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AFRICAN INDUSTRIAL WORKERS BEING TESTED

AN INVESTIGATION INTO EDUCATIONAL AND OCCUPATIONAL DIFFERENCES IN TEST PERFORMANCE ON A BATTERY OF ADAPTABILITY TESTS DESIGNED FOR AFRICANS.

A THESIS

SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR

THE DEGREE OF DOCTOR OF PHILOSOPHY

IN THE DEPARTMENT OF PSYCHOLOGY, FACULTY OF ARTS,

AT THE UNIVERSITY OF THE WITWATERSRAND,

JOHANNESBURG.

BY

Jacobus Celicourt

J.C. DE RIDDER.

JUNE, 1956.



AFRICAN INDUSTRIAL WORKERS BEING TESTED

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Thesis

Approval Sheet.



Acknowledgements.

During the period of this research (June 1952 to June 1956) I have become indebted to a number of persons.

I must acknowledge firstly, my indebtedness to my supervisor Dr. S. Biesheuvel, Director of the National Institute for Personnel Research, for the guidance, assistance and advice given me during this project. I am grateful likewise to Mr. R.S. Hall, Dr. W. Hudson and Mr. R.V. Sutton - of the N.I.P.R., for the help given me at various stages of this research. Thanks are due also to: D.G. Sloan; A.M. Masilela; W.B. Mofokeng and R.O. Mazibuko, members of the African Labour Research Team, who assisted in the application of the test battery.

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My gratitude is also expressed to the many headmasters, principal teachers and teachers of the African schools visited, for their cooperation and help during the testing programme.

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for permission granted to reproduce the illustrations of native heads appearing at the foot of various pages.

And finally I must acknowledge my indebtedness to the Council for Scientific and Industrial Research of the Union of South Africa, for the financial assistance granted me in the form of Research Bursaries for the years 1953 to 54; 1954 to 55 and 1955 to 56.

J.C. DE RIDDER.

JOHANNESBURG.

JUNE, 1956.



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INTRODUCTORY STATEMENT TO PART : 1.

Introductory Statement to Part 1:

In the volume and value of its production South African secondary industry has by a wide margin outstripped the direct contribution of mining or agriculture to the national income.

This development is a healthy one. The mines are a vanishing asset and increased industrialisation is the best insurance for the future. The wider the foundations on which the Union's prosperity rests, the more certain it is to continue and spread. The continuance of this industrial expansion is, however, intimately related to the labour potential of the Union. The unit of industrial expansion is ultimately the industrial worker.

An increasing understanding of the requirements of South Africa's rapidly expanding secondary industrial economy, coupled with the realisation of the Union's limited skilled labour potential, will tend to make industrialists more conscious than they are at present of the need for scientific placement and classification techniques in the selection of a more efficient labour force.

The pressing need for research into the selection of African workers - who constitute the vast majority of the Union's secondary industrial labour force - is consequently obvious.

In the present research the main emphasis will be upon the ability of a particular test battery to select and classify African workers for jobs within secondary industry. However, in order to fully assess the selectivity and usefulness of this battery, considerable stress will be placed upon a number of variables, which it is thought, may in some way influence test performance.

For the sake of convenience, the present research may be divided into two broad sections:

1. a section which will consider the usefulness of a particular aptitude test battery as a selection device,

and 2. a section which will consider the effects that certain variables such as: age, educational standard, job experience and sex, exert upon the selectivity of this test battery.

A test battery used in a study of this nature where one is dealing with subjects speaking a number of different languages, and varying from complete literacy to complete illiteracy, must satisfy a number of special conditions. With slight alterations it was possible to use the General Adaptability Battery designed by the National Institute for Personnel Research and employed at present on a number of gold mines in the Union, as it has been specially constructed to overcome such language and literacy problems, and has the additional advantage of having proved itself a very successful selection device for African mine-labour.

A detailed consideration of the method of application of the General Adaptability Battery as a selection device for African secondary industrial labour, will be given in the text of this research.

2. Sample Selection:

The problem of the selection of samples was twofold: firstly, to test a representative sample of African secondary industrial workers, and secondly, to test an African school sample, included to throw light upon certain aspects regarding the influence of age and education on test scores and to consider the existence

of sex differences in test performance on the battery.

In order to draw conclusions relevant to the Industrial Sample concerning the effects of certain factors (eg: age, education, etc.) on test performance observed in the School Sample, it is absolutely necessary that the methods of test procedure and presentation remain similar in form for both samples.

The methods employed to ensure and maintain the required similarity of form in the procedure and presentation of the General Adaptability Battery when applied to these two sample populations, forms a major section of the first portion of this research.

3. Criterion of Classification:

The criterion used to assess the predictive ability of the General Adaptability Battery as a means of worker selection and classification, is based upon a job analysis carried out at each plant visited.

Although each job analysis undertaken is illustrated and explained in the text, because of the importance job analysis assumes in this research, an account of its development and of the general theory underlaying its application, will help to establish its choice as a means of providing a criterion measure.

The first job analysis was undertaken in America by the Civil Service Commission of 1871, when various attempts at job classification were made by Civil Service reformers. In 1909 the Civil Service Commission of Chicago instituted a job analysis procedure to aid in job classification, job rating, worker selection and promotion, for the municipal services. The procedure instituted here was further developed by E.O. Griffenhagen into the job analysis

technique used today.

From this beginning job analysis has now taken its place in all industrial and personnel work as a basic review study of duties prior to any attempt at standardisation, classification or selection within the work situation. A knowledge of job analysis is a fundamental prerequisite for an intelligent attack upon all personnel problems in any organisation.

In the present study the work situation is analysed from two angles by:

1. a job analysis,

and 2. a worker analysis.

The job analysis refers to the procedures employed in collecting information concerning the nature and conditions of work involved in a given job, and the term worker analysis refers to the procedures employed in collecting information concerning the necessary or desired characteristics of the worker who successfully performs the job. The results of a job analysis are set down in job specifications or descriptions, and the worker analysis in worker specifications or characteristics.

A job analysis is undertaken in order to establish, classify and group the various labour duties, a worker analysis is carried out to consider, isolate and define the various personal qualities required for the successful performance of a job.

4. Validating Technique Employed:

No single test or combination of tests will ever do a perfect job. There are far too many personality factors contributing to a successful job performance that are not measured by the presently available tests. There are, however, two basic fact-finding techniques whereby it is

possible to know whether or not a given test or combination of tests should be used as a tool in allocating personnel to particular jobs. Both are known as validating techniques and have as their purpose testing the test. These methods are referred to as the "present employee method" and the "follow-up method".

The "present employee method" will be used in this research. The time factor rules out the use of the "follow-up method" as a validating technique. The "present employee method" involves the following steps:

1. Analyse the job.
2. Select a trial battery.
3. Identify criterion groups.
4. Administer trial battery.
5. Compare test results.

5. Definition of Terms:

Because the terms "job", "job family" and "worker" have been used in a variety of different senses in studies of job and worker analysis, it is advisable to define the sense in which they will be employed in the present research:

1. Position: a position is a group of industrial tasks performed by one person. In any organisation there are as many positions as workers. In an office, for example, there might be four positions of clerk-typist, each of which would be filled by a different individual.

2. Job: a job is a group of similar positions. In any establishment there may be only one person or there may be many persons engaged in the same job. Thus in the above case the four positions of clerk-typist would constitute the job of

clerk-typist in the organisation. (O.L Shartle "Occupational Information").

3. Job Family: a job family is a number of allied jobs. Thus one speaks of the jobs of clerk-typist, office clerk and bookkeeper as falling within a clerical job family.

4. A Worker: for the purposes of this study a worker will be defined as an individual who has been successfully engaged upon a particular position for at least one month.

Consequently, from the point of view of this research the analysis of the work situation undertaken can be defined as:

> A review study of jobs to ascertain what kind and what degree of man-qualities are necessary to make man-job units operate satisfactorily.

6. Scope of Inquiry:

The formulation of specific questions of investigation in relation to the general problem or field of inquiry, is essential in a subject which is as broad in scope as the present.

One must narrow down the field in order to focus ones efforts to achievable units. In this research the interest will be focussed upon the following questions:

1. An assessment of the ability of the test battery to differentiate between Mechanical and Non-Mechanical jobs in secondary industry.

2. Does education effect selection on this battery?

3. Does age effect selection on this battery?

4. Does a combined age-education factor effect selection on this battary?

5. Does job experience effect selection on this battery?

and 6. Do any sex differences in test performance exist on this battery?

7. Research Layout:

This research project will be presented in two parts.

Part 1: will explain in detail the test programme: its organisation and administration, it will introduce the test battery, describe the methods employed in the collection of the data, and present a detailed account of the methods, procedures and results of each job analysis.

Part 11: will contain the statistical analysis and presentation of data, a summary of the research findings, and the conclusions arrived at on the basis of the statistical analysis and from observations made during the course of the research.

PART : 1.

1. Research Aim:

The industries of the Union are very largely dependent on native labour, which is drawn from the native population resident -

a) in rural locations and reserves within the borders of the Union;

b) on European - owned farms:

c) in urban - areas;

d) in extra - Union territories; [1].

The mines derive their labour supply mainly from the sources mentioned in a) and d), while employers of natives in industry may be said to rely to some extent on all these sources. It is obvious, therefore, that the industrial native labour force of the Union comprises an extremely heterogeneous group, ranging from the primitive tribesmen of the reserves and extra - Union territories to the urban natives living in the towns and cities and influenced and educated in varying degrees by their contact with European culture.

There has been over the past number of years a steady drift of natives from the farms to the towns. In the latter part of the thirties and during the recent war years, there has been an attempt, chiefly by means of wage board determinations, to raise unskilled, that is Non-European, wage rates, particularly in the larger urban centres. This has tended to increase the gap between money wages on farms and in the urban areas and to strengthen the movement of labour from the farms. In addition to the lower money wages, conditions and terms of service on farms have deteriorated in some respects, particularly for young Africans.

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1. Official Year Book of the Union of South Africa No. 25 - 1949 - Government Printer, Pretoria.

Grazing and cultivation rights have been limited increasingly as the value of land to the farmer has risen with the development of more intensive and commercialised farming, and coupled with the attempt to limit the system of labour tenancy, this has led to farm work becoming increasingly less popular. Also the wants of Africans in rural areas have increased in variety while the means of satisfying them have not increased correspondingly. The result is that in many respects conditions for Africans on European-owned farms compare unfavourably with the higher money wages and the greater freedom and variety of urban life.

In the reserves similar influences have affected the African population. As on the farms, their wants have increased as they have come into contact with an increasing range of European goods. At the same time pressure of population and the growing impoverishment of the reserves have forced the native population to seek work elsewhere in order to satisfy their growing wants. While the frequent droughts in some areas, cause a general exodus to centres of employment outside the reserves. [2.]

The problem of conserving this available manpower and making better use of it has become an urgent matter of national concern. Especially during a time: a) When the Union itself is feeling the stresses and strains of a period of intense industrial development,

and b) at a time when the march of economic progress on the other side of our borders must gradually have a profound effect on the distribution of our manpower resources and leave its impact on the traditional sources of

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2. Handbook on Race Relations in South Africa - Edited by Ellen Hellman, Oxford University Press, 1949

a large part of South Africa's native labour force.

In the mining industry ways and means of improving the efficiency of native labour are constantly being studied, unlike the rapidly expanding industrial field where little or nothing has been done in this direction.

One of the first studies, aimed at a more efficient utilisation of native Mine Labour, was conducted by the National Institute for Personnel Research, who devised a battery of tests for the selection and classification of native underground labour. The tests were of the performance type, constructed to stand up to continuous use, and applied by means of a silent film showing all test instructions and demonstrations through the medium of mime, thus making it possible to apply them to subjects regardless of literacy, of language and of cultural differences.

For the purpose of classifying native underground workers two test batteries were developed which were considered to involve the necessary abilities and yet remain suitable for mass administration to primitive peoples. They were called:

1) The General Adaptability Battery.

2) The Special Test Battery.

The General Adaptability Battery was designed to "measure the candidates ability to understand and act on instruction; to acquire knowledge and profit by experience; to observe and analyse the essentials of a task and to take appropriate action on the basis of this analysis; to apply his experience to the solution of new problems and to

manipulate equipment effectively" [3]. The battery originally constructed for this purpose was composed of the following tests:

1. Screws Test.
2. Formboards Test.
3. Abacus Frame Test.
4. Sorting Test I (Mechanical Parts)
5. Sorting Test II (Letters and Numbers)
6. Cube Construction Test.
7. Mechanical Pegboard Test.
8. Tripod Assembly Test.
9. Associative Learning Test.

While the original Special Test Battery, applied to candidates graded out by the General Adaptability Battery and designed to amplify the pointers to Boss Boy potentiality obtained from the General Adaptability Battery contained four tests, namely:

1. Wiggly Blocks Test.
2. Kohs Blocks Test.
3. The Stile Test - a practical intelligence test.
4. The Leaderless Group Tests.

These tests classified recruits psychometrically into three major job families - supervisory, mechanical and non-mechanical. Validation results, obtained after a number of years, are presented on a substantial sample of African underground workers; the median multiple correlation with training results being .58 ± .07, and

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3. Aptitude Tests for native labour on the Witwatersrand Gold Mines - Part II. Report on investigation H16/35 carried out on behalf of the Transvaal Chamber of Mines by the National Institute for Personnel Research.

with job efficiency .55 while the training wastage for test selected supervisory trainees is 3.6 per cent as compared with 26 per cent (expected) for chance selection and 17 per cent for selection by orthodox methods.

From these results it may be concluded that the selection and classification procedures carried out on the mines are most satisfactory. The usefulness of these tests "as selection devices for occupations other than mining, and for vocational or educational guidance generally, is worth investigating" [4].

And the following study is an investigation along these lines, being primarily concerned with two features arising out of the experimental introduction to secondary industry of the above mentioned test battery. These are:

1. the ability of the Mines tests to differentiate between Mechanical and Non-Mechanical jobs as classified by the job analyses conducted in various secondary industries,

and 2. as the subjects found in secondary industry tend to represent a different sample of the native population, and are better educated than Mine subjects, to consider the effects of education upon test scores by:

   a) noting the educational standard of all industrial subjects.

   and b) applying the tests to school - children from the Sub-Standards to the Matriculation class in a number of different native schools.

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4. Personnel Selection Tests for Africans - article by Dr. S. Biesheuvel. South African Journal of Science, Vol. 49, No. 1, August 1952.

The main object of the present study, then, is as follows:

<u>To assess the ability of the N.I.P.R. Mines test battery to differentiate between Mechanical jobs and Non-Mechanical jobs in secondary industry, and as the labour employed in secondary industry is better educated than Mine labour, to consider the effect of education upon test scores.</u>

2. Research Programme.

A Research programme for a study of this kind must, due to the nature of the problem - as stated above, involve two distinct samples:

a) an Industrial Sample

and b) a School Sample.

Within the Industrial Sample interest is focused mainly upon the tests ability to differentiate between Mechanical and Non-Mechanical duties, and secondly upon the effect of his education on the industrial workers test score.

In the School Sample the main interest is upon the influence of education on test scores in a population where the age factor is fairly constant within each educational standard, and the influence of job or working experience almost nil.

The Research programme of the Industrial sample involved two steps:

1, carrying out a job analysis at each industrial plant in order to classify the labour,

and 2. applying the test battery to a representative sample of both Mechanical and Non-Mechanical workers within each plant.

The School Sample involved simply the application of the tests to children from the Sub-Standards (i.e: Grades 1 and 2) up to the Matriculation class.

The Industrial Sample was obtained from three sources: an automobile assembly; a soap factory and a paper manufacturing plant. These three industries combined were considered to give a good range of Mechanical and Non-Mechanical job skills.

The programme of research (given in chronological order) was as follows:

1. Preliminary study at Stanley Motors to alter test times.
2. Job Analysis at Stanley Motors.
3. Job Analysis at Lever Brothers.
4. Testing at Stanley Motors.
5. Testing at Lever Brothers.
6. Testing at Western Native Township Bantu High School.
7. Testing at Western Native Township Amalgamated School.
8. Job Analysis at South African Pulp and Paper Ind. Limited.
9. Testing the Apostolic Faith Mission School.
10. Testing Newlands Methodist School.
11. Testing the Salvation Army School.
12. Testing Kilnerton High School (Pretoria).
13. Testing Kilnerton Primary School (Pretoria).
14. Testing at South African Pulp and Paper Ind. Ltd.

The above programme allowed for the testing of approximately 3,200 subjects.

3. Research Samples.

The Industrial Sample was obtained from the following sources:

1. Stanley Motors - Natalspruit.
2. Lever Brothers - Auckland Park, Johannesburg.
3. South African Paper and Pulp Industries Ltd. - Geduld.

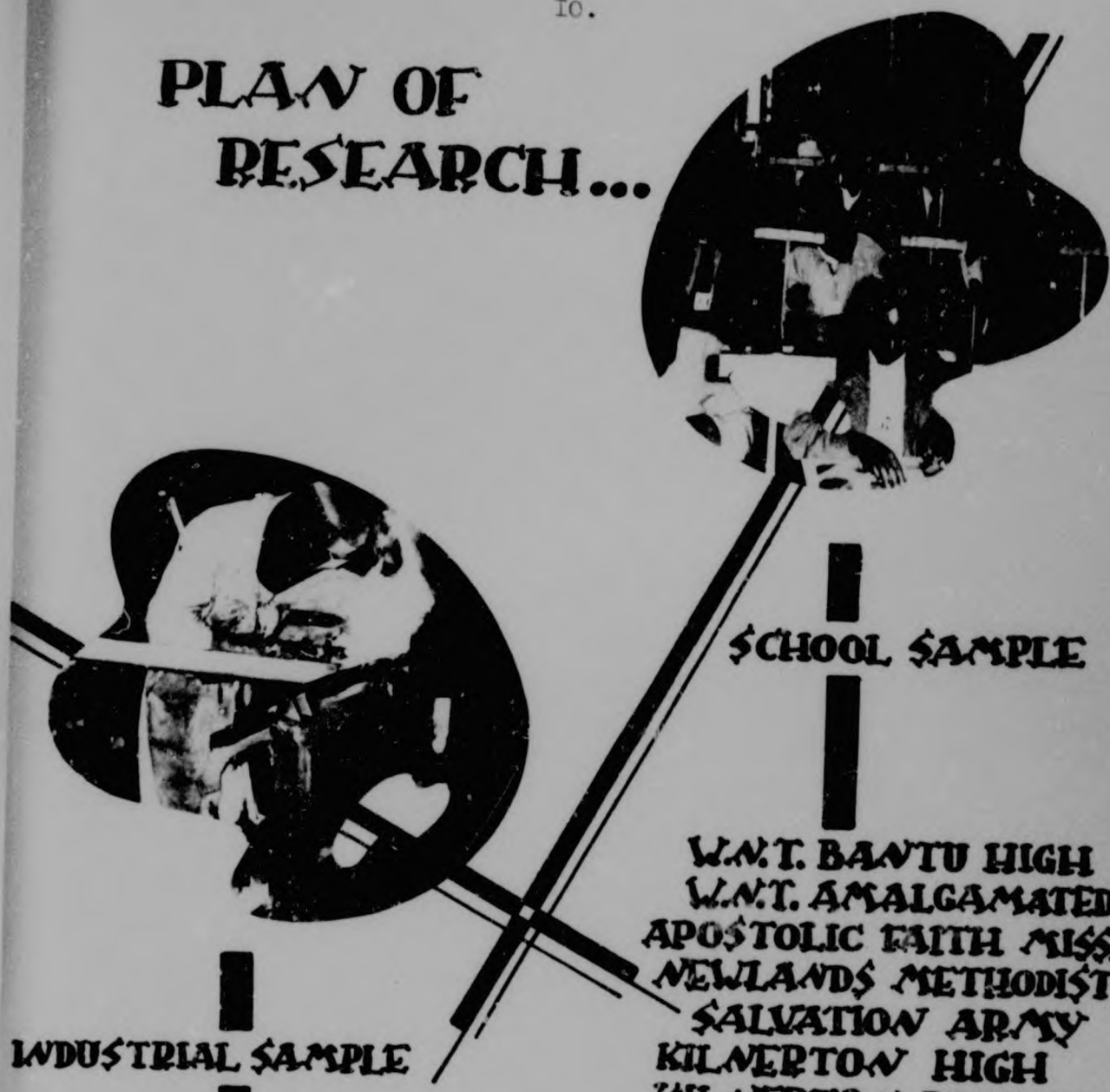
And the School Sample from the following institutions:

1. Western Native Township Bantu High School.
2. Western Native Township Amalgamated School.
3. Apostolic Faith Mission School.
4. Newlands Methodist School.
5. Salvation Army School.
6. Kilnerton High School - Pretoria.
7. Kilnerton Primary School - Pretoria.

For the sake of convenience the Industrial Sample as such, and the School Sample as such, will be discussed separately, as they differ slightly with regard to:

1. the necessary biographical details;
2. certain aspects of preliminary testing procedure;
and 3. the job analysis, job classification and grouping required for the Industrial Sample.

PLAN OF RESEARCH...



$CHOOL $AMPLE

W.N.T. BANTU HIGH
W.N.T. AMALGAMATED
APO$TOLIC FAITH MI$$.
NEWLAND$ METHODI$T
$ALVATION ARMY
KILNERTON HIGH
KILNERTON PRIMARY

INDU$TRIAL $AMPLE

$TANLEY MOTOR$
LEVER BRO$.
$.A.P.P.I.

[OCCUPATIONAL DIFF$.]

[EDUCATIONAL DIFF$.]

[AGE DIFF$.]

Mac R.

B.

1. Industrial Sample:

The basis of any selection and classification programme is a rich background of information about the jobs and the general work situation, and a discriminating organisation and analysis of that information. The first and one of the most important phases of any personnel selection procedure is a detailed analysis of the various duties performed and the circumstances under which they are carried out. This information must be complete, precise and specific. Each job must be thoroughly described, analysed and classified. Then and only then, may the actual testing commence. [5.]

A job analysis in industry may serve a number of different purposes. It may be employed with a view to setting wage rates (a type of job evaluation), for improvement methods (as in time and motion studies), to facilitate training on the job (for apprentices and new employees), in order to obtain personnel specifications or worker requirements (for employment purposes), or to establish personnel selection procedures (with a view to constructing various selection tests). In the present study the main concern is with the last consideration - personnel selection - not, however, with a view to test construction, but rather to consider the feasibility and usefulness of an established test battery as a means of personnel selection in a new field.

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5. Personnel Selection - Test and Measurement Techniques - by Robert L. Thorndike. Published by John Wiley and Sons, Inc., New York; Chapman and Hall, Ltd. London. 1949.

2. Job Analysis Procedure:

Before the Mines test battery could be applied to secondary industry, it is obvious that the labour in these industries had first to be classified in order to determine the ability of the tests to differentiate between the various job classifications - in this case, between Mechanical jobs and Non-Mechanical jobs.

And as the job analyses constitute the criterion of classification, it was absolutely essential that the same job analysis procedure be followed in all the industries studied. And in the various industrial plants, assemblies and factories visited, the following preliminary procedure was always employed:

1. With the works manager, works foreman or personnel manager, the plant was toured from beginning to end, from raw materials to finished products.
2. Having obtained a general survey of the different stages of production, the various duties within each stage were then distinguished.
3. Each duty or job was then described according to the following pattern:
   a) a detailed statement of the actual activities carried out by the worker;
   b) so organised as to facilitate identification of the various activities;
   c) highlighting the critical requirements of the job as distinct from the relatively unimportant features;
   d) noting the materials, tools and equipment used, and considering the relative importance of the particular job in relation to the other duties within the specific stage of production;

e) considering the basic requirements of a good job;

f) a bad job and its effect upon the rest of the production process.

4. Having described and identified the various duties within the plant, each job was then analysed in terms of the needed worker attributes and qualities required for its successful performance.

5. This information was then roughly grouped into a number of different categories - e.g. Mechanical Jobs; Non-Mechanical Jobs, Menial Jobs...etc. etc.

6. Finer classifications were then made and the various main job families established. These job families, however, had of necessity to remain fairly broad so as not to tax the discriminatory ability of the test battery unduly.

In this process of analysis a number of aids were used, namely:

1. Photography - the use of photographs was found helpful when considering the sequence of jobs in the production process and for highlighting particular activities within any specific job. The advantage of this procedure was that it provided a quick and easy check, as the pile of photographs could be handed to the Planning Department of any plant to be resorted to conform to the correct production sequence. Also the photographs provided a most suitable means of reference when considering the jobs at a later date.

2. Time and motion schedules - this information was most useful when considering the activities involved in each job.

3. Planning Department Schedules - were a valuable means of obtaining detailed information of the different stages of production.
4. Time Office Sheets - used to get an idea of the present wage scales of the various jobs. This information was sometimes helpful when the various duties were being ranked.
5. Job Analysis Blanks - cyclostyled Job Analysis Blanks were drawn up to help with the collection of data and to keep it in a more uniform pattern for comparison between jobs. (See Appendix A).

3. Job Analysis, difficulties.

During the course of job analyses carried out in the various plants a few minor difficulties occurred, these are mentioned briefly:

1. It was most difficult, if not impossible, to obtain unbiased information from the European foremen regarding the work performed by natives, and consequently, one had to rely upon actual observation, doing the job oneself and interviewing native workers.
2. The work done by the natives was very often found not to correspond to their official duties as stated in the managements schedules of work, and one was thus faced with the problem of identifying a workers duties within the general scheme of job classification when officially no such duty was considered to exist.
3. It often occurred in plants running parallel operations, that natives working under different European supervisors, were allowed varying degrees of freedom to exercise initiative and manipulate

machinery. The problem then arose as to which of the two similiar processes were to be considered representative of the job in question. And the acceptance of that process in which the greatest degree of freedom to exercise initiative, as being representative of the job, was considered the best solution.

4. Industrial Biographical data:

In order to obtain essential information for the purposes of the present research and for any follow-up study, certain biographical data was taken from the native workers. This information was filled in on cyclostyled biographical blanks. (See Appendix A.). Although certain questions on these biographical blanks are not connected with the present research, they were included as they may prove useful for any future study.

All biographical information was obtained from the native workers by trained African personnel. The employment of Africans for this purpose had three great advantages:

1. it helped to lessen the native workers suspicion and overcome the language difficulty;
2. the African assistants have a far more detailed knowledge of the many tribes and sub-tribes and where they come from (one of the biographical questions) than any European, and the native workers were more likely to give correct information to African assistants than to Europeans.
3. the African assistants could assess the workers ages more accurately than most Europeans could, and many of the native workers were uncertain of

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3. the African assistants could assess the workers ages more accurately than most Europeans could, and many of the native workers were uncertain of

their ages or deliberately gave wrong ages for fear of being paid-off due to their being too old or too young.

Before any biographical information was taken, each subject was asked the question: Have you done any of these tests before?; if so, he was immediately excluded.

C.

1. School Sample:

Africans in secondary industry tend to be better educated than Mine natives, and the School Sample was included in order to assess the effect of education upon test scores in a population in which the age factor was better controlled than was the case within the Industrial Sample, and the influence of job experience almost eliminated.

The preliminary procedure with regard to the School Sample was not at all as complicated as that required by the Industrial Sample. And due to the fact that one African member of the team was an ex-schoolteacher and well known to the principal-teachers of all the schools visited, our problems were considerably lessened by the co-operation thereby obtained from the school staffs.

The standards tested ranged from the Sub-Standards (i.e: Grades I and II) up to the matriculation class (i.e: Form 5).

2. School Biographical data:

The biographical details required for the School Sample were slightly different from those obtained from industry. (See Appendix A).

In the lower classes the teachers filled in the necessary forms, but from standard 5 upwards the pupils themselves completed the biographical blanks.

These biographical forms were handed to the various classes one day before they were due to be tested, thus saving any unnecessary wastage of time and thereby allowing the school children to complete the battery during normal school hours - as it was considered that should they be

kept any later they might become restless and dissatisfied and this in turn might have an affect on the test scores, especially in the lower classes.

D.

1. Test Programme Administration.

Any testing programme involves administrative as well as technical problems. These administrative problems become progressively more important as the programme becomes larger, they include such duties as scoring and administration of tests, entering and checking scores, reading through and checking biographical forms, seeing to the security of the test equipment and the arrangement of the test room for the following day. Consequently, if time is to be found for all these activities some sort of a daily testing schedule must be drawn up.

In planning a daily testing schedule for a programme of this nature, where the subjects range from six to sixty and one has to make provision for lunch, tea and school feeding scheme times, a fair amount of elasticity must be allowed for.

The schedule followed as closely as possible with both samples was as follows:

Start testing.	8.5 Morning.
First break (after Cube Const.)	10.00 Morning.
Start again.	10.15 Morning.
Lunch break.	1.00 Afternoon.
Start again.	2.00 Afternoon.
Finish testing.	2.45 Afternoon.
Enter biographical details of Industrial Sample, Check and enter scores, arrange and clean test room.	3.00 Afternoon.
Finish.	5.30 Afternoon.

2. Test Room: basic Requirements:

In a testing programme such as this, where a number of different test rooms were used, it was necessary to set down certain basic requirements in order to maintain some semblance of uniformity between the test centres. These requirements were as follows:

The test room must be large enough to seat 30 subjects comfortably, with an aisle on one side and ample space between rows for the testers to move unhindered. There must be enough space at the back of the room for a number of sorting tables, a projector table and space to store unused tests.

The angle which the candidates at the extreme outside of the front row of tables make with the screen should not be greater than 30°.

The test tables should be wide enough to comfortably hold the final formboard test (which is the largest test in the battery) and allow each candidate at least 2'9" elbow space.

The room must be well ventilated, have at least two light fittings and one three-point plug for the projector, independent of the lights (two double-adaptors and half-a-dozen extra electric lights were carried for use should the room prove too dark).

All windows must be blacked out (15 yards of Black Italian cloth was carried for this purpose, in addition to a number of hardboard screens).

A table must be provided for the front of the room upon which to place the starting and stopping gong in full view of the subjects.

And finally the test room must be well locked and barred to ensure adequate security of test materials. (a number of hasps, staples and extra locks were carried for this purpose).

As a number of different test rooms were used and as any radical changes in their general layout might have some effect upon the subjects' test scores, a scale plan was drawn up to act as a frame of reference when establishing a new test room. This layout was followed as closely as possible in the different test centres. (See over the page).

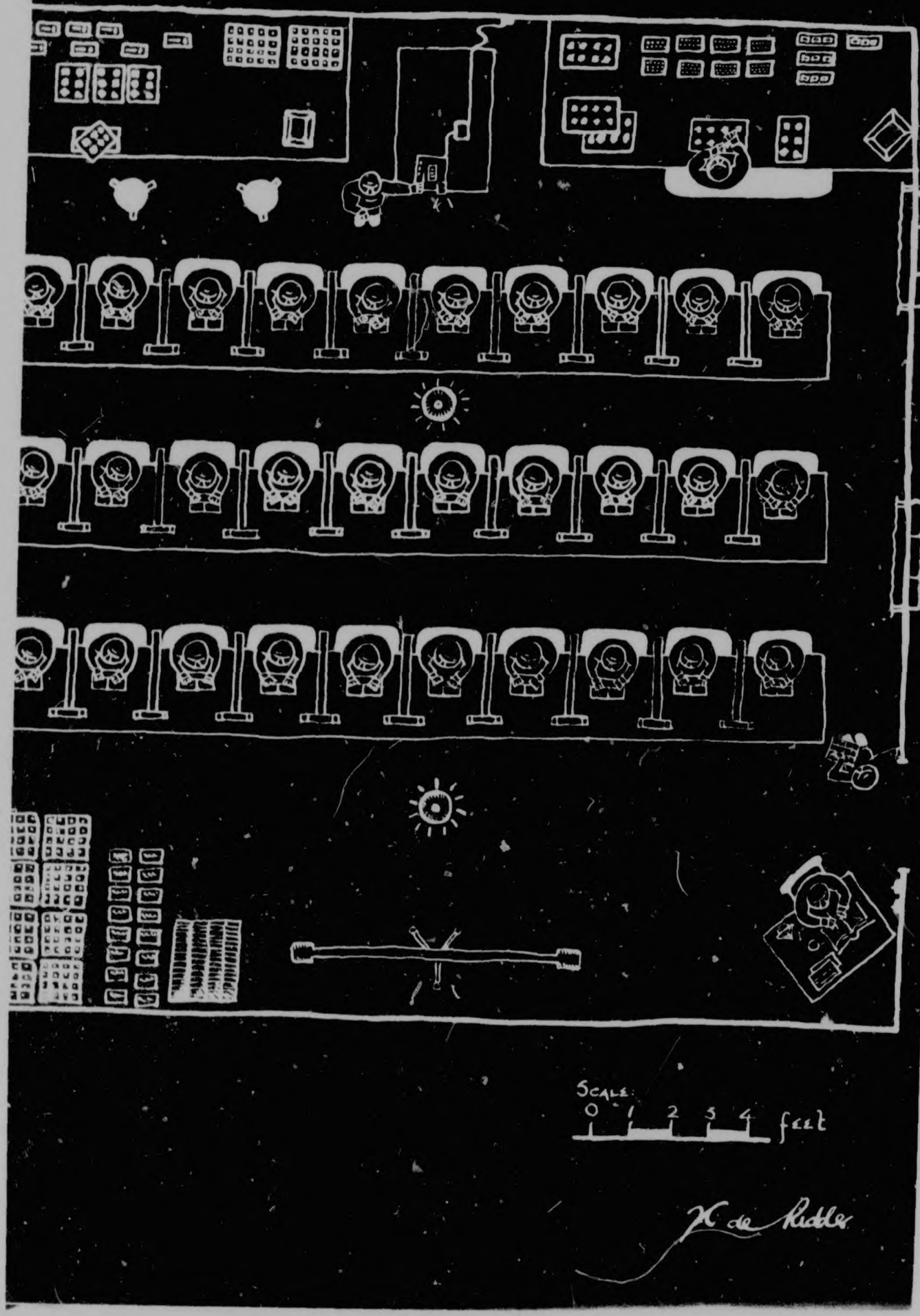
With what success we managed to keep within this frame of reference with regard to the general layout of the various test rooms, may be seen from the photographs taken of each test room used.

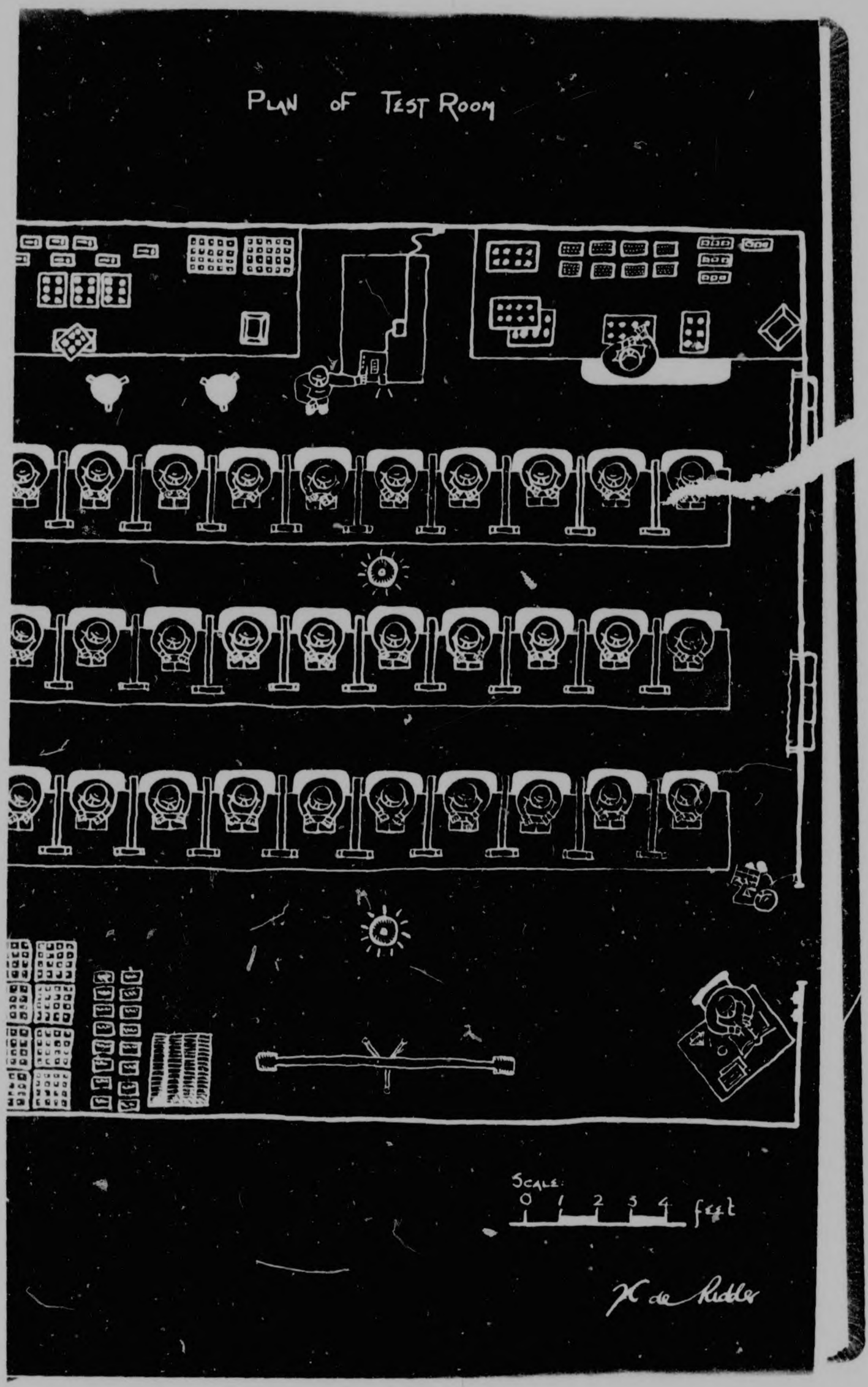
3. Entering of test scores:

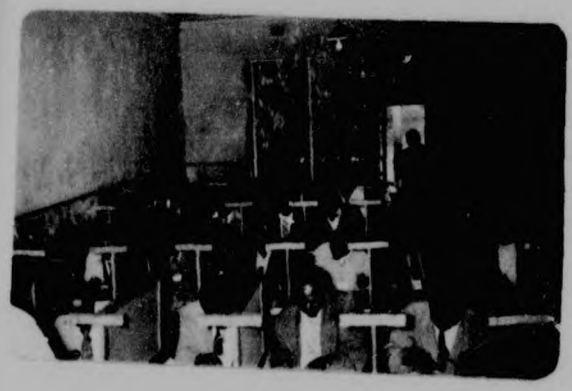
To facilitate quick and easy identification of each subject, alloted numbers stencilled onto tin disks, were hung about the subjects necks. Each alloted number being entered onto the relevant biographical form. It was thus a simple matter to compare test scores and biographical data.

During the actual testing each performance test was scored while still in front of the subject, an assistant following to clear the tables. These scores were entered onto cyclostyled score sheets (see appendix A) and then transferred and checked into prepared scorebooks. The scorebooks were specially designed to organise the scores for mechanical computation in Hollerith machines. (see Appendix A. for an example of a scorebook).

Plan of Test Room




PLAN OF TEST ROOM
SCALE:
0 1 2 3 4 feet
K de Ridder





WESTERN NATIVE TOWNSHIP





KILNERTON HIGH





KILNERTON PRIMARY

VIEWS OF THE TEST CENTRES





STANLEY MOTORS





LEVER BROTHERS





S.A.P.P.I.

E.

1. Testing Procedure:

A standardised testing procedure was followed throughout the testing programme:

Upon entering the test room each subject was given an alloted number corresponding to the alloted number on his completed biographical form. They were then seated in numerical order with the first test in front of them.

The African assistant then gave the test instructions to the subjects, emphasising the time factor, the starting and stopping gong and explaining the use of the film.

With the instructions over the lights were switched off and the film shown. On completion of the film, the lights were switched on, the gong struck and the subjects commenced work on the tests in front of them.

After the regulation test time had elapsed the gong was again struck and the subjects stopped work. The tests were then scored, the tables cleared, the next test presented to the subjects, the film of this test shown, and so on, repeating the performance with each new test.

2. Test Instructions:

Test instructions, both those given to the subjects and those to guide the test administrator, are among the most important aspects of test procedure. And in the instructions and procedural details of a battery such as the one used in the present study, where the emphasis is upon speed of performance, the content and presentation of the instructions become increasingly important.

In order that the instructions be full, clear, uniformly and consistently presented, they were written down and open for reference at any time. Because in the novel types of test materials used, and the new test

medium, scores may depend to a great extent on an understanding of what one is supposed to do.

The instructions given to the two sample populations differed somewhat in presentation but remained essentially the same in form.

The industrial sample was addressed in both Zulu and Sotho, the representative tongues of the two main language groupings. It was considered inadvisable to employ Fanakalo - the lingua franca of the mines - because:

a) Many of the subjects were unable to fully understand and follow Fanakalo instructions

b) As the instructions were given by an African member of the team, the use of Fanakalo by him - an African - may have tended to create the impression among the more sophisticated subjects that they were considered inferiors, and this would not have promoted the correct atmosphere necessary to gain their full co-operation.

c) Fanakalo is associated with the mines, an industry which does not appear to be particularly popular among the more sophisticated Africans encountered in secondary industry, and this unfavourable association may have antagonised certain of the subjects, thereby creating the wrong set.
(For the Zulu and Sotho Versions of Industrial Sample Test instructions together with their English translation, see Appendix B).

English being the medium of education in Native schools, the test instructions were given in English to all classes above Standard 2 (i.e: from Standard 3 to Matriculation). As it was considered that children below

Standard 3 (i.e: from the Grades to Standard 2) were still unsure of their English, they were instructed in Zulu and Sotho. (For the test instructions to the School Sample see Appendix B).

It was also considered advisable to reassure the examination-conscious pupils between Standard 3 and Matriculation, that the tests have nothing to do with the end of year examinations and that their performance on the battery would in no way affect their examination results at the end of the year. This assurance was given at the end of the battery in English. (See Appendix B for the reassurance given to pupils between standard 3 and matriculation).

3. Medium of testing:

When the initial investigation on the Mines was begun some years ago, it was realised that as the subjects differed with regard to literacy, cultural development, and dialects, the use of paper and pencil tests was necessarily precluded. This problem was overcome by designing tests of the performance type suitable for use with primitive peoples, administered through the medium of a film and capable of being demonstrated without the use of spoken or written language to a large group of subjects. In so doing, the difficulties relating to literacy, language and cultural development, as well as the important time factor - the bugbear of individual testing - were considerably lessened and in some instances almost eliminated.

Motion picture tests retain most of the advantages of group administration which characterise printed tests. And in certain phases of realism, standardisation, objectivity and uniformity of phrasing of timing and

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