of possession of special skills of the unemployed group is, on the average, lower than that of the normal working population. The data of this study suggest, in fact, that this may be the case. They also suggest, however, that if such a difference between the present unemployed and the normal working population exists, it is not a very great one, and must be regarded as an average or total difference only. It is perhaps no greater than the difference that would be expected between any two groups of individuals chosen at

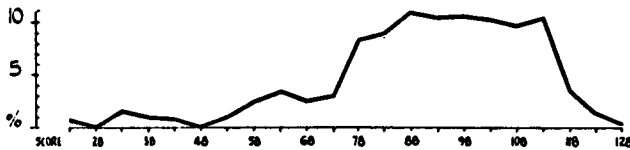
random. As there is a strong suggestion that this is the case, it would obviously be unwise to assume that a certain individual, simply because he is unemployed, is therefore inferior as regards his occupational ability to another individual who happens to have a job.



FIGS. 8, 9.—Distribution of Scores upon Revised Beta Examination and upon Test 4, Revised Beta, estimated application to all unemployed male wage earners, Montreal, 1931.

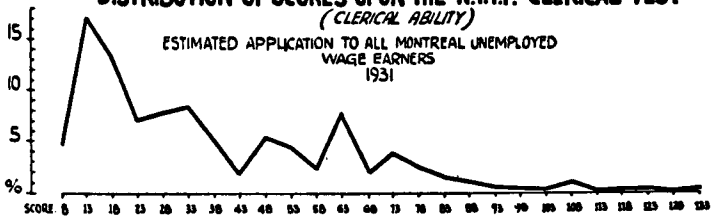
DISTRIBUTION OF SCORES UPON THE NEW STANFORD ACHIEVEMENT TEST
(EDUCATIONAL ACHIEVEMENT)

ESTIMATED APPLICATION TO ALL MONTREAL UNEMPLOYED WAGE EARNERS 1931



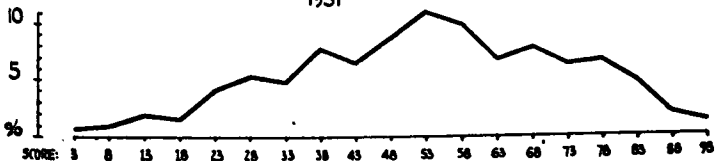
DISTRIBUTION OF SCORES UPON THE N.I.P. CLERICAL TEST
(CLERICAL ABILITY)

ESTIMATED APPLICATION TO ALL MONTREAL UNEMPLOYED WAGE EARNERS 1931



DISTRIBUTION OF SCORES UPON THE STENQUIST MECHANICAL APTITUDE TEST I

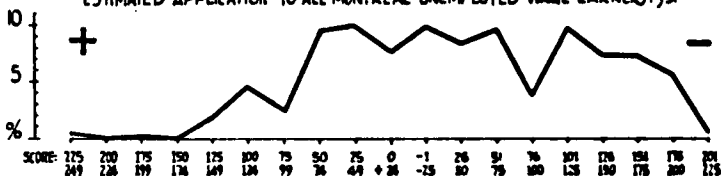
ESTIMATED APPLICATION TO ALL MONTREAL UNEMPLOYED WAGE EARNERS 1931



FIGS. 10, 11, 12.—Distribution of Scores upon New Stanford Achievement Test, N.I.P. Clerical Test, and Stenquist Mechanical Aptitude Test I; estimated application to all unemployed male wage earners, Montreal, 1931.

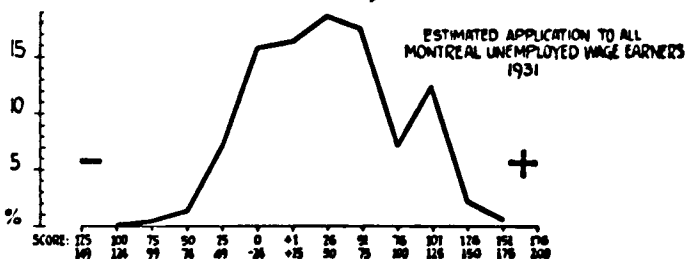
DISTRIBUTION OF SCORES UPON THE BERNREUTER PERSONALITY INVENTORY (B1-N) (EMOTIONAL STABILITY)

ESTIMATED APPLICATION TO ALL MONTREAL UNEMPLOYED WAGE EARNERS 1931



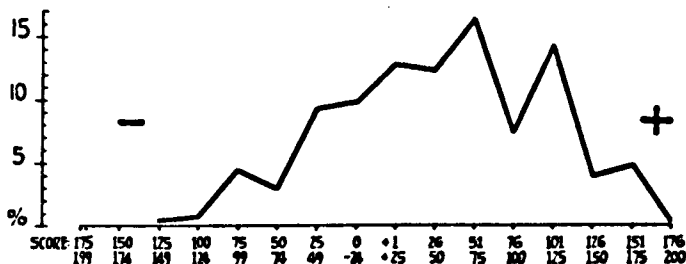
DISTRIBUTION OF SCORES UPON THE BERNREUTER PERSONALITY INVENTORY (B2-S) (SELF SUFFICIENCY)

ESTIMATED APPLICATION TO ALL
MONTREAL UNEMPLOYED WAGE EARNERS
1931

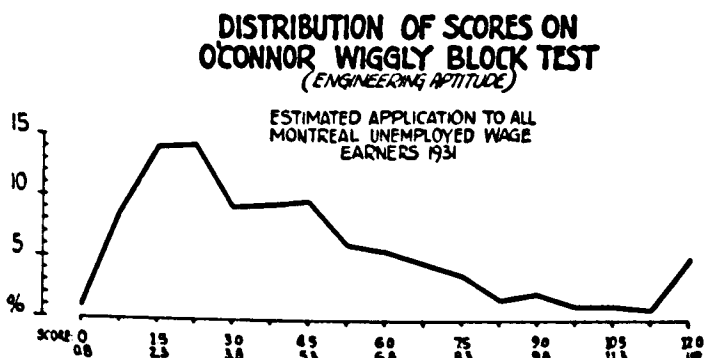
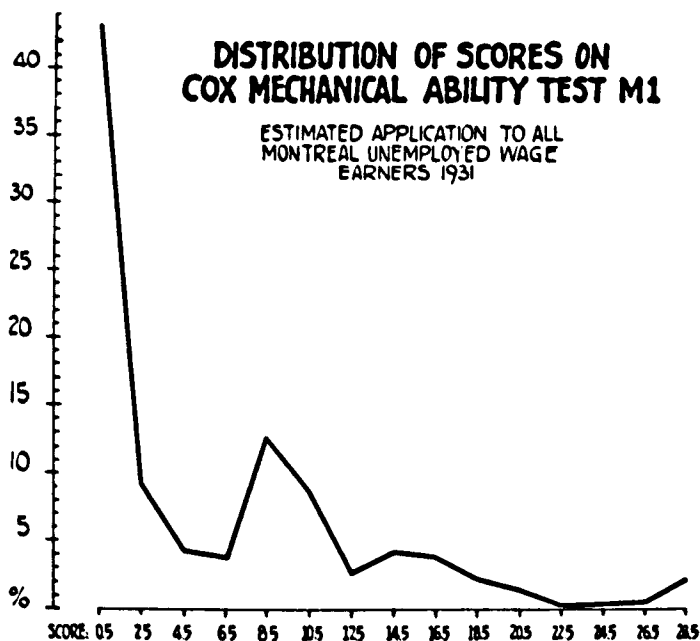


DISTRIBUTION OF SCORES UPON THE BERNREUTER PERSONALITY INVENTORY (B4-D) (DOMINANCE-SUBMISSION)

ESTIMATED APPLICATION TO ALL MONTREAL UNEMPLOYED WAGE EARNERS 1931



FIGS. 13a, b, c.—Distribution of scores upon Bernreuter Personality Inventory, B1-N, B2-S, and B4-D; estimated application to all unemployed male wage earners, Montreal, 1931.



FIGS. 14, 15.—Distribution of Scores upon Cox Mechanical Ability Test M1 and O'Connor Wiggly Block Test; estimated application to all unemployed male wage earners, Montreal, 1931.

Table XIIIa. AGE, EDUCATION, PERIOD UNEMPLOYED, AND TEST SCORES (MEANS AND STANDARD DEVIATION).

a. GROUP I.

Test	Number in Group	Mean	Standard Deviation
Age.....	296	27.6	10.1
Education ^a	291	9.4	2.2
Period Unemployed ^b	267	0.6	0.3
Otis.....	279	43.3	11.3
Beta.....	174	93.1	13.7
New Stanford.....	206	108.6	8.7
Thurstone.....	183	105.9	33.0
Stenquist.....	159	56.1	15.7
Minnesota Paper Form Board..	30	29.2	9.6
Bernreuter B1-N.....	230	-38.9	87.0
Bernreuter B2-S.....	230	40.0	55.0
Bernreuter B4-D.....	230	40.1	64.8
Study of Values:			
Theoretical.....	257	31.7	6.7
Economic.....	257	32.5	6.9
Aesthetic.....	257	23.8	8.1
Social.....	257	30.3	6.4
Political.....	257	31.3	6.7
Religious.....	257	30.9	7.8
O'Connor Blocks:	96	Class A — 0 —2.75	29.2 ^c
		“ B — 2.76-4.00	20.8
		“ C — 4.01-6.00	19.8
		“ D — Over 6.00	30.2

^aNumber of grades.

^bFor mean and standard deviation read median and quartile deviation, in years: base date as at April 1st, 1932.

^cFor standard deviation read percentages: the four classes A, B, C, D equal 100. This applies throughout Tables XII and XIII.

THE CONSTITUENT GROUPS

Table XIII.c. AGE, EDUCATION, PERIOD UNEMPLOYED, AND TEST SCORES (MEANS AND STANDARD DEVIATION).

b. GROUP II.

Test	Number in Group	Mean	Standard Deviation
Age.....	278	32.0	12.0
Education ^a	282	9.4	2.3
Period Unemployed ^b	265	0.9	0.6
Otis.....	286	40.9	12.6
New Stanford.....	287	103.0	12.5
Bernreuter B1-N.....	75	-43.3	81.3
Bernreuter B2-S.....	75	39.4	51.9
Bernreuter B4-D.....	75	39.6	63.0

^aNumber of grades.

^bFor mean and standard deviation read median and quartile deviation, in years; base date as at June 1, 1933.

c. GROUP III.

Test	Number in Group	Mean	Standard Deviation
Age.....	200	32.2	12.7
Education ^a	192	9.3	2.5
Period Unemployed ^b	164	1.3	0.8
Otis.....	174	40.7	11.5
Beta.....	78	90.6	13.2
New Stanford.....	176	103.8	13.4
Thurstone.....	32	102.7	31.9
N.I.I.P. Clerical.....	83	67.1	27.4
Stenquist.....	44	54.8	19.4
Cox.....	51	12.3	7.4
Tweezer Dexterity.....	34	6.45	0.87
Bernreuter B1-N.....	127	-67.3	83.5
Bernreuter B2-S.....	127	49.8	52.8
Bernreuter B4-D.....	127	55.6	61.8
O'Connor Blocks.....		Class A — 0 —2.75	21.0
		“ B — 2.76-4.00	18.4
		“ C — 4.01-6.00	13.2
		“ D — Over 6.00	47.4

^aNumber of grades.

^bFor mean and standard deviation read median and quartile deviation, in years; base date as at April 1st, 1932.

Table XIII.e. AGE, EDUCATION, PERIOD UNEMPLOYED, AND TEST SCORES (MEANS AND STANDARD DEVIATION).

d. GROUP IV.

Test	Number in Group	Mean	Standard Deviation
Age.....	242	29.6	9.1
Education ^a	235	7.1	1.9
Period Unemployed ^b	236	0.8	0.4
Alpha.....	28	79.1	36.5
Beta.....	263	76.6	19.3
Stenquist ^c	31	78.0	14.6

^aNumber of grades.^bFor mean and standard deviation read median and quartile deviation, in years: base date as at May 1, 1932.^cFor "mechanical" class. Range of scores, 22-95.

e. GROUP V.

Test	Number in Group	Mean	Standard Deviation	(*) D
Age.....	568	36.0	11.4	
Period Unemployed ^b ..	548	2.0	0.75	
Alpha.....	32	77.4	39.4	
Beta.....	722	63.9	21.2	
New Stanford.....	106	81.6	21.0	
Stenquist.....	313	44.5	18.8	
Hand Dynamometer: ^c ..				
Left, 1st trial.....	111	85.7	21.4	42.1
2nd trial.....	111	85.3	18.0	44.5
Right, 1st trial.....	111	90.8	15.2	38.3
2nd trial.....	111	91.5	15.6	40.6
O'Connor Blocks.....	204	Class A— 0 -2.75 Class B—2.76-4.00 Class C—4.01-6.00 Class D over 6.00	32.5 17.5 24.0 26.0	

^aRange between the 90th and 10th percentiles.^bFor mean and standard deviation, read median and quartile deviation, in years: base date as at May 1st, 1933.^cIn pounds pressure.

THE CONSTITUENT GROUPS

Table XIII, g. AGE, EDUCATION, PERIOD UNEMPLOYED, AND TEST SCORES (MEANS AND STANDARD DEVIATION).

f. GROUP VI.

Test	Number in Group	Mean	Standard Deviation
Age.....	143	36.7	11.0
Education ^a	137	6.6	2.2
Period Unemployed ^b	134	1.1	0.7
Alpha.....	70	94.1	42.2
Beta.....	139	73.0	23.5
New Stanford.....	83	96.3	16.3
Thurstone.....	81	145.0	49.5
Stenquist.....	130	53.9	20.4
Minn. Paper Form Board.....	93	27.9	11.8
Bernreuter B1-N.....	40	-55.5	84.5
Bernreuter B2-S.....	40	54.5	49.2
Bernreuter B4-D.....	40	40.5	65.0
O'Connor Blocks.....	54	Class A— 0 -2.75	35.2
		Class B—2.76-4.00	20.4
		Class C—4.01-6.00	24.0
		Class D Over 6.00	20.4

^aFor mean and standard deviation read median and quartile deviation, in years: base date as at June 1st, 1933.

g. GROUP VII.

Test	Number in Group	Mean	Standard Deviation
Age.....	127	36.9	12.4
Education ^a	113	7.2	2.2
Period Unemployed ^b	109	1.25	0.7
Beta.....	122	78.6	18.4
New Stanford.....	75	96.2	14.0
N.I.I.P. Clerical.....	78	42.3	25.8
Stenquist.....	126	56.2	18.8
Cox.....	46	8.3	7.2
Tweezer Dexterity.....	48	6.66	0.93
Bernreuter B1-N.....	53	-52.6	95.5
Bernreuter B2-S.....	53	61.2	45.8
Bernreuter B4-D.....	53	53.0	70.4
O'Connor Blocks...		Class A— 0 -2.75	19.2
		Class B—2.76-4.00	17.3
		Class C—4.01-6.00	25.0
		Class D Over-6.00	38.5

^aNumber of grades.

^bFor mean and standard deviation read median and quartile deviation, in years: base date as at April 1, 1934.

Table XIII. AGE, EDUCATION, AND TEST SCORES:
COMPARISON OF MEANS FOR ALL GROUPS.

Test	I	II	III	IV	V	VI	VII
Age.....	27.6	32.0	32.2	29.6	36.0	36.7	36.9
Education.....	9.4	9.4	9.3	7.1	—	6.6	7.2
Otis.....	43.3	40.9	40.7	—	—	—	—
Alpha.....	—	—	—	79.1	77.4	—	—
Beta.....	93.1	—	90.6	76.6	63.8	73.0	78.6
New Stanford...	108.6	103.0	103.8	—	81.6	96.3	96.2
Thurstone.....	105.9	—	102.7	—	—	145.0	—
N.I.I.P. Clerical.	—	—	67.1	—	—	—	42.3
Stenquist.....	56.1	—	54.8	78.0 ^a	44.5	53.9	56.2
Cox.....	—	—	12.3	—	—	—	8.3
Tweezer Dexterity.....	—	—	6.45	—	—	—	6.66
Minn. Paper Form Board..	29.2	—	—	—	—	27.9	—
Bernreuter B1-N	-38.9	-43.3	-67.3	—	—	-55.5	-52.6
Bernreuter B2-S.	40.0	39.4	49.8	—	—	54.5	61.2
Bernreuter B4-D	40.1	39.6	55.6	—	—	40.5	53.0
O'Connor Blocks							
Class A.....	29.2	—	21.0	—	32.5	35.2	19.2
Class B.....	20.8	—	18.4	—	17.5	20.4	17.3
Class C.....	19.8	—	13.2	—	24.0	24.0	25.0
Class D.....	30.2	—	47.4	—	26.0	20.4	38.5

^a"Mechanical" class.

CHAPTER VII

THE COMPARISON OF OCCUPATIONAL GROUPS AMONG THE UNEMPLOYED

THE relationship of occupational standards in terms of measurable traits to vocational guidance and employment placement has been discussed briefly in a previous chapter. In investigating the nature of these standards, it is possible to use either or both of two methods of approach. One method is to compare test scores with actual achievement at work, in the case of a group of workers newly trained to the job, and tested before training. The other method involves the study of representative groups of workers from different occupations, in order to discern the central tendency for each group for each measured trait, and what resemblances and differences exist among the groups. While the first method is superior in that it tends to eliminate influences of training upon test performance, and may provide for a rigorous criterion by which individuals may be distinguished as to capability for work, it is more difficult in practice, owing to the obstacles usually encountered in arranging all the necessary experimental conditions. The second method—that of simply comparing one group of workers with another—is appreciably easier, but is theoretically wanting, for it neglects the elimination of training effects, and may involve an indifferent treatment of good, bad, and mediocre workers. It should, therefore, be used only for purposes of orientation or confirmation, or where the use of the first method is not feasible.

In the present investigation, the total group of unemployed men represented a wide range of occupations. This fact suggested the study of central tendencies in test scores for different occupational groups, first, for their own sake, as resulting from the examination of a considerable body of

unemployed men; and secondly, for whatever light they might shed upon similarities and differences in occupational requirements. In connection with the second objective, however, it was explicit that the test data shared in the disadvantages of all data secured by the second method above-mentioned, and that, further, the data were obtained not from workers in the various occupations represented, but from men who had been workers in those occupations, and who were now unemployed.

The procedure which was employed in elaborating the data by occupational groups was to pool all cases, regardless of their source, and then to divide them according to a classification based mainly upon occupational groups.¹ The uppermost three of these groups were divided further so that the final scheme of classification involved the use of thirteen groups. The occupations which they included are shown in Table XV.

The means for age, education, and test scores for the fourteen² groups for which these have been computed are brought together in this Table. More complete data for each group, giving the population, mean, standard deviation, and coefficient of skewness³ for each variable are provided in Tables XVI (a-e).⁴

¹*Supra*, p. 12.

²Data are provided for five occupations falling within the skilled trades class. These data, and data for other skilled trades occupations the populations of which were not great enough to permit of separate treatment, are grouped also under the general heading of "Skilled trades". Thus there are thirteen distinct classifications, and a fourteenth as well which includes five of the preceding thirteen.

³The coefficient of skewness, as explained in Appendix B, denotes the degree to which a distribution is biased from normal symmetry. If two distributions, the means of which are compared, are skewed in opposite directions, the ratio of the difference between the means to its standard error may be somewhat misleading. Where, for example, the distribution having the higher mean is skewed positively (toward the top) and the distribution having the lower mean is skewed negatively (toward the bottom), there may be actually much more overlapping of the two distributions than the critical ratio would suggest. Under opposite conditions, the difference may tend to be minimized.

⁴Critical ratios (the ratio of the difference between each pair of means to its standard error) and the probabilities of true difference in each case, have been worked out for all possible inter-group comparisons in Appendix E (p. 270).

There is a wide range in mean age for the fourteen groups—from 26.8 to 38.1 years—and the critical ratios of the difference vary from 0.2 to 9.3. The youngest groups are those of office clerks, draughtsmen, and mechanics, while the oldest group is that of accountants and auditors. There is not readily apparent any predominant relationship between age and any other variable, such as would bring about the principal differences in test scores through their correlation with age.

Education tends to vary steadily downward with the level of occupation, from 13.0 grades of schooling in the case of engineers to 6.1 grades in the case of unskilled workers. All differences in education between engineers and other groups are significant, the critical ratios varying from 4.5 to 15.0. Not all of the other differences in educational status are significantly removed from the range of chance variance, but in a total of seventy-three, thirty-nine have a critical ratio of 3.0 or over.

Mean scores upon the Otis Test, Revised Beta Examination, Test 4 of Revised Beta Examination, and the New Stanford Achievement Test, tend to vary from group to group in approximately the same manner as education. The highest mean score for the Otis Test is 50.6 for the engineering group, with a general drift downward to 33.0 for carpenters and 33.5 for semi-skilled workers. The highest mean score for Revised Beta Examination is 99.1, for engineers, and the lowest mean score, 61.9, is found in the case of unskilled workers. Test 4 of Beta varies from 14.9 (engineers) to 7.7 (unskilled), the difference between these extremes being 14.1 times its standard error.¹ Mean scores upon the New Stanford Achievement Test vary from 114.3 to 80.6. There appear to be four roughly-defined levels of intelligence, with much overlapping, for the occupational groups as classified here: the level of the engineering and

¹This is an instance of where there may be even less overlapping than indicated, as the distribution of the superior group is slightly negatively skewed, and that of the inferior group slightly positively skewed.

accounting groups (the highest), the level of office-clerks, draughtsmen, and book-keepers, the level of the sales group and of skilled and semi-skilled trades-people, and the level of the unskilled workers (the lowest). It is important to note, however, that these levels do not represent clear-cut steps, but rather plateaux in a continuously declining slope.¹

The lowest (best) mean score in the Thurstone Clerical Examination is 76.7, for accountants, while for draughtsmen the mean score is 87.7, and for engineers, 90.0. Office clerks (100.0) do not rank appreciably better than salesmen (105.1). These groups, together with the group of book-keepers, have noticeably better mean scores than any of the skilled or semi-skilled trades-people. The highest (best) mean scores upon the N.I.I.P. Clerical Test are found for accountants and engineers (95.9 and 90.6, respectively), and the score for office clerks is again lower, at 78.6². The lowest mean score upon this test is possessed by unskilled workers, being 23.3. It should be mentioned, however, that the means of the groups for this test are based upon only a few cases.

The highest mean scores in the Stenquist Mechanical Aptitude Test are found for engineers, 70.6; machinists 71.4; mechanics, 70.8; and plumbers, 71.7. For draughtsmen, the mean score is 64.6, and for all skilled workers, 63.2; while for accountants and other office workers, salesmen, and semi-skilled trades workers it lies in the neighbourhood of 50 to 55. The mean for unskilled workers is 44.1. The critical ratio of the difference runs as high as 9.1 (all skilled workers *vs.* unskilled). The highest mean score upon the Cox Mechanical Ability Test is 18.9, for engineers; the lowest, 0.4, for unskilled workers. Between these extremes lie means of 10.2 for office-clerks, 10.6 for skilled trades

¹Five levels might be distinguished by separating, in addition, salesmen and certain of the skilled groups, on the one hand, and semi-skilled and the remainder of the skilled trades groups, on the other. The actual number, however, must be somewhat arbitrary.

²Median scores for employed office clerks cited by Moore, *op. cit.*, p. 409, are 83.0 and 77.5.

workers, and 6.9 for the semi-skilled group. The lowest (best) median scores upon the O'Connor Blocks Test (mechanical or engineering aptitude) are possessed by engineers (2.88), and the group of machinists, mechanics, and carpenters (2.38, 2.50, and 2.25, respectively), while the skilled trades group as a whole have a median score of 2.94. The highest (poorest) mean scores upon this test are found in the case of clerical workers (6.13) and electricians (5.50). The semi-skilled and unskilled groups have median scores of 4.81 and 4.00, respectively. From these data, applying to three separate tests of mechanical ability, may be derived the conclusion that the group of engineers is consistently superior in this trait as it is with respect to general intelligence, clerical ability, and formal educational status. Certain groups within the skilled trades class show an equal superiority as regards mechanical ability, but are deficient (relative to the group of engineers) as regards educational status and accomplishment in tests of intelligence and clerical ability. To these skilled trades groups certain other groups (such as office clerks) are inferior in mechanical ability, but superior in intelligence and clerical ability.

Only one of the group-differences for the O'Connor Tweezer Dexterity Test is significant (three times its standard error), namely, that between skilled workers (mean score 6.03) and semi-skilled workers (7.05), the latter group being relatively inferior. It is possible, however, that the lack of significance of most of the differences is owing to the small number of cases in which this test was given.

On the basis of scores upon the B1-N scale of the Bernreuter Personality Inventory, the two groups which are emotionally the least stable are engineers and unskilled workers. Those most stable are accountants, sales workers, carpenters and electricians. Other groups fall between these extremes. None of the differences is fully significant,

although two, relating to the superiority of sales workers and electricians over the group of semi-skilled trades workers are almost so (2.9 times the standard error of the difference). As regards the B2-S (self-sufficiency) scale of the Personality Inventory, the groups of accountants, sales workers, and electricians are the most self-sufficient; the groups of mechanics and carpenters the least so. A few of the differences in mean scores upon this scale approach significance: the group of electricians tends to be more self-sufficient than the groups of office clerks, mechanics, or semi-skilled workers; and the group of sales workers to be more self-sufficient than the office clerks. On the B4-D scale (dominance-submission), the groups of accountants, sales workers and electricians tend toward the extreme of dominance; and the groups of engineers, carpenters, semi-skilled and unskilled workers toward the extreme of submissiveness. The three most dominant groups tend to be significantly more dominant than the group of semi-skilled trades workers.

It is of some interest to compare certain of the findings with respect to differences of mean scores upon the Bernreuter Personality Inventory with those of investigators at the Employment Stabilization Research Institute of the University of Minnesota. Table XIV shows the number of cases, mean scores, and relative order of eight occupations or occupational groups to which the Personality Inventory was given in Minnesota and in Montreal. The extent of agreement is by no means high, whether with respect to absolute score or relative order. Unfortunately, however, the means of four Montreal groups (mechanics, unskilled labourers, machinists, and carpenters) are rendered extremely unstable by the small number of cases for each. If only the remaining groups, for which the statistical populations are reasonably adequate, are considered, the agreement is somewhat better. In the case of each source, salesmen are emotionally the most stable, and are most self-sufficient and dominant. Moreover, for this group, the absolute mean

Table XIV. COMPARISON OF SCORES UPON THE BERNREUTER PERSONALITY INVENTORY BY OCCUPATIONS AND OCCUPATIONAL GROUPS FOR MINNESOTA AND MONTREAL.

Occupational Group	Bernreuter B1-N Emotional Stability						Bernreuter B2-S (Self-Sufficiency)				Bernreuter B4-D (Dominance-Submission)			
	Minnesota			Montreal			Minnesota		Montreal		Minnesota		Montreal	
	Rank	No.	Mean	Rank	No.	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean
Salesmen	1	80	-77.0	2	41	-76.4	1	32.3	1	66.0	1	63.8	1	70.9
Office Clerks . .	2	183	-70.5	5	143	-47.8	4	26.7	5	40.5	2	46.2	5	36.4
Mechanics	3	78	-66.4	6	9	-40.3	2	30.3	8	20.8	3	36.4	3	51.3
Unskilled Labourers	4	78	-62.6	8	11	-26.3	3	30.0	6	29.5	4	36.2	6	36.2
Skilled Workers	5	293	-58.7	3	85	-52.7	5	25.8	3	46.5	5	35.5	4	45.9
Machinists . . .	6	82	-52.7	4	8	-49.5	8	20.0	2	47.8	7	31.0	2	54.4
Carpenters . . .	7	76	-52.1	1	8	-83.0	6	25.0	7	28.4	6	33.9	8	31.0
Semi-skilled Workers	8	81	-47.3	7	67	-30.5	7	20.9	4	42.2	8	27.0	7	31.7

(Data for Minnesota from Bulletins of the Employment Stabilization Research Institute, University of Minnesota, Vol. III, No. 4. Minneapolis, August, 1934, Tables I, III.)

scores upon the emotional stability and dominance-submission scores are nearly the same. A fairly wide difference exists on the self-sufficiency scale, as the Montreal group tend to be more self-sufficient.¹ Semi-skilled workers, on the other hand, tend in each case to be emotionally the least stable, and to be the most submissive. In general, the other two groups (office clerks and skilled workers) fall between the extremes of salesmen and semi-skilled workers. While this

¹The difference is not fully significant, however, as it is 2.4 times its standard error.

degree of relationship between scores of workers from sources which are geographically distinct is neither secure nor complete, it may be at least judged somewhat promising.

In the results obtained from the Allport-Vernon Tests of Values, a few differences observed between mean scores tend toward significance; the majority, however, are well within the scope of chance variation. Those differences which are significant are found between engineers and accountants, the former showing relative lack of religious interest; between engineers and clerks, of whom the former show more interest in aesthetic topics; and between engineers and semi-skilled groups, where the former are again superior as regards aesthetic interest.

In summary of the various group-differences and tendencies the following may be said. There appears to be no constant trend as regards age among the thirteen or fourteen occupational groups of unemployed men. Formal educational status and performance upon tests of intelligence is best for those professional or "white-collar" groups which lie highest in the occupational scale. Conversely, the least well-educated and the least mentally alert tend to be found in the skilled and semi-skilled trades occupations, and among the unskilled labouring groups. The highest achievement upon tests of clerical ability is found among the group of accountants, with engineers, draughtsmen, and office clerks following. There is, however, no distinct difference in trend between intelligence and clerical test scores. Scores upon tests of mechanical ability tend in the main to be highest or best for those occupations or occupational groups which would be expected to require such ability—engineering, and certain of the skilled manual trades. The three Bernreuter scales furnish significant differences in a few instances: engineers and unskilled workers are relatively lacking in "emotional stability", while accountants, sales-workers, and members of two of the skilled trades groups

are more stable. In general, differences upon the "emotional stability" scale (B1-N) are accompanied by corresponding differences upon the remaining two scales which were used. The Allport-Vernon Study of Values reveals for the most part no significant differences between occupational groups as regards the fundamental interests with which it deals.

While these data relate to group tendencies only, and provide much scope for individual variation within the group, they suggest certain general conclusions. First, psychological tests serve to distinguish occupational groups (among unemployed workers) with respect to several traits. Secondly, there appears to be a norm or centre of gravity as regards the performance of each group upon each test, which may serve, when other factors are taken into account, as a rough preliminary standard for workers in that occupation. It is not to be forgotten that such a standard must be used initially for general orientation purposes only, as evidence to show its complete bearing upon job success is lacking. Thirdly, the data suggest that for a finer and more effective analysis of the qualities characteristic of different occupations, the use of a series of tests adapted to more detailed individual study and of one or more measures of success in each occupation would be necessary.

Table XV. COMPARISON OF AVERAGE AGE AND SCHOOLING AND MEAN TEST SCORES FOR FOURTEEN OCCUPATIONAL GROUPS.

Test	Engineers	Accountants, Auditors	Office Clerks	Draughtsmen	Bookkeepers	Sales Clerks	All Skilled Workers
Age.....	35.5	38.1	26.8	29.8	34.6	35.8	34.6
Education.....	13.0	10.4	9.1	10.0	9.3	8.9	7.5
Otis.....	50.6	49.9	44.1	44.3	43.1	39.3	37.6
Beta.....	99.1	96.7	94.3	95.0	92.7	83.8	79.6
Beta, Test 4.....	14.9	13.3	11.3	13.5	11.3	10.7	10.6
Thurstone.....	90.0	76.7	100.0	87.7	102.0	105.1	139.5
N.I.I.P. Clerical.....	90.6	95.9	78.6	64.9	—	64.4	41.1
New Stanford.....	114.0	114.3	107.0	109.0	107.7	102.7	96.6
Steaquist.....	70.6	53.0	54.4	64.6	54.8	50.9	63.2
Cox.....	18.9	14.8	10.2	—	—	12.3	10.6
O'Connor Blocks ^a	2.88	3.63	6.13	3.76	3.75	4.51	2.94
Tweezer Dexterity.....	6.43	6.29	6.39	—	—	6.26	6.45
Bernreuter B1-N.....	25.1	74.7	47.8	45.5	45.0	76.4	52.7
Bernreuter B2-S.....	43.6	57.4	40.5	41.0	42.1	66.0	46.5
Bernreuter B4-D.....	33.2	76.4	43.4	44.3	43.2	70.9	45.9
Study of Values:							
Theoretical.....	34.5	29.9	31.3	31.5	29.4	33.2	33.9
Economic.....	32.0	33.5	33.1	31.4	31.8	32.3	32.2
Aesthetic.....	28.4	21.4	21.9	26.2	25.8	24.3	23.7
Social.....	29.3	29.8	30.7	31.5	29.5	30.2	29.6
Political.....	30.3	31.4	31.8	30.6	32.2	31.6	31.0
Religious.....	25.5	34.0	31.2	28.8	31.3	28.4	29.6

^aMedian and quartile deviation employed instead of mean and standard deviation; P.E. diff. used for σ diff.

Table XV. COMPARISON OF AVERAGE AGE AND SCHOOLING AND MEAN TEST SCORES FOR FOURTEEN OCCUPATIONAL GROUPS (Continued).

Test	Machinists	Mechanics	Carpenters Cabinet- makers	Electric- ians	Plumbers	Semi- Skilled Trades	Unskilled Workers
Age.....	32.9	28.4	36.5	35.4	33.8	33.8	34.2
Education.....	7.5	8.2	7.7	7.1	6.6	7.2	6.1
Otia.....	40.6	34.8	33.0	38.3	—	33.5	—
Beta.....	87.3	78.0	76.4	82.2	75.7	74.6	61.9
Beta, Test 4.....	11.9	10.4	11.6	10.4	9.2	9.7	7.7
Thurstone.....	123.0	137.2	127.0	120.3	—	154.2	—
N.I.I.P. Clerical.....	33.2	—	—	50.5	—	37.1	23.3
New Stanford.....	101.5	95.1	90.9	95.0	—	92.7	80.6
Stenquist.....	71.4	70.8	62.0	64.4	71.7	52.3	44.1
Cox.....	—	—	—	—	—	6.9	11.4
O'Connor Blocks ^a	2.38	2.50	2.25	5.50	4.38	4.81	4.11
Tweezer Dexterity.....	6.03	—	—	6.50	—	7.05	—
Bernreuter B1-N.....	49.5	40.3	83.0	98.3	—	30.5	26.3
Bernreuter B2-S.....	47.8	20.8	28.4	76.4	—	42.2	29.5
Bernreuter B4-D.....	54.4	51.3	31.0	80.9	—	31.7	36.2
Study of Values:							
Theoretical.....						31.8	
Economic.....						33.9	
Aesthetic.....		(Tests	not given)			21.9	
Social.....						29.6	
Political.....						30.7	
Religious.....						32.1	

^aMedian and quartile deviation employed instead of mean and standard deviation; P.E. diff. used for σ diff.

Table XVI. AGE, EDUCATION, AND TEST SCORES FOR UNEMPLOYED ENGINEERS AND DRAUGHTSMEN.

Test	Engineers				Draughtsmen			
	No.	M.	S.D.	Sk.	No.	M.	S.D.	Sk.
1. Age.....	45	35.5	8.1	+0.74	43	29.8	9.6	+0.94
2. Education.....	44	13.0	2.7	-0.33	41	10.0	2.8	+0.64
3. Otis.....	30	50.6	10.9	+0.47	38	44.3	10.1	+0.15
4. Beta.....	24	99.1	12.6	+0.13	14	95.0	10.7	-0.56
5. Beta, Test 4.....	29	14.9	2.5	-0.48	15	13.5	2.3	-0.00
6. Thurstone.....	15	90.9	19.3	+0.61	11	87.7	21.8	-0.45
7. N.I.I.P. Clerical...	10	90.6	25.4	+0.31	4	64.9	9.9	-0.58
8. New Stanford.....	37	114.0	8.5	-0.28	36	109.0	9.3	-0.42
9. Stenquist.....	15	70.6	10.1	+0.68	13	64.6	14.5	-1.32
10. Cox.....	7	18.9	7.4	-1.66	—	—	—	—
11. O'Connor Blocks ^a ...	12	2.88	1.00	—	8	3.76	2.63	—
12. Tweezer Dexterity.	5	6.43	0.62	+0.63	—	—	—	—
13. Bernreuter B1-N...	31	25.1	97.3	-0.07	20	45.5	62.5	-0.22
14. Bernreuter B2-S...	31	43.6	72.0	-0.37	20	41.0	50.6	+0.21
15. Bernreuter B4-D...	31	33.2	79.0	+0.47	20	44.3	68.5	+0.48
Study of Values:								
16. Theoretical.....	14	34.5	5.6	-0.27	13	31.5	8.5	-0.18
17. Economic.....	14	32.0	5.3	-0.28	13	31.4	7.9	-0.23
18. Aesthetic.....	14	28.4	6.3	+0.43	13	26.2	6.5	-0.37
19. Social.....	14	29.3	5.5	0.00	13	31.5	6.3	+0.48
20. Political.....	14	30.3	6.2	-0.58	13	30.6	5.1	-1.41
21. Religious.....	14	25.5	7.6	-0.20	13	28.8	8.8	+0.27

No: Number. M: Arithmetic mean. S.D: Standard deviation. Sk: Co-efficient of skewness.

^aFor mean and standard deviation read median and quartile deviation. P.E. diff. used for # diff.

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Table XVII. AGE, EDUCATION, AND TEST SCORES FOR UNEMPLOYED ACCOUNTANTS, BOOKKEEPERS, AND OFFICE CLERKS.

*Test	Accountants				Bookkeepers				Office Clerks			
	No.	M.	S.D.	Sk.	No.	M.	S.D.	Sk.	No.	M.	S.D.	Sk.
1.....	25	38.1	9.4	+0.19	74	34.6	11.9	+0.91	267	26.8	9.8	+1.29
2.....	26	10.4	2.1	-0.43	69	9.3	2.0	+0.30	256	9.1	1.8	+0.50
3.....	23	49.9	8.2	+0.40	70	43.1	10.6	+0.23	225	44.1	10.2	+0.32
4.....	12	96.7	10.6	-0.23	37	92.7	12.6	-0.17	120	94.3	12.7	-0.02
5.....	14	13.3	2.5	-0.24	37	11.3	4.1	-0.07	132	11.3	3.4	0.00
6.....	9	76.7	19.7	+0.87	24	102.0	24.9	+0.06	91	100.0	25.8	-0.48
7.....	6	95.9	28.6	-0.25	—	—	—	—	24	78.6	18.1	+0.60
8.....	21	114.3	4.7	+0.83	63	107.7	8.1	-0.33	209	107.0	9.5	-0.44
9.....	9	33.0	13.9	-0.43	33	54.8	18.8	-0.64	87	54.4	16.7	+0.05
10.....	4	14.8	10.6	-0.34	—	—	—	—	22	10.2	6.1	+0.34
11 (a).....	7	3.63	1.67	—	12	3.75	3.00	—	54	6.13	2.40	—
12.....	4	6.29	0.91	-0.03	—	—	—	—	15	6.39	0.68	+0.40
13.....	17	-74.7	68.5	-0.54	43	-45.0	89.0	-0.47	143	-47.8	83.0	-0.25
14.....	17	57.4	49.8	+0.21	43	42.1	64.8	-0.66	143	40.5	53.3	+0.06
15.....	17	76.4	56.0	+0.18	43	43.2	62.8	-0.53	143	43.4	61.3	-0.23
16.....	11	29.9	8.1	+0.70	34	29.4	5.6	+0.05	109	31.3	7.4	+0.20
17.....	11	33.5	5.9	-0.25	34	31.8	7.2	+0.50	109	33.1	6.8	-0.18
18.....	11	21.4	9.4	+0.13	34	25.8	7.9	+0.87	109	21.9	7.7	+0.47
19.....	11	29.8	5.7	-0.63	34	29.5	5.7	+0.26	109	30.7	6.9	-0.13
20.....	11	31.4	7.1	-0.68	34	32.2	6.5	-0.83	109	31.8	5.8	+0.05
21.....	11	34.0	8.2	-0.37	34	31.3	6.6	+0.05	109	31.2	7.6	+0.16

*See Table XVIa.

*See footnote, Table XVIa.

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Table XVIc. AGE, EDUCATION, AND TEST SCORES FOR UNEMPLOYED SKILLED WORKERS, MACHINISTS, AND MECHANICS.

*Test	All Skilled Workers				Machinists				Mechanics			
	No.	M.	S.D.	Sk.	No.	M.	S.D.	Sk.	No.	M.	S.D.	Sk.
1.....	342	34.6	11.0	-0.35	35	32.9	9.9	+0.94	37	28.4	7.2	+0.46
2.....	239	7.5	2.0	0.00	29	7.5	2.0	+0.15	25	8.2	1.6	+0.56
3.....	79	37.6	11.7	-0.13	5	40.6	9.7	+2.35	10	34.8	15.7	-0.99
4.....	276	79.6	17.6	-0.26	30	87.3	18.0	-0.45	27	78.0	21.7	+0.76
5.....	282	10.6	3.7	-0.24	31	11.9	4.0	-0.90	28	10.4	4.4	+0.07
6.....	59	139.5	33.8	+0.24	10	123.0	35.2	+0.21	6	137.2	36.8	-0.07
7.....	40	41.1	20.8	+0.59	8	33.2	15.2	+0.93	—	—	—	—
8.....	160	96.6	14.3	-0.27	23	101.5	12.7	+0.05	11	95.1	19.6	+0.78
9.....	165	63.2	17.0	-0.14	24	71.4	12.4	-0.15	13	70.8	12.8	+0.07
10.....	25	10.6	7.6	+0.63	—	—	—	—	—	—	—	—
11 (a).....	88	2.94	1.65	—	17	2.38	1.84	—	9	2.50	1.71	—
12.....	24	6.45	1.00	+0.54	5	6.03	0.53	-1.58	—	—	—	—
13.....	85	52.7	89.5	-0.07	8	49.5	86.6	+1.47	9	40.3	78.8	+0.20
14.....	85	46.5	49.2	-0.44	8	47.8	59.3	-0.09	9	20.8	47.5	-0.83
15.....	85	45.9	49.2	+0.08	8	54.4	61.9	-0.36	9	51.3	44.2	+0.97
16.....	26	33.9	6.0	-0.05	—	—	—	—	—	—	—	—
17.....	26	32.2	6.7	+0.54	—	—	—	—	—	—	—	—
18.....	26	23.7	6.6	+0.32	—	—	—	—	—	—	—	—
19.....	26	29.6	4.6	+0.20	—	—	—	—	—	—	—	—
20.....	26	31.0	5.1	+0.18	—	—	—	—	—	—	—	—
21.....	26	29.6	6.1	-0.20	—	—	—	—	—	—	—	—

*See Table XVIa.

*See footnote, Table XVIa.

OCCUPATIONAL GROUPS

Table XVII. AGE, EDUCATION, AND TEST SCORES FOR UNEMPLOYED CARPENTERS, ELECTRICIANS, AND PLUMBERS.

*Test	Carpenters				Electricians				Plumbers			
	No.	M.	S.D.	Sk.	No.	M.	S.D.	Sk.	No.	M.	S.D.	Sk.
1.....	42	36.5	12.0	-0.08	34	35.4	8.6	+0.14	25	33.8	10.1	+0.24
2.....	19	7.7	1.7	+0.53	24	7.1	1.7	-0.53	15	6.6	2.2	-0.41
3.....	7	33.0	9.1	-0.36	13	38.3	7.7	-0.66	—	—	—	—
4.....	35	76.4	13.2	-0.39	25	82.2	14.6	+0.45	24	75.7	18.3	-0.71
5.....	35	11.6	2.5	0.00	26	10.4	3.4	+0.44	24	9.2	3.5	-0.51
6.....	6	127.0	20.1	+0.07	6	120.3	34.9	+0.11	—	—	—	—
7.....	—	—	—	—	6	50.5	23.1	-1.08	—	—	—	—
8.....	18	90.9	13.2	+0.09	23	95.0	15.8	-1.04	—	—	—	—
9.....	14	62.0	17.1	+1.14	21	64.4	11.8	+1.04	9	71.7	11.4	+2.03
10.....	12	2.25	1.13	—	8	5.50	2.50	—	6	4.38	1.38	—
11 (a)....	—	—	—	—	5	6.50	0.54	+1.33	—	—	—	—
12.....	8	-83.0	78.6	-0.80	12	-98.3	73.6	-0.91	—	—	—	—
13.....	8	28.4	40.4	-1.52	12	76.4	38.6	+0.26	—	—	—	—
14.....	8	31.0	68.8	+0.04	12	80.9	55.6	-0.57	—	—	—	—

*See Table XVIa.

*See footnote, Table XVIa.

OCCUPATIONAL ABILITIES

Table XVIe. AGE, EDUCATION, AND TEST SCORES FOR UNEMPLOYED SALES CLERKS, SEMI-SKILLED AND UNSKILLED WORKERS.

*Test	Sales Clerks				Semi-Skilled Workers				Unskilled Workers			
	No.	M.	S.D.	Sk.	No.	M.	S.D.	Sk.	No.	M.	S.D.	Sk.
1.....	85	35.8	12.2	+0.66	397	33.8	11.6	+0.39	432	34.2	11.5	+0.68
2.....	77	8.9	2.2	+0.82	274	7.2	1.8	0.00	103	6.1	2.1	-0.57
3.....	67	39.3	11.4	+0.13	88	33.5	11.5	+0.16	—	—	—	—
4.....	38	83.8	15.7	-0.23	313	74.6	18.4	-0.15	377	61.9	21.4	+0.13
5.....	40	10.7	3.9	+0.54	315	9.1	3.8	-0.16	377	7.7	3.8	+0.08
6.....	25	105.1	30.7	+0.68	51	154.2	50.6	+0.69	—	—	—	—
7.....	7	64.4	24.6	-0.80	33	37.1	20.2	+0.59	9	23.3	16.1	+0.58
8.....	68	102.7	12.9	-0.35	163	92.7	16.0	-0.28	31	80.6	21.4	-0.45
9.....	34	50.9	14.6	-0.16	153	52.3	18.6	-0.10	140	44.1	19.5	+0.22
10.....	6	12.3	7.0	+0.77	17	6.9	5.1	+0.64	5	0.4	0.5	+0.80
11 (a)....	16	4.51	1.82	—	83	4.81	1.96	—	77	4.00	1.98	—
12.....	4	6.26	0.93	+0.29	19	7.05	1.05	+1.20	—	—	—	—
13.....	41	-76.4	74.9	-0.11	67	-30.5	86.3	-0.17	11	-26.3	85.0	+0.26
14.....	41	66.0	51.8	-0.72	67	42.2	36.0	-0.13	11	29.5	46.3	+0.62
15.....	41	70.9	67.5	-0.11	67	31.7	65.8	+0.06	11	36.2	69.1	+0.31
16.....	27	33.2	5.9	-0.15	23	31.8	6.4	+0.84	—	—	—	—
17.....	27	32.3	6.8	-0.31	23	33.9	5.2	-0.63	—	—	—	—
18.....	27	24.3	9.7	+1.02	23	21.9	6.6	+0.64	—	—	—	—
19.....	27	30.2	7.5	-0.12	23	29.6	6.5	-0.18	—	—	—	—
20.....	27	31.6	7.4	-0.57	23	30.7	7.2	+0.29	—	—	—	—
21.....	27	28.4	9.0	-0.20	23	32.1	7.0	-0.17	—	—	—	—

*See Table XVIa.

*See footnote, Table XVIa.

CHAPTER VIII.

EMPLOYED OFFICE CLERKS: A COMPARATIVE GROUP.

THERE are two reasons for which a study of occupational abilities of unemployed men should include "control" groups of employed workers with whom to compare parallel groups of unemployed. First, this is necessary in order to make a just estimate of the unemployed man's abilities, since ordinary test norms may not be available or may not be readily applicable to the present groups. Secondly, where significant differences exist between such groups of employed and unemployed, the relative size of these differences may be helpful in attempting to isolate the factors which tend to be of some importance in influencing the decision to retain an individual for employment or to discharge him.

To ensure the adequacy of the data for the first of these two objectives it is necessary to secure for examination really comparable employed and unemployed groups. That is, each must be a fair sample of the total body of employed or unemployed workers from which the test group constitutes a selection. As regards the second objective—that of studying particular trait-differences—such normal sampling is perhaps not the main point to be considered in selecting the groups for study, as here not the absolute but rather the relative differences are of principal importance. In the second instance there are, however, certain statistical restrictions which must be considered. The most frequent method of comparing two groups with respect to any one variable consists in determining the number of times that the difference between the means of the two groups contains the standard error of that difference. To predicate a difference greater than chance sampling would permit, this difference must be at least three times its standard error. The statistical formula for the standard error of the mean, upon

which the standard error of the difference between two means depends, is a direct function of the standard deviation of the distribution of scores, and an inverse function of the square root of the number of cases in that distribution.¹ While the variance of each of two distributions is fundamental to the amount of overlapping between them, the number of cases in each distribution may be arbitrarily determined by the conditions of acquisition of the data. Therefore, where two variables are compared with respect to their capacity to differentiate two groups, and where the critical ratio of the difference is used as an index of this capacity, the number of cases for each variable should be the same. Generally, in the present investigation it has been impossible to obtain for each variable the same number of cases and at the same time to have an adequate number for each. As this is the case, the degree to which the superiority of one group over the other differs from one variable to another must be shown in another way. The method which is used here is to indicate the percentage of cases in one distribution to which the median (or fiftieth percentile) of the other is equal or superior. This index is independent of the population of each distribution, but of course implies nothing by itself as to the statistical significance of the superiority (if any) which it indicates.

To secure cases of employed workers for testing, a number of Montreal companies were approached; the objectives of the research were explained to them, and an attempt was made to obtain each firm's consent to the testing of employees, and where possible, its active co-operation. Negotiations were opened with some twenty companies, and subjects for testing were secured from nine. In the case of two of these, the management allowed tests to be administered within working hours, and provided in each instance an adequately heated and lighted room furnished with tables and chairs. Approximately one hundred and sixty em-

¹See Appendix B.

ployees were examined under these circumstances. In the other seven cases, it was impossible to carry on the work within company hours, and it became necessary to make other arrangements. Either (as happened in two cases out of the seven) tests were administered under satisfactory physical conditions in the company building at noon or after work, or, as in the case of the majority of subjects, the individuals examined came to the University in the evening on one, two, or three occasions, and were tested in the Departmental laboratory.

Wherever the tests were not administered within company time, the subjects could be secured only through the individual interest and co-operation of each man. To elicit such interest and co-operation, a circular describing the tests and the purpose of their use was prepared and was sent to employees of each firm with which contact had been made. If the employee was interested, he filled out a brief form giving his name, department, and free hours during the day or evening, and sent it to his departmental head, who sent it on. These forms were collected until a number sufficient to constitute a group accumulated, and were then annotated as to time, place and date of testing, and were returned to the employees. After the scoring of the tests, the scores, together with a brief interpretation of them, were reported to the subjects, for whom this report probably constituted the main incentive to being tested. This method of securing subjects, although it produced about two hundred cases, had several manifest drawbacks. First, there was no means of knowing how much or what type of selection was involved. Secondly, it was a method calculated to appeal only to the better educated and more sophisticated individuals, and the employees who responded were in over four cases out of five office workers. Thirdly, the method was extremely uneconomical as regards the time of the investigator. However, it was used as the only course possible under the circumstances.

The only occupational group of any appreciable size that could be used was that of office clerks, of whom 158 were examined. The remainder of the entire tested group represented a wide range of occupations of a quite heterogeneous variety, and so few cases were available for each that using these cases as samples of those employed groups was out of the question. Consequently, the only group of employed workers whose data could be compared with those of unemployed men was the group of office clerks. As has been stated, there was no means of knowing how adequate a sample they formed of office clerks in Montreal in general. Beyond the selective sampling on the basis of interest and voluntary participation in the testing, these subjects came from nine comparatively large firms, whereas many of the unemployed office clerks had been formerly employed by much smaller organizations, possibly inferior in their methods of selection of personnel. On the whole, there was reason to expect the group of employed office clerks to be a somewhat superior sample of the class as a whole.

The data for the group of 158 employed office clerks are shown in Table XVII, together with corresponding data for a group of 267 unemployed office clerks, composed from all available sources of unemployed workers, but largely from Groups I, II, and III of unemployed men. The average age for the employed group is over three years greater than that of unemployed clerks. This difference is statistically significant, being 3.5 times its standard error. The employed group have achieved a significantly greater number of grades of schooling, and are similarly superior upon the Thurstone Clerical Examination and Test 4 of Beta Examination. Mean scores upon Revised Beta Examination (total), the New Stanford Achievement Test, and the Stenquist Mechanical Aptitude Test are somewhat higher for the employed group, but the superiority is not fully significant in each case. Small differences slightly in favour of the unemployed group are found for the N.I.I.P. Clerical Test

and the Cox Mechanical Ability Test, but these differences, being based upon only 20 to 24 cases, are insignificant. The employed group tend to be emotionally more stable, and to be more self-sufficient and dominant than the unemployed, according to mean scores upon the Bernreuter scales. These personality differences are almost, but not quite, significant. All of the differences found for the Allport-Vernon Study of Values are well within the range of chance variation. It is possible to detect no single measured trait in which the superiority of the employed group is most manifest, on the basis of the percentage of unemployed to which the median of the employed group is equal or superior. The difference tends to be greatest, however, for age, education, and scores upon the Thurstone Clerical Examination and Test 4 of Beta Examination.

Since there is a significant difference in the age composition of the two groups, it is necessary to make a comparison of the test scores with age held constant.¹ This comparison is shown in Table XVIII. After matching for age, the difference in grades of schooling completed is still present, and has increased from 0.8 grades to 1.0 grade, in favour of the employed group. In respect of all test scores, other than those upon the Allport-Vernon Study of Values, the employed group is superior. The actual differences in test scores are little changed from those for the same groups unmatched for age. They are, however, less significant, owing to the diminution in the populations. There is one significant difference in the case of the Bernreuter scales: the employed group tends to be more self-sufficient than the unemployed. Nevertheless, the significance of this difference is probably due to the fact that the two distributions are skewed in such a manner as to enhance the difference ratio. The two largest differences in terms of overlapping of

¹Age was held constant for the two groups by selecting cases at random such that within five-year step-intervals the same number of cases would be found for each group. This tended, of course, to reduce the population of each group appreciably—from 158 to 130, in the case of employed; and from 267 to 130, in the case of unemployed.

scores are found for education (number of grades schooling completed) and Test 4 of Beta Examination (paper formboard). For each of these two variables, the median score for employed office clerks was equal or superior to the score of about three-quarters of the group of unemployed clerks.

The greatest differences between the original groups of employed and unemployed office clerks are found, then, with respect to age, education, and scores upon the Thurstone Clerical Examination and Test 4 of Beta Examination (paper formboard). The employed group is older, has had slightly more formal education, and has superior scores upon these tests. The differences are statistically significant. The employed group tends to have superior scores upon certain of the other tests as well (Revised Beta Examination, the New Stanford Achievement Test, and the Stenquist Mechanical Aptitude Test), and to be more stable emotionally, more self-sufficient, and more dominant, according to the measures of the Bernreuter Personality Inventory. The Allport-Vernon Study of Values does not differentiate the groups significantly. When age is held constant, the superiority of the employed group is most manifest as regards education and scores upon the paper formboard test of Revised Beta Examination.

In spite of the demonstrated superiority of the employed group of office clerks, it must be remembered that this superiority is not always great, and statistically is barely significant. Moreover, the sampling of employed office clerks has not been shown to be fully satisfactory, and it is believed (although this belief is not subject to proof) that the employed clerks constitute a somewhat superior sample. It is therefore rather dangerous, on the basis of the present evidence, to generalize too broadly concerning the superior status of employed clerical workers, as a group. In the case of a single individual, it appears probable that present employment or unemployment cannot be thought to have any certain bearing upon his ability as an office worker.

Table XVII. COMPARISON OF TEST SCORES FOR GROUPS OF EMPLOYED AND UNEMPLOYED OFFICE CLERKS.

Test	Employed Men				Unemployed Men				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comparative Percentage*
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	158	29.9	8.0	+0.79	267	26.8	9.8	+1.29	3.1	0.88	3.5	69.4
Education.....	136	9.9	2.4	-0.25	256	9.1	1.8	+0.50	0.8	0.23	3.5	69.8
Beta.....	164	97.7	11.5	+0.18	120	94.3	12.7	-0.02	3.4	1.47	2.3	56.0
Beta 4.....	164	12.0	3.6	-0.50	132	10.8	3.4	0.00	1.2	0.40	3.0	69.0
Thurstone.....	82	88.5	20.2	+0.46	91	100.0	25.8	+0.48	11.5	3.50	3.3	67.3
N.I.I.P. Clerical.....	22	78.2	20.2	+0.10	24	78.6	18.1	+0.60	0.4	5.68	0.1*	58.3
New Stanford.....	65	110.5	9.5	-0.25	209	107.0	9.5	-0.44	3.5	1.35	2.6	63.7
Stenquist.....	63	60.1	16.0	+0.19	87	54.4	16.7	+0.05	5.7	2.70	2.1	60.2
Cox.....	20	9.0	5.9	+0.25	22	10.2	6.1	+0.34	1.2	1.85	0.6*	40.9
Bernreuter												
B1 - N.....	142	-72.3	73.8	-0.47	143	-47.8	83.0	-0.25	24.5	9.30	2.6	60.8
B2 - S.....	142	58.5	53.4	-0.13	143	40.5	53.3	+0.06	18.0	6.32	2.8	63.7
B4 - D.....	142	57.5	60.8	-0.55	143	36.4	61.3	-0.23	21.1	7.23	2.9	61.8
Values:												
Theoretical.....	43	29.8	6.6	+0.68	109	31.3	7.4	+0.20	1.5	1.23	1.2*	39.5
Economic.....	43	33.0	7.9	0.00	109	33.1	6.8	-0.18	0.1	1.37	0.1*	47.2
Aesthetic.....	43	24.1	9.0	+1.10	109	21.9	7.7	+0.47	2.2	1.56	1.4	50.6
Social.....	43	30.3	5.8	+0.05	109	30.7	6.9	-0.13	0.4	1.11	0.4*	46.7
Political.....	43	32.8	7.7	+0.08	109	31.8	5.8	+0.05	1.0	1.30	0.8	57.8
Religious.....	43	30.4	9.5	+0.06	109	31.2	7.6	+0.16	0.8	1.63	0.5*	47.0

*Percentage of the unemployed group having scores inferior to the median score of the employed group.

Table XVIII. COMPARISON OF TEST SCORES FOR GROUPS OF EMPLOYED AND UNEMPLOYED OFFICE CLERKS, MATCHED FOR AGE.

Test	Employed Men				Unemployed Men				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comparative Percentage ^a
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	130	27.4	8.1	+0.07	130	27.4	8.1	+0.07	0.0	—	—	50.0
Education.....	114	10.0	2.4	-0.25	124	9.0	1.9	+0.47	1.0	0.28	3.6	73.1
Beta.....	127	97.0	12.0	-0.10	60	93.0	12.4	-0.19	4.0	1.92	2.1	63.0
Beta 4.....	127	12.0	3.6	-0.42	69	10.6	3.4	+0.09	1.4	0.51	2.7	73.9
Thurstone.....	56	89.6	21.1	+0.13	51	98.7	24.9	+0.41	9.1	4.49	2.0	59.4
N.I.I.P. Clerical.....	22	78.2	20.2	+0.10	14	76.9	15.5	+0.27	1.3	5.98	0.2	64.3
New Stanford.....	44	110.4	17.6	-0.20	107	107.7	9.1	-0.43	2.7	2.75	1.0	61.9
Stenquist.....	49	59.4	16.1	+0.17	48	54.9	16.9	-0.02	4.5	3.35	1.3	55.8
Cox.....	20	9.0	5.9	+0.25	15	8.5	4.9	+0.31	0.5	1.83	0.3	53.3
Bernreuter:												
B1 - N.....	115	-72.8	78.0	-0.53	74	-55.2	82.3	-0.46	17.6	12.02	1.5	57.7
B2 - S.....	115	66.4	53.9	+0.24	74	42.5	54.3	-0.14	23.9	8.07	3.0	65.7
B4 - D.....	115	59.3	63.8	-0.54	74	44.3	59.9	-0.04	15.0	9.15	1.6	61.2
Values:												
Theoretical.....	34	29.8	5.5	+0.71	51	31.0	7.5	0.00	1.2	1.41	0.9	39.2
Economic.....	34	33.2	7.2	-0.33	51	33.8	7.7	-0.86	0.6	1.64	0.4	45.1
Aesthetic.....	34	24.0	9.2	+1.04	51	22.0	7.6	+0.40	2.0	1.90	1.1	49.0
Social.....	34	29.8	5.9	-0.36	51	31.5	6.5	-0.23	1.7	1.36	1.3	41.1
Political.....	34	32.3	7.0	-0.34	51	31.7	5.9	-0.66	0.6	1.46	0.4	41.1
Religious.....	34	30.9	8.4	-0.21	51	30.0	7.9	+0.39	0.9	1.82	0.5	54.9

^aPercentage of the unemployed group having scores inferior to the median score of the employed group.

CHAPTER IX.

THE RELATIVE STATUS OF RACIO-NATIONAL GROUPS.

NATIONAL groups have frequently been compared as to abilities, and extensive differences, represented by scores upon psychological tests, have been found. Such differences have often, however, been clouded by corresponding differences in language, and in educational and social background.¹ In order to obviate to as great a degree as possible such vitiating factors, the comparisons of the present chapter are made only between English-speaking groups of not strongly dissimilar background. In addition to a sample of English-speaking Canadian unemployed there are provided samples of unemployed men of American, English, Scottish, and Irish birth. Such samples, it must be remembered, are not necessarily true samples of employed or unemployed men of the country in question (United States, England, Scotland, or Ireland), and therefore must not be taken as such. Indeed, there is no certainty that they are normal samples of men of non-Canadian birth unemployed in Canada. Nevertheless, if due regard is had to their limitations, their comparison is of interest.

Mean test scores and age-characteristics, etc., are shown for the five groups in Table XIX. In Tables XXI to XXIII are presented more complete data (including the number of cases, the means, standard deviations, and coefficients of skewness) and for each variable the ratio of the difference between the means to its standard error, and the percentage of cases in the second group to which the median of the first group is equal or superior.

It is notable that the foreign-born groups of unemployed are from 2.5 to 6.0 years older on an average than the Canadian-born group. This, no doubt, is owing in part to

¹Freeman, F. S. *Individual Differences*. (Henry Holt, N.Y., 1934), pp. 170-186.

TABLE XIX. MEAN TEST SCORES FOR FIVE ENGLISH-SPEAKING NATIONAL GROUPS.

Test	English	Scottish	Irish	United States	Canadian
Age (yrs).....	35.7	32.2	34.0	33.3	29.7
Period in Canada (yrs)*.....	12.3	8.8	7.3	20.0	—
School Grades.....	8.4	8.5	7.7	9.6	8.4
Otis.....	42.0	40.4	40.2	47.4	43.0
Beta.....	80.6	82.8	68.2	84.7	81.1
Beta 4.....	10.5	10.7	8.9	10.6	10.1
Thurstone.....	112.4	120.0	—	—	113.6
N.I.I.P. Clerical.....	42.7	64.1	—	—	58.1
New Stanford.....	101.7	105.1	94.7	107.1	102.9
Stenquist.....	53.5	54.1	35.1	60.5	59.7
Cox.....	8.8	11.5	—	—	10.8
O'Connor Blocks*.....	5.52	4.31	—	—	3.60
Tweezer Dexterity.....	7.13	6.76	—	—	6.27
Bernreuter:					
B1 - N.....	-45.3	-41.6	-41.7	-72.8	-48.7
B2 - S.....	50.0	45.5	49.6	66.1	38.3
B4 - D.....	49.8	38.0	42.5	62.5	42.1

*For mean and standard deviation, median and quartile used; also P. E. diff. for σ diff.

the large number of recent elementary and high school graduates which are included in the Canadian-born group, and to the fact that within the last five years the volume of immigration into Canada has diminished considerably.

Differences in educational status exist, although only one, the difference of 1.9 grades of schooling between Irish and American groups, is statistically significant.¹ The status of the American-born group is highest, with a mean grade of 9.6, and that of the Irish lowest, the mean being 7.7. The remaining groups are of equal level, and fall midway between these extremes. The median educational level of the American-born group is equal or superior to that of 63.6 per cent. of the Scottish group, 65.5 per cent. of the Canadian-born group, 69.1 per cent. of the English group, and 77.6 per cent. of the Irish group.

The same order tends to occur among the five groups as

¹Grade levels have been made as nearly comparable as possible by reduction to the Quebec system, in which there are seven grades in elementary school and four in secondary or high school.

regards scores upon tests of intelligence, although the differences, perhaps owing to variation in the size of the sample for different tests, are not altogether consistent. In each case, however, whether for the Otis Test, Revised Beta Examination, Test 4 of Beta Examination, or the New Stanford Achievement Test, the American-born group tends to be highest or among the highest, and the Irish group to be the lowest. Only differences between the extremes or between the largest groups (the relatively large populations tending to diminish the standard error of the difference) are significant, however.

The highest mean scores upon the Stenquist Mechanical Aptitude Test are found for the American and Canadian groups, with 60.5 and 59.7 respectively.¹ The Scottish and English groups follow with mean scores of 54.1 and 53.5, and the Irish group is last with a mean score of 35.1. The median score of the Canadian-born group is equal or superior to that of 55.3 per cent. of the English group, 66.0 per cent. of the Scottish group, 66.5 per cent. of the American group, and 92.0 per cent. of the Irish group. The difference between the means of the Canadian and Irish groups is 9.6 times its standard error. The differences between the Irish and the other groups and between the English and Canadian groups are also significant. The Canadian-born group enjoys a significant superiority in mechanical or engineering aptitude, as gauged by the O'Connor Blocks Test, over the English group, the median of the former being equal or superior to the score of 69.0 per cent. of the cases in the latter group. The superiority of the Canadian group over the Scottish group in the O'Connor Blocks Test is less pronounced, and is not statistically significant. The Canadian-born group tends to have the best scores upon the O'Connor Tweezer Dexterity Test, the median being equal or superior to the score of 74.3 per cent. of the Scottish group, and 79.2

¹The distribution of scores for the American group is extremely skewed in a positive direction, however, the median score being 53.0. The mean therefore tends to create a false impression regarding the superiority of the group.

per cent. of the English. Differences in mean scores upon the Cox Mechanical Ability Test are small and unreliable.

Differences in mean scores upon the Bernreuter Personality Inventory for the English, Scottish, Irish and Canadian groups are small and of an insignificant order. The mean scores of the American group are considerably higher than those of the others. The median score of the American group upon the emotional stability scale (B1-N) is equal or superior to the score of 53 to 84 per cent. of those in the other groups. Similarly, the median for self-sufficiency (B2-S) is equal or superior to the score of 74 to 84 per cent., and the median for dominance-submission equal or superior to the score of 47 to 68 per cent., of those in the other groups. The data for the American group are based upon only 19 cases, however, and therefore the difference cannot be said to be significant.

In view of the entirely inconsistent trends in mean scores upon the two tests of clerical ability (for the English, Scottish, and Canadian groups), any observations regarding the relative superiority of one group to another would appear to be unsafe. It is probable that the inconsistency in mean scores upon the two tests arises from differences of sampling of the groups at different times, for more frequently than not a man taking the Thurstone Clerical Examination did not take the N.I.I.P. Clerical Test.

There is found a great range in the median periods of domicile in Canada, and five of the six differences in this respect are fully significant. The American-born group has lived in Canada for a median period of 20.0 years, the English for 12.3, and the Scottish and Irish for 8.8 and 7.3 years, respectively. The median period of domicile of the American group is equal or superior to that of 80.5 per cent. of the English, 90.9 per cent. of the Scottish, and 93.6 per cent. of the Irish group.

The occupational distribution of the English, Scottish, and American groups of unemployed, as shown in percentage

Table XX. COMPARATIVE OCCUPATIONAL DISTRIBUTION OF FIVE RACIO-NATIONAL GROUPS.

Racio-National Group	Occupational Group						Not Stated	Total
	A	B	C	D	E	Not Worked		
English.....	6.4	31.3	20.2	24.4	17.2	0.5	0	100
Scottish.....	6.7	30.3	29.1	22.4	10.3	1.2	0	100
Irish.....	1.5	21.2	13.6	25.8	37.9	0.0	0	100
American.....	6.7	37.8	20.0	20.0	13.3	2.2	0	100
Canadian.....	4.2	40.5	17.2	20.7	10.5	5.7	1.2	100

terms in Table XX, is roughly similar. A slightly greater percentage of American-born are found in Class B, in comparison with the English and Scottish groups, and a somewhat greater percentage of Scottish in Class C, as compared with English and American. The Canadian-born group has fewer in Class A, and a greater percentage in Class B, than the preceding groups, and also a greater percentage who have had no regular job of any kind. The group of Irish-born differs appreciably from all four of the other groups in distribution of occupations, having a much smaller percentage of Class A, Class B, and Class C occupants represented, and a much greater percentage of men of the semi-skilled and unskilled labouring classes. There appears thus to be a parallel between the relatively low occupational status of the Irish unemployed group and their relative inferiority in education and their lower scores on tests of intelligence and mechanical aptitude.

When the English and Scottish groups are matched for age within five-year intervals, the original differences are not subject to great modification, except in two instances: the median score of the English group upon the O'Connor Blocks Test improves (that is, becomes lower), and the median period of the English group in Canada diminishes. The latter decrease would of course be expected in view of the diminution of the mean age of the English group through matching. Similarly, when Canadian and English

groups are matched for age, there are few changes. Upon matching, a slight Canadian superiority in mean score upon Beta Examination and upon the Otis Test is inverted, to become a slight deficiency; and a small English superiority in Test 4 of Beta Examination becomes upon matching large enough to be statistically significant. The tendency of the English group to be somewhat more self-sufficient than the Canadian group is increased with matching for age, and virtually becomes significant. When Scottish and Canadian-born groups are matched for age, there is no change of any importance, and none of the differences is significant.

The trend of evidence presented in the present chapter may be summarized as follows. Of five racio-national groups, the American-born group is superior as regards educational status and scores upon tests of intelligence. The Irish group stands lowest in these respects; and the remaining groups fall between these extremes. The American-born group which is the foreign-born group of longest residence in Canada, ranks high in occupational status. The English, Scottish, and Canadian groups do not differ greatly in mean test scores, except that the Canadian-born group tends to be superior as regards mechanical aptitude. The Irish group of unemployed which on the average shows the shortest residence in Canada is decidedly inferior to the other four groups, particularly in mechanical aptitude, and tends also toward the lowest occupational status.

Table XXI. TEST SCORES OF UNEMPLOYED MEN, DISTINGUISHED BY RACIO-NATIONAL GROUPS

Test	English				Scottish				Irish			
	N	M	S.D.	Sk.	N	M	S.D.	Sk.	N	M	S.D.	Sk.
Age (yrs).....	377	35.7	13.1	+0.46	165	32.2	11.6	+0.85	66	34.0	11.2	+0.86
Period in Canada (yrs)...	375	12.3	8.1	—	157	8.8	4.7	—	66	7.3	4.2	—
Grades of School.....	295	8.4	2.4	+0.88	143	8.5	2.2	+0.68	37	7.7	2.3	+0.39
Otis.....	165	42.0	11.6	+0.31	90	40.4	12.5	-0.12	20	40.2	13.5	+0.42
Beta.....	256	80.6	19.9	-0.20	96	82.8	16.9	-0.39	49	68.2	23.0	-0.27
Beta 4.....	260	10.5	4.0	-0.38	100	10.7	3.7	-0.49	50	8.9	4.1	+0.22
Thurstone.....	77	112.4	42.6	+0.74	35	120.0	30.5	-0.65	—	—	—	—
N.I.I.P. Clerical.....	36	42.7	25.1	+1.04	21	64.1	33.7	+0.16	—	—	—	—
New Stanford.....	227	101.7	14.3	-0.42	103	105.1	12.7	-0.35	23	94.7	13.9	-0.04
Stenquist.....	174	53.5	18.4	0.00	66	54.1	16.7	+0.23	18	35.1	9.8	+1.26
Cox.....	13	8.8	4.8	-0.75	13	11.5	8.2	+0.91	—	—	—	—
O'Connor Blocks*.....	71	5.52	2.79	—	35	4.31	1.63	—	—	—	—	—
Tweezer Dexterity.....	16	7.13	1.30	+0.69	13	6.76	0.86	+0.45	—	—	—	—
Bernreuter												
B1 - N.....	123	-45.3	91.5	-0.12	62	-41.6	95.8	-0.49	14	-41.7	75.0	+0.67
B2 - S.....	123	50.0	54.5	-0.05	62	45.5	57.8	-0.23	14	49.6	64.8	+0.10
B4 - D.....	123	49.8	63.0	-0.31	62	38.0	72.3	+0.28	14	42.5	59.7	-0.20

N: number. M: arithmetic mean. S.D: standard deviation. Sk: coefficient of skewness.

RACIO-NATIONAL GROUPS

Table XXI. (continued). TEST SCORES OF UNEMPLOYED MEN, DISTINGUISHED BY RACIO-NATIONAL GROUPS.

Test	United States-born				Canadian born			
	N	M	S.D.	Sk.	N.	M	S.D.	Sk.
Age (yrs).....	45	33.3	10.2	+0.29	586	29.7	11.5	+0.97
Grades of School	33	9.6	2.7	+0.33	466	8.4	2.5	+0.24
Otis	24	47.4	10.6	+0.09	320	43.0	11.0	+0.41
Beta	29	84.7	17.8	+0.27	357	81.1	19.7	-0.40
Beta 4	30	10.6	4.3	+0.42	377	10.7	4.0	0.00
New Stanford	27	107.1	13.8	-0.93	372	102.9	14.0	-0.56
Stenquist.....	19	60.5	19.3	+4.17	235	59.7	17.3	-0.14
Bernreuter								
B1 - N	19	-72.8	75.2	-0.03	219	-48.7	82.3	+0.03
B2 - S	19	66.1	46.4	-0.25	219	38.3	48.2	+0.05
B4 - D.....	19	60.5	63.9	+0.40	219	42.1	61.0	+0.09

N: number. M: arithmetic mean. S.D: standard deviation. Sk: coefficient of skewness.

Table XXII. COMPARISON OF TEST-SHOWING OF RACIO-NATIONAL GROUPS.

Item	English-Scotch		English-Irish		English-Canadian	
	A	B	A	B	A	B
Age.....	3.1	66.4	2.4	55.9	7.2	68.4
Period in Canada*	5.1	67.8	6.0	73.8	—	—
Grades of School ..	0.4	42.4	1.7	59.7	0.0	40.0
Otis.....	1.0	47.9	0.6	56.0	0.9	47.9
Beta.....	1.0	34.7	3.5	71.6	0.3	47.1
Beta 4.....	0.4	47.0	2.6	68.0	1.2	57.0
Thurstone.....	1.1	66.3	—	—	0.2	55.1
N.I.I.P. Clerical...	2.5	18.1	—	—	2.8	27.0
New Stanford.....	2.2	40.0	2.3	61.7	1.0	44.6
Stenquist.....	0.2	52.0	6.8	94.4	3.5	44.7
Cox.....	1.0	61.5	—	—	1.2	53.3
O'Connor Blocks*	2.3	33.0	—	—	4.2	31.0
Tweezer Dexterity.	0.9	38.5	—	—	2.5	20.8
Bernreuter						
B1 - N.....	0.3	46.8	0.2	57.1	0.3	50.3
B2 - S.....	0.5	50.8	0.0	57.1	2.0	59.1
B4 - D.....	1.1	65.3	0.4	71.4	1.1	57.2

A: Ratio of difference between mean scores to σ diff.

B: Percentage of cases in second group to which 50 per cent. of first group are equal or superior.

*A denotes for this item the ratio of the difference between medians to its probable error.

Table XXII (continued). COMPARISON OF TEST-SHOWING OF RACIO-NATIONAL GROUPS.

Item	Scottish-Canadian		Irish-Canadian		American-Canadian	
	A	B	A	B	A	B
Age.....	2.5	59.0	2.9	61.9	2.3	65.3
Grades of School..	0.5	47.6	1.8	32.3	2.5	65.5
Otis.....	1.8	48.2	0.9	39.0	2.0	66.0
Beta.....	0.8	53.0	3.7	26.6	1.0	49.0
Beta 4.....	1.4	60.6	2.0	33.6	0.6	46.4
New Stanford....	1.5	54.3	2.7	25.0	1.5	71.1
Stenquist.....	2.4	34.0	9.6	8.0	0.2	34.5
Bernreuter						
B1 - N.....	0.5	53.8	0.3	42.0	1.3	60.3
B2 - S.....	0.9	58.3	0.6	56.1	2.5	73.5
B4 - D.....	0.4	46.3	0.0	52.5	1.3	56.0

Item	Scottish-Irish		English-American		Scottish-American		Irish-American	
	A	B	A	B	A	B	A	B
Age.....	1.1	44.5	1.4	52.7	0.6	42.7	0.3	47.8
Period in Canada*	1.9	60.9	5.6	19.5	8.3	9.1	8.8	6.4
Grades of School..	1.9	70.3	2.4	30.9	2.2	36.4	3.2	22.4
Otis.....	0.1	56.0	2.3	23.3	2.8	23.8	1.9	16.7
Beta.....	3.9	75.5	1.2	45.2	0.5	51.7	3.5	17.9
Beta 4.....	2.6	70.4	0.1	63.3	0.1	63.3	1.8	38.7
New Stanford....	3.3	81.3	1.9	27.8	0.7	33.7	3.1	18.1
Stenquist.....	6.1	94.4	1.5	52.6	1.3	47.4	5.1	7.9
Bernreuter								
B1 - N.....	0.0	64.3	1.4	36.8	1.5	47.4	1.2	15.8
B2 - S.....	0.2	57.1	1.4	26.3	1.6	26.3	0.8	15.8
B4 - D.....	0.2	35.7	0.8	52.6	1.4	31.6	0.9	36.8

A: Ratio of difference between mean scores to σ diff.

B: Percentage of cases in second group to which 50 per cent. of first group are equal or superior.

*A denotes for this item the ratio of the difference between means to its probable error.

Table XXIIIa. COMPARISON OF UNEMPLOYED GROUPS OF ENGLISH AND SCOTTISH BIRTH, MATCHED FOR AGE.

Test	English				Scottish				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comparative Percentage ^a
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	165	32.2	11.6	+0.85	165	32.2	11.6	+0.85	0.0	1.27	0.0	50.0
Period in Canada*.....	165	10.4	8.1	—	157	8.8	4.7	—	1.6	0.90	1.8	59.9
Grades of School.....	124	8.2	2.3	+0.64	143	8.5	2.2	+0.68	0.3	0.28	1.1	42.4
Otis.....	66	43.3	12.0	+0.38	90	40.4	12.5	+0.12	2.9	1.98	1.5	50.8
Beta.....	114	80.1	19.2	-0.19	96	82.8	16.9	-0.39	2.7	2.50	1.1	39.2
Beta 4.....	115	10.3	3.8	-0.32	100	10.7	3.7	-0.49	0.4	0.52	0.8	45.2
Thurstone.....	31	106.0	40.3	+0.77	35	120.0	30.5	-0.65	14.0	8.89	1.6	75.1
New Stanford.....	90	101.7	16.3	-0.61	103	105.1	12.7	-0.35	3.4	2.14	1.6	44.7
Stenquist.....	73	56.1	17.6	-0.14	66	54.1	16.7	+0.23	2.0	2.90	0.7	58.9
O'Connor Blocks*.....	23	4.13	2.46	—	35	4.31	1.63	—	0.18	0.72	0.3	54.3
Bernreuter												
B1 - N.....	48	-32.3	83.5	+0.26	62	-41.6	95.8	-0.49	9.3	17.12	0.5	45.2
B2 - S.....	48	48.9	54.9	-0.09	62	45.5	57.8	-0.23	3.4	10.80	0.3	50.6
B4 - D.....	48	44.6	58.4	-0.28	62	38.0	72.3	+0.28	6.6	12.46	0.5	64.5

RACIO-NATIONAL GROUPS

OCCUPATIONAL STATUS.

	A	B	C	D	E	NW	NS	Total
English.....	7.3	29.1	17.6	32.4	23.6	0	0	100
Scottish.....	6.7	30.3	29.1	22.4	10.3	0	1.2	100

For mean and standard deviation, median and quartile used; also P. E. diff. for σ diff.

^aSee footnote, Tables XVII, XVIII.

Table XXIIIb. COMPARISON OF UNEMPLOYED GROUPS OF ENGLISH AND CANADIAN BIRTH, MATCHED FOR AGE.

Test	English				Canadian				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comparative Percentage
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	347	34.0	12.0	—	347	34.0	12.0	+0.53	0.0	0.91	0.0	50.0
Grades of School.....	270	8.4	2.4	+0.88	260	8.3	2.8	+0.32	0.1	0.22	0.5	43.0
Otis.....	151	42.5	11.6	+0.31	169	41.6	10.8	+0.50	0.9	1.25	0.7	54.9
Beta.....	235	81.8	19.5	-0.21	226	77.3	20.1	-0.25	4.5	1.84	2.4	58.5
Beta 4.....	239	10.7	4.0	-0.30	236	9.5	4.0	-0.15	1.2	0.37	3.2	61.4
Thurstone.....	74	112.0	42.9	+0.78	78	114.0	38.7	+0.39	2.0	6.64	0.3	59.4
N.I.I.P. Clerical.....	30	42.5	23.6	+0.95	35	56.2	25.8	+0.57	13.7	6.13	2.2	26.6
New Stanford.....	208	101.9	14.4	-0.46	218	101.4	13.7	-0.59	0.5	1.36	0.4	51.4
Stenquist.....	161	54.5	17.7	-0.05	138	58.6	17.9	-0.12	4.1	2.07	2.0	41.5
Cox.....	10	10.2	3.6	-0.25	23	10.7	7.8	+0.73	0.5	1.99	0.2	58.7
O'Connor Blocks*	69	4.77	2.36	—	74	3.41	2.10	—	1.36	0.48	2.8	37.7
Tweezer Dexterity.....	16	7.13	1.30	+0.69	22	6.27	0.70	-0.04	0.86	0.36	2.4	22.7
Bernreuter												
B1 - N.....	114	-49.0	92.0	-0.15	116	-47.5	88.5	-0.27	1.5	11.91	0.1	49.1
B2 - S.....	114	49.6	52.0	-0.05	116	31.3	46.1	+0.08	18.3	6.25	2.9	62.5
B4 - D.....	114	53.1	60.5	-0.24	116	38.8	62.3	+0.51	13.3	7.76	1.7	58.0

OCCUPATIONAL STATUS.

	A	B	C	D	E	N.S.	N.W.	Total
English.....	6.2	31.4	20.0	25.1	16.7	0	0.6	100
Canadian.....	4.9	38.3	19.9	22.2	11.8	0.9	2.0	100

*For mean and standard deviation, median and quartile used; also P.E. diff. for σ diff.

Table XXIIIc. COMPARISON OF UNEMPLOYED GROUPS OF SCOTTISH AND CANADIAN BIRTH, MATCHED BY AGE GROUPS.

Test	Scottish				Canadian				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comparative Percentage
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	165	32.2	11.6	+0.85	331	32.2	11.6	+0.97	0.0	1.10	0.0	49.2
Grades of School.....	143	8.5	2.2	+0.68	257	8.2	2.8	+0.24	0.3	0.25	1.2	52.1
Otis.....	90	40.4	12.5	-0.12	167	41.7	11.0	+0.41	1.3	1.57	0.8	53.6
Beta.....	96	82.8	16.9	-0.39	210	79.8	20.0	-0.40	3.0	2.21	1.4	57.0
Beta 4.....	100	10.7	3.7	-0.49	221	9.8	4.1	0.00	0.9	0.46	2.0	60.3
Thurstone.....	35	120.0	30.5	-0.65	79	115.0	37.6	+0.53	5.0	6.68	0.8	29.0
N.I.I.P. Clerical.....	21	64.1	33.7	+0.16	34	57.7	27.1	-0.04	6.4	8.69	0.7	64.1
New Stanford.....	103	105.1	12.7	-0.35	210	101.4	13.9	-0.56	3.7	1.58	2.3	59.3
Stenquist.....	66	54.1	16.7	-0.23	143	59.4	18.1	-0.14	5.3	2.56	2.1	35.9
Cox.....	13	11.5	8.2	+0.91	21	11.5	8.1	+0.63	0.0	2.87	0.0	47.6
O'Connor Blocks*.....	35	4.31	1.63	—	73	3.44	1.88	—	0.87	0.44	2.0	38.9
Tweezer Dexterity.....	13	6.76	0.86	+0.45	19	6.10	0.65	0.17	0.66	0.28	2.4	15.8
Bernreuter												
B1 - N.....	62	-41.6	95.8	-0.49	112	-42.9	89.3	+0.03	1.3	14.80	0.1	53.0
B2 - S.....	62	45.5	57.8	0.23	112	32.2	49.2	+0.05	13.3	8.69	1.5	59.8
B4 - D.....	62	38.0	72.3	0.28	112	36.7	65.5	+0.09	1.3	11.07	0.1	51.6

OCCUPATIONAL STATUS.

	A	B	C	D	E	N.S.	N.W.	Total
Scottish.....	6.7	30.3	29.1	22.4	10.3	0.0	1.2	100
Canadian.....	5.2	40.0	20.0	20.0	11.5	1.2	2.1	100

*For mean and standard deviation, median and quartile used; also P.E. diff. for σ diff.

CHAPTER X

RELIEF GROUPS COMPARED WITH OTHER UNEMPLOYED.

THE men who composed Groups II (1932-33) and III (1933-34) could, on the basis of a distinction in the records of the employment bureau, be separated into two categories—those in receipt of relief, and those who while unemployed still had means of self-support. The relief assistance obtained took the form of a room and meals, in the case of unmarried men or those without dependents, or of small amounts of money, in the case of others. All individuals who were noted as not receiving relief assistance through this agency were not in receipt of assistance from any other organized source, so far as could be determined from the current practice of the unemployment relief authorities. As these relief and non-relief groups appeared to be quite clearly distinguished, a comparison is here made of their age, educational status, period of unemployment, and scores upon those tests which were administered to them.

In Tables XXIVa and XXVa the data are shown for the relief and non-relief groups of Group II, and in Tables XXIVb and XXVb similar data are shown for the same groups of Group III. Data from the two main groups II and III were not amalgamated in view of their possible heterogeneity. The extent of the differences in age, education, and test scores between the relief groups of Groups II and III, and between the non-relief groups from the same sources are shown in Tables XXVI and XXVII. Since significant differences were found between the mean age of relief and non-relief groups, further comparisons were made between these groups with age held constant. Such constancy of age distribution was assured by matching the two groups for age within five-year intervals. While this procedure re-

duced considerably the number of cases included within the groups compared, it was regarded as a necessary step. The comparative data for relief and non-relief groups matched as regards age are shown in Tables XXVa,b.

It may be noted from Table XXIVa that the relief group of Group II is significantly older than the non-relief group and has a mean score upon the Otis Test significantly lower than that of the non-relief group. The difference ratio of the latter comparison is heightened, however, by differences in skewness of the distributions involved. The non-relief group tends also to have higher scores upon the New Stanford Achievement Test, to be less self-sufficient, and to have been unemployed an average of nearly four months less than the relief group. The difference between the mean educational status of the two groups is insignificant, although it is in favour of the non-relief group. The distribution of grades of schooling completed of the relief group is skewed positively more than that of the non-relief group, however, which serves to explain in part the lack of significance in the difference between the means of the two groups. In terms of overlapping of distributions, the greatest difference between the two groups appears to lie in the superiority of the relief group as regards self-sufficiency (measured by the B2-S scale of the Bernreuter Personality Inventory). The remaining differences are of approximately equal degree. For what reason or reasons the self-sufficiency scores of 75 per cent. of the relief group should be equal to or above the median score of the non-relief group is not at once apparent. By the trait of self-sufficiency is meant the presence of a tendency in the individual to pursue his own affairs independently, without great encouragement, stimulation, sympathy, or assistance from others.¹ Superficially, this does not sound like a characteristic of those unemployed men

¹Bernreuter, R. G. "The Measurement of Self-Sufficiency." *Journal of Abnormal and Social Psychology*, Vol. 28 (1933-34), pp. 291-300.

who are on relief. On the other hand, it is possible that, being more self-sufficient, they are on relief because they tend not to have others (friends or immediate relatives) upon whom they can lean in times of stress. While such a tendency may not be the general rule, it may perhaps be true in a sufficient number of cases to bring about a perceptible difference in the average scores of the two groups which are compared.

When the same groups are compared in Table XXVa with age held constant by matching within five-year intervals the differences do not tend to be reduced, although their statistical significance is less, owing to the diminution of populations. No difference is now fully significant, although the difference ratios are still obscured by differences in skewness of the distributions. The greatest difference in terms of overlapping is now found in the greater emotional stability of the non-relief group (measured by the B1-N scale of the Bernreuter Inventory), for the median score of the relief group is equal or superior to only 28.6 per cent. of those of the non-relief group.

Turning to the comparison of relief and non-relief groups of Group III (Table XXIVb), it is found that the relief group still tends to be significantly older than the non-relief group. Similarly also, the mean scores of the non-relief group upon tests of intelligence and of clerical ability tend to be higher than those of the relief group. On the other hand, the educational status of the relief group is slightly superior. None of the differences except that with respect to age is statistically significant, however. The relief group has a median score of 3.10 upon the O'Connor Blocks Test which is almost significantly better than the median of 6.56 for the non-relief group, being equal or superior to 80.0 per cent. of the scores of those in the latter group upon this test. In addition, the relief group shows some tendency toward a superiority in tweezer

dexterity, its median score upon this test being equal or superior to 70.8 per cent. of the scores made by those of the non-relief group. No reliable differences are found between mean scores upon the three scales of the Bernreuter Personality Inventory. The difference between the median number of months of unemployment of the two groups is small and insignificant. The relief group tends to have been unemployed a somewhat shorter time, however, in contrast to its significantly greater period of unemployment in the case of Group II. It may be observed that, as in the case of the same group for Group II, the non-relief group contains many more individuals who have never worked regularly at any occupation, that is, individuals who have recently left school. This undoubtedly contributes largely to the differences in mean age, and possibly also to some of the differences in test scores. It is a factor which is largely eliminated by age-matching, however, as may be seen from the corresponding data for occupational class distribution in Tables XXIVb and XXVb.

When age is held constant for the relief and non-relief groups of Group III the changes in the relation of the mean scores of one group to those of the other are small, and are probably of no importance. None of the differences is significant statistically.

A comparison of the relief groups of Groups II and III shows no differences which are worthy of mention. The same comparison for non-relief groups provides again no fully significant differences, although one (upon the B2-S scale of the Bernreuter Personality Inventory) approaches significance: the non-relief group of Group III tends to be more self-sufficient than the non-relief group of Group II.

One of the chief factors which might be expected to be contributory toward forcing an unemployed man to seek relief assistance is the number of individuals who are economically dependent upon him. Accordingly, distributions of the number of dependents for the men of

Groups II and III in receipt and not in receipt of unemployment relief assistance are shown in Table XXVIII. Contrary to expectations, however, the mean number of dependents for the non-relief group is greater than for the relief group. This is consistently the case over the two years under review. In neither instance is the difference fully significant, although for Group II it is twice its standard error, and for Group III it is 1.1 times its standard error.¹ It is true that the relief group has a somewhat greater percentage of men having no dependents at all; but even if that portion of each group having no dependents is excluded in making the computation of the mean number of dependents, the relief groups still do not tend consistently to have a greater number of individuals dependent upon them.

It is not easy to account for this discrepancy between expectation and fact. The explanation which suggests itself as being the most probable is that among these groups those persons having dependents enjoy thereby a greater number of family connections and are more intimately connected with the community in which they live. This would imply that they might be able to turn to sources of assistance other than that of the agency at which they were registered at the time of the enquiry, and would tend to account for the relatively smaller number of men on relief having dependents. Conversely, men having no dependents might tend to have fewer connections by blood or friendship in the community, and might thereby be forced more easily to turn to an organized agency for assistance. This would tend to account for the greater proportion of men without dependents on relief.

A second hypothesis to explain the facts is that the dependents of some of the unemployed men, while legally

¹The standard deviation of each distribution, which is extremely skew, is taken as \sqrt{M} , following Yule, *Introduction to the Theory of Statistics*, (Griffin, London, 1922), p. 265. The standard error of the mean is derived by the usual formula, which is of general application. Cf. Yule, *op. cit.* p. 344.

such, are in reality at work, and aid materially in supporting the family. As there are more dependents in the case of those men not on relief than in the case of those in receipt of relief, this would serve in part to render more intelligible the difference in status of the two groups.

In order to take into account all factors other than period of unemployment¹ likely to have a bearing upon relief or non-relief status or upon test scores, the data for Groups II and III were pooled, and the relief and non-relief groups were matched for age, occupational status, and number of dependents. The comparative data for the relief and non-relief groups on this basis are shown in Table XXIX. It will be seen that no difference between the two groups is significant statistically. Further, the median of the relief group for each variable does not fall below the forty-first percentile or above the fifty-eighth percentile of the non-relief group. It must therefore be concluded that there are for these groups, matched for age, occupational status, and number of dependents, no distinct differences with respect to any of the other variables.

The most apparent and consistent differences between relief and non-relief groups from the present source is, then, the difference in age composition, which can in part be accounted for by the number of recent school graduates included in the latter group. Accompanying this is no significant difference in educational status, but there is a tendency, even after matching for age, for the non-relief group to have higher scores upon tests of intelligence, and in one instance to have relatively inferior scores upon the O'Connor Blocks Test. Differences in emotional stability and in self-sufficiency suggest themselves, but are not fully significant. There is no consistent difference between the two groups as regards the period of time that each tends to have been unemployed. It is found, however, that the

¹This could not be held constant, owing to the pooling of data of Groups II and III.

relief group as a whole in each of the two main groups has a smaller number of dependents. When the data for Groups II and III are pooled, and the relief and non-relief groups are matched for age, occupational status and number of dependents, no significant differences as regards any of the other variables are found.

Table XXIVa. COMPARISON OF TEST SCORES OBTAINED BY MEN ON RELIEF AND NOT ON RELIEF, RESPECTIVELY: GROUP II.

Test	Relief				Non-Relief				Diff. Between Means (a)	S.D. diff. (b)	Ratio of a:b	Comparative Percentage
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age (yrs.).....	97	35.8	12.8	+0.84	201	29.9	11.0	+0.87	5.9	1.52	3.9	64.2
Education (grades).....	88	9.2	2.5	+1.08	190	9.5	2.3	+0.65	0.3	0.32	0.9	38.7
Otis.....	91	37.6	12.4	-0.29	188	43.4	11.9	+0.13	5.8	1.56	3.7	40.2
New Stanford.....	89	100.1	13.3	-0.20	194	104.6	12.0	-0.33	4.5	1.65	2.7	37.3
Bernreuter												
B1 - N.....	34	-28.4	77.5	+0.13	48	-48.4	80.3	-0.43	20.0	17.63	1.1	37.5
B2 - S.....	34	56.5	47.7	-0.03	48	29.6	45.0	+0.36	26.9	10.45	2.6	75.0
B4 - D.....	34	45.4	55.8	-0.41	48	43.2	62.3	+0.15	2.2	13.13	0.2	56.3
Period Unemployed* (mths.).....	92	14.2	10.8	—	176	10.5	7.0	—	3.7	1.56	2.4	63.6
OCCUPATIONAL STATUS.												
	A	B	C	D	E	NW	NS	Total				
Relief Group.....	11	46	16	20	3	1	0	97				
Non-Relief Group.....	17	118	21	22	3	13	7	201				

*For mean and standard deviation, median and quartile used; also P.E. diff. for σ diff.

Table XXIVb. COMPARISON OF TEST SCORES OBTAINED BY MEN ON RELIEF AND NOT ON RELIEF, RESPECTIVELY: GROUP III.

Test	Relief				Non-Relief				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comparative Percentage
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	63	37.9	14.0	+0.86	134	29.7	11.0	+1.04	8.2	1.99	4.1	69.3
Education.....	59	9.5	3.1	+0.68	131	9.2	2.3	+0.13	0.3	0.46	0.7	46.9
Otis.....	44	38.1	12.1	+0.10	128	41.3	11.1	+0.16	3.2	2.07	1.5	39.8
Beta.....	23	89.5	16.0	+0.13	55	91.3	12.2	-0.34	1.8	3.73	0.5	33.8
Beta 4.....	34	12.5	3.6	+0.17	78	12.0	3.3	0.00	0.5	0.72	0.7	54.6
Thurstone.....	9	103.0	29.5	-1.22	24	100.4	33.8	+0.83	2.6	12.01	0.2	37.5
N.I.I.P. Clerical.....	32	66.6	26.6	+0.41	51	68.0	28.1	+0.12	1.4	6.13	0.2	43.1
New Stanford.....	46	99.6	15.0	-0.74	128	105.0	12.4	-0.58	5.4	2.47	2.2	35.6
Cox.....	15	12.0	7.7	0.00	36	12.4	7.3	+0.86	0.4	2.33	0.2	58.3
O'Connor Blocks*	11	3.10	1.72	—	27	6.56	3.08	—	3.46	0.99	3.5	80.0
Tweezer Dexterity.....	10	6.15	0.70	+0.51	24	6.57	0.87	+0.34	0.42	0.28	1.5	70.8
Bernreuter												
B1 - N.....	40	-59.2	88.0	+0.48	87	-72.5	81.0	+0.11	13.3	16.40	0.8	37.7
B2 - S.....	40	46.6	50.6	-0.35	87	51.8	53.8	-0.40	5.2	9.86	0.5	46.6
B4 - D.....	40	51.9	64.4	-0.38	87	57.8	60.0	-0.38	5.9	12.03	0.5	48.3
Period Unemployed*.....	54	14.6	10.1	—	108	16.9	8.6	—	2.3	2.00	1.2	44.1

OCCUPATIONAL STATUS.

	A	B	C	D	E	NW	NS	Total
Relief Group.....	13	30	5	13	—	1	1	63
Non-Relief Group.....	14	73	14	9	2	19	2	133

*For mean and standard deviation, median and quartile used; also P.E. diff. for σ diff.

Table XXVa. COMPARISON OF TEST SCORES OBTAINED BY MEN ON RELIEF AND NOT ON RELIEF, FROM GROUP II, MATCHED FOR AGE.

Test	Relief				Non-Relief				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comparative Percentage
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	88	33.7	10.8	+0.83	88	33.7	10.8	+0.83	—	—	—	50.0
Education.....	82	9.2	2.5	+1.10	81	9.4	2.4	+0.75	0.2	0.37	0.5	42.2
Otis.....	82	38.0	12.5	-0.02	81	42.8	10.9	+0.33	4.8	1.84	2.6	39.4
New Stanford.....	80	101.2	13.6	-0.40	84	104.4	11.0	-0.25	3.2	1.94	1.7	42.1
Bernreuter												
B1 - N.....	30	-30.5	83.3	+0.20	21	-71.3	68.8	-0.03	40.8	21.36	1.9	28.6
B2 - S.....	30	59.0	46.2	+0.13	21	33.0	52.5	+0.69	26.0	14.23	1.8	65.7
B4 - D.....	30	45.5	56.3	+0.40	21	49.9	57.0	+0.32	4.4	16.13	0.3	54.8
Period Unemployed*.....	83	14.4	10.9	—	79	9.7	8.1	—	4.7	1.88	2.5	68.6

	OCCUPATIONAL STATUS.								
	A	B	C	D	E	NW	NS	Total	
Relief Group.....	10	41	16	17	3	0	1	88	
Non-Relief Group.....	6	58	11	7	0	2	4	88	

*For mean and standard deviation, median and quartile used; also P.E. diff. for σ diff.

Table XXVb. COMPARISON OF TEST SCORES OBTAINED BY MEN ON RELIEF AND NOT ON RELIEF, FROM GROUP III, MATCHED FOR AGE.

Test	Relief				Non-Relief				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comparative Percentage
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	54	33.8	10.3	+0.96	54	33.8	10.3	+0.96	—	—	—	50.0
Education.....	50	9.1	3.0	+0.80	53	9.0	2.3	+0.39	0.1	0.53	0.2	46.2
Otis.....	38	38.4	12.2	+0.10	51	40.8	11.5	-0.31	2.4	2.55	0.9	45.3
Beta.....	22	89.1	16.3	+0.29	22	91.4	9.7	-0.19	2.3	4.03	0.6	27.3
Beta 4.....	32	12.1	3.9	+0.31	31	11.1	3.4	+0.09	1.0	0.91	1.1	62.9
Thurstone.....	9	103.0	29.5	-1.22	10	107.5	43.0	+0.77	4.5	16.78	0.3	40.0
N.I.I.P. Clerical.....	31	64.7	24.2	+0.36	15	66.8	33.5	+0.34	2.1	9.69	0.2	46.7
New Stanford.....	42	99.1	15.2	-0.67	50	102.4	14.0	-0.56	3.3	3.08	1.1	41.0
Cox.....	14	12.8	7.4	+0.32	13	12.3	5.8	+1.10	0.5	2.53	0.2	64.3
O'Connor Blocks*	10	3.10	1.82	—	12	6.01	4.50	—	2.91	1.77	1.6	66.7
Tweezer Dexterity.....	8	5.87	0.50	+0.66	10	6.44	0.95	+0.28	0.57	0.35	1.6	80.0
Bernreuter.....												
B1 - N.....	38	-55.8	90.8	+0.47	36	-55.4	73.3	+0.22	0.4	19.13	0.0	48.1
B2 - S.....	38	43.1	49.5	-0.48	36	59.7	51.0	-0.46	16.6	11.69	1.4	37.8
B4 - D.....	38	50.5	62.8	-0.37	36	48.0	57.6	+0.16	2.5	13.99	0.2	55.0
Period Unemployed*.....	48	14.1	9.6	—	52	16.4	10.7	—	2.3	2.54	0.9	44.0

OCCUPATIONAL STATUS

Relief Group.....	A	B	C	D	E	NW	NS	Total
Relief Group.....	11	23	5	13	0	1	1	54
Non-Relief Group.....	8	31	7	5	1	2	0	54

*For mean and standard deviation, median and quartile used; also P.E. diff. for σ diff.

Table XXVI. COMPARISON OF TEST SCORES OBTAINED BY MEN ON RELIEF, GROUPS II AND III.

Test	Group II				Group III				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comparative Percentage
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	97	35.8	12.8	+0.84	63	37.9	14.0	+0.86	2.1	2.19	1.0	46.2
Education.....	88	9.2	2.5	+1.08	59	9.5	3.1	+0.68	0.3	0.49	0.6	45.4
Otis.....	91	37.6	12.4	-0.29	44	38.1	12.1	+0.10	0.5	2.24	0.2	55.5
New Stanford.....	89	100.1	13.3	-0.20	46	99.6	15.0	-0.74	0.5	2.62	0.2	46.5
Bernreuter												
B1 - N.....	34	-28.4	77.5	+0.13	40	-59.2	88.0	+0.48	30.8	19.24	1.6	40.0
B2 - S.....	34	56.5	47.7	-0.03	40	46.6	50.6	-0.35	9.9	11.44	0.9	57.5
B4 - D.....	34	45.4	55.8	-0.41	40	51.9	64.4	-0.38	6.5	13.96	0.5	43.1

OCCUPATIONAL STATUS.

	A	B	C	D	E	NW	NS	Total
Relief Group II.....	11	46	16	20	3	1	0	97
Relief Group III.....	13	30	5	13	0	1	1	63

RELIEF AND NON-RELIEF GROUPS

Table XXVII. COMPARISON OF TEST SCORES OBTAINED BY NON-DEPENDENT MEN IN GROUPS II AND III.

Test	Group II				Group III				Diff. Between Means (a)	S.D. diff. (b)	Ratio of a:b	Comparative Percentage
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	201	29.9	11.0	+0.87	134	29.7	11.0	+1.04	0.2	1.21	0.2	52.7
Education.....	190	9.5	2.3	+0.65	131	9.2	2.3	+0.13	0.3	0.26	1.2	48.9
Otis.....	188	43.4	11.9	+0.13	128	41.3	11.1	+0.16	2.1	1.31	1.6	57.7
Beta.....	27	88.4	15.2	-0.93	55	91.3	12.2	-0.34	2.9	3.36	0.9	52.2
Beta 4.....	27	10.2	3.2	-1.31	78	11.5	3.3	0.00	1.3	0.72	1.8	51.5
Thurstone.....	20	106.1	30.3	-0.49	24	100.4	3.4	+0.83	5.7	9.67	0.6	37.5
New Stanford.....	194	104.6	12.0	-0.33	128	105.0	12.4	-0.58	0.4	1.39	0.3	43.7
Stenquist.....	21	54.8	16.7	-0.40	44	55.1	19.7	+0.02	0.3	4.70	0.1	55.5
Bernreuter	48	-48.4	80.3	-0.43	87	-72.5	81.0	+0.11	24.1	14.48	1.7	44.6
B2 - S.....	48	29.6	45.0	+0.36	87	51.8	53.8	-0.40	22.4	8.69	2.6	31.8
B4 - D.....	48	43.2	62.3	+0.15	87	57.8	60.0	-0.38	14.6	11.05	1.3	38.7

OCCUPATIONAL STATUS.

	A	B	C	D	E	NW	NS	Total
Non-Relief Group II....	17	118	21	22	3	13	7	201
Non-Relief Group III....	14	73	14	9	2	19	2	133

RELIEF AND NON-RELIEF GROUPS

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Table XXVIII. COMPARISON OF THE NUMBER OF DEPENDENTS OF MEN ON RELIEF AND NOT ON RELIEF RESPECTIVELY, GROUPS II AND III.

Number of Dependents	Group II		Group III	
	Relief	Non-Relief	Relief	Non-Relief
0	66	118	37	86
1	8	21	8	16
2	8	25	8	13
3	2	12	3	8
4	3	9	2	9
5	2	5	0	3
6	1	1	0	0
7	1	2	0	0
8	1	1	0	0
N.S.....	5	7	5	1
Total.....	97	201	63	136
Total Number Stating Number of Dependents....	92	194	58	135
Total Number of Dependents	73	196	41	117
Mean Number of Dependents	0.79	1.01	0.71	0.87
Difference of Means.....	0.22		0.16	
Standard Error of Difference.	0.11		0.14	
Ratio of Difference to Standard Error.....	2.0		1.1	
Chances of a True Difference Greater Than Zero, of 100.	98		86	

Table XXIX. COMPARISON OF RELIEF AND NON-RELIEF GROUPS OF GROUPS II AND III COMBINED, MATCHED FOR AGE, NUMBER OF DEPENDENTS, AND OCCUPATIONAL STATUS.

Test	On Relief				Non-Relief				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comparative Percentage
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	126	33.4	11.4	+0.97	126	33.4	11.4	+0.97	0.0	1.02	0.0	50.0
Education.....	117	9.2	2.6	+1.02	120	9.4	2.3	+0.71	0.2	0.32	0.6	45.0
Otis.....	110	100.8	14.4	-0.54	123	104.1	13.2	-0.50	3.3	1.81	1.9	41.1
New Stanford.....	109	39.1	11.5	+0.11	119	42.1	11.1	+0.16	3.0	1.49	2.0	41.8
Bernreuter												
B1 - N.....	64	-46.6	84.3	+0.03	64	-59.5	78.3	+0.09	12.9	14.39	0.9	46.0
B2 - S.....	64	50.9	50.1	-0.16	64	41.0	55.5	+0.11	9.9	9.35	1.1	57.6
B4 - D.....	64	48.8	57.8	-0.47	64	43.9	61.4	+0.13	4.9	10.06	0.5	55.6
Number of Dependents...	125	0.82	0.91	—	125	0.81	0.90	—	0.01	0.11	0.1	—
OCCUPATIONAL STATUS.												
	A	B	C	D	E	NW	NS	Total				
Relief Group.....	20	59	16	26	3	1	1	126				
Non-Relief Group.....	18	62	19	22	3	1	1	126				

CHAPTER XI.

THE RELATIONSHIP OF AGE AND REGENCY OF EMPLOYMENT TO TEST MEASURES.

a. THE INFLUENCE OF AGE.

It has been shown by several investigators in the past that beyond the age of twenty or thereabouts there is associated with increasing years a decline in scores upon tests of intelligence.¹ This negative relationship between age and test scores becomes particularly pronounced when individuals beyond the age of sixty are included in the calculations, and may yield a coefficient as high as $-.50^2$. In the present instance, correlation of test scores with age ranges from $-.009$ to $-.519$, the most extreme negative correlation being found between age and total score upon Revised Beta Examination. The only other available data bearing on the relation between the age and measured traits of unemployed men are those provided in the course of research at the Employment Stabilization Research Institute of the University of Minnesota. These data indicate that groups of clerical workers over 40 years of age tend to have lower median scores upon tests of intelligence, clerical ability, manual dexterity, and mechanical ability than groups below the age of 40 years.³ The rate of decline of average test scores with increasing age appears to vary, however, for different functions. Similarly, in the case of the Minnesota

¹It is not necessarily to be concluded that such a decline in test scores with age involves a similar decline in ability. Inferior selection of older groups may distort the data, and the factors of interest and motivation may not be constant. Cf. Freeman, F. S. *Individual Differences*. (Henry Holt, N.Y., 1934), Chap. 8.

²Freeman, F. S., *op. cit.*, pp. 263-273. It is worth noting that even a correlation coefficient of $-.50$ permits of much departure from the main trend, such that a number of older men may be superior to men many years younger.

³Chase, W. P. and Darley, J. G. *Age Changes and Occupational Test Scores Among Clerical Workers*. Bulletins of the Employment Stabilization Research Institute of the University of Minnesota, Vol. III, No. 4, pp. 167-175. Minneapolis, August, 1934.

standard sample of unemployed men all coefficients of correlation between age and test measures are negative, varying from $-.09$ to $-.41$ ¹ With the Duluth casual labour group a general negative relation was found between age and test scores, the greatest distinction in level of ability occurring between men of age 19 to 39 years and men of age 40 years and over.²

The relation between recency of employment and test scores of unemployed men is less well known. Among the Duluth casual labour group, the only distinct differences between the group unemployed for less than four months and the group unemployed for over one year lay in the greater physical strength (measured by the hand dynamometer) and lesser age of the former group.³ There existed a tendency, but neither a marked nor a statistically significant one, for the group unemployed the longer period to have inferior scores upon tests of intelligence, manual dexterity, and clerical and mechanical ability. No difference was found as regards scores upon the Bernreuter Personality Inventory.

In investigating the bearing of age and recency of employment upon test scores in the present instance, the data pertaining to each of several groups of unemployed men have been kept distinct, in order to obviate the possible spurious effects which might otherwise be obtained. In making comparisons, the procedure follows that of the Minnesota investigators in their study of the Duluth casual labour group. From each main group two smaller groups, one at each extreme as regards age or recency of employment (as the case may be), have been selected and compared. Usually the first and third quartiles of the total dis-

¹Darley, J. G. and Rempel, H. D. *Intercorrelations of the Test Scores Made by Individuals in the Standard Samples*. Bulletins of the Employment Stabilization Research Institute of the University of Minnesota, Vol. III, No. 4, p. 201. Minneapolis, August, 1934.

²Hansen, A. H., Trabue, M. R., and Diehl, H. S. *The Duluth Casual Labour Group*. Bulletins of the Employment Stabilization Research Institute of the University of Minnesota, Vol. I, No. 3, p. 189. Minneapolis, March, 1932.

³*Op. cit.*, p. 189.

tribution of the main variable in question (age or recency of employment) have been chosen as the boundary-lines for the two sub-groups, one including all cases below the first quartile and the other all cases above the third quartile. For each test the difference between the mean scores of the two sub-groups is compared with the standard error of the difference, the resulting ratio being an indication of the statistical significance of the difference. In addition, the percentage of cases of one group to which the median score of the other sub-group is equal or superior is shown.

In Tables XXX(a-e) sub-groups I, II, III, IV and V are compared with respect to age. The data of Groups VI and VII are not included owing to the relatively small populations which would be available. With almost entire consistency, the sub-groups of younger men of the five groups of unemployed have higher mean scores upon tests of intelligence, educational achievement, and clerical ability. The superiority of the younger group, when indicated in terms of the percentage of cases in the older group to which the median of the younger is equal or superior, appears to be most complete in the case of the Otis Test and total score upon Revised Beta Examination. In Group I, principally composed of office workers, the median score of the older group upon the Stenquist Mechanical Aptitude Test equals or exceeds the score of 67.4 per cent. of the younger group. On the other hand, only 37.9 per cent. of those of the older sub-group of Group V (composed mostly of semi-skilled and unskilled workers) attain the median score of the younger group in the Stenquist Test. This contrasting trend of Group I may be owing to several causes: to the presence in the younger group of Group I of a number of individuals who have recently left school, and who have had less opportunity to gain mechanical experience; or to the fact that the age limits are different for Groups I and V; or to the possibility that a real decline is to be found only in the case of general intelligence, of which the Stenquist

test tends to constitute a measure in the case of Group V, which is of relatively inferior intelligence.

In every instance the younger sub-group tends to have been unemployed for a shorter period of time than the older sub-group. In three cases out of four, the older sub-group has a slightly higher formal educational status (represented by the number of grades of schooling completed), while in the fourth the two sub-groups are approximately equal.¹ Only a few of the differences which are found as regards education, period of unemployment, and test scores are fully significant statistically when taken alone. Differences in recency of employment (in favour of the younger sub-group) are 1.7, 1.6, 1.4, 3.5, and 6.0 times their probable errors. In Group I, the difference between the sub-groups as regards scores upon Beta Examination is 3.6 times its standard error; and in Groups IV and V the difference ratios are 3.5 and 4.2. In Groups II and III no difference is fully significant, although several are probably true differences. There are no significant or near-significant differences in scores upon the Bernreuter Personality Inventory, and the trend of observed differences is not altogether consistent. In Group I, one difference for the Allport-Vernon Study of Values nears significance (having a difference ratio of 2.8): the younger group of unemployed men tends to have a greater "economic" interest.

Two conclusions, at least, appear to be clear as regards age differences. Younger unemployed men of these samples tend to have higher scores upon tests of intelligence, and may thereby be characterized by greater mental alertness. They tend also to have been employed more recently. It seems probable, further, that the older unemployed men have had slightly more formal schooling than the younger. Statistically, however, this is less sure, and in addition may be owing to the greater influence on the older men of elapsed time and the desire to "make a good showing". The con-

¹In the case of Group V, no data concerning educational status were secured.

ditions underlying the differences between younger and older groups in recency of employment are not readily apparent. When those who have had no occupational experience are disregarded, there is no large or consistent difference between the two sets of sub-groups in occupational status, with consequent variation in employment conditions. Neither is it possible to discover, at least by cursory inspection, any consistent difference in work-histories such as to suggest that the older group would be more mobile or accustomed to work of a casual variety. It seems probable that the difference may most reasonably be attributed to the frequent tendency to discharge older men when they have lost some of the alertness, agility, and physical strength of youth, and to the greater difficulty which the older man experiences in securing a new job after having been discharged.

b. THE INFLUENCE OF THE PERIOD OF UNEMPLOYMENT.

In Tables XXXI(a-e) are shown, for Groups I to V, comparisons of sub-groups segregated on the basis of recency of employment. There may be found no consistent or significant differences as regards the number of grades of schooling completed. But throughout, the sub-groups more recently employed tend to have higher or better scores upon tests of intelligence, educational achievement, and clerical ability. In the two groups in which the Stenquist Mechanical Aptitude Test was given, the direction of the difference varies; neither difference, however, is of statistical significance. No difference in the mean scores upon the Bernreuter Personality Inventory is fully significant, although there is a tendency for the sub-groups more recently employed to exhibit somewhat greater emotional stability, self-sufficiency, and dominance. The sub-groups more recently employed have a consistently lower mean age than those less recently employed. This difference, which varies from 3.7 to 8.3 years among the five groups, is

statistically significant in three cases of five. No difference in regard to the Allport-Vernon Study of Values nears significance. There is a slight tendency for the less recently employed sub-group of Group I to show greater interest in religious values than the more recently employed.

The consistent variation one with the other of age and recency of employment suggests that the differences found between the more and the less recently employed sub-groups of Tables XXXI(a-e) are owing in reality to the underlying differences in age-composition of these groups. That is, the less recently employed may not be of lower intelligence owing to a tendency for the less intelligent men to be discharged first in time of depression—as one hypothesis might suggest—but may tend simply to have lower scores upon tests of intelligence because of the more numerous inclusion in the less recently employed sub-groups of men of relatively advanced age. To test these hypotheses, the opposing sub-groups may be matched for age-composition, and the presence or absence of any residual differences may be noted. The data for such sub-groups of Groups I and V, matched in five-year intervals for age, are shown in Tables XXXIIa,b. It may be observed that the differences which remain between the means of the sub-groups are generally smaller, and the overlapping of the distributions somewhat greater. No difference now remains significant, but this, unfortunately, is owing in part to the diminished populations, which could not bear much further reduction. The majority of the original differences are still in the same direction, suggesting a somewhat superior intelligence on the part of the sub-groups more recently employed, but it is a debatable question whether these small differences are owing to the persistent effect of chance fluctuation or to a real residual factor or factors. Only with data for samples of much greater size can this question be settled.

Further data bearing indirectly upon the relation of recency of employment to test measures are furnished by

registration figures for individuals of Groups I and II at the employment office which constituted the source of these groups. These data refer to the date upon which each individual of Groups I and II was first registered at the placement office. They are not available for members of Group II, although that group was derived from the same source, because by that time (the autumn of 1933) complications of first and second re-registration (beyond the initial registration, and after temporary employment) has set in. The correlation of date of registration with age, education, recency of employment, and test scores is shown in Table XXXIII for each group separately. In the case of Group I, correlations between date of registration and test scores and education were positive, indicating a tendency for registrants to have higher educational status and test scores. None of these coefficients was significant, however. Age and recency of employment correlated negatively with date of registration, on the other hand, suggesting that the later registrants tended to be younger and to have been employed less recently. Again, neither coefficient was statistically significant. In the case of Group II, all test scores correlated positively with date of registration, but again no coefficient was significant. Age and education correlated negatively with date of registration. These correlations also were not beyond the range of chance fluctuation. For this group, the only significant correlation was that between date of registration and recency of employment ($+0.291 \pm 0.041$), which suggested a slight probability among the more recent registrants to have been more recently employed.

The data of Groups I and II were also combined, so far as was possible, and the correlations between date of registration and the other variables were recomputed. This combination of data of the two groups, (see Table XXXIII) set up a number of conflicting results, apparently because the tendency of one group was sometimes contrary to that of the

other. Age, for example, while negatively (although insignificantly) correlated with date of registration in the case of Groups I and II separately, became positively and significantly correlated with date of registration after the date of Groups I and II were combined. This was apparently because the later group was appreciably older, on an average, than the earlier group. Again, while there was an insignificant negative correlation between date of registration and recency of employment for Group I, the significant positive correlation appearing for Group II was sufficiently strong in its trend to make the correlation for the combined groups positive, although lower than for Group II.

In general, therefore, there is practically no relationship to be found between date of registration at the employment office in question and the other variables. Only one coefficient of correlation is significant, namely, that between date of registration and recency of employment in the case of Group II. When Groups I and II are combined, age bears a significant positive relation to date of registration (indicating the older to be more recently registered), although the correlation is very low. In view, however, of the contrasting tendencies displayed in this respect by the constituent groups, it is difficult to regard any conclusions derived from this fact as warrantable.

Table XXXa. COMPARISON OF SELECTED GROUPS OF OLDER AND YOUNGER MEN IN GROUP I.

Test	Men Aged 33 and Over				Men Aged 20 and Under				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Period Unemployed*.....	70	9.0	7.0	—	60	7.0	3.0	—	2.0	1.15	1.7	70.0
Education.....	73	9.5	2.1	+0.58	74	9.2	2.2	+0.04	0.3	0.35	0.9	52.7
Otis.....	72	41.5	11.4	+0.39	69	45.1	12.0	+0.03	3.6	1.97	1.8	37.7
Beta.....	43	86.4	14.1	-0.13	48	96.9	13.9	+0.09	10.5	2.94	3.6	27.1
Beta, Test 4.....	43	10.4	3.6	+0.17	48	11.9	3.4	-0.44	1.5	0.74	2.0	30.8
Thurstone.....	45	110.3	34.9	+0.34	47	107.7	31.8	+0.68	2.6	6.97	0.4	38.8
New Stanford.....	55	108.0	10.7	-0.56	53	109.2	8.4	-0.29	1.2	1.84	0.6	50.0
Stenquist.....	37	55.7	15.8	-0.63	43	54.2	14.4	+0.46	1.5	3.41	0.4	67.4
Bernreuter B1 - N.....	60	-47.2	88.0	-0.24	59	-36.7	83.3	+0.27	10.5	15.83	0.7	55.6
B2 - S.....	60	45.3	53.3	-0.17	59	40.1	54.5	+0.09	5.2	9.87	0.5	58.0
B4 - D.....	60	50.5	63.0	+0.26	59	38.8	59.3	-0.12	11.7	11.22	1.0	67.8
Study of values:												
Theoretical.....	64	31.3	6.0	+0.15	66	32.8	6.8	+0.13	1.5	1.13	1.3	42.4
Economic.....	64	30.8	7.6	-0.47	66	34.1	5.8	+0.05	3.3	1.19	2.8	34.8
Aesthetic.....	64	23.7	8.0	+0.26	66	21.9	6.5	-0.05	1.8	1.28	1.4	59.1
Social.....	64	31.8	5.8	-0.62	66	30.0	6.9	+0.22	1.8	1.12	1.6	65.1
Political.....	64	30.4	7.0	-0.39	66	31.2	5.6	+0.11	0.8	1.12	0.7	60.6
Religious.....	64	32.1	8.8	-0.14	66	30.7	7.8	-0.19	1.4	1.46	1.0	59.8

OCCUPATIONAL STATUS.

	A	B	C	D	E	Not Worked	Total
Group 1: 33 and over.....	4	61	4	4	0	0	73
Group 2: 20 and under.....	0	54	1	8	0	12	75

*For mean and standard deviation, read median and quartile. For σ diff. read P. E. diff.

Table XXXb. COMPARISON OF SELECTED GROUPS OF OLDER AND YOUNGER MEN IN GROUP II.

Test	Men Aged 39 and Over				Men Aged 21 and Under				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Period Unemployed*.....	69	13.5	9.5	—	58	10.5	7.5	—	3.0	1.89	1.6	60.3
Education.....	68	9.8	2.7	+0.28	70	8.9	1.7	+0.52	0.9	0.39	2.3	65.7
Otis.....	75	37.4	11.9	+0.23	69	42.7	12.7	+0.17	5.3	2.05	2.6	31.9
New Stanford.....	72	101.6	12.9	+0.56	71	103.3	11.0	+0.08	1.7	2.01	0.8	46.5
Bernreuter B1 - N.....	22	-16.1	78.8	+0.14	16	-22.4	62.5	-1.32	5.3	22.95	0.3	40.6
B2 - S.....	22	25.0	64.9	+0.03	16	19.4	28.0	-0.39	5.6	15.53	0.4	56.3
B4 - D.....	22	12.5	67.4	-0.40	16	17.5	42.9	-0.07	5.0	17.90	0.3	56.3

OCCUPATIONAL STATUS.							
	A	B	C	D	E	Not Worked	Total
Group 1: 39 and over.....	6	53	8	9	0	0	76
Group 2: 21 and under.....	0	42	5	12	1	13	73

*For mean and standard deviation, read median and quartile. For σ diff. read P. E. diff.

Table XXXc. COMPARISON OF SELECTED GROUPS OF OLDER AND YOUNGER MEN IN GROUP III.

Test	Men Aged 45 and Over				Men Aged 25 and Under				Diff. Between Means (a)	D. S. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Period Unemployed*.....	54	18.8	9.6	—	32	25.0	19.4	—	6.2	4.60	1.4	64.8
Education.....	78	9.1	1.8	+0.17	36	10.0	3.1	-0.29	0.9	0.55	1.6	71.4
Otis.....	72	42.5	10.8	+0.39	30	38.2	11.0	+0.30	4.3	2.38	1.8	36.2
Beta.....	35	93.3	12.6	+0.12	13	90.7	12.1	-0.30	2.6	4.00	0.7	45.7
Beta, Test 4.....	47	11.9	3.2	+0.09	15	11.5	3.9	-0.23	0.4	1.21	0.3	50.6
New Stanford.....	74	105.0	11.1	-0.57	31	103.2	13.4	-0.90	1.8	2.73	0.7	50.5
Bernreuter B1 - N.....	50	-76.5	83.3	-0.41	17	-73.3	85.8	-1.97	3.2	23.48	0.1	59.4
B2 - S.....	50	51.2	45.9	-0.41	17	52.1	49.5	-0.56	0.9	13.65	0.1	53.0
B4 - D.....	50	64.4	64.5	-0.10	17	64.5	57.3	-0.16	0.1	16.10	0.0	51.0

OCCUPATIONAL STATUS.

	A	B	C	D	E	Not Worked	Total
Group 1: 45 and over.....	4	50	7	4	1	13	78
Group 2: 25 and under.....	10	22	2	4	0	0	38

*For mean and standard deviation, read median and quartile. For σ diff. read P. E. diff.

Table XXXd. COMPARISON OF SELECTED GROUPS OF OLDER AND YOUNGER MEN IN GROUP IV.

Test	Men Aged 36 and Over				Men Aged 22 and Under				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Period Unemployed*.....	56	12.0	5.5	—	55	8.0	4.0	—	4.0	1.14	3.5	76.4
Education.....	54	7.1	2.1	-0.14	57	7.2	1.7	—	0.1	0.37	0.3	47.4
Beta.....	52	72.0	22.0	-0.75	53	84.6	13.8	-0.30	12.6	3.59	3.5	24.5
Beta, Test 4.....	52	9.0	4.0	—	53	10.8	3.6	+0.55	1.8	0.74	2.4	35.8

OCCUPATIONAL STATUS.						
	A	B	C	D	E	Total
Group 1: 36 and over.....	0	5	17	17	19	58
Group 2: 22 and under.....	0	5	18	18	18	59

*For mean and standard deviation, read median and quartile. For σ diff. read P. E. diff.

Table XXXc. COMPARISON OF SELECTED GROUPS OF OLDER AND YOUNGER MEN IN GROUP V.

Test	Men Aged 44 and Over				Men Aged 27 and Under				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Period Unemployed*.....	133	30.0	10.3	—	139	21.0	9.0	—	9.0	1.49	6.0	78.4
Beta.....	121	63.1	20.9	-0.13	132	73.0	18.5	-0.08	9.9	2.49	4.0	31.1
Beta, Test 4.....	121	7.9	3.4	-0.27	132	9.2	3.8	-0.23	1.3	0.45	2.9	37.9
Stenquist.....	41	45.8	16.0	-0.41	58	51.4	14.7	-0.12	5.6	3.16	1.8	41.4

OCCUPATIONAL STATUS.							
	A	B	C	D	E	Total	
Group 1: 44 and over.....	1	6	32	28	74	141	
Group 2: 27 and under.....	0	4	19	22	102	147	

*For mean and standard deviation, read median and quartile. For σ diff. read P. E. diff.

Table XXXIa. COMPARISON OF SELECTED GROUPS ACCORDING TO THEIR PERIOD OF UNEMPLOYMENT, GROUP I.

Test	Men Unemployed One Year or More				Men Unemployed Four Months or Less				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	80	30.8	9.0	+0.93	78	27.1	10.7	+0.70	3.7	1.58	2.3	62.8
Education.....	80	9.2	2.2	+0.41	77	9.4	2.3	+0.39	0.2	0.36	0.7	46.8
Otis.....	75	40.6	11.4	-0.11	75	45.0	11.3	0.00	4.4	1.84	2.4	38.7
Beta.....	39	89.5	12.4	0.00	55	95.6	13.6	-0.08	6.1	2.71	2.3	27.3
Beta, Test 4.....	39	11.3	3.2	-0.09	55	12.0	3.6	-0.58	0.7	0.71	1.0	41.5
Thurstone.....	44	117.1	40.9	+0.59	47	98.6	30.3	+0.85	18.5	7.60	2.4	30.2
New Stanford.....	50	106.0	11.7	-0.64	59	110.5	9.2	-0.49	4.5	2.05	2.2	32.2
Stenquist.....	35	59.0	15.5	-0.19	50	53.8	15.5	-0.23	5.2	3.42	1.5	62.0
Bernreuter B1-N.....	62	-28.2	87.5	-0.08	61	-33.1	84.5	+0.10	4.9	15.57	0.3	50.8
B2-S.....	62	35.1	52.2	-0.14	61	43.7	59.0	-0.25	8.6	10.15	0.9	45.1
B4-D.....	62	40.4	60.5	+0.27	61	38.4	63.0	+0.28	2.0	11.14	0.2	50.0
Study of values:												
Theoretical.....	73	31.7	5.8	-0.10	63	32.3	7.8	+0.27	0.6	1.20	0.5	51.9
Economic.....	73	32.3	7.0	-0.22	63	33.3	7.0	+0.09	1.0	1.20	0.8	47.9
Aesthetic.....	73	23.3	8.1	+0.33	63	24.5	8.5	+0.64	1.2	1.43	0.8	48.3
Social.....	73	30.4	6.6	+0.23	63	31.2	6.5	0.00	0.8	1.13	0.7	40.8
Political.....	73	31.6	6.7	-0.31	63	31.4	6.1	+0.44	0.2	1.10	0.2	62.7
Religious.....	73	31.5	7.5	+0.12	63	28.3	8.1	+0.26	3.2	1.35	2.4	64.1

OCCUPATIONAL STATUS.

	A	B	C	D	E	Total
Group 1: Unemployed 1 yr. or more.....	2	64	6	8	0	80
Group 2: Unemployed 4 mths. or less.....	3	65	2	7	0	77

Table XXXIb. COMPARISON OF SELECTED GROUPS ACCORDING TO THEIR PERIOD OF UNEMPLOYMENT, GROUP II.

Test	Men Unemployed 2 Years or More				Men Unemployed 6 Months or Less				Diff. Be- tween Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	68	35.9	12.6	+0.21	53	29.2	10.2	+0.65	6.7	2.05	3.3	73.6
Education.....	60	9.3	2.7	+1.22	52	9.2	1.9	+0.32	0.1	0.44	0.2	37.7
Otis.....	63	38.0	11.8	+0.25	52	45.5	11.3	-0.40	7.5	2.19	3.4	28.8
New Stanford.....	63	99.9	13.3	+0.09	54	106.6	10.4	-0.69	6.7	2.19	3.1	20.4
Bernreuter B1-N.....	22	50.5	81.8	+0.48	16	59.9	56.5	-0.80	9.4	22.39	0.4	25.0
B2-S.....	22	44.5	49.7	-0.15	16	48.6	49.0	-0.58	4.1	16.19	0.2	43.8
B4-D.....	22	40.7	66.1	+0.33	16	44.7	46.8	-0.66	4.0	18.31	0.2	43.8

OCCUPATIONAL STATUS.

	A	B	C	D	E	Total
Group 1: Unemployed 2 yrs. or more.....	4	42	8	13	0	67
Group 2: Unemployed 6 mths. or less.....	1	41	5	7	0	54

AGE AND REGENCY OF EMPLOYMENT

Table XXXIc. COMPARISON OF SELECTED GROUPS ACCORDING TO THEIR PERIOD OF UNEMPLOYMENT, GROUP III.

Test	Men Unemployed 30 Months or More				Men Unemployed 10 Months or Less				Diff. Be- tween Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	41	37.0	14.6	+0.51	47	30.8	9.4	+0.86	6.2	2.77	2.2	74.7
Education.....	37	9.3	2.8	+0.22	47	9.0	2.2	+0.67	0.3	0.56	0.5	61.1
Otis.....	34	40.1	9.7	+0.56	43	43.3	13.0	+0.18	3.2	2.58	1.2	33.3
New Stanford.....	34	103.6	13.2	-0.18	42	106.5	12.4	-0.58	2.9	3.13	0.9	32.1
Bernreuter B1-N.....	22	-27.8	89.5	-0.73	31	-86.4	72.8	-0.31	58.6	23.16	2.5	35.5
B2-S.....	22	39.4	65.6	+0.43	31	59.3	57.0	-0.17	19.1	15.18	1.3	29.0
B4-D.....	22	30.5	61.9	-0.34	31	61.4	57.7	-0.16	30.9	16.69	1.9	33.9

OCCUPATIONAL STATUS.

	A	B	C	D	E	Total
Group 1: Unemployed 30 mths. or more.....	6	26	5	3	1	41
Group 2: Unemployed 10 mths. or less.....	6	30	5	5	1	47

Table XXXId. COMPARISON OF SELECTED GROUPS ACCORDING TO THEIR PERIOD OF UNEMPLOYMENT, GROUP IV.

Test	Men Unemployed 18 Months or More				Men Unemployed 6 Months or Less				Diff. Be- tween Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	52	33.2	10.6	+0.76	57	26.5	7.2	+1.04	6.7	1.75	3.8	73.7
Education.....	48	7.1	2.0	0.00	55	7.2	1.7	0.00	0.1	0.37	0.3	44.0
Beta.....	42	73.2	19.5	-0.43	54	81.6	16.4	-0.35	8.4	3.74	2.2	38.9
Beta, Test 4.....	42	7.9	4.0	-0.23	54	9.7	3.8	+0.32	1.8	0.80	2.3	37.4

OCCUPATIONAL STATUS.						
	A	B	C	D	E	Total
Group 1: Unemployed 18 months or more.....	0	3	16	15	18	52
Group 2: Unemployed 6 months or less.....	0	5	10	24	18	57

Table XXXIc. COMPARISON OF SELECTED GROUPS ACCORDING TO THEIR PERIOD OF UNEMPLOYMENT, GROUP V.

Test	Men Unemployed 3 Years or More				Men Unemployed 15 Months or Less				Diff. Be- tween Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	156	39.3	12.2	+0.30	120	31.0	11.4	+0.53	8.2	1.43	5.7	80.0
Beta.....	138	61.7	22.3	+0.03	108	69.5	19.3	-0.39	7.8	2.69	2.9	32.4
Beta, Test 4.....	138	7.6	3.4	-0.18	108	8.7	4.1	-0.07	1.1	0.49	2.2	40.2
Stenquist.....	51	46.1	19.9	-0.29	42	52.5	14.3	0.00	6.4	3.56	1.8	38.1

OCCUPATIONAL STATUS.						
	A	B	C	D	E	Total
Group 1: Unemployed 3 years or more.....	0	5	23	22	106	156
Group 2: Unemployed 15 months or less.....	1	5	25	30	60	121

Table XXXIII. COMPARISON OF SELECTED GROUPS ACCORDING TO THEIR PERIOD OF UNEMPLOYMENT, MATCHED FOR AGE, GROUP I.

Test	Men Unemployed 1 Year or More				Men Unemployed 4 Months or Less				Diff. Between Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Education.....	64	9.4	2.2	+0.14	64	9.4	2.3	+0.53	0.0	0.40	0.0	55.6
Otis.....	59	42.9	11.1	+0.43	62	46.1	12.3	+0.44	3.2	2.17	1.5	43.5
Beta.....	32	92.5	12.8	+0.70	45	92.7	15.1	+0.04	0.2	3.19	0.1	38.9
Beta, Test 4.....	32	11.8	3.4	+0.27	45	11.6	3.7	-0.48	0.2	0.81	0.2	46.7
Thurstone.....	34	107.7	27.7	+0.16	35	104.3	38.1	+0.33	3.4	8.01	0.4	42.3
New Stanford.....	40	108.2	9.4	-0.26	44	110.1	9.5	-0.41	1.9	2.08	0.9	47.7
Stenquist.....	28	58.4	15.2	+0.41	38	54.0	15.5	-0.19	4.4	3.81	1.2	52.1
Bernreuter B1 - N.....	63	-23.7	85.0	-0.29	61	-34.3	85.0	+0.14	10.6	15.28	0.7	50.7
B2 - S.....	63	33.6	48.5	-0.36	61	43.2	59.6	-0.30	9.6	9.78	1.0	44.1
B4 - D.....	63	38.0	61.0	+0.08	61	38.4	64.5	+0.27	0.4	11.28	0.0	51.3
Study of Values:												
Theoretical.....	58	30.9	6.2	+0.15	48	32.9	8.0	+0.34	2.0	1.40	1.4	44.2
Economic.....	58	32.7	6.5	+0.09	48	32.2	6.8	+0.04	0.5	1.30	0.4	51.0
Aesthetic.....	58	23.1	7.2	+0.29	48	24.1	8.1	+0.56	1.0	1.49	0.7	48.8
Social.....	58	29.1	6.1	+1.32	48	31.3	6.7	+0.04	2.2	1.26	1.8	17.9
Political.....	58	31.9	6.5	+0.14	48	31.4	6.3	+0.22	0.5	1.25	0.4	57.1
Religious.....	58	31.8	7.8	+0.16	48	28.3	8.5	+0.25	3.5	1.60	2.2	65.4

OCCUPATIONAL STATUS.

	A	B	C	D	E	Total
Group 1: Unemployed 1 year or more.....	2	49	6	7	0	64
Group 2: Unemployed 4 months or less.....	3	51	2	8	0	64

Table XXXIIb. COMPARISON OF SELECTED GROUPS ACCORDING TO THEIR PERIOD OF UNEMPLOYMENT, MATCHED FOR AGE, GROUP II.

Test	Men Unemployed 3 Years or More				Men Unemployed 15 Months or Less				Diff. Be- tween Means (a)	S. D. diff. (b)	Ratio of a:b	Comp. P.C.
	No.	Mean	S.D.	Sk.	No.	Mean	S.D.	Sk.				
Age.....	100	33.3	10.1	+0.24	100	33.3	10.1	+0.24	0.0	1.43	0.0	50.0
Beta.....	90	64.7	22.8	+0.18	93	67.9	18.8	-0.06	3.2	3.09	1.0	37.3
Beta, Test 4.....	90	7.7	3.9	-0.15	93	8.4	3.7	-0.16	0.7	0.57	1.2	41.1
Stenquist.....	44	47.8	21.1	-0.37	28	54.8	15.8	-0.04	7.0	4.21	1.6	36.8

OCCUPATIONAL STATUS.						
	A	B	C	D	E	Total
Group 1: Unemployed 3 years or more.....	0	5	11	21	63	100
Group 2: Unemployed 15 months or less.....	1	4	16	29	50	100

Table XXXIII. COEFFICIENTS OF CORRELATION BETWEEN TIME OF REGISTRATION, REGENCY OF EMPLOYMENT, AGE, EDUCATION AND TEST SCORES.

Test	Group I			Group II			Groups I and II	
	Mean	r	PE _r	Mean	r	PE _r	r	PE _r
Age.....	27.7	-.088	.043	32.2	-.071	.041	.154	.029
Recency of Employment*....	9.9	-.110	.037	17.1	.291	.041	.234	.029
Grades of School.....	9.4	.015	.043	9.4	-.013	.043	-.021	.030
Otis.....	43.3	.126	.044	41.7	.067	.042	-.025	.031
New Stanford.....	108.4	.138	.050	103.9	.030	.042	-.168	.031
Bernreuter B1-N.....	-41.3	.031	.049	-33.3	.147	.076	.021	.041
Beta.....	—	.059	.055	—	—	—	—	—
Beta, Test 4.....	—	.086	.055	—	—	—	—	—
Thurstone.....	—	.021	.055	—	—	—	—	—
Stenquist.....	—	.026	.059	—	—	—	—	—
O'Connor Blocks.....	—	.104	.074	—	—	—	—	—

*Number of months unemployed. An upward adjustment of 14 months was required for this group on combination with Group II, in order that both might have a common base-date.

CHAPTER XII.

SUMMARY AND CONCLUSIONS.

THE present investigation was devised in order to study the level and relationship of certain occupational abilities of groups of employed and unemployed men in Montreal, and the bearing of age, education, nationality, length of unemployment, and other personal factors upon these abilities. Facts of this kind, if their collection can be continued, can eventually be brought into close relation to the theory and practice of vocational guidance and systematized employment placement. While the approach toward the problem in this volume has been largely a statistical one, it is clear that an orderly attempt to appraise the occupational qualifications of the individual demands in practice the use of clinical psychological methods as well. The findings of this study must be interpreted as having strict application only to the particular data on which they are based, and then only in consideration of several difficulties of sampling and treatment of the data of the investigation. Of these difficulties, the most prominent is that of sampling, as almost all subjects of the study were secured on the basis of their own individual interest and willingness to participate in the proceedings: though certain indirect checks can be provided in studying the adequacy of sampling of the sources of unemployed groups. Even though these checks suggest a not altogether unsatisfactory sampling, however, they do not provide complete means of treatment of the data to make them representative of the entire body of unemployed workers of Montreal.

In the present investigation, a number of well-authenticated psychological tests were used in examining the general mental level and the special aptitudes and personal traits of the unemployed men specially studied.

These tests were not unrelated measures, but on the contrary tended to overlap appreciably; as such they might theoretically be described in terms of three independent factors of measurement, plus specific characteristics for each test. These three factors, after appropriate statistical treatment, have been tentatively labelled as factors of intellectual penetration, verbal ability, and personality. It was impossible to use this factorial analysis in later treatment of test results, however, owing to inability to isolate and control the influence of each of the several factors. The factor solution is therefore left as a matter of record only.

SUMMARY OF TEST RESULTS.

The seven groups of unemployed men examined varied considerably in their level of general mental ability, educational status, and special aptitudes, and in the occupational classes which they represented. They tended to be slightly younger, on an average, than their source-groups, and there were some abnormalities of sampling according to country of birth. In educational status they were satisfactorily similar to their sources. Three groups, mainly of office workers, appeared to be above the average of the population in intelligence, education, and scholastic achievement, and to be of average level in clerical ability and mechanical ability. They tended, however, to be slightly upon the neurotic, self-sufficient, and submissive side of personality deviation, according to Bernreuter norms. One group of unemployed workers was on the whole inferior, being drawn from a largely manual labour class population. Two groups were of approximately average level, and one other group was of average level but was definitely known to be an unfair sample of its source. An attempt was made to construct, on the basis of Dominion Census data of 1931, distributions of education and test scores for the group of unemployed wage-earners of Montreal City dealt with by the Census statistics. These distributions tentatively suggested a level

of intelligence and education not far removed from normal, and probably normal mechanical ability. Somewhat inferior clerical ability and emotional stability appeared to be characteristic of the group as well. But the general deviation from normal in no case appeared to be great.

When the data for unemployed workers were segregated by fourteen occupational groups, a number of systematic and significant differences were found. The level of education and scores upon tests of intelligence and educational achievement tended to vary concomitantly with the level of occupation, being highest for professional, and lowest for unskilled workers. The best clerical test scores were found for accountants, with engineers, draughtsmen and office clerks following. Scores upon tests of mechanical ability tended to be highest for those groups of occupations which are ordinarily regarded as requiring the greatest amount of mechanical skill—professional engineers and certain classes of skilled trades workers. On the other hand, mechanical ability was of average level only in the case of office clerks, salesmen, and other groups of clerical or non-technical workers. Certain significant differences were found upon the Bernreuter Personality Inventory. Engineers and unskilled workers tended to be lacking in emotional stability, while salesmen, accountants, and certain groups of skilled workers appeared to possess a greater degree of emotional stability than the other occupational groups. The Allport-Vernon Study of Values was found to be of little use in discriminating the present groups.

A comparison of employed and unemployed office clerks provided a basis for the conclusion that the employed group tended to be slightly older, to be of higher educational status, to have higher scores upon tests of intelligence and clerical ability, and to be emotionally more stable. When age was held constant for the two groups, significant differences were still found: the employed group was of higher educational status, tended to be more self-sufficient, and had

better scores upon the paper formboard test (Test 4) of Revised Beta Examination. The differences, however, while in favor of the employed group, were not great, and there was moreover some reason to believe that the employed group constituted a rather superior sample group of office clerks.

The study of English-speaking racio-national groups among the unemployed (distinguishing those born in Canada, the United States, England, Scotland, and Ireland) brought to view a number of differences. The American-born group was superior to the others in respect of educational status, intelligence test scores, and possibly also emotional stability. It was also, however, the foreign-born group of longest residence in Canada, a fact which conceivably may have some inter-causal connection. The English, Scottish, and Canadian-born groups appeared to be fairly similar, except that the last showed some tendency to be superior to the others in scores upon tests of mechanical ability. The Irish-born group, which was the one of least residence in Canada, tended to be inferior to the other groups in respect of all traits measured.

A comparison of groups of unemployed men in receipt and not in receipt of unemployment relief was made. This comparison indicated that the relief groups were appreciably older, owing in part to the presence of many recent school graduates in the non-relief groups. There was a tendency, even after matching for age, for the relief groups to show as slightly inferior in intelligence, and possibly in respect of other traits as well. Most of the differences, however, tended to lose significance after matching for age.

When the numbers of dependents for the relief and non-relief groups were computed, it was discovered, contrary to expectation, that the latter groups possessed a greater number of dependents per person. Two hypotheses were advanced to account for this. It was suggested that those unemployed men who had families might be more likely to

be able to turn to friends and relations for assistance rather than to be forced to go to relief authorities. In addition, it seemed possible that some of the so-called dependents might actually be working and aiding to support the household. On the other hand, single men might lack sources other than that of organized relief to which to turn, and having no immediate family, would ordinarily have no source of income other than their own wages or salary. When the two relief groups were pooled to form a total relief group, and the two non-relief groups were similarly brought together, and when the two final groups were matched for age, occupational status, and number of dependents, none of the differences in education or test-scores was significant.

The age of unemployed men was found to vary inversely in a consistent manner with their scores upon tests of intelligence and with recency of employment. It tended on the whole to bear no trustworthy relation to education, mechanical ability, or personality deviations. Recency of employment tended to be accompanied by higher scores upon tests of intelligence, educational achievement, and clerical ability. Some slight evidence was found also for a positive relation between recency of employment and scores upon the Bernreuter Personality Inventory. As it seemed probable that the differences accompanying variation in recency of employment were in reality owing to differences in the age-composition of groups more and less recently employed, a comparison was made of such groups with age held constant. The results of this comparison were equivocal, however, owing to the relatively small samples which were involved. Only one significant correlation coefficient was found when the date of registration at the employment office was correlated with other variables for two groups. This indicated a slight tendency toward a positive relation between date of registration and recency of employment.

FUTURE APPLICATIONS.

It is believed that the present investigation, in addition to presenting some new factual data relating to the unemployed, may be of some value in suggesting the uses of psychological test methods in studying occupational characteristics and differences. The application of such methods, carefully tempered by the clinical experience of an examiner who realizes their possibilities and limitations, may provide a valuable supplement to the ordinary means of appraising the qualifications requisite in workers in different field of commercial and industrial activity.

It is apparent, on the other hand, that in the advanced study of occupational specifications and occupational classification one of the most urgent necessities is the development of suitable criteria of job satisfaction and competency. It is imperative that further studies should deal aggressively with this important factor, and that they should in addition pay considerable attention to the problem of the relation of personal capacity to training and finished skill. The present study, at least so far as it relates to the topic of job classification, is one which might be termed "static" in approach, as it was intended to be in the main a survey. Studies of a "functional" character, involving the investigation of individuals through time, of the process of growth, and of training and adjustment in their occupations, are the next steps which are necessary in order to make additions to our body of practical knowledge.

Another aspect of the picture relates to the use of psychological test methods in the work of evaluating and adjusting the individual, having in mind the qualities which he will be called upon to display in types of work which may be available for him. Illustrations of the use made of the psychological examination in this connection, and of the additional light which it may throw upon the individual's qualities, are afforded in the case studies appended to this

chapter. The use of the psychological examination occurs principally in juvenile vocational and educational guidance, to some extent also in employment selection where more than one level or variety of work may be offered to a candidate, and in the adult adjustment work of the better-organized public employment offices. The last-named field seems at the moment to be one in which the greatest immediate development is likely to occur. As the authors of a recent report¹ dealing with the aims, methods, and potential social value of the public employment service point out, certain well-selected psychological and trade tests appear now to be adequate for use as tools in the vocational counselling and placement procedures of such offices, providing the tests are used by trained people. With a growing tendency toward the expansion of organized public employment services, both for their own sake and because they constitute an indispensable factor in projected schemes of unemployment insurance, it is to be hoped that the use of suitable test measures in selection and guidance will also increase.

¹Hopkins, J. T., et al. *The Emergence of a New Public Employment Service*. Public Employment Center of Rochester, N.Y., 1935, pp. 50, 136-150.

OCCUPATIONAL CASE STUDIES

OCCUPATIONAL CASE STUDIES.

A presentation of statistical evidence regarding the level and distribution of abilities of unemployed workers, and the inter-relation of these abilities with other relevant factors, is basic to any major conclusions which may be made about the status of such a group from the psychological point of view. The statistical approach to this problem is justified by its objectivity and the breadth of its application. Nevertheless, it is admittedly often lacking in personal warmth and colour, for it purports to show the "dry bones" of the general trend, with—at its best—only proportional regard to the circumstances, complications, and personal values of the individual case. In seeking a systematic outlook upon the group as a whole, the integral personality of the individual is inevitably lost. The present section, with its emphasis upon the vocational background and prospect of the single person, is designed in part to remedy this deficiency.

The fourteen case histories which are briefly recorded in the following pages are not intended to be regarded as providing a sufficient basis for generalized conclusions on the causes of unemployment, the level of abilities, or the types of adjustment problems encountered among unemployed men as a group in Montreal. While selected from many others of which they are largely typical, there is no way to show that they are strictly and completely representative of the unemployed group as a whole. Whatever their natural deficiencies in this respect, it is expected that they may have certain merits. They suggest, for example, something of the range of occupational experience and ability which may be found in such a group as is dealt with in the body of the present study. They indicate as well the manner in which a blending of ordinary facts and psychological test data, viewed as a whole from a clinical point of view, may be ac-

completed in appraising the individual. In addition, they tend to show the individualized character of the treatment of these men which is likely to be necessary whenever the question of re-employment on any considerable scale arises. It will be realized, of course, that in each case many interesting, and sometimes important, details have either been telescoped into a curt summary or are passed over without mention owing to the necessary brevity of the sketch. Full consideration of the qualities of an individual perhaps demands nothing short of the presence of the individual himself. Further, not all desirable facts have been shown, either because they were not obtained or fully recorded as a result of inevitable limitations upon the time allowed for interview and examination, or because they could not be secured except through other means of painstaking enquiry.

The case-histories have been grouped into three major categories according to the degree of promise which the persons concerned show for training or employment. While this classification is an arbitrary one, it is made as strictly as possible in accordance with all the known facts of each case. In the first group fall those individuals whose vocational assets seem positively to outweigh any personal liabilities which they may possess, and who may be thought of as good employment risks. In the second group are those who display general competence or evidence of some special skill or aptitude, or who may under normal conditions be expected to fit in more or less adequately in some job, yet who display some obvious liability which is likely to act as a conditioning or limiting factor. Often this failing is a personality weakness or an undesirable temperamental trait. In the third class are examples of cases where there is apparent general incompetence or practical disability for work, save of a rudimentary or closely supervised kind. It is clear that while the classification tends at its extremes to correspond to the limits of an occupational scale, this is not its primary object, but occurs merely because those persons fitting into

better-grade or more highly skilled occupations are generally those who give more definite evidence of capacity. Furthermore, this correspondence between classification by employability and the occupational scale is not a close one, since considerable variation will be found in occupational level within the scope of a single group. There is also a slight, yet perceptible, relation between employability-classes and age, such that older individuals have been referred, with somewhat greater frequency, to the second and third groups. This is undoubtedly due to the general retarding effect of added years, which often makes competition for employment following displacement more severe for older persons. Here, too, there are exceptions, however, for this is a tendency rather than an inexorable rule. Cases 11 and 14 may be compared in the light of this statement.

While in each case a general summing-up with reference to employment is made, it is thought undesirable to undertake any detailed and specific recommendations for placement, since to such a considerable degree these must depend upon the opportunities and standards for employment and the facilities for training which are prevalent at the time. For example, at a time when labour of an ordinarily marketable level of skill tends to be scarce, an employer may be justified in hiring and training an individual even of inferior ability if otherwise the prospective task is to go unperformed. Similarly, where an individual displays some aptitude the realization of which is likely to depend upon opportunities for suitable training, but this training is unavailable, the resources which the individual brings with him to the labour market can only include this aptitude conditionally. And as, under present circumstances, the most pressing need of each unemployed worker appears to be not to secure work which will in the long run provide the most fruitful returns to himself, to his employer, and to society, but rather to get any work which involves immediate monetary gain, secondary skills and fortuitous circumstances often dictate

what work he shall do. So long as this necessity tends largely to control the situation, precise recommendations for immediate employment are somewhat gratuitous in the present context.

The order of development of each case-history comprehends four main steps. The first is a brief outline of the personal details of the case: age, origin, education and training, occupational experience, etc. The second step consists in a résumé of the principal facts observed concerning the individual's behaviour, with special reference to traits of personality and character, during the period of interview and examination: and a notation of his chief interests. The third section relates to test scores and other quantitative data. A brief interpretation of these is made to save the reader from the necessity of consulting other portions of the report for norms. Where such norms have been indicated for the first few cases, however, they have not always been shown for the later cases. The final stage is a summary of the chief facts of the case considered with a view to choice of the most suitable general kinds of training or employment. Such a summary is made, of course, within the limits of the restricting factors to which reference is made in the preceding paragraph.

CLASS I. CASES SHOWING GOOD PROMISE OF EMPLOYABILITY.

Case 1: Charles A....., age 19 years.

A..... had been unemployed at time of examination for four or five months. He had been born in Montreal of English parents, and had gone to school until he completed Grade Six and a part of the seventh grade (the last of the elementary series), at the age of fifteen. A..... apparently had left school for several reasons: he had disliked the irksomeness of school discipline, and had consequently been a year or more retarded. Too, he had trouble with his teacher, finally resulting in his suspension from school. All his friends were working and were to that extent masters of their own destiny, a situation in which he rather envied them. Economic circumstances contributed to school leaving also, for his father, a stores-keeper in a garage, was not earning a great deal to support a wife and four children. Through a friend of his mother's A..... started to work in 1929 as a "coffee boy" in a sandwich shop, his duties being mainly to remove dirty dishes and maintain a supply of clean ones at the counter. He worked here for several months, then left when he had an opportunity to become an apprentice in a carpentry shop. Although he earned somewhat less at this at first, he liked the work and felt that he was "getting somewhere" by learning a trade. After a year and eight or nine months, however, he was laid off as a result of the steadily decreasing volume of construction work, and he was without work for several months. To make matters worse, his father died, leaving the mother a small amount of insurance, insufficient, however, to guarantee support of the family. Finally A..... picked up work as a "red cap" at a suburban railroad station, and this kept him going through the summer of 1932. When the fall came, he was laid off again, but through the early winter had work

for two or three weeks a month as a labourer on the railroad tracks, doing maintenance repair. This ended in January, 1933, however, and since then he had nothing whatsoever to do. A younger brother, aged fourteen, was now working as a grocer's delivery boy, but was earning very little, and the family was contemplating "going on relief", as no resources were left. Two sisters, aged twelve and sixteen, were in school, and making fair progress.

A.....'s appearance was rather attractive: tall, slim, rather shabbily, but neatly dressed, an open, frank, and surprisingly cheerful manner. He told his story, more or less spontaneously, with a little questioning, in rather poor English. He had a fair vocabulary, but was lacking in knowledge of grammar, and spelled atrociously. His approach toward the examiner was rather aggressive, and he was in no way over-awed by the solemnity of the occasion. His vocational ambitions were precise enough: he wanted to be either a machinist or a carpenter, because "they were good trades" and because he liked working with his hands, with tools, or with machinery, and as a boy had found this much more interesting than school work. While apprenticed as a carpenter, he had started to take an evening course in a technical school in practical mechanics, but had to give it up when shortly afterwards he was laid off. Lately he had started a correspondence course in draughting and mechanical design, apparently having gathered enough money together to make a down-payment on the course, and he had hopes that he might continue it. He was not interested in office-work, nor did any other kind of "white-collar" job appeal to him, as he did not want to work under the confinement of an office desk. Naturally, he said that he would take any job he could get.

The impression that A was of fair alertness was confirmed by a score of 128 on Army Alpha Examination, equivalent to a position in the general population of the 90th or 91st percentile. Similarly, he had a score of

98 on Beta Examination, lying at the top of "B" class. Scores upon single tests of the New Stanford Achievement Test suggested that his best subjects (of those measured) were geography, word meaning, and arithmetic; his poorest, spelling and language usage. This agreed in part with a statement that he liked best in school the subjects of arithmetic, spelling and geography. On the Thurstone Clerical Test he had a total score of 121 ("inferior"), having only an average number of errors, but requiring nearly an hour and a half to complete the test.

The superficial impression of A.....'s personality was ratified by his scores upon the Bernreuter Personality Inventory: his score upon the "neurotic tendency" scale (B1-N) lay at the 6th percentile—indicating much better than average stability. His score on the self-sufficiency scale lay at the 55th percentile; and that on the dominance-submission scale at the 73rd percentile, which tended to suggest greater than average aggressiveness.

A..... shone at his best on tests of mechanical aptitude. On the O'Connor Blocks his mean weighted score was 1.06, lying well up in the top ten per cent., while he took as little as twenty-five seconds (on the third trial) to assemble the blocks. Throughout he worked with no effort: the blocks appeared to whip themselves rapidly into shape, and he thought it "easy". On the Stenquist Mechanical Aptitude Test I he had 86 out of 95 items correct, and appeared to have a very good knowledge of the relations of mechanical devices such as were shown here. On the Minnesota Paper Formboard "A" he tried 48 out of 54 items, and had 47 of these correct—a much better than average score. His mechanical aptitude was consistently to be rated at a high level.

To sum up there appears to be here a case of a boy with clear vocational ambitions, which he has on several occasions made some spontaneous effort to satisfy, but which have not yet received much fulfilment. He has an apparently

marked "mechanical" bent, both as regards interest and aptitude; a history of trouble in school, owing, it seems, to a chafing at school discipline and inability, perhaps mutual, for his teacher and himself to get along; a distaste for office work and an inferior capacity for it; yet a rather high level of intelligence, with no great verbal handicap; an aggressive, open manner and a good degree of self-possession. He would seem to be a fair risk for technical education, perhaps with emphasis at first on the "practical" side and with some degree of independence in his work.

Case 2: Lloyd B....., age 40 years.

Born in Wales, B..... was at the time of examination nearing his forty-first year. His father, manager of a small shipping firm, had kept him in school until he was fifteen years old, when he had completed elementary grades and had taken one or two years of secondary education. He was then sent to business school, where he spent three years (from 1910 to 1913) in studying business methods, book-keeping, typing and shorthand. At the end of this period, B..... went to work as a stenographer and junior clerk, his choice of situation again being determined by his father. After two years he took an opportunity to work in the purser's department of a P. & O. liner, which soon after became a hospital ship. There he got a training in government routine in office work which he felt afforded him a valuable experience, and at the close of the war he became a full-fledged ship's purser. He left the work in 1921, however, got married, and went to South America as an accountant for a trading company, signing a five-year contract, including six months' holidays at the end of the period. When his contract was up, he returned to England, and after his furlough returned abroad, this time as accountant for a firm of textile merchants with a colonial office. He stayed abroad until the fall of 1934, leaving before the end of his

contractual period owing to a severe heart condition. When B..... reached England, he was told that he must live in a drier climate, and so, leaving his wife in England with relatives, he came to Canada. For some months he was unemployed, then got work as a night watchman in a warehouse, which he retained, but with which he was dissatisfied. When interviewed B..... was looking for something better in the line of his former work.

B..... had a very pleasant and agreeable manner, a good voice with traces of a fair education, and appeared to be quite alert. While at first a little nervous, he soon got over it, and seemed quite self-possessed. On the whole, he made a decidedly good personal impression as regards his general capability and resource. He hoped to find office work, and thought that he was good for little else, as he was not physically fit to engage in any strenuous work requiring much activity, nor had he any interests or training in work other than accountancy or clerical duties. He had no special hobbies, and appeared to spend most of his spare time at present in reading. He had little leisure, however, as he worked twelve hours per night.

On the Otis Self-Administering Test (Higher, Form "A") B..... had a score of 46, which was approximately at the average level of those engaged in office work at a clerical or sub-managerial level. On Revised Beta Examination he scored 90 (B). On the N.I.I.P. Clerical Test he scored 106.0, which was much above average. On the sub-test of arithmetic computation he had a perfect score, completing every item correctly in slightly less than the time limit for the test. An average score for a white-collar group on this sub-test is about 12.0 as compared with his 30.0.

On tests of typing and stenography B..... showed that he could type forty words per minute with quite fair accuracy, but could take at dictation only some thirty to thirty-five words per minute with subsequent ease of

transcription. This latter record, he felt, constituted quite a loss of ability, as after leaving school he had been able to take 130 words per minute at dictation. He had used his acquired skill little since that time.

On the O'Connor Blocks Test he was given a single trial, in which he required some ten minutes to assemble the materials. As his performance was so utterly inept and lacking in insight into what he was doing, he was given no further trials. He distinctly could not visualize the material tri-dimensionally nor isolate in any way the function of each type of block to be assembled. He acknowledged, in addition, that he had never had any inclination whatsoever to mechanical or technical work.

On the whole, therefore, in addition to having a pleasing type of personality, free for the most part from any instability or lack of confidence, he was of better than average intelligence, and had a very high level of clerical aptitude. This last was true especially with regard to handling of figures, in which a year's inactivity had caused so little slackness that he overshot the limits of a well-designed test. His use of the typewriter was quite adept, and his knowledge of stenography, though faded from disuse, by no means so completely forgotten that with a brief period of practice it could easily be revived.

His level of mechanical aptitude, as gauged by his performance upon the O'Connor Blocks Test, was very low. This was of small significance, however, as no necessity for any form of re-training in which mechanical aptitude would be essential suggested itself, and in any case, such training would have been impossible to procure. B.....'s greatest vocational potentialities seemed undoubtedly to lie in the line of his previous profession, or in work, say, as a statistical clerk, where he might make use of his facility in handling figures. Beyond any doubt his ability was being wasted as a night watchman.

Case 3: John C....., age 44 years.

Born in Wales in 1889, C..... had been for twenty-five years a coal miner, although recently, with the advent of the depression of the industry in Great Britain, he had turned carpenter. His father, originally a farmer, had been a coal miner also, but when C..... was growing up, was injured in a mine accident, and had not worked since that time. C..... went to school until he completed the seventh standard, at the age of thirteen. He then went into the mines as a pitboy to help support his family, comprising his parents and six other children, of whom two elder brothers and a sister were working. He continued to work as a miner, although in the years between 1921 and 1924 he took evening courses at technical school in mathematics, surveying, and cabinet-making, without completing all the classes. From 1924 to 1927 he worked also in his spare time as an insurance agent, selling a little to acquaintances "on the side" in order to add to his income. In 1928 he gave up coal mining, and turned carpenter, relying for his success largely upon a spare-time hobby of cabinet-making. He worked more or less successfully at this from 1928 to 1930, earning about £10 per month. At the end of this time decided to come to Canada to better his fortunes, and brought here his wife and two children. He stayed in Montreal, and for the first year worked quite regularly on construction, but thereafter only sporadically. In the spring of 1933 he was on relief.

A small, dark, wiry man, C..... was a trifle shy and uncommunicative, and most of his story had to be unearthed through persistent questioning. He gave the impression of being fairly well educated, in the sense that his speech and general knowledge appeared to be at a somewhat better than average level, and he expressed himself clearly in his more voluble moments. He followed directions with little hesitation or lack of understanding. He felt that his only

practical resource, apart from work as a labourer, was as a carpenter, though he considered himself to be useful in general with his hands. He could make minor electrical or mechanical repairs, and knew something about heating systems. No other alternative, beyond the relatively unremunerative job of house-to-house canvassing, had presented itself to him. He did not seem to be unduly lacking in confidence, as regards his ability, and showed no sign of nervousness or emotional imbalance during the examination.

On Army Alpha Examination C..... had a score of 112, lying at the 85th percentile in the general population, and thus suggesting a level of intelligence significantly better than average. Similarly, he had upon Revised Beta Examination a score of 93 (B), and on the New Stanford Achievement Test a mean score of 103. His strongest school subject was apparently arithmetic computation, in the test of which he scored 111. Upon the Thurstone Clerical Examination he had a score of 96, lying within the range of the average office clerk.

His practical knowledge of mechanics and mechanical devices appeared to be rather low, as he had only an average score of 52 upon the Stenquist Mechanical Aptitude Test I. On the other hand, he had the rather high score of 45, out of a possible 54, upon the Minnesota Paper Formboard (Series A). Similarly, on the O'Connor Blocks Test he had phenomenally good scores of 51, 36, and 29 seconds on three consecutive trials, providing a mean weighted score of 0.84, which was one of the very highest scores observed for any examinee. Remarkably enough, as well, he did not achieve this simply by re-assembling the blocks in the reverse order in which they had been set out, although, especially in the second and third trials, it involved this procedure in part.

Fairly conclusively, therefore, C..... appeared to be of above-average, if not really superior, intelligence. Although without any unusual knowledge of mechanical details, he possessed an excellent understanding and appreciation of

form relations, generally observed to be characteristic of workers in a number of skilled technical occupations. In addition, his clerical ability was at a level characteristic of the ordinary office worker, although his clerical experience, so far as could be determined, was nil. A general recommendation for further systematic training in carpentry, wood-working, or a similar trade would probably be justified.

Case 4: James D....., age 27 years.

D.....'s father was a Scottish sheet metal worker, operating his own small contracting firm. His mother was of Dutch origin. D..... had been born in Montreal in 1908, and at the age of twelve-and-a-half completed elementary school. He finished Grade 11 in 1924. He then went to work in his father's shop as a helper, and became foreman after three years. Wishing to branch out beyond the scope of this work, however, D..... left his father in 1927 to serve as thermostat installer at \$20 per week for a company manufacturing and selling heat regulation devices. Successful at the work, he left the company after a year to join a substantial firm of architects as mechanical engineer at \$125 per month, being an assistant in charge of the design and installation of structural steel and heating and ventilating equipment. He was laid off from this job late in 1930, however, owing to the early decline of building construction, and was unemployed for a month. After the New Year, he secured another job as mechanical engineer with a building company at \$150 per month, but the work to which he was detailed was concluded in June, 1931, and for two months he was out of work again. He then picked up a job as sales engineer with a coal company, and apparently held down the job successfully, but the division was closed in the following spring. From that time on he was altogether unemployed, with the exception of a two-month period when he

had a temporary position as a cost clerk. He was still unemployed in March, 1935.

Tall, well-built, and with well-cut features, D.....'s manner was direct and matter-of-fact, his bearing and speech confident. He seemed cheerful, sociable, and was a rather likeable sort. He was without any doubt whatsoever regarding his ability to do work connected with engineering, and stated that his interests definitely lay along the lines of mechanical engineering or engineering sales promotion. In addition, he had a little clerical experience, could use a typewriter, and had picked up a working knowledge of French through conversation with workmen on the job.

With a score of 102 (A) on Revised Beta Examination, his appearance and manner of alertness were confirmed. On the N.I.I.P. Clerical Test he had a rather superior score of 112.0, an average score for a clerical employee being in the neighbourhood of 75 to 80. In working with the mechanical assembly test he showed, rather surprisingly, little acquaintance with the materials involved, though his assembly of objects was fairly systematic and insightful. He had a total score of 52 out of a possible 100 points on this test. Similarly, he had a score of 52, out of a possible 95, on the Stenquist Mechanical Aptitude Test I. On the other hand, he dealt easily and expertly with the materials of the O'Connor Blocks, having a mean weighted score of 2.27, in the top twenty-five per cent. of scores, and demonstrated throughout a clear conception of the intrinsic relationships of the blocks.

On the Bernreuter Personality Inventory he had a score of -94 (39th percentile) upon the B1-N (Neurotic tendency) scale, of 126 upon the B2-S (self-sufficiency) scale, at the 97th percentile, and of 79 (66th percentile), upon the B4-D (dominance-submission) scale. Discussion of some of his responses to individual items of the questionnaire indicated that while on the whole somewhat more aggressive than the average individual, and well accustomed through

his experience to meet and deal with other people in an atmosphere of business or work, he regarded himself as being somewhat shy, backward, or reserved on many occasions in a social milieu. Without doubt he tended in the main to have a normally stable and balanced personality, however, and to have a reasonable number of interests in regard to current events, sports, and other people.

While showing capability for office work, D.....'s possible interest in it was heavily outweighed by his attraction to mechanical engineering. For this he appeared to have some aptitude, and an assorted experience, while his principal traits of personality suggested a possible fitness for training in sales engineering. For mechanical engineering, a more rigorous course of study than he had as yet accomplished might be recommended, as he seemed somewhat deficient in systematic knowledge of mechanical details.

Case 5: Edward E....., age 33 years.

E..... had been born in Liverpool, England, in 1902. His father, a saddler, had sent him through elementary school and secondary school, the latter of which he completed at the age of sixteen. At that time E..... wished to go into a bank, because the nature of the work and the atmosphere of a bank interested him. His father, however, thought that he should learn a steady trade, and accordingly he was apprenticed for five years as an engine fitter in a shipyard. When E.....'s period of apprenticeship was completed in 1923, he decided that he so disliked the work that he would give it up. Being interested in music, and having studied the organ since he had been a boy of fourteen, he gathered together what funds he had and went to the University of London to study music. After a few months money ran short, and he was compelled to leave to look for a job, and found a minor clerical position in the general post office in London. He then transferred, after less than a year, to the offices of the Ministry of Labour, and became an

Employment Exchange officer at a salary of three pounds ten shillings per week. He found the duties, which involved case investigation and report rather than ordinary clerical tasks, rather agreeable and interesting, but after two years, in 1926, his section of the Exchange was closed, and he was compelled to look elsewhere for employment. Being informed of opportunities for employment in Canada, he came to Montreal in the spring of 1927 with his wife. On arrival, he found work at once as a machinist in a sheet metal fabrication plant, and working there twelve to thirteen hours per day, earned \$40-50 per week. The work lasted only from March to June, and he then went to a firm of general machinists, where he was employed as an estimating clerk at \$90 per month. In March, 1928, he left this firm to join another as a tracer and estimating clerk, and earned \$125 per month until October, 1933, when he was laid off. Following that time E..... was unemployed, save for the fact that during the following two summers he worked one day per week as a railway freight checker—a job secured through a friend. In addition, since a time very soon after his arrival in Montreal, he had acted as organist every Sunday in a church, and received regularly a small remuneration for this. During the fall of 1934 he was able, largely through church connections and his prestige among fellow professional musicians, to give a number of lectures on music and several radio broadcasts.

E..... was tall and quite strongly built, well dressed, and had a polished, educated manner and good diction. He was quite English in his speech and manner, and although actually fairly alert, tended initially to give the impression, through the way in which he carried himself, of weariness, slackness, lassitude. Quite pleasant and agreeable, he talked readily and with self-possession. He appeared to have a great many friends or acquaintances, although he had apparently not mixed a great deal outside a circle of English people, who like himself and his wife, had come to Canada

recently. In addition to his skill as an organist, he had as an asset some training as a tracer, and produced one or two examples of work which, being neat and workmanlike, appeared to show a fair measure of ability. He could not do original design or drafting, however. Beyond this, he regarded himself as being an office clerk, with special emphasis upon estimating and statistical work in connection with engineering planning, but without any business training or knowledge of business methods.

On the Otis Self-Administering Test (Form C) he had a score of 28, which was perceptibly below average level. On being questioned afterwards, however, he remarked that he had taken his time with it, as he did not like being hurried. Accordingly, he was given a second form (Form A), and was urged to work as quickly as he could while still attending to the accuracy of his answers. On this second attempt he had a score of 48, which, subject to a deduction of 4 points for practice effect, became 44. On the N.I.I.P. Clerical Test he had a score of 75.5, lying approximately at the average for an office clerk of ordinary ability.

On the O'Connor Blocks Test he had a mean weighted score of 6.50, lying just below the 25th percentile. He required, on three successive trials, 6.81, 4.62, and 3.66 minutes to complete the assembly. By the end of the second trial, he appeared to have a fair idea of the structure as a whole, and of the position of the individual pieces, but he could not size up the characteristics of each block nor use it in the matching process quickly enough to make an efficient execution. He had great trouble, for example, in reversing blocks end for end, generally concluding by trying the same pieces twice in the same way. On the Minnesota Paper Formboard (Form A) he had a score of 30, lying at average or below average level.

To judge from his response to personality schedules which he filled out, he was quite free from any tendency to sensitiveness or shyness. He appeared to be ordinarily

aggressive enough in relations with other people, though somewhat inclined, perhaps, as a result of his background, toward a degree of seriousness and formality in social situations.

On the whole, therefore, he appeared to be of the general intelligence level of a normal white-collar office worker, and had for such an occupational group an average score upon a test of clerical aptitude, though without any marked capacity for work with figures. While he displayed some ability in the quality of his work as a tracer, he had no great interest in engineering or other skilled technical work, and so far as could be determined, less than average aptitude. This last conclusion was derived, of course, in spite of his five or six years of training and experience as a fitter and mechanic. Undoubtedly his chief interest, and possibly his greatest skill, lay in the field of music. It would seem that his most promising vocational potentiality lay in this field, the other possibilities of work as a clerk or tracer being secondary to it.

CLASS II. CASES OF CONDITIONAL EMPLOYABILITY.

Case 6: David F....., age 28 years.

F..... was born in Canada, though his parents were of Polish-Jewish origin. His people had come to this continent while they were yet children, brought by their parents, and his father had studied mining engineering at an eastern Canadian university. After a successful career as a consultant engineer, he had retired (in Canada) in 1924. F..... received a rather varied education, as his father moved about a great deal in following his profession. His first few years of schooling were by private tutor, but at the age of ten he went into the fourth grade of day school, and finished his elementary schooling in Montreal. Then the family moved to the West, and he went through high school there. Finally he came to Montreal, and spent a year in engineering at a university, but was forced to leave in 1922 when family fortunes suffered a reverse. Through friends, he got a job as a mechanical draughtsman, kept it for a year, and then worked as an installer for a firm manufacturing electrical apparatus, being promoted in 1925 to become a cost estimator, at a salary of \$190 per month. He married, and worked successfully at this job, being again promoted to become a telephone engineer, at a salary of \$210, in 1929. In 1931, however, F..... was laid off with the first effects of the depression, and at the time of examination, in 1933, was still without work, and beginning to regard his situation as a rather desperate one.

The most characteristic feature of F.....'s personality was his very strong aggressiveness, which tended to take almost an antagonistic form where a discussion of any topic liable to enquiry from more than one point of view was raised. Beyond this, he seemed likeable enough: showing traces of a fair education, he was well-built, seemed to be

physically strong, fairly alert, and readily communicative. He confessed before discussion had gone far that he had often wished to change his occupation, as in many respects he found it uninteresting. He had no alternative in mind, however, and enquiry suggested that its "dullness" was largely owing to the fact that he was rather unsatisfied with his progress and remuneration, feeling that it was a waste of time to spend years where it took a long time to climb. Actually, he seemed to have no quarrel with the work itself, though he tended to look upon it merely as something to earn a living with—to have no special attractiveness itself. He had shown some initiative in trying to get ahead, although not in his own field, as he had taken and completed a two-year correspondence course in modern business methods.

The Otis Self-Administering test suggested that he was of appreciably better than average intelligence, as he had a score of 55. His knowledge of educational material was very high, and he had an average score upon the New Stanford Achievement Test of 123. On the N.I.I.P. Clerical Test he scored 80.5.

Tests of mechanical aptitude tended to indicate a level of capacity which was scarcely distinctive, yet certainly above average: on the Stenquist Mechanical Aptitude Test he scored 68, a fair score in view of his limited engineering experience. On the Cox Mechanical Ability Test M1 he had a score of 23, whereas a median score appeared to be in the neighbourhood of 10 to 12. On the O'Connor Blocks Test he had a mean weighted score, for four consecutive trials, of 3.30, with his scores on single trials showing no great variation. Observation of his performance on the last of these indicated that he had a fair grasp of the principles underlying solution of the problem.

Scores upon the Bernreuter Personality Inventory placed him at the 2nd percentile upon the "neurotic tendency" scale; at the 81st percentile upon the "self-sufficiency"

scale; and at the 98th percentile upon the aggressiveness-submission scale. Undoubtedly, on the basis of judgment of his behaviour, he was extremely aggressive. He was "pushful" to such an extent, in fact, that it seemed practicable to visualize the possibility that he would be a rather difficult person with whom to work in co-operation. While by no means certain, it is possible that this somewhat difficult feature of his make-up contributed toward his unemployment, though he personally regarded lack of seniority as the principal factor.

It appeared likely that this strong trait of aggressiveness could be drafted into service, rather than allowed to act as a hindrance if he were to attempt some occupation in which the trait—provided it did not run to the extreme of tactlessness—might be at a premium. Salesmanship, or perhaps more specifically the sale of engineering products with which he was acquainted, would be worthy of consideration. Preferably, such work would be non-salaried, so that he might compare his output of work directly with his personal gain and progress. Otherwise, the alternative would be a more careful check upon his tendency to domination and bluntness, and the development of a greater intrinsic interest in his previous occupation.

Case 7: Henry G....., age 40 years.

Born in Lancashire of Scottish parents, G..... had had a few years of schooling, ending at about the level of the fourth grade at the age of thirteen. Several factors apparently contributed toward his school-leaving: he had made his way very slowly, and had much trouble in mastering the work, and his father, a dock hand in Glasgow, died, necessitating the addition of G.....'s earnings toward the upkeep of his mother and three sisters. Of his own accord he found himself a job as messenger at a co-operative grocery store, and worked there until aged fifteen, when he left Scotland to come to Canada as a farm boy through an

assisted immigration scheme. He worked for two years in Ontario, leaving the farm when he became tired of it, and drifted to Montreal. He worked as a casual labourer, then at the time of the outbreak of war became apprenticed in the railroad shops as an electrician, and worked at this trade until 1920, earning a wage of about \$100 per month more or less regularly. He was unemployed for a while in 1921-22, and thereafter worked as a casual labourer, as he was never able to return to the electrical work for which he had been trained. He was intermittently employed on construction and other work as a labourer, then turned to work as a hospital orderly, earning \$40 per month and his board. He worked at this until the fall of 1932, in at least two hospitals, then resigned his job owing to an altercation with the superintendent regarding living conditions in the orderlies' quarters. He was apparently just beginning to regret this step, as in the three months' following he had had nothing whatsoever to do. He was without dependents, never having married.

G..... was, if not "down and out", rather dilapidated in appearance. His facial features were roughly cut, and he was short and inclined to stoutness. His manner was cooperative throughout the examination, though he appeared to be suffering somewhat from nervousness. He expressed himself rather poorly, and was most certainly deficient in education, as gauged from his speech and background of thought. He was at first somewhat inclined to reserve, but after some while became more communicative and became talkative in short bursts after questioning, though never voluble. Judging from his responses in detail to personality questionnaires, he was inclined to be rather shut-in in his feelings, and to be suffering from an undue sensitiveness to criticism and the attitudes of others toward him, to be shy and rather unassertive. Quantitative scores compiled from responses to the Bernreuter Personality Inventory indicated that with respect to "neurotic tendency" he would lie at the

73rd percentile; for "self-sufficiency", at the 88th percentile; and as regards dominance-submission, at the 11th percentile, on the basis of norms for adult males. These quantitative scores accorded roughly with general observations made of his behaviour.

He was desperately and pathetically anxious to get back in some way to his one-time trade of electrician, but regarded his opportunities for this as negligible. Aside from this one ambition, he had few special interests. Socially he appeared inclined to keep to himself, and had never made many friends. His reserve and shyness appeared to be personal characteristics of some long standing.

He appeared to be of approximately average intelligence, having a score of 65 upon Army Alpha Examination, at the 54th percentile, and of 84 upon Revised Beta Examination, at the C+ grade (high average). His performance upon the Thurstone Clerical Examination was distinctly inferior, as he had a total score of 163. On the New Stanford Achievement Test he had a mean score of 91, the highest score of 110 being for the test of word meaning.

His scores upon tests of mechanical ability were at well above average level. He showed a better than average knowledge of mechanical devices through a score of 74 upon the Stenquist Mechanical Aptitude Test I; while upon the O'Connor Blocks Test he had a mean weighted score of 2.74, with a regularly improving performance upon each trial. On the Minnesota Paper Formboard Test (Form A) he scored 46 of a possible 54, and upon a similar sub-test in Revised Beta Examination scored 16 of a possible 18. Without great doubt he demonstrated on these two or three latter tests an excellent understanding of problems of form relations, though his intelligence as a whole did not lie higher than average level.

In the examiner's judgment, G..... had the advantage of possessing two assets: an apparent aptitude for work of an engineering or mechanical variety, and a strong desire for

employment in a specific trade in which he had had some experience. His intelligence appeared to be at or near the level of a skilled tradesman. Liabilities were his physical appearance—probably of minor importance—his submissiveness and “shut-in” character, and the somewhat indefinite, but possibly real, effects of sporadic employment in recent years. Certainly he would require an appreciable amount of training, even in regard to his one-time occupation of electrician, before he could be regarded as being rehabilitated. This would necessitate directed assistance through an agency designed for such a purpose. Unless such re-establishment were possible, his prospects for work could scarcely be beyond the field of semi-skilled labour.

Case 8: John H....., age 25 years.

Born in Canada of English and Scottish parents, H..... was now twenty-five years of age, and had been almost entirely unemployed for two and a half years. His father, now dead, had been an accountant, living in Montreal. He had had formal education as far as the completion of first year high school, in 1925, and then left school because he was tired of it and wished to be working. His first job, which he secured through his own solicitation, was as a bank messenger at \$50 per month. He stayed at it for some fifteen months, leaving in order to get a better-paid position as shipper in a departmental store. Within three months, however, he changed to a position as invoice clerk at \$70 with a job press company, leaving this firm in June, 1928, to get a job as junior clerk at \$80 per month with a railway company. After a year he tired of the work indoors, and signed up as a deckhand on a ship sailing to the West Indies. When fall came, he returned to Montreal and entered the employment of a manufacturing company at \$20 per week, as cost clerk. The next spring, however, H..... was off to sea again as a seaman on an oil tanker, but was laid off after two months, in July, 1930. He then found work again in

the city as a timekeeper at \$18 per week at a tin can manufacturing plant, being laid off after a year, in July, 1931. He went on to Toronto, where he found employment as a waiter and orderly in a large hospital, and stayed there until October, 1932, when a general staff reduction occurred. Since then he had had a few odd jobs, but generally had been unemployed.

H.....'s employment record suggested a rather roving disposition, for in a period of about seven years he had held nine jobs, termination from six of them being voluntary. An interview with him supported this conclusion, as he appeared to have still very little in the way of settled interests. He had, however, taken the trouble to add to his education through night schooling in the years 1927-8 and 1929-30, having completed the work of Grade Nine and part of Grade Ten. He had no fixed ideas on the subject of his vocational interests, save for the fact that he was most skilled at timekeeping and costing work at a clerical level. For any form of skilled trade or technical work he professed entire disinterest, nor was he attracted by any kind of work involving public relations or sales promotion.

Part of the difficulty in ascertaining H.....'s interests was dependent upon the distaste with which he talked about himself. Most uncommunicative, it was only by frequent questions likely to encourage a continuation of his contribution to the discussion that he could be drawn out at all. On the other hand, he did not appear to be a natural and customary reserve, as he seemed to have a fairly large number of friends and acquaintances and to be quite interested in most social amusements. He was definitely "old country" in his dress, though he had never been there, while his manner and speech were somewhat tinged with this same characteristic. He expressed himself clearly when he chose to be communicative, and his grammar and choice of words were reasonably good.

On the Otis Test H..... had a score of 43, lying near

the average for a clerical worker, and a score of 86.0 upon the N.I.I.P. Clerical Test. On a short revised form of the Minnesota Mechanical Ability Test he had a score—well below average—of 37, out of a possible 100. On the O'Connor Blocks Test he had a mean weighted score of 12.08 for three trials, lying well within the poorest ten or fifteen per cent. He exhibited no understanding of the function of the several kinds of blocks, frequently placed the flat sides of the blocks together (instead of their irregularly curved surfaces), and failed to distinguish at all between those pieces fitting in corners and those in sides. His dexterity was judged in general to be of mediocre level, and he had an average score upon the N.I.I.P. Nuts and Bolts Assembly Test.

His principle assets were therefore some fairly specialized clerical experience and a probable aptitude for clerical work, although he had no systematized office training beyond that picked up incidentally on the job. As a liability was his somewhat unimpressive, though apparently normally stable, personality, and his rather marked disposition in the past to stick at no job for more than a few months or a year. The latter may possibly have become tempered, however, by somewhat greater maturity and the sobering effect of unemployment. A suitable general recommendation would be clerical work as a member of a ship's purser's staff, which might provide some scope for his desire for travel and movement. If he remained on shore, he would probably benefit from classes in business methods.

Case 9: George J....., age 27 years.

Born in Canada of a French father and an English-Canadian mother in 1908, J..... had been educated as far as the end of elementary school. He did not finish the last grade, because his father, an industrial chemist, died in the spring of 1923, and it was necessary for the son to go to work immediately to help support his mother. His first—and

only—job was secured through a chance meeting with an acquaintance in a newspaper office, who told him that a nearby broker required a junior clerk. He applied personally for the job and got it, starting at an initial salary of \$12 per week. His duties were to answer the telephone, to file buying and selling orders and to match them with confirmation slips from the stock exchange. He held the job satisfactorily, so far as could be determined, and in five years' time had his salary raised to \$15 per week. In November, 1934, he was laid off owing to lack of business. For the ensuing three or four months he was unemployed, although he appeared to be actively looking for work.

J..... was small, thin in physical build, and appeared to be decidedly undeveloped, giving the appearance of a lad of eighteen to twenty years rather than one of twenty-seven. His face was still covered with down, it seemed that he scarcely needed ever to shave, while his voice was low and rather high-pitched. His manner was shy and decidedly meek and unimpressive. His clothing was good, and showed signs of being attended to carefully. The total impression of his personality was certainly that of mildness and unaggressiveness, and possibly of dullness as well. He had little to say for himself, though what he did say was well-expressed and generally to the point. So far as could be determined, his one and only position in the past had satisfied him perfectly and he had never thought of doing anything else, although willing to tackle whatever he could get now.

On Revised Beta Examination J..... had a score of 79 (C+), near the average for the general population. On the N.I.I.P. Clerical Test he had, for an office worker, a very inferior score of 38, with a consistently poor performance on each part of the test. Similarly, on the Thurstone Clerical Examination he scored 127, requiring over an hour and a half to complete the form.

Although he disavowed any interest in or acquaintance

with mechanics or mechanical operations, he had at least an average score of 67, and though unfamiliar with many of the items to be assembled, showed in general a very fair appreciation of the relations existing between the parts of mechanical devices to be put together. On the O'Connor Blocks Test he had a mean weighted score of 4.05, lying near the 50th percentile for this test. In the first trial his performance was rather aimless at the beginning, and gave the appearance of being due in part to a lack of proper incentive. After a brief period, however, he picked up measurably, seemed at once to understand the handling of the blocks, and completed their assembly with little loss of time. Similarly, in the second and third trials, he finished the task in 2.08 and 1.37 minutes, and his work was both systematic and insightful, so far as could be observed. His level of performance upon the N.I.I.P. Nuts and Bolts Assembly Test was rather poor, however, as he had scores on successive trials of fifty-one and forty-seven seconds, lying below the 25th percentile.

On the Bernreuter Personality Inventory J..... had scores upon the "neurotic tendency" (B1-N) and "self-sufficiency" (B2-S) scales lying at the 5th and 57th percentiles of the general adult population, respectively. As far as the first of these was concerned, it did not appear at all to lie parallel to observations of his behavior and the probable nature of his personal make-up.

While apparently of no better than average intelligence, and quite unsuited for clerical work, it seemed possible from his test performance that he might have a rather better than normal appreciation of form relations, and might, as an apprentice, fit into some type of skilled trade requiring initially at least not too high a level of dexterity. His age, however, was a decided draw-back in this, as well as his apparent lack of interest and what appeared to be some measure of physical frailty. Other than this, it seemed

probable that he would best fit in as a light factory hand or helper, or at some similar work.

Case 10: Thomas K....., age 25 years.

K..... was born in Scotland in 1910, the son of a Scottish pipe-layer foreman. He went to school in Glasgow, completed Grade 8 by 1925, and then went to work because his father could not send him farther in school. For two years he worked as an electrician's helper in Glasgow at thirty shillings per week, then left his job to come to Canada. For the first few months he worked at odd jobs, as a dock-hand, cargo checker, and labourer. For three months in the fall of 1928 he worked as a hide-shaker at \$16 per week for an abattoir, but left under a cloud when he quarrelled with some of the other employees. He was then jobless for a while, but in February, 1929, picked up a job as a steward on a West Indies ship, and stayed at this until July, 1929, when he was laid off. Until March, 1931, he did odd jobs of cleaning and repair work, and worked as a construction labourer, then got a job as helper in a cafeteria, where he worked until September. Though apparently considered a good worker by his supervisor, and bright, he was discharged because he incurred the ill-will of other and older employees. Again he was unemployed, although for a couple of months in 1932 he worked as a labourer on a coal dock. In September, 1933, he was placed through a public employment office as a helper in a metal fabrication company, and worked there steadily for a year. At the end of this time he began to suffer from lead poisoning in one arm, and was advised to "lay off", though without compensation. As a result, he brought up the matter before a government inspector and saw enforced the use of masks and special clothing in the plant, but in doing so eliminated his job owing to the antagonistic attitude of the management toward him. Since that time he has been unemployed, and he and his wife were on relief.

K..... had a quite self-possessed and assured manner, and appeared to be strongly independent in his thinking. He was frank to the extent of being outspoken, and was obviously rather impulsive and lacking in tact. His appearance was rather poor, owing to the dilapidated character of his clothing, although his features were well-cut and attractive. His Scottish accent was marked and his use of language fair, while he tended to express himself quite clearly, though often at great length. His vocational ambitions were directed toward a white-collar job as an accountant, secretary, or office clerk, and to further this end he had taken some preliminary courses of business training at night school. In 1932-33 he had taken an elementary course in book-keeping, and had finished in the first half of his class. During 1934-35 he went on with accountancy, having a mark at the completion of the course rather better than the average of the group, and also took a course in typing, in which he finished 14th in a class of 14. He claimed, however, that his poor performance in typewriting was owing to lack of facilities for practice.

On Revised Beta Examination he had a score of 87 (B), and on the Army Alpha Examination a score of 125, at the 89th percentile for the general population. On the Thurstone Clerical Examination he had the low score of 134, but as he made only twenty-four errors in the process, laying his emphasis altogether upon accuracy of work rather than speed, this probably conveyed an unfairly low representation of his skill. Accordingly, he was given the N.I.I.P. Clerical Test, and on it made a score of 82, which was approximately at the average level for an office worker.

On the Stenquist Mechanical Aptitude Test I he scored 54, at average level, and on the Minnesota Paper Form-board (Series A) scored 31. On the O'Connor Blocks Test he had a mean weighted score of 5.28, and showed in his performance only a mediocre understanding of the

materials. His mechanical aptitude appeared therefore on the whole to be, if not low, at least no better than average.

On the Bernreuter Personality Inventory he had quantitative scores lying, for the B1-N (neurotic tendency) scale at the 54th percentile, for the B2-S (self-sufficiency) scale at the 94th percentile, and for the B4-D (dominance-submission) scale at the 80th percentile.

His choice of book-keeping for study seemed reasonable in view of his better-than-average intelligence and his aptitude for clerical work. There appeared, however, to be fundamental objections to this on account of his somewhat impulsive temperament, as indubitably he would need more tact for work with other employees in an office. On the other hand, it seemed likely that unless he were to gain more detachment, he would meet this obstacle in almost any kind of work which he might attempt. Without doubt, his chief need was remedial assistance to scrutinize the underlying causes of his provocative behaviour and to develop more tactful habits in dealing with other people.

Case 11: Robert L....., age 51 years.

L..... was born in a small suburban town in 1884 of Canadian parents. His father owned a general store, and the family lived in fairly prosperous circumstances. L..... was sent to school in a somewhat larger municipality nearby, and completed the elementary grades at the age of thirteen. In the following year he had a brief period of supplementary education at a model high school, and then began to work in his father's store. In 1899 he joined the staff of a large firm of wholesale drygoods merchants, as a junior clerk at \$2 per week, and worked his way through the office until eventually he became cashier of the firm, at a salary of \$50 per week. In 1905 he began to take evening classes in book-keeping, business methods and stenography, which he completed. In 1933 he was laid off, another and younger employee being transferred to his position. As he had

never married, and had only a paralytic older brother dependent upon him, his personal financial resources were fairly good, and he was not worried at the time by the loss of position. After a few months, however, he began to seek employment, and found his age to be a decided disadvantage. He tried selling insurance for a month or so, but as he had very few friends or acquaintances, he lacked contacts for the business. Trying to sell was repugnant to him in any case, for he was rather timid about meeting and talking to people. He gave it up, and began to look for employment outside the scope of office work at warehouses, shops, factories and with firms of florists and landscape gardeners. This search was unavailing, and at the time of interview he had been unemployed for nearly two years. His financial circumstances were becoming somewhat stringent, and he spoke of going on relief soon.

In physical appearance L..... was tall and thin, and was neatly and carefully dressed. He showed a very mild and submissive manner, and was evidently not at ease. His confidence improved somewhat after a minute's conversation, however, and he gave a ready and detailed account of himself. Although he had few friends or acquaintances, he had always maintained strong church connections in the neighbourhood in which he had lived for the past twenty years. He taught a Sunday School class, and he remarked upon the way in which he felt at a loss during the summer when he did not have this work to do. His other principal interest was in gardening, with which he appeared to have had a lengthy acquaintance. For recreation apart from these interests, he read more or less serious books, listened to music, and went for long walks by himself.

On Revised Beta Examination he had a score of 88 (B), indicating a high average level of alertness to new kinds of material, despite his age of fifty-one years. On the N.I.I.P. Clerical Test he made a very superior score of 101.5, with a particularly good showing on the sub-test

of arithmetic computation. On a test of mechanical assembly he had a low average score of 54 points of a possible 100, although he claimed an almost complete lack of familiarity with such material. While he stated that he had not done stenography for years, and had probably forgotten it all, it was found that he could take fifty words per minute dictation with accuracy, and could type fairly well.

His responses to a questionnaire designed to probe his personality make-up and temperamental traits confirmed the original observation of diffidence and submissiveness. His feelings tended to be rather easily bruised, and he gave evidence of being quite unsociable and of "closed" temperament. He seemed to be inclined toward slowness of response and a lack of impetuosity.

Thus he gave a strong indication of having high qualifications for routine office work with pencil and paper, and in spite of the fixity of his social and domestic habits, of being much more adaptable in his approach toward test materials than most clerical workers of his age. He had a particular facility for work with figures, and a largely unpractised knowledge of stenography which was better than that of a number of business school graduates. His manner was pleasant and attractive, in spite of his shyness, and the evidence of his entire past suggested character-traits of patience and reliability. In spite of his age, his most obvious fitness was for office work. Alternative possibilities appeared to be light gardening or caretaking, supervision of a children's playground, and similar activities.

CLASS III. MARGINALLY EMPLOYABLE CASES.

Case 12: Stephen M....., age 35 years.

The son of an English-Canadian journeyman carpenter and an Irish mother, M..... was born in Montreal in 1900. He went to elementary school, completed it at the age of fifteen and a half years, and then went to work as an errand boy and general helper for a master plumber at six dollars weekly. While engaged primarily in office duties, he often acted as an assistant on actual repair jobs. At the end of three years he left to work as a bank messenger at eight dollars per week, and later as a junior in the office of the bank. In 1922 he left the bank to take a position as clerk with a small construction company, for which he worked steadily until 1931. He earned from \$22 to \$40 per week, climbing to the position of chief clerk of the office, and leaving with good references. He was, in fact, the last office employee to be discharged from the firm when its business, of a specialized kind, was virtually eliminated by the economic depression. His duties involved purchasing, correspondence, preparation of payroll accounts, and a small amount of ledger-keeping. In 1923 he had taken courses in book-keeping and stenography, but had not completed them, and found little use for these subjects in his work. Married in 1925, he had no children, but supported his father and mother, who both died early in 1932, leaving him a little real estate. This small bequest he had sold. In 1933, after looking for office work, he attempted to act for a month or two as salesman for a firm retailing accessory kitchen products directly to householders. He made no headway at this, however, and disliked the work intensely. In the following year a friend induced him to come around with him on his rounds as a salesman, with the idea that this might accustom M..... to the selling situation, but the anticipated effect was

not secured. Apart from these efforts, M..... had been unemployed at the time of interview for three-and-a-half years. At present he was spending his time in gardening, had apparently given up the idea of looking for work, and expected to go on relief in another two or three months, when his financial resources would be exhausted.

M..... was a small man, apparently not strong physically. He had a rather mobile face, and an artificially cheerful smile. He was very much inclined to nervousness, and he spoke spontaneously of his "sensitiveness". He showed physical signs of this trait of instability in his jittery behavior and the tremor of his hands. His appearance apart from these characteristics was good, however, and he was quite neatly dressed. He was in no sense reserved or uncommunicative, but explained his circumstances quite readily. A continual touch of self-reference was found throughout his conversation, and he appeared quite engrossed in his own person, virtually to the extent of being classified as hypochondriac. He remarked that he had few friends, and was not very sociable. Much of his emotional life had been bound up in his parents, and their rather sudden death, shortly after he lost his position, had had a severe effect upon him. Quite emphatic concerning his nervous instability, he believed that it was a family trait, for it appeared strongly in his father, and two elder sisters showed signs of it also. His mother, however, he described as calm, deliberate, and objective in attitude, although she had borne most of the family worries and responsibilities. M..... felt that his sisters and his relations by marriage had treated him very unsympathetically in the past year or two, in view of the nervous strain under which he had been labouring. He asserted that they were inclined to be scornful of his ability, and that when in any discussion he attempted to make a point of his own, they grew impatient, for they regarded him as young and inexperienced. As regards M.....'s attitude toward his work, he maintained that he had never been able

to work under pressure or in a hurry, and that as a boy he had always been at a loss in examinations. Although he liked office work, and had never wished to do anything else, he felt that he was totally out of its atmosphere now, and would have considerable difficulty in regaining his skill as a clerk. This, M..... said, would explain low test scores.

On Revised Beta Examination he had a score of 73 (C), lying near the 50th percentile for the general population. On the N.I.I.P. Clerical Test he had a very poor score of 41.0, with consistently low scores throughout, and a zero score for the sub-test of arithmetic computation. He scored 20 upon the Higher Examination of the Otis Test, which was extremely low for a clerical worker, and would be comparable to a Binet-Simon I.Q. of 75 to 80. On a standardized test of book-keeping practice he had a score of 40.5, as compared with a median score of 68.0 for second-year commercial high school students.

There was thus throughout a good quantity of evidence to suggest that M..... had a rather low level of mental ability; his poor test scores, the relatively late age at which he completed elementary school, the attitude adopted toward him by his relations, his own remarks concerning difficult conditions of work and the time which it would require to re-adjust himself to the office environment. This evidence was not untinged, however, with other complicating factors, such as the family history (on his father's side) of nervous imbalance, his own instability, the death of his parents to whom he had had very strong bonds of attachment, and finally, his long period of unemployment. It seemed questionable, nevertheless, that even this record of circumstances and pre-disposing emotional tendencies could account for more than a part of such poor test achievement in the case of a supposed white-collar office worker, for motivation during examination seemed to be adequate and no extraordinary signs of distress had been shown. Still, his record of employment from 1922 to 1931 was good, and

he had advanced his position during that time until he earned upwards of \$2,000 per year. It might be concluded, of course, that in a small office with an informal procedure his duties had been so unexacting that care, patience, and long hours had tended to compensate for any fundamental lack of aptitude for the work, as seemed to be characteristic of him.

Clearly on the basis of the evidence no final decision could be reached, save that in the light of current circumstances, in view of his nervousness and demonstrated lack of alertness under competitive examination conditions, his prospects of immediate employment were decidedly poor, and that a considerable process of re-adjustment and guidance must be undergone before they would ever improve.

Case 13: John N....., age 50 years.

N..... was born in 1885 in the Dutch East Indies, where his father, a Netherlander of good education, had been a general trader, merchant and speculator. N..... went to a private school in Colombo, and completed the course leading to the equivalent of matriculation, passing in 1902 into a medical college, where he spent five years in the undergraduate medical course. Within five years he completed third year standing, and then was sent by his father to London, where he studied for another year, but failed his year's examinations. About that time his father lost most of his money, and N..... secured a post as clerk with a Canadian fur-trading company, and worked at a post for two years in northern Quebec. He left after a cut of wages in 1910, and came to Montreal, where he found a job as a repair clerk with a railway company. He held this job, which involved checking freight cars against lists of repairs made in the shops, until 1923, apart from a temporary absence in 1917 when he worked in a munitions factory as a laboratory assistant testing metals. In the fall of 1923 he heard of some openings in the federal civil service, and tried

the examinations. He passed them, and was appointed as a laboratory assistant at a government research institute, with a pay of \$115 per month. His duties were at first to help with experiments in preparing apparatus set-ups, cleaning equipment, etc., but as he showed himself incapable of following instructions and was extremely clumsy, he was detailed to the work of copying out excerpts from reports, which involved a routine handling with no room for initiative. He was finally laid off in 1931, but was transferred to another government department, where he worked for two years as a doorman, helper, and general maintenance man. Owing to still further reductions in personnel, he lost this job in 1933, and since that time had kept himself going by selling coal on commission, earning just enough thereby to avoid starving. He still hoped, however, to get another job as a laboratory assistant, office clerk, or even as a watchman or cleaner.

N.....'s appearance was very uninspiring, as he had very shoddy, disreputable clothes, a scrubby and half-shaved face, a matting of bedraggled hair around his brow. His manner was dull and heavy, but he had a very good flow of language, which tended readily toward the use of such stereotyped phrases as "drastic financial reductions", (in reference to the cause of his unemployment), "thorough medical training" (referring to his education). He showed an obvious inclination to account for much of his past in terms of excuses: the loss of his job, the incompleteness of his medical education, his performance on tests. He was married, for the second time, and was subject, he said, to rheumatism and diabetes.

On Beta Examination N..... had a score of 44, at the margin of the "D" and "E" classes, while on the N.I.I.P. Clerical Test he scored 31.5. Both of these scores were appreciably below average. On a revised form of the Minnesota Mechanical Assembly Test (a single set of ten items) he scored 17, of a possible 100. An average score

on this test is 60 to 70. On the O'Connor Blocks Test he was given a single trial, but after eighteen minutes had not a single block joined to another. He showed a definite preference to *say* what he knew about the blocks rather than to *do* anything with them, and assigned blocks to groups on the table rather than attempting to assemble them. He gave the clear impression here that he would do almost anything as a bluff to postpone or prevent a trial of what he really could or could not do. On the N.I.I.P. Nuts and Bolts Test he scored on two successive trials 72 and 66 seconds (each for the assembly of five pairs), complaining that he had a touch of rheumatism in the little finger of his right hand. This score lay somewhere in the neighbourhood of the 5th percentile.

In summary N_____, more than anything else, seemed to show incapacity and unemployability, good perhaps only for the most routine and easily accomplished of unskilled jobs, under strict supervision. His physical as well as his mental capacity was probably low, as a result of his diabetic condition.

Case 14: Howard P_____, age 55 years.

P_____ was born in England, an only child, in 1880. His father was a greengrocer. P_____ went to school for a few years, until he reached the level of the fifth standard, at the age of fourteen, and then went to work in his father's small shop. After a couple of years at this, however, he left in order to work as a messenger boy for a drygoods firm. He liked the work, but when at the age of eighteen, he was judged too old to continue longer in this capacity, he was forced to look for another position, and was employed successively as labourer, kitchen helper, and cook. In 1907 he came to Canada, and obtained work as a helper in a construction camp cookhouse, continuing this in various camps through northern Ontario and the West until the time of the War. He married, and in 1915 went overseas as a regi-

mental cook, continuing in this capacity through the duration of the War. After a period of re-adjustment following demobilization, when he was irregularly employed as labourer, cleaner, and watchman, he found construction camp work again, and continued at this until 1930. Then, with a wife and two children dependent upon him, he became ill and was found to be diabetic. As industrial construction was falling off, he came to Montreal. He worked at various odd jobs, being employed only a portion of the time, and received clinical treatment. In 1933 he was without work and on relief.

A short, stout man, seeming to show signs of age beyond his fifty-five years, he was ready to talk and apparently fairly cheerful in spite of decidedly poor economic circumstances. Obviously lacking in educational knowledge, he was quite slow and dull in his reactions and showed a poor understanding of questions and directions. His one boasted skill was camp cookery and kitchen management.

The extent of his general dullness, enhanced perhaps by a lack of much formal education and the natural slowing-down effect of added years, was observed in his performance upon every test. On the Army Alpha Examination he scored 19 (E grade), and on Revised Beta Examination 45 (D grade). On the New Stanford Achievement Test he had a mean score of 70, highest at 94 upon the test of language usage, lowest upon the test of arithmetic computation at 37. On the Thurstone Clerical Examination he scored 254, involving a huge total of errors and omissions. On tests of mechanical knowledge and aptitude he was equally low: he completed 9 out of 95 items correctly on the Stenquist Mechanical Aptitude Test I, having given up hopelessly before completing the form. On the Minnesota Paper Formboard he completed 7 of 54 items correctly, the majority of the remainder being chaotic in their solutions; while on the O'Connor Blocks Test he required 14.13 minutes to accomplish a single trial, which was so obviously

a matter of pure trial-and-error, without any understanding of the factors involved, that no further trials were given.

It was virtually certain that P..... would be employable only for unskilled work, the nature of which would be dependent upon his physical condition. Contingent on this same factor would be any return to his previous occupation of cook or helper in a camp kitchen.

APPENDICES.

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APPENDIX A: TESTS AND QUESTIONNAIRES.

The primary data of the present study fall into two classes: first, facts relating to the personal history and occupational background of each subject included in the investigation; and secondly, his scores upon a battery of psychological tests. Data of the first class were secured mainly through the use of a four-page printed questionnaire, which was filled in by each individual.¹ This questionnaire, which is shown on page 245, covered the following main sections of enquiry:

- (1) The individual's name, age, and address, together with information concerning his parents: their nationality, and the occupational experiences of his father.
- (2) Information as to individual's personal history, under several main headings:
 - A. Place of birth, marital status, religion, length of domicile in Canada and in Montreal, number of dependents, etc.
 - B. His regular occupation, regularity of employment during the past three years, part-time employment during the previous twelve months, length of time unemployed.
 - C. Education and training, including apprenticeship, with reasons for leaving school (possible reasons were cited, and were checked by the individual).
 - D. Occupational history (i) from time of leaving school until aged twenty, and (ii) since aged twenty.
 - E. Reason or reasons for present unemployment. Possible reasons were enumerated, and were checked by the person interviewed. The individual was further required to indicate whether the loss of his last job was due to discharge, lay-off, or voluntary resignation, and whether he had any physical incapacities such as to interfere with his employment, and if so, what their nature and duration were.
 - F. Statements concerning domestic relationships, such as employment of wife, education and employment of children, etc.

The psychological tests and questionnaires which were used were selected almost wholly from those already exist-

¹The questionnaire was drawn up by the Executive Committee for joint use in a number of the studies included in the McGill Social Research programme.

ing and standardized. The reasons for this were two. First, the construction and standardization of a psychological test requires as a rule a great deal of time, effort, and expense. Secondly, the use of tests which have been employed in previous researches often makes possible advantageous comparisons, in addition to providing information beforehand as to the appropriateness of the test. One test was developed (as a revision of a previous test) for the particular purposes of the present study: Revised Beta Examination. All other tests had been used in investigations prior to 1931, or had at least been developed and standardized by that time.

The tests used were as follows:

- (1) *Revised Beta Examination.* This, a non-verbal test of general mental alertness, is a revision of United States Army Beta Examination, which was employed extensively during 1918 for the testing of army recruits who were illiterate or of foreign origin.¹ It includes in its revised form six sub-tests, of which the content is exclusively non-verbal. As the instructions for the test can be given by demonstration, and as fore-exercises for practice are included, it is well suited for dealing with men for whom a language test involves a definite handicap.

The total possible score upon the test is 123, and the letter-grades (following Army Alpha and Beta Examination) are as follows:

A	100-123
B	87- 99
C+	75- 86
C	65- 74
C-	55- 64
D	45- 54
E	0- 44

The time necessary for administration ranges from 25 to 40 minutes, depending upon the size and character of the group tested, and the number of assistants. Its reliability coefficient, determined by the odd-even half method, and augmented by the Spearman-Brown formula, is .987.²

- (2) *Army Alpha Examination.* This is the 1925 Psychological Corporation Revision of Army Alpha, executed by Dr. E. O.

¹Yerkes, R. M. "Psychological Examining in the U. S. Army." *Memoirs of the National Academy of Science*, Vol. 15 (1920).

²Kellogg, C. E. and Morton, N. W. "Revised Beta Examination." *Personnel Journal*, Vol. 13 (1934), pp. 94-100.

Bregman, and following in the main Form 8 of U.S. Army Alpha. Time of administration is forty minutes; reliability coefficient, approximately .97.¹

- (3) *Otis Self-Administering Test of Mental Ability, Higher Examination Form A.* This, like Army Alpha, is a group-type verbal test of intelligence. Time of administration is thirty-five minutes; reliability (alternative forms) .935.²
- (4) *New Stanford Achievement Test, Advanced Examination, Form V.* The tests included within this examination serve as a measure of achievement in a number of school subjects. Certain tests, namely, Test 5 (Literature), Test 6 (History and Civics), and Test 8 (Physiology) were not used, because their content was not altogether appropriate to the men tested. Tests 1 (Paragraph Meaning), 2 (Word Meaning), 3 (Dictation), 4 (Language Usage), 7 (Geography), 9 (Arithmetic Reasoning), and 10 (Arithmetic Computation), having a total time of administration of about two and one-quarter hours, were used. This group of tests had a joint reliability of about .95, while individual test reliability coefficients ranged from .84 to .96.³
- (5) *Thurstone Clerical Examination, Form A.* This test, which is supposed to serve as a measure of clerical ability, is scored in terms of both speed and accuracy. The total score is the weighted sum of the errors made in the course of the examination, and the total number of minutes required for completion. One alteration in the procedure of scoring seemed advisable: Test 5, consisting in the classification by cities of a list of mixed names, included in its instructions the injunction to place these names in alphabetical order within each city group. Placement in alphabetical order was not made in a great many cases, and this would have resulted in what appeared to be undue penalization, quite uncorrelated with the total score for the remainder of the examination. Accordingly, the necessity of placement in alphabetical order was disregarded. Thurstone cites the test as having a validity coefficient of .61, with office ratings as a criterion.⁴ When age and schooling are added, by the device of multiple correlation, the coefficient is raised to .67. Stedman, using it to predict grades of students in book-keeping, found that it correlated .74 with book-keeping grades, and correlated .73 with the

¹For norms, see Bregman, E. O. "On Converting Scores on Army Alpha Examination into Percentiles of the Total Population." *School and Society* 23 (1926).

²Otis, A. S. *Manual of Directions for the Otis S-A Tests of Mental Ability.* (World Book Company, Yonkers, N.Y., 1928).

³Kelley, T. L., Ruch, G. M., and Terman, L. M. *Guide for Interpreting* (Second Revision). (World Book Company, Yonkers, N.Y., 1929), p. 9.

⁴Thurstone, L. L. "A Standardized Test for Office Clerks." *Journal of Applied Psychology*, Vol. 3, (1919), 248-251.

Carlson Book-keeping Test.¹ The correlation between the Terman Group Test and grades was .58. Time of administration varies from forty-five to ninety minutes, according to the individual subject. The reliability of the test is not known, but is probably adequate.

- (6) *National Institute of Industrial Psychology Clerical Test (Moore American Revision)*. This test, a revision of the English test of clerical ability, is reported by Moore to have shown validity coefficients of .87 and .94 with two groups of office clerks in Springfield, Massachusetts (N=18 and 26).² The criterion was in each case ratings by two officers of the firm. The range of scores reported for office workers is 39 to 117, and for a general population of over seven hundred, 12 to 134, with a possible maximum of 161. A score of 80 or over appears to be requisite for satisfactory work. Administration time is thirty to thirty-five minutes. The reliability of the test is not known, but is probably quite high.
- (7) *Scott Company Filing Test*. This test was developed by the Scott Company as a test for filing clerks, but was considered equally valid for predicting success at general clerical work. According to Paterson, the extent of correlation between rated trade status and score, for a group of 43 filing clerks, is .82, while the correlation between mental alertness and trade status is .63.³
- (8) *Minnesota Paper Formboard, Forms A and B*. This test, a development of the formboard test of Army Beta Examination, considerably lengthened and increased in scope, was used by investigators of the Minnesota mechanical ability project as one of the tests selected for their final battery. It was determined to have a validity coefficient of .52 (uncorrected for attenuation) when the quality of shopwork was used as a criterion, and to have a reliability coefficient of .90.⁴ Similarly, Hall found it moderately diagnostic in the determination of promising pressman apprentices and to have in this case a validity coefficient of .58 when correlated with rankings.⁵
- (9) *O'Connor Wiggly Blocks Test*. This constitutes a performance test of engineering aptitude, the material used being nine pieces of wood which are required, after being laid before the subject in a prescribed fashion, to be placed together so as to form a

¹Stedman, M. B. "Factors Influencing School Success in Book-keeping." *Journal of Applied Psychology*, Vol. 14 (1930), pp. 74-82.

²Moore, H. "The Institute's Clerical Test in America." *Human Factor*, Vol. 7 (1933), pp. 407-409.

³Paterson, D. G. "The Scott Company's Filing Clerk's Test." *Journal of Personnel Research*, Vol. 1 (1922-23), pp. 547-561.

⁴Paterson, D. G. et al. *Minnesota Mechanical Ability Tests*. (University of Minnesota Press, Minneapolis, 1930), pp. 57 ff., 299.

⁵Hall, O. M. "An Aid to the Selection of Pressman Apprentices." *Personnel Journal*, Vol. 9 (1930-31), pp. 77-81.

10" x 5" x 5" block. Three trials are given, a time score being used. The second and third trials, according to O'Connor's instructions, are weighted for practice effect, and the final score is the mean of the three weighted trial scores.¹ O'Connor states that these blocks have been used successfully in the selection of engineering apprentices at the General Electric Company plants, and gives some indication of definite grade norms.² Scott, Clothier, and Mathewson, in their discussion of test uses and results, provide further data regarding the validity of this test.³ Its reliability is relatively low. O'Connor states the correlation between trials 1 and 2 to be .36, and between trials 2 and 3, .38. These coefficients are confirmed by Remmers and Schell, who suggest that the reliability of the three trials together is about .57.⁴

- (10) *Kent-Shakow Formboard (4b)*. This formboard, one of a series designed by the same authors, consists of twenty pieces of wood which are to be fitted into five slots of different size and shape. Four pieces are required for each slot, and the pattern of cut for the pieces of each slot is the same. The test is scored by the time required to complete the formboard.⁵
- (11) *Cuba Construction Test (N.I.I.P.)* Developed by the National Institute of Industrial Psychology and the Industrial Health Research Board, this test has been used as one of a series of performance tests of intelligence. It involves the fitting together of cubes, painted on different sides, so that a prescribed relationship of the cubes is obtained. Raw scores, based on time and the number of movements made in assembling the blocks, are converted into point scores. The test correlates from .27 to .44 with a group test of intelligence, and correlates .63 with Spearman's "g".⁶
- (12) *Stenquist Mechanical Aptitude Test I*. This is a picture test requiring the pairing of 190 mechanical objects, presented in sets of five pairs, so as to indicate those which normally go together (as screw and screwdriver, brace and bit, etc.). It was employed originally by Stenquist for purposes of vocational guidance, on the assumption that in the case of boys, knowledge of the relationship of mechanical objects was indicative of

¹Keane, F. L. and O'Connor, J. "A Measure of Mechanical Aptitude." *Personnel Journal*, Vol. 6 (1927-28), pp. 15-24.

²O'Connor, J., *Born That Way*. (Williams and Wilkins, Baltimore, 1928).

³Scott, W. D., Clothier, R. C., and Mathewson, S. B. *Personnel Management*. (McGraw-Hill, N.Y., 1931), pp. 227-229, 275-276.

⁴Remmers, H. H. and Schell, J. W. "Testing the O'Connor Wiggly Blocks Test." *Personnel Journal*, Vol. 12 (1933-34), pp. 155-159.

⁵Kent, G. H. and Shakow, D. "A Graded Series of Formboards." *Personnel Journal*, Vol. 8 (1929-30), pp. 115-120.

⁶Earle, F. M., Milner, M. et al. *The Use of Performance Tests of Intelligence in Vocational Guidance*. Industrial Health Research Board Report No. 53, London, 1929, pp. 28-31, 48-49, 52.

mechanical aptitude. He cites the validity coefficient of the test as having a median value of .67, and as ranging as high as .84.¹ The final findings of the Minnesota investigators indicated it to have a validity co-efficient for their quality criterion of .24, and to have a reliability co-efficient of .74.² Simpson, in a study of mechanical aptitudes among a group of convicts, found that it displayed a reasonably significant relationship to the individual's occupational experience: 53% of the persons scoring in the highest quartile had held as their longest job (for an average of 54.1 months) one essentially involving mechanical operations, while only 14% of the lowest quartile (for an average period of 51.3 months) had had similar experience.³ It appeared in this investigation to be positively related to Army Alpha Examination, the coefficient of correlation being $+.46 \pm .03$. The Minnesota investigators, on the other hand, found it to correlate only to the extent of $+.04$ with Otis I.Q., and $+.11$ with Otis mental age.⁴ These differences are probably explicable in terms of different ranges of ability, however.

- (13) *Minnesota Mechanical Assembly Tests, Sets I and II.* These tests involve the assembly, within a given limit of time, of twenty dis-assembled mechanical appliances and tools. Scoring is based on the number of units correctly, or partially correctly, assembled. The tests in their longest form (36 units as against the present 20) correlated .55 with the Minnesota shop operations quality criterion. The coefficient of reliability is probably about .90.⁵ Time of administration, over one hour.
- (14) *Cox Mechanical Aptitude Test, Form M1.* This test consists in the selection by the subject of the unseen essential features of a working wooden model (involving pulleys, levers, etc.), using as a guide a plan of the model which includes irrelevant additions to the working parts.⁶ The test is made up of nine models, which increase in complexity, and for which there is a total (perfect) score of 46 points. Its reliability, determined in the present investigation on the basis of the inter-correlation of scores on odd and even models (compensated by the Spearman-Brown formula) was found to be .64. Time of administration was about forty-five minutes.
- (15) *O'Connor Tweezer Dexterity Test.* This test is used as one measure of the individual's capacity to deal dexterously and

¹Stenquist, J. L. *The Stenquist Mechanical Aptitude Tests.* (World Book Company, Yonkers, N.Y., 1922), p. 11.

²*Loc. cit.*, p. 299.

³Simpson, R. M. "The Mechanical Aptitudes of 312 Prisoners." *Journal of Applied Psychology*, Vol. 16 (1932), pp. 485-495.

⁴*Loc. cit.*, Appendix IV.

⁵*Loc. cit.*, pp. 299, 315-327.

⁶Cox, J. W. *Mechanical Aptitude.* (Methuen, London, 1928), p. 206.

quickly with small objects. Its procedure involves picking up one hundred small brass pegs, one at a time, with a pair of sharp-nosed tweezers, and inserting them into a like number of small holes drilled in a metal plate.¹ One trial is given, and is scored in minutes and hundredths. The reliability of the test is not known, but it is probably adequate, for it correlates from .42 to .67 with a similar test, the O'Connor Finger Dexterity Test, the reliability of which is .93 (first vs. second half).²

- (16) *Nuts and Bolts Assembly Test*. Devised by investigators of the National Institute of Industrial Psychology as a measure of manual dexterity, this test involves the assembly of ten small bolts, an inch and a half long, and ten corresponding nuts.³ The test has shown some promise for predictive purposes by positive correlations with trade proficiency in occupations requiring manual dexterity. The reliability of the test, as measured by the correlation between successive trials, is high. It appears, however, to be subject to much practice effect, at least within the limit of six trials. In the use of the test in the present investigation, one trial only was given. Correlation between the first and second halves of this trial was $.794 \pm .039$, furnishing a reliability coefficient of .89.
- (17) *Allport-Vernon Study of Values*. This consists in a scale designed to measure the relative strength of certain basic interests in the individual: theoretical, economic, aesthetic, social, political, and religious, as developed in the theory of Spranger.⁴ It has a split-half reliability of .72.⁵
- (18) *Bernreuter Personality Inventory*. This forms, on the basis of responses to 125 questions concerning personal attitudes, interests and behavior, a series of four scales designed to measure certain aspects of personality known as (a) neurotic tendency, (b) self-sufficiency, (c) introversion-extroversion, and (d) dominance-submission. It was validated on the basis of four previous single scales, with which it has correlations ranging from .67 to .91 (uncorrected for attenuation).⁶ Its reliability

¹O'Connor, J. *Born That Way*. (Williams and Wilkins, Baltimore, 1928).

²Darley, J. C. *The Reliability of the Tests in the Standard Battery*. Bulletin of the Employment Stabilization Research Institute, Minneapolis, 1934, Vol. 3, No. 4, pp. 42-44, 46.

³Earle, F. M. et al. *The Measurement of Manual Dexterities*. Report No. 4, National Institute of Industrial Psychology, London, 1930, pp. 22, 44-47, 84-85.

⁴Spranger, E. *Types of Men*. Translated from the German by P. J. W. Pigors. (Halle, 1928).

⁵Vernon, P. E. and Allport, G. W. "A Test for Personal Values". *Journal of Abnormal and Social Psychology*, Vol. 26 (1931), pp. 231-248.

⁶Bernreuter, R. G. "The Validity of the Personality Inventory". *Personnel Journal*, Vol. II (1932-33), pp. 303-308. Also: *Manual for the Personality Inventory*. (Stanford University Press, 1931).

coefficients range, for the four scales, from .85 to .88 (split-half method, corrected by the Spearman-Brown formula). Clinical application of the Inventory has suggested relationships between scores on certain of the scales and some types of neurosis.¹ The four scales are not independent: it is impossible to discriminate in practice between the scales of neurotic tendency and introversion-extroversion, and both of these are correlated highly with the scale of dominance-submission.²

A typical individual record card, used to assemble the main information of the general questionnaire and the results of tests given, is shown on p. 249.

¹Marshall, Helen. "Clinical Applications of the Bernreuter Personality Inventory". *Psychological Bulletin*, Vol. 30 (1933), pp. 601-602.

²Cf. also: Bernreuter, R. G. "The Imbrication of Tests of Introversion-Extroversion and Neurotic Tendency". *Psychological Bulletin*, Vol. 30 (1933), pp. 665-666. Perry, R. C. "Analysis of Group Factors in Certain Adjustment Questionnaires". *Psychological Bulletin*, Vol. 30 (1933), pp. 598

GENERAL QUESTIONNAIRE.

N.B.—This information is not required in any way for official purposes, but only in order to understand your particular problem.

Name Age Date 1933
 Address: No. and Street
 District Age years.
 How long have you lived in this district?

PARENTS.

	Mother	Father	Number of your brothers sisters
Country of birth	_____	_____	
Racial origin (e.g., Scottish, Jewish, etc.)	_____	_____	
Has he or she taken out naturalization papers?	_____	_____	_____

Occupation(s) of Father	Length of Time followed	Place in which followed
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

PERSON INTERVIEWED.

A. *General.* Country of birth Religion
 Racial origin Married or single
 Born in city, town or country? Children Other
 How long have you lived in Canada? Dependents
 How long have you lived in Montreal?
 If you have lived in Montreal less than six months, what was the last
 place in which you lived for six months or more?
 When did you leave this last place?

B. *Regular Occupation*
 (Give details: if "labourer", state kind of work usually done).
 If your occupation has not given you steady work over last 3 years, i.e.,
 you have usually been unemployed for a time between jobs, put
 X here
 If your employment has been part-time (i.e., regular but only part
 of the week) during any part of the last 12 months put X here
 How long is it since you last worked at your regular occupa-
 tion?

C. Education and Training.

Age on entering regular day school _____

Age on leaving regular day school _____

Last grade or standard completed in regular day school _____

EDUCATIONAL OR TRAINING INSTITUTIONS ATTENDED, ETC.

Type of School	Name of School	Location of School	Dates of Attendance	Did you finish courses?
Elementary (Public School)				
High School				
University or College				
University Extension (evening)				
Business School or College (day)				
Business School or College (evening)				
Technical School (day)				
Technical School (evening)				
Correspondence Course				
Other types, day or evening (e.g., trades school, barber college, art school, telegraphy courses, etc.)				

What school subjects, if any, did you like best? _____

If you have ever served regular apprenticeship give details:—

Trade _____ Firm _____

No. of years _____ Dates _____

D. (a) Employments from time of leaving school till aged 20.

Occupation	Industry or Employer	How Obtained*	Duration (give dates if possible)
------------	----------------------	---------------	--------------------------------------

1 _____

2 _____

3 _____

4 _____

5 _____

*How obtained. Specify according to following list:

- | | |
|-----------------------------|--------------------------------|
| 1. School or teacher's help | 5. Advertisements |
| 2. Parents | 6. Employment agency (specify) |
| 3. Friend(s) | 7. Some other way (specify) |
| 4. Personal search | |

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D. (b) *Occupational Experience (since age of 20).*

Occupation	Industry or Employer	Where?	Approximate Dates	Average Monthly Earnings
1	_____	_____	_____	_____
2	_____	_____	_____	_____
3	_____	_____	_____	_____
4	_____	_____	_____	_____

Have you ever wished to enter any other occupation in the past? If so, state occupations for which you think you are fitted: _____

E. *Reason for Present Unemployment.*

N.B.—Mark with X the reason which best fits your case. If you think more than one reason necessary, mark the second reason by figure 2. Read them all before giving your answer.

1. Slack month in regular occupation _____
2. Firm reduced staff owing to depression _____
3. Firm closed down or bankrupt _____
4. Your type of labour not required owing to new machinery or other equipment being adopted _____
5. Discharged because considered too old _____
6. Displaced because juvenile or female workers doing work at cheaper rates _____
7. Left voluntarily to find better-paid work _____
8. Left voluntarily to find more suitable work _____
9. Left because otherwise dissatisfied with conditions of work _____
10. Lost job after period of sickness _____
11. Permanent disablement or other physical handicap (see below) _____
12. Other reason (give details) _____

Would you describe your last loss of your regular job as "discharge", "lay-off", or "left voluntarily" (D, LO, or V.)? _____

Have you had any serious illness or other bodily incapacity, which has prevented your regular employment since the age of 20? _____

Nature (specify) Duration
(give dates)

F. *Status of Family (if married).*

- (a) How long have you been married? _____ years.
- (b) Is your wife usually a wage-earner? _____ If so, at what occupation? _____
 Approximate number of weeks she worked during 1931 _____
 Average monthly earnings during 1931 \$ _____
 Amount, if any, expended during the year, for any domestic help \$ _____

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- (c) Has your wife been forced to seek work since January 1931 because of your unemployment?
- If so, at what work? part time or full time?
- Approximate number of weeks she worked during 1931
- Average monthly earnings during 1931 \$.....

(d) *Children in Family.*

Age	Sex	Living at Home?	At School	Left School but unemployed	IF AT WORK Occupation	Average Monthly Earnings	Years spent at school	Present grade, or grade at leaving
1						\$		
2						\$		
3						\$		
4						\$		

A TYPICAL RECORD CARD.

11AM SMITH, John A. 32 M-2 England 0.4 x—NR A—Engineer											
Mechanical Engineer						Mining Engineer					
Mechanical Draftsman				Prot.		3:6		2		L	
Gr. 11. 1917. Apprentice engineer & Tech. Sch. 1917-1922. Min. Sch. 1922-23											
65	7	28	18	16	17	21	107	A	NPC 118/1		
129	124	105	127	—	—	121	—	120	117	// 120	
32.0	37.5	30.0	36.0	29.5	15.0	—177	153	—109	163	+2 N.K.	
83 Cox: 26.											
WB. 7.72, 1.49, 1.67, 0.78, 1.03, 0.53						TD. 6.75		CC. 22.			
NB. 44/38—82.						R 52, 45; L 46, 39.		RH.			

Interpretation: John Smith, of Group III, is age 32 years at last birthday, is married, and has two children. He has been unemployed four months, and has been employed irregularly during the last three years, with no regular part-time work in the last twelve months. He is not on relief. Main occupation: mechanical engineer; subsidiary, mining engineer. Taussig Class A (Engineering). His father's main occupation was that of mechanical draftsman. Smith is a Protestant, and has been in Canada three years and six months. He was laid off from his last job by reason of the depression. He completed Grade 11 in 1917, was apprenticed as an engineer from 1917 to 1922, and at the same time attended technical school. From 1922 to 1923 he attended mining school. He has a score of 65 upon the Otis Test, and a total score upon Revised Beta Examination of 107 (sub-test scores are also given). His total score upon the N.I.I.P. Clerical Test is 118, placing him in the first tenth of the population. The average score upon the New Stanford Achievement Test is 120 (sub-test scores are also given). Scores upon the Allport-Vernon Study of Values range from 15.0 to 37.5, the highest being for economic interest, the lowest for religious interest. His scores upon the four scales of the Bernreuter Personality Inventory are —177, 153, —109, and 163. He has a score of +2 upon the Neymann-Kohlstedt Diagnostic Test of Introversion-Extroversion. The score upon the Stenquist Mechanical Aptitude Test I is 83; upon the Cox Mechanical Ability Test, 26. Scores for six successive trials upon the O'Connor Blocks Test range from 7.72 minutes to 0.53 minutes (unweighted). The score upon the O'Connor Tweezer Dexterity Test is 6.75 minutes, and upon the N.I.I.P. Cube Construction Test, 22 (points). Scores upon two trials of the N.I.I.P. Nuts and Bolts Assembly Test are 44 and 38 seconds, making a total score of 82 seconds. Records of performance (in pounds pressure exerted) upon the Smedley Hand Dynamometer are 52 and 45, for the right hand, and 46 and 39, for the left. Smith is right-handed.

APPENDIX B: STATISTICAL TERMS AND METHODS.

The Frequency Distribution. The statistical concepts used in this and other psychological studies are largely based upon, and determined by, the qualities of the frequency distribution. By a frequency distribution is meant a citation of the number of cases for each possible score upon a test, from the highest score made to the lowest. Such a distribution may either be shown graphically or by a table. In the former case, points on the horizontal axis (or abscissa) represent the successive possible scores for the test, and points on the vertical scale indicate for each of the successive possible scores the number of persons making those scores. In tabular form, the number of cases is cited for each score in ordinary numerical fashion. Figs. 8-15 in the preceding text are examples of graphic representation of frequency distribution, while Tables VIII-XI show some frequency distributions in tabular form.

Frequently, where the "population", or number of cases, of the entire distribution is great enough (say, 50 or more), so-called "step-intervals" embracing two or more successive possible scores are used instead of single scores. Thus, instead of an enumeration of cases for successive scores of 1, 2, 3, 4, 5, 6, _____, there is arranged a grouping of the cases for step-intervals of, say, three successive scores: 1-3, 4-6, 7-9, _____. This eventually involves the assumption, when certain constants for the distribution are computed, that the middle score for each step-interval (2, 5, 8; _____ in the above example) may be used to represent the entire step-interval. Under ordinary circumstances this assumption involves only a negligible error if the population is large, and the error is more than counter-balanced by the reduction in physical size of the frequency table which the use of step-intervals makes possible.

After a test has been administered to a group of subjects, the first step in studying the test scores is to plot them in the form of a frequency distribution. When this has been done, it is usually desirable to know certain facts about the distribution. Such questions as the following may be asked: Does the frequency distribution assume a "normal", bell-shaped form such that the majority of the cases is found near the middle of the range of scores, with the remainder tailing out symmetrically toward the extremes?¹ If not, to what extent does the distribution tend to be biased toward one extreme? What score may be used as an average, to describe the central tendency of all the others? Are the cases bunched together around this average, or are they relatively dispersed from it, so that the average becomes less typical of them?

The Mean, the Median, and the Standard Deviation.—These questions are answered by deriving from the distribution certain constants, each one of which is descriptive of one of the characteristics of the distribution. To answer the question regarding the central tendency of the scores, it is necessary to compute either or both of two forms of average: the mean and the median. By the former is meant what is in ordinary parlance called the "average"—the sum of all the scores divided by their number. By the median is meant the scale-value of the middle case of the distribution, or that point in the range of scores which has just one-half of the cases above it and one-half below. These two forms of average, the mean and the median, are identical if the distribution is a perfectly symmetrical one; that is, if it slopes off at an equal rate on each side of the highest ordinate, which lies in the exact middle of the distribution. If this condition is not met, then the two will differ slightly, and the

¹A "normal" distribution is a completely symmetrical curve which has a number of definite mathematical properties (cf. Holzinger, K. J. *Statistical Methods for Students in Education*, Ginn & Co., Boston, 1928. Chap. XII). It is of great usefulness in psychological measurements because of all the curves which might be employed, it gives the best single approximation to the ordinary test score distribution.

difference will tend to vary with the degree of asymmetry of the distribution.

If the mean is used as an average or measure of central tendency, a third constant, called the standard deviation, is derived in order to describe the extent to which the scores tend to be clustered around, or dispersed from, the mean. This measure is found by determining the distance of each score from the mean, squaring that amount, adding together all these squared deviations, dividing their total by their number (the "population" of the distribution), and calculating the square root of the resulting quotient. Thus, if a distribution has a mean of 56.0, and one of the cases is a score of 25, the deviation of that score from the mean is $56.0 - 25$, or 31.0, and its square is 961.0. To this squared deviation is added all the others of the distribution, and the square-root of the mean of all the squared deviations is the measure of dispersion—the standard deviation. This measure, often expressed by the Greek letter σ , is larger if the scores tend to be dispersed from the mean, smaller if they tend to cluster around the mean.

Skewness.—Three measures, or constants, now having been found, it is possible to derive an index of the extent to which the distribution tends to be biased from the normal symmetrical shape to one extreme or the other. If, for example, the cases tend to be grouped to the lower end of the scale, or range of scores, and to tail out more sparsely toward the upper end, the mean will be higher in value than the median, because the former is unduly affected by a few very high scores. The greater the amount of bias (or skewness, as it is usually termed), the more this will be so. It is apparent therefore, that the size of this difference may be used as an index of the amount of skewness present in the distribution, and that its sign, positive or negative, will vary with the direction of the skew. To use it as such, however, it must be divided by the standard deviation of the distribution. The reason for this is evident upon examination.

If of two distributions one has a standard deviation of 20.0, and the second a standard deviation of 10.0, and if the difference between the mean and the median is the same, namely 3.0, in each, it is apparent that this difference of 3.0 is (relative to the total tendency to dispersion of scores) much less where the standard deviation is 20.0 than where it is only 10.0. Therefore, in order to make the index, or coefficient, of skewness comparable from one distribution to another, the deviation of the median from the mean is in each instance divided by the standard deviation. If there is no skewness inhering in the distribution at all, the coefficient will be zero, and ordinarily it does not vary beyond ± 1.00 .

Sampling.—A further problem occurs when it is desired to compare any two distributions. This problem arises if, for example, it is necessary to determine whether one group of subjects tends to be superior to another group in respect of any given tested trait. It does not do simply to find the mean of the distribution of scores for each group of subjects, and to conclude that Group A is superior to Group B if the mean score of the former is higher than that of the latter. This simple comparison is insufficient because each group must be regarded as being only a *sample* of a much larger group which it represents, and it is known in practice that a sample of a larger group is not necessarily typical of that group. Thus, if a group of 100 unemployed office clerks is compared with a group of 100 employed office clerks, each must be regarded as being a sample of a much larger group, from which this small body has been drawn. Accordingly, it must be expected that the sample will be subject to purely chance fluctuations in its composition, and that it will be perhaps somewhat better, perhaps somewhat worse, than the total group from which it is taken. Since this is the case, two samples may be drawn from two major groups of exactly equal status in some respect, and it may be found that simply by chance one sample from one group is superior to the other sample from the other group. The

statistician, in order to protect himself from possibly unjustified conclusions resulting from such errors in sampling, is forced to insist that the difference between the means of any two samples must, to be considered as real, be demonstrably such that it could not in the ordinary course of events be caused by chance.

To determine how much allowance must be made for sampling errors in the comparison of the means of any two distributions of scores for the same test, recourse is had to two statistical laws. The first of these is that the larger the sample of a source group, the more typical it tends to be of that parent group. The second is that the less scattered are the items of a distribution, the more the mean becomes typical of that distribution. Combining these two generalizations, it may be concluded that the mean of a distribution may be regarded as being a more trustworthy measure, the larger the number of cases and the smaller the standard deviation. This is usually expressed the other way about by saying that the standard error of a mean of a distribution varies directly with the standard deviation and inversely with the (square root of the) number of cases thus:

$\sigma_m = \frac{\sigma}{\sqrt{N}}$. In ordinary practice, when it is desired to compare the means of two distributions for the same variable, as in the example above, the standard error of each mean is computed, and from these the standard error of the difference is derived by the formula

$\sigma_{\text{diff}} = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}$. The difference between the two means is then compared with the standard error of the difference, and if the ratio of the former to the latter is 3.0 or greater it is virtually assured that the difference is greater than chance would permit. The ratio of 3.0 is taken as a criterion because the ordinary limits of a distribution are ± 3.0 times the standard deviation of that distribution. Thus a mean of, say, 56.0 with a standard error of 1.5 will

not ordinarily vary by chance, in any sample of the same size and standard deviation, above 60.5 or below 51.5. In the same way, a difference of 10.5 points with a standard error of 2.1 cannot ordinarily by chance fluctuation be less than $10.5 - (3 \times 2.1)$, or 4.2—in other words, the difference must have some residual value above zero, and is a real, indisputable difference. A warning, however, should be added at this point. This notion of sampling and sampling error, and of provision for the latter by computation of the standard error, deals only with *chance* sampling, and does not extend toward the influences of *selective* sampling. The latter variety always involves some special factor or factors which contribute to make the sample atypical of its source. Such a condition arises as when, in the case of Group IV of the present study, men for testing could be obtained only from educational classes, which would be likely to be composed only of the brighter and keener individuals.

Correlation.—Correlation means simply joint variation of two variables, and a coefficient of correlation is an index of the extent to which such joint variation is present in a given instance. The user of psychological tests often wishes to know the extent to which a high score upon one test is accompanied by a high score upon another. Moreover, he wishes to have a precise quantitative expression of this degree of correspondence, beyond being able to say that it is “high”, “low”, or “middling”. To obtain this, he takes fifty, a hundred, or more cases to whom both tests have been administered under comparable conditions. Setting out the cases in parallel, he then computes the ratio which the algebraic sum of the products of the deviations from the mean of each test bears to the geometric mean¹ of the sums

¹“The geometric mean of a series of observation is the value obtained by finding the product of all the observations, and then obtaining the root of that product with an index equal to the number of items in the group.” (Holzinger, *op cit.*, p. 91). Thus, in the above instance, it is the square root of the product of Σx^2 and Σy^2 .

of the squares of the deviations from the mean of each test. This ratio, which is the Pearson product-moment coefficient of correlation, is usually expressed by the formula $\frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$. It may vary between the limits of + 1.00 and -1.00. If the coefficient is + 1.00, it indicates that a unit deviation in one variable corresponds perfectly with a unit deviation in the other, and in the same direction. A correlation coefficient of - 1.00 indicates the same perfect agreement, but in an inverse direction. A coefficient of zero indicates complete unrelatedness. It is very seldom that a raw correlation coefficient rises above $\pm .95$.

The degree of accuracy with which a score on one test can be predicted from a score on another does not vary in exact proportion to the size of the correlation between the two tests. It increases much more slowly than the correlation coefficient. Thus, as a coefficient of .00 indicates complete chance prediction of one variable from another, a coefficient of .30 has a forecasting efficiency of 5 per cent. (5 per cent. better than chance), one of .60 an efficiency of 20 per cent., one of .87 an efficiency of 50 per cent., and one of .98 an efficiency of 80 per cent.

Thus far, it has been assumed that the relationship between the two variables which are correlated is a rectilinear one; that is, that it can be expressed by a straight line if the relationship is perfect, and that otherwise it tends to approach this form. While this is usually the case with test data, sometimes the relationship is other than rectilinear. It may then, for example, take the form of a curve. If this is the case, the rectilinear coefficient described above does not do justice to the relationship, but understates it, and it is necessary to use another statistical mechanism, called the "correlation ratio", to express the relationship between the two variables adequately. The correlation ratio, which has the same limits as the correlation coefficient (± 1.00), is always equal to or greater than the latter, as it may always

include the rectilinear relationship as one of its forms, and may take into account slight deviations from rectilinearity which are reducing factors for the correlation coefficient. However, it is not often necessary to use the correlation ratio with ordinary test data, because its superiority with such data is not as a rule very great.

The correlation coefficient, like the mean, is subject to ordinary errors of sampling. In just the same way, its trustworthiness is expressed by a standard error (or more usually, by the "probable error", which is always .6745 times the standard error, for a normal or near-normal distribution). The standard error is derived by the formula

$$\sigma r = \frac{1-r^2}{\sqrt{N}},$$
 where r is the correlation coefficient, and N is

the population upon which it is based. The value of the probable error is usually appended to the correlation coefficient whenever the latter is cited, thus: $r = .69 \pm .03$. This expression is interpreted to mean that the observed value of the correlation coefficient is .69, and that there are 50 chances in 100 that the real value of the coefficient is between .66 and .72.

APPENDIX C: THE BARR RATING SCALES AND THEIR CORRELATION WITH TEST SCORES.

In order to classify occupations according to the amount of a given skill or ability required, a method of grading which involves the use of a numerical scale to represent the skill or ability has been devised. The method has been employed in at least two extensive investigations: in the Terman study of gifted children, where Mr. F. E. Barr developed this type of scale to rate fathers' occupations for intelligence;¹ and in the Minnesota research into mechanical ability, where the method was used for rating fathers' occupation for intelligence and mechanical ability.² In the former case it was found that the average rating for fathers of the gifted children included within the survey was significantly higher than the average rating for the general population, as determined from census data. In the Minnesota study no significant relationship was found between test scores and either the Barr intelligence ratings or mechanical ability ratings. Certain of the "environmental" ratings (that is, for cultural status, literary interests, tools owned by father, etc.) correlated significantly with the Barr ratings, however.

The procedure through which the original Barr scale was constructed commenced by having thirty judges rate one hundred representative occupations on a scale of 0 to 100, according to the grade of intelligence that each occupation was believed to demand. Probable error values were then determined from a distribution of the averages of these thirty ratings, and the probable error value, which ranged from zero ("Hobo") to 20.71 ("Inventive Genius"), was used

¹Terman, L. M. et al. *Genetic Studies of Genius*, Vol. 1. (Stanford University Press, 1925).

²Paterson, D. G. et al. *The Minnesota Mechanical Ability Tests*. (University of Minnesota Press, Minneapolis, 1930).

as an index of the occupation to which it was attached.¹ The mean probable error value for the general population was estimated to lie between 7.92 and 8.88.

By a similar method, the Minnesota investigators developed the Barr-type scale for mechanical ability. Standard deviation values were used instead of probable error values, however. These ranged from 0.27 ("High National Official") to 5.73 ("Inventive Genius").

It was attempted in the present investigation to determine something of the inter-relationship of these scales, and their correlation with test scores, for the individuals themselves tested (not those one generation removed), in order to throw some light upon the scales and the tests. Accordingly, a group of 246 unemployed men, representing a wide range of occupations and abilities, was selected, and these individuals were rated on the basis of the Barr scales for their own and their fathers' occupations. All of these men had taken the Beta Examination and the Stenquist Mechanical Aptitude Test I, and the majority had taken also the Otis Test ($N = 109$) and the O'Connor Blocks Test ($N = 194$). As the Minnesota Paper Formboard had been administered to only 79 of the group, it was thought inadvisable to use it for correlation purposes. Test 4 of Beta Examination, involving substantially the same type of content, was used in its stead. This was considered justified in the main by the fact that the Minnesota Paper Formboard and Test 4 of Beta Examination correlated $+ .875 \pm .014$.²

The Barr ratings were then correlated with each other and

¹The *probable error* (P.E.), like the *standard deviation* (S.D.), measures dispersion from the mean of a distribution. In a normal frequency distribution, 50 per cent of the cases are included within the limits of one probable error unit above and below the mean. If desired, an arbitrary zero point, based upon the position of the limiting case, may be set at the bottom extreme of the distribution, and all scores may be translated into probable error units above the arbitrary zero point. Exactly the same procedure may be used in the case of standard deviation units. It is to be noted that the zero point on such a scale does not mean "no ability at all", but simply indicates that such a rating or score is at the very bottom of the distribution.

²Uncompensated for attenuation. Taking the reliability of the Minnesota Paper Formboard to be .82 (single form), the coefficient, adjusted for attenuation, becomes .966.

with test scores. These coefficients of correlation are presented in the table on p. 267. In addition, the Barr intelligence and mechanical ability ratings were correlated as between father and son. The coefficients of correlation for the father-son relationship were, for intelligence rating, $+ .647 \pm .025$, and for mechanical ability rating, $+ .300 \pm .039$.

Fifteen of the twenty-one coefficients derived were found to be fully significant, that is, four or more times the probable error. The Barr intelligence scale correlated positively and significantly with all five tests except the O'Connor Blocks. Its highest correlation was with Beta Examination, being $+ .609 \pm .027$. The mechanical ability scale, on the other hand, was correlated significantly in only two instances: with the Stenquist Mechanical Aptitude Test I ($+ .332 \pm .032$) and the O'Connor Blocks Test ($+ .206 \pm .047$). The relationship between the Stenquist Test and the mechanical ability scale ($+ .332 \pm .032$) was no higher than the relationship between the Stenquist Test and the intelligence scale ($+ .348 \pm .038$).

The two scales themselves intercorrelated to the extent of $+ .100 \pm .043$. This correlation is, of course, not fully significant. Inspection of the scatter of tallies in the correlation chart indicated, however, that the principal reason for the lack of linear relationship was the fact that while the mechanical ability ratings of 3.00 and over were correlated positively with intelligence ratings, those under 3.00 tended to be correlated negatively.¹ The cause of this was that clerical and commercial occupations, while given a high

¹Where a correlation between two such sets of measures is positive (that is, high values on one scale tend to accompany high values on the other, and conversely) it is generally shown by a scatter of tallies in a scatter diagram similar to Fig. 16, proceeding from the bottom left hand corner to the upper right hand corner. If the correlation is negative, the scatter approximates a line drawn from bottom right to upper left. In Fig. 16 it will be seen that both such tendencies are present, and consequently a line drawn through the middle of the scatter of tallies would tend to take a form like that of a parabola, with the "open" side facing downwards. For such a form, the correlation ratio is a better means of expression than the correlation coefficient, as may be judged by the difference between .830 and .100.

rating on the intelligence scale, were rated at the inferior end of the mechanical ability scale, which was contrary to the general trend. The correlation ratio for the regression of the intelligence scale upon the mechanical ability scale was therefore computed, and was found to be $.830 \pm .013$. Blakeman's test for linearity of function¹ gave a resultant indicating clearly the predominance of the curvilinear trend, zeta being over 28 times its probable error. The linear correlation coefficient between the two scales is given by the Minnesota investigators as being $+ .04$, no attempt apparently having been made to determine whether the relationship were other than linear.

Following this clue, it was found that the same curvilinear relationship held, though to a less degree, between the Barr mechanical ability ratings and each of Beta Examination, Test 4 of Beta, and the Stenquist Test, the correlation ratios (regression of each on the Barr mechanical ability scale) being respectively $.553 \pm .030$, $.381 \pm .037$, and $.471 \pm .033$. These were in each case significantly greater than the corresponding rectilinear coefficients.² The scatter diagrams illustrative of the various relationships are shown in Figs. 16 to 19.

Three general conclusions may be drawn from these data. First, the Barr intelligence scale bears an appreciable positive relationship to the intelligence test scores of the individuals whose occupations are rated. The coefficient of correlation

¹The correlation ratio is never less than the correlation coefficient and is generally greater. The former may, of course, be greater owing to chance fluctuation. To determine whether the predominance of the curvilinear trend over the linear is significant, a statistical criterion known as Blakeman's test is used. If the difference between the squares of the correlation ratio and the correlation coefficient is three or more times its standard error the existence of the curvilinear trend is judged to be real.

²Cf. Kelley, T. L. *Statistical Method*. (Macmillan, N.Y., 1924). Formulas 195, 196. The zetas, together with their probable errors, were as follows:

	ZETA	P.E.
Barr Intelligence — Barr Mechanical Scale _____	.679	.024
Beta Examination — " " " _____	.306	.033
Test 4 of Beta — " " " _____	.125	.027
Stenquist Test — " " " _____	.112	.026

**BARR INTELLIGENCE SCALE
BARR-TYPE MECHANICAL ABILITY SCALE**

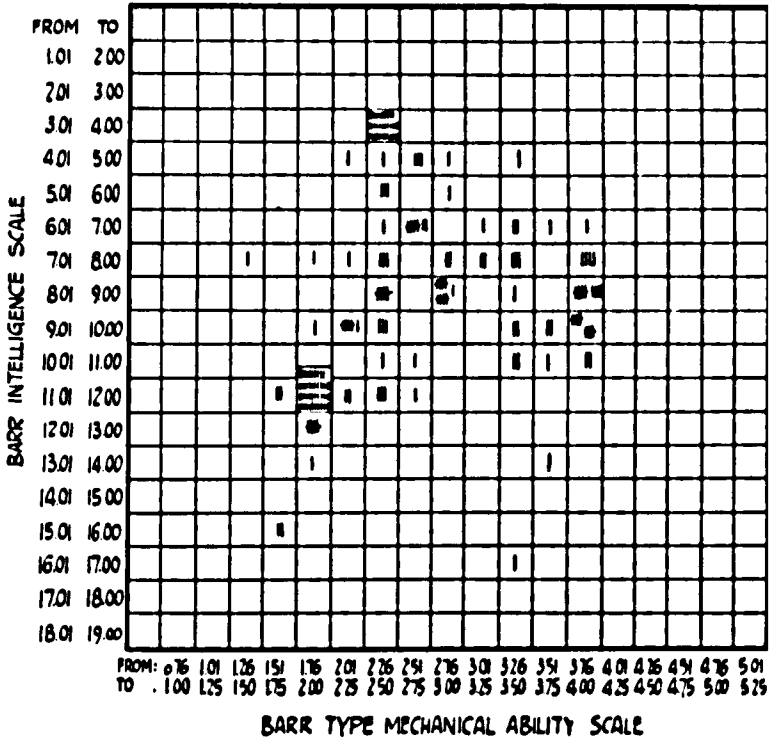
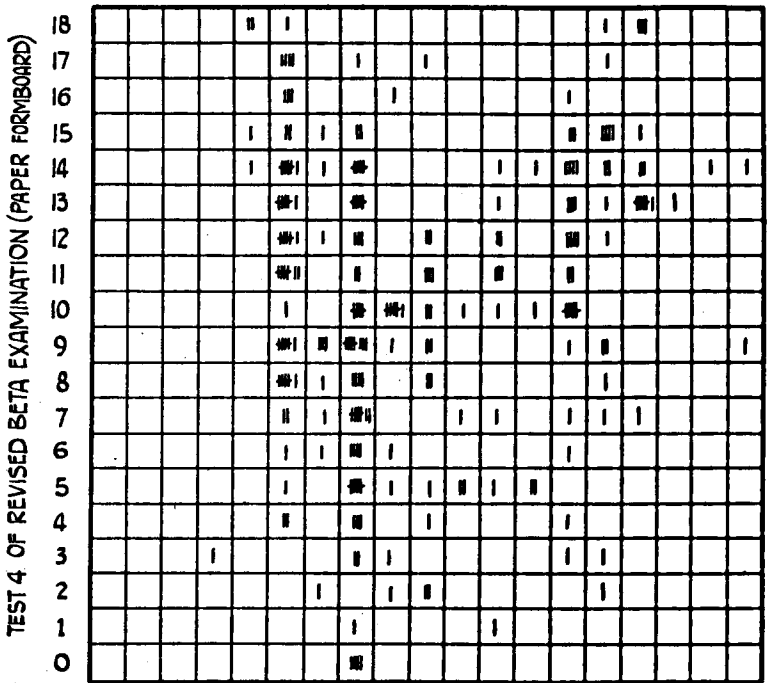


FIG. 16. Scatter-diagram for correlation between Barr Intelligence Scale and Barr-Type Mechanical Ability Scale.

TEST 4 OF REVISED BETA EXAMINATION
(PAPER FORMBOARD)
BARR-TYPE MECHANICAL ABILITY SCALE



FROM: 0.76 1.01 1.26 1.51 1.76 2.01 2.26 2.51 2.76 3.01 3.26 3.51 3.76 4.01 4.26 4.51 4.76 5.01
 TO : 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75 4.00 4.25 4.50 4.75 5.00 5.25

BARR-TYPE MECHANICAL ABILITY SCALE

FIG. 18. Scatter-diagram for correlation of Test 4 Revised Beta and Barr-Type Mechanical Ability Scale.

**STENQUIST MECHANICAL APTITUDE TEST 1
BARR TYPE MECHANICAL ABILITY SCALE**

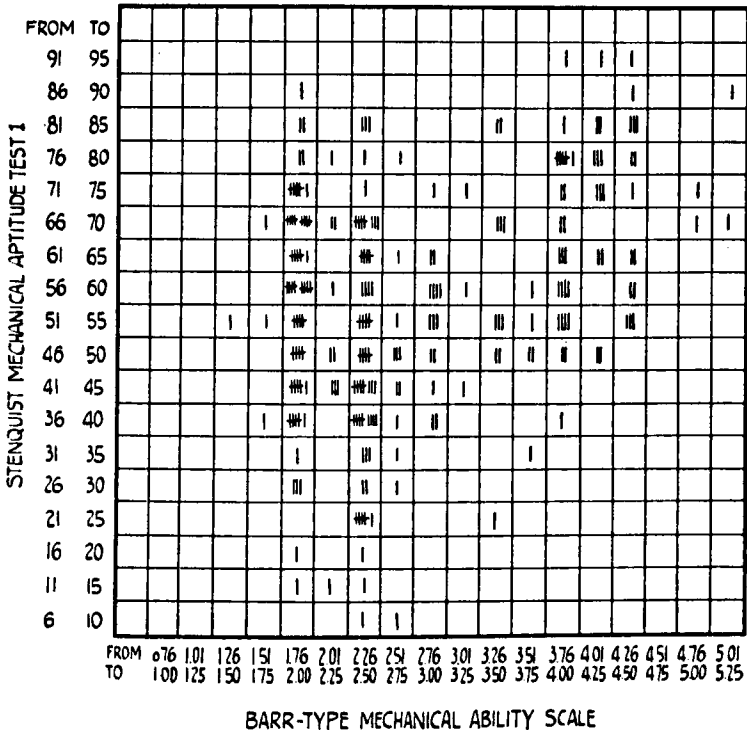


Fig. 19. Scatter-diagram for correlation between Stenquist Mechanical Aptitude Test 1 and Barr-Type Mechanical Ability Scale.

is approximately .60 with the Beta Examination, .30 with the Otis Test. Secondly, the Barr mechanical ability scale tends to have a definitely curvilinear correlation with the Barr intelligence scale and test scores, including those of the Stenquist Test and the formboard test (Test 4 of Beta Examination). The relationship of the Stenquist Test to Beta Examination is known, however, to be approximately rectilinear, and is believed to be so in the case of the Stenquist Test and intelligence tests other than Beta Examination.

Thirdly, certain judgments may be made, tentatively, concerning the tests themselves. It is noteworthy that the O'Connor Blocks Test, while (if it measures anything very consistently) containing something of a general intelligence factor, is most highly correlated with Test 4 of Beta (paper formboard). One might possibly infer that this implies a similarity in function in that they both call for a visualization of spatial relationships. It may be noted in this connection that the Minnesota group found their test of spatial relations to correlate + .63 with the paper formboard. Again, with respect to the paper formboard itself, the bulk of the evidence here seems to show that its function is much better related to general intelligence than to mechanical ability. While it correlates + .476 with the Stenquist Test, its relationship is much higher ($+ .651 \pm .037$) with a purely verbal test like the Otis. In addition, it is to be observed, for what the distinction is worth, that the rectilinear relationship between the paper formboard and the Barr intelligence scale is much higher than between the formboard and the Barr mechanical ability scale, and higher also than the correlation ratio for the regression of the formboard on the Barr mechanical ability scale.

THE BARR RATING SCALES

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COEFFICIENTS OF CORRELATION FOR BARR INTELLIGENCE AND MECHANICAL ABILITIES, RATINGS AND TEST SCORES.

	Barr Intelligence Scale	Barr Mechanical Scale	Otis
Barr Intelligence Scale.....	—	.100 ± .043	.319 ± .058
Barr Mechanical Scale.....	.100 ± .043	—	.085 ± .064
Otis.....	.319 ± .058	.085 ± .064	—
Beta.....	.609 ± .027	.018 ± .043	.700 ± .033
Stenquist.....	.348 ± .038	.332 ± .038	.219 ± .062
O'Connor Blocks.....	.039 ± .048	.206 ± .047	.315 ± .082
Beta, Test 4.....	.456 ± .034	.142 ± .042	.651 ± .037

	Beta Total	Stenquist	O'Connor Blocks	Beta Test 4
Barr Intelligence Scale...	.609 ± .027	.348 ± .038	.089 ± .048	.456 ± .034
Barr Mechanical Scale.....	.018 ± .043	.332 ± .038	.206 ± .047	.142 ± .042
Otis.....	.700 ± .033	.219 ± .062	.315 ± .082	.651 ± .037
Beta.....	—	.517 ± .032	.373 ± .042	.786 ± .016
Stenquist.....	.517 ± .032	—	.384 ± .041	.476 ± .033
O'Connor Blocks.....	.373 ± .042	.384 ± .041	—	.461 ± .038
Beta, Test 4...	.786 ± .016	.476 ± .033	.461 ± .038	—

**APPENDIX D: CONSTANTS OF THEORETICAL DISTRIBUTIONS
SHOWN IN FIGS. 7-15.***

Test	Mean	Median	S.D.	Coefficient of Skewness
Education.....	7.7	7.8	2.3	-0.13
Beta Total.....	72.9	74.7	21.5	-0.25
Test 4 of Beta.....	8.8	9.0	4.0	-0.15
New Stanford.....	91.0	92.9	19.4	-0.29
N.I.I.P. Clerical.....	37.5	30.0	24.8	+0.91
Stenquist.....	53.0	53.2	19.8	-0.03
Cox.....	6.2	2.5	7.0	+1.59
O'Connor Blocks.....	—	3.92	—	—
Bernreuter B1-N.....	-37.8	-34.1	90.3	+0.12 ^a
Bernreuter B2-S.....	38.7	36.6	49.3	+0.13 ^a
Bernreuter B4-D.....	41.7	44.5	65.8	-0.13

*See Chapter VI.

^ai.e., the distribution is skewed slightly to the right. (See Figs. 13).

**APPENDIX E. CRITICAL RATIOS, TEST-SCORES FOR
OCCUPATIONAL GROUPS.**

APPENDIX E: CRITICAL RATIOS, TEST-SCORES FOR OCCUPATIONAL GROUPS.

The letter-number symbols in the table facing, denote occupational groups as follows:

<i>Symbol</i>	<i>Occupational Group</i>	<i>Symbol</i>	<i>Occupational Group</i>
A ₁	Engineers	C ₃	Carpenters, cabinetmakers
A ₂	Accountants and auditors	C ₄	Electricians
B ₁	Office clerks	C ₅	Plumbers
B ₂	Draughtsmen	D	Semi-skilled trades (street-car motormen, factory hand, auto-body polisher, etc.)
B ₃	Book-keepers		
B ₄	Salesmen, salesclerks		
C	Skilled trades (inclusive of C ₁ -C ₅)		
C ₁	Machinists	E	Unskilled (labourers, farm hands, etc.)
C ₂	Mechanics		

For each occupational comparison (A₁A₂, A₁B., etc.), the first column ($\frac{D}{\sigma_{diff}}$) gives the ratio of the difference between the two means for the variable concerned to its standard error. The second column (Chances in 100) gives the number of chances in 100, of a true difference greater than zero being represented.

Where no asterisk appears, the score of the first occupational group cited is superior to that of the second; presence of the asterisk indicates the contrary.

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