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THE RELIABILITY
OF EXAMINATIONS

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THE RELIABILITY OF EXAMINATIONS

AN ENQUIRY

With Special Reference to the Entrance Examinations
to Secondary Schools, the School Certificate Examination,
and the award of Scholarships at Universities

BY

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PREFACE

IN this book an account is given of an enquiry, extending over several years, into the reliability of examinations so far as this can be tested by the performance in subsequent years of those examined. In particular the selection of pupils for secondary schools and the award of scholarships at the universities are dealt with.

It should be made clear at once that this is no tirade against examinations in general. They seem to the writer an inevitable part of our educational system at some stages and for some purposes. What is urgent is that they should not dominate, and that we should know where their strength and weaknesses lie. An important aspect of this general problem is, how far we can rely on examination results, and that is our main topic here.

It should also be emphasised that this is no attack upon examining bodies in general. My prejudices are indeed likely to be in favour of such examining bodies; for I am fortunate in having had the opportunity of seeing the planning, development, and managing of such examinations from the inside, both as a member for twelve years of the Joint Northern Matriculation Board, and as first Chairman of the Examining Board to establish and control a general examination for the admission of pupils to, and the award of free places for, the Grammar Schools and the Municipal Secondary Schools in the City of Birmingham.

In both those bodies I have seen the personal and almost meticulous care taken by officials and members of schools, and members of boards to secure the efficiency and fairness of the examinations. There is no doubt that the majority of examinations are conducted with a like care and with a like success in the face of the difficult tasks with a like

to use every kind of examination technique, every device, statistical and psychological, which may improve the reliability and fairness of their examinations.

An essential preliminary to the accomplishment of such aims is to know the facts. And it is to present some of these facts, however disturbing they may be, that this report is published.

It is, of course, impossible to deal with a subject like this without the presentation of figures and statistics. I hope, however, that those to whom even elementary mathematics are unpalatable will not be alarmed. I have had such readers definitely in mind, and I think throughout the treatment is as simple as it could be made. Detailed figures and the special treatment of some mathematical points are collected in the Appendix, to which explicit references in the text will guide those interested. I may add that after Part I either Part II or Part III may be read first.

This enquiry would not have been possible but for the kind co-operation of many helpers. My chief debt is to my friend and colleague Mr. W. G. Emmett, who has done for me nearly all the detailed statistical work and frequently helped me with valuable suggestions.

My warm thanks are also due to my own Vice-Chancellor, Sir Charles Grant Robertson, for his kindness in reading the proofs of the chapters relating to university scholarships and of Part I, and for making some most useful observations; to Sir Michael Sadler for reading the proofs of the chapters on university scholarships, and for his encouraging counsel at an earlier stage of the work; to Mr. Udny Yule, of St. John's College, for his helpful reading of the same chapters; to Mr. J. H. D. Innes, of the City of Birmingham, and

to Mr. H. P. Lunn, Headmaster of Yardley School, Birmingham, for reading the chapters on the secondary school entrance examination, and for many helpful comments; to Professor Godfrey Thomson and Mr. Frank Sandon for a critical reading of the chapters on the schools from a statistical point of view, and for their valuable opinions on some important points, and to Miss Marjorie Lewis for her patient interpretation of a difficult manuscript.

My thanks are also due to a number of others—Heads and Tutors of various colleges at Oxford and Cambridge, the Registrars of several provincial universities, Directors of Education and Heads of secondary schools, who have sent me particulars, and patiently answered many questions on points of detail; these, however, I must not name, as it is desirable that the various modern universities, the particular colleges at Oxford and Cambridge, and also the city and county centres for the entrance examinations to secondary schools should not be indicated. I wish further to acknowledge the courtesy of the Board of Education in supplying me with very full information as to the performance of State Scholars at the universities, and the receipt of a very useful grant from the Research Committee of the University of Birmingham for the expenses of this enquiry.

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PART I

GENERAL CAUSES OF THE UNRELIABILITY OF EXAMINATIONS, WITH SPECIAL REFERENCE TO THE SCHOOL CERTIFICATE EXAMINATION

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Chapter I

THE INFLUENCE OF EXAMINATIONS ON EDUCATION AND SOME SUPPOSED CAUSES OF THE UNRELIABILITY OF EXAMINATIONS

ONE of the main causes of the growing concern about examinations is the harmful influence they are thought to have on the work of the schools—in spite of the value to many pupils of the stimulus provided by an examination ahead. However carefully examining bodies may try to adapt syllabuses and regulations to the needs and capacities of pupils at different stages, it is argued that they cannot do this so well as those who are in living contact with the pupils themselves. In secondary schools the influence of examinations is especially felt through matriculation regulations. Subjects reasonably required for further studies at the university are imposed, through the practical unification of matriculation and School Certificate examinations, upon nearly all secondary school pupils, the great majority of whom will never go to a university.

Further, examinations can only deal with the dry bones of some subjects. The main aim of the study of literature, for example, is surely to cultivate appreciation. It is difficult, however, to devise examination questions which can do more than test a knowledge of *facts about* the literature; and the danger is lest the need to prepare for the examination should warp the whole study of the subject, though admittedly things are much better than they were in the writer's own school-days, when it was more important for examination purposes to read the introduction to a play of Shakespeare and the notes than it was to read the play itself.

Also, the greater facility in examining on certain parts of a subject is apt to emphasise those parts in the examination

and consequently in the work of the school. Consider the study of a modern language. There is an increasing belief that for the average pupil wider reading in the language (for comprehension and appreciation) is important, even at the sacrifice of practice in composition.¹

Yet the difficulty of readily discriminating between pupils by their translation from French into English is much greater than it is if composition and grammar questions are set. In the latter case there are far more mistakes to the page; whereas it would be necessary to give several pages of French for translation to discriminate equally well between the brilliant and the good, the good and the average, the average and the weak.

Again, there is the influence on school work of the mere inclusion or exclusion of a subject in the examination syllabus. I well remember the difficulty I felt in voting as to whether music should be included as a subject for a certain School Certificate and matriculation examination. I was anxious to encourage the appreciation and serious study of music in the schools; yet I feared the cramping effect of preparing pupils for a written examination about music. Even the very best schools, holding to high ideals of education, can hardly fail to be influenced by examination syllabuses and regulations. In the worst type of school the effects may be disastrous. One of my students, for example, told me that in her own school the pupils studied the Hanoverian period in English history for four consecutive years (instead of reading all the periods leading up to it first), because that was to be the period selected for their School Certificate examination.

Even in schools of considerable repute, where such

¹ See the report of the Committee on the Position of French in the School Certificate Examination, especially p. 9 (Board of Education Pamphlets, No. 70, 1929).

methods would be repudiated, the curricula of pupils are sometimes unduly restricted so that they may concentrate on the five essential subjects required for the School Certificate.

At university stage the cramping influence of examinations is fortunately not nearly so great, yet even here it is not altogether absent. A professor of mathematics, for example, recently protested against the time often wasted at Cambridge by the working of many examples, in order to turn an easy second-class honours man into a just first-class, though the time would be far more profitably spent on wide reading and general principles. As a sidelight on the possibility of independence of thought being discouraged by examinations, I may quote a recent testimonial from a distinguished university professor of English, who, after commending the originality of a former student of his, wrote: "Indeed, to begin with, Miss X sometimes failed to do herself full justice, because she was unwilling to substitute for her own thought a reproduction of the thoughts of others." In general, however, such a danger is not, I imagine, great. It is so refreshing (and rare) to find independence and originality of thought in a student's work that one gladly rewards it.

Much more might be said on the question of the influence of examinations on education, but it is not the main problem of this book. It is relevant only because, so far as the influence of examinations may be educationally *harmful*, it is all the more important to enquire how far they are *reliable*. A revelation of great unreliability should tend to lessen the weight attached to examinations and so decrease their dominance in the general scheme of education.¹

¹ The unrest among teachers, due to the fear of the harmful influence of examinations, is vigorously expressed by Dr. Cyril Norwood in his arresting book, *The English Tradition of Education*, London, 1929 (chap. xiii).

This question as to the reliability of examinations is made more important because a vast network of more or less standardised examinations is spread over practically the whole educational system. One net covers the elementary-school pupils who try to pass through into the secondary school; another is over those who seek to leave the secondary school with a School Certificate, or who wish to enter a university; another with a smaller mesh for those seeking scholarships at the modern universities; and yet another for those seeking scholarships at one of the ancient universities.

Many people are wondering whether these various tests always select the best pupils, especially those pupils who are most capable of profiting from the further education. Some teachers, both school and university, are convinced they often do not.

Opinions, however, even of experienced teachers, are very conflicting, and before we can form confident judgments we need more facts. It was with a view to discovering some important facts in reference to examinations that the present enquiry was undertaken.

First, however, it may be well to examine briefly the reasons for the distrust felt by many as to the reliability of examination awards.

SUPPOSED CAUSES OF THE UNRELIABILITY OF EXAMINATIONS

(a) In the first place some feel that the *element of 'luck'* in the type of questions a candidate happens to meet has still too much weight. Naturally this is an important factor in the view of the candidate who has failed. So often "the questions did not suit him." For the fully prepared

candidate, however, the one who has carefully covered the whole of the prescribed course, this aspect of luck is of little significance, and examiners familiar with the technique of examinations bear in mind the danger that the question paper may ignore any important sections of the syllabus or deal too fully with one part only.

Yet the element of luck cannot be entirely disregarded, and may be decisive in border-line cases. It works both ways of course. Every teacher knows cases in which exceptionally lucky choice in revision immediately before an examination has just pulled a weak candidate over the border. On the other hand, a particular concatenation of questions on a subject in which the paper cannot cover all the work (e.g. in history) may happen not to 'suit' a particular pupil or even a whole class. Such seems to be the explanation of a curious result shown in a certain School Certificate examination in history. An excellent school had had remarkable results in history, with many high distinctions and 98 per cent. of passes over a period of five years. Then one year, with the same master in charge of the class, and with boys who in their other work appeared of similar calibre to those of earlier years, there was a sudden drop in distinctions and credits and a large increase in failures. The teacher and the headmaster thought that some error had been made in the returns, but enquiry did not support this.¹

The element of luck due to the selection of questions is much less in some subjects than in others. It should have little influence in a thorough examination in a language, if the ground is adequately covered. In mathematics and

¹ The indignant teacher indicated, as the sole change he knew of concerning history teaching in the neighbourhood, the fact that a branch of the Historical Association had been founded in the town that year!

some other subjects it can be met at an elementary stage by the device suggested by Dr. Ballard, by which many very short questions are set covering the whole of the work,¹ and it is met along somewhat similar lines by the plan of the papers set by the Joint Northern Matriculation Board in mathematics and to some extent in chemistry.

Variability in the relative difficulty of alternative questions is another disturbing factor. Even teachers engaged in day to day work with pupils are not infallible in their judgment as to what questions will be hard or easy for their own pupils.² Such errors of judgment are much more likely to occur among examiners in public examinations; and the hurried selection by a candidate of one or two questions unsuspectedly difficult may penalise him severely.

Further, speed of working is an important factor in success in long papers, which may unduly hamper some pupils, whereas short papers give no extra credit to more intelligent candidates who have done their work long before duller but plodding pupils.

An aspect of luck which has less significance for the great majority is the mental condition or 'form' the candidate seems to be in on the day of examination. With the nervy 'highly strung' candidate this may be important. And 'bad luck' in the working of his first question may cause him to be erratic in the rest of the paper. No doubt this variability of form, or exceptional 'bad luck' in the questions set, or unwise choice by the candidate as to which questions he will attempt, are the main reasons why one hears so often an internal examiner say that so-and-so has "failed to do himself justice."

¹ See P. B. Ballard, *The New Examiner*, London, 1923.

² See *Measuring the Results of Teaching*, by W. S. Monroe, p. 14.

More than once, when acting as External Examiner, have I heard university teachers say with a sigh that a certain student must fail because of one markedly weak paper, though they declared him to be one of the best students, from their knowledge of his work during the year. It was the absurdity of such recurrent situations that impelled me to institute a further viva-voce test in my own examinations at Birmingham University for students on the border-line in their written work—either border-line ‘fails’ or border-line ‘firsts.’ Such supplementary viva-voce tests, however, are not possible in large examinations like those for the School Certificate, in which thousands of candidates are involved.

There is one other aspect of ‘luck’ which may be serious but which can hardly be countered. It is difficult to estimate the disadvantage under which some adolescent girls suffer if a critical paper coincides with a time of unusual pain or nervous depression.

All these aspects of ‘luck’ are probably factors in producing *varying results in different examinations in the same subject about the same time*, an aspect of unreliability to which I shall refer as *instability*, and as to which I shall give some evidence later.

(b) A second ground for uneasiness felt as to the reliability of examination awards is the *apparently adventitious nature of some decisions* as to a pass or fail. Thus in the School Certificate examination or matriculation a few marks may make the difference between success and failure in one subject, and that subject may be essential for the award of a certificate. For example, in Fig. 1 below are shown the marks of two boys in a secondary-school examination. Boy A, with two distinctions and one subject marked good, and with a much greater total of marks than B, fails to get a

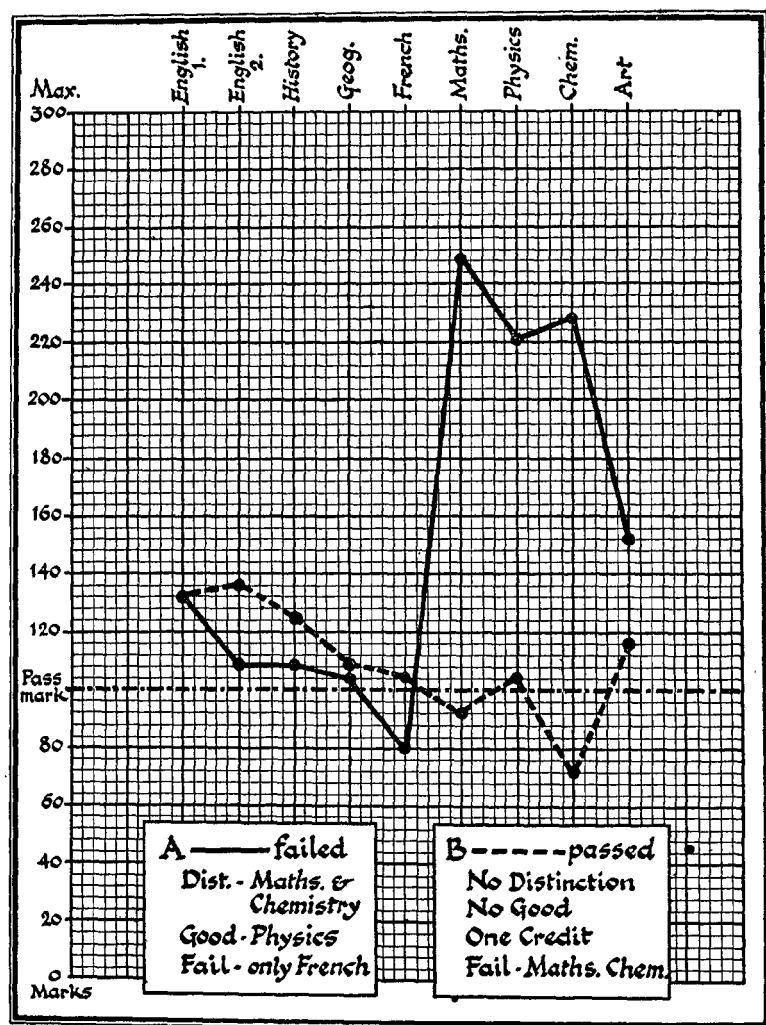


FIG. I.

certificate because of weakness in French, though he gets only a few marks less than B in French, who obtains the certificate. All who know the variability of examination papers, or of the performance of pupils,

know well that at another examination in French on the next day—or even on the same paper—the position of B and A might be reversed. It is possible that they might be reversed even if the *same* scripts were handed to a different examiner.

Another boy at the same school obtained three 'distinctions' and had two subjects marked 'good' (which is higher than 'credit'), but failed to get a School Certificate (which only requires five passes and one credit). These are only two examples from one school in one or two years. "Many of us," writes the Headmaster of Holt School, Liverpool, "have had the heart-breaking experience of a candidate, *the best in his year*, with as many as four distinctions, failing to get matriculation or even a School Certificate."¹ Such cases seem to occur constantly. Nor can one blame the Examination Boards. They must fix a limit of marks somewhere; and even with the principle of compensation for weakness in one subject by average strength, hard cases will appear at the margin.²

¹ "Reform of Examinations in Secondary Schools in England," in the *Educational Outlook* (University of Pennsylvania Press).

² It is not part of the present enquiry to discuss the desirability of certain compulsory subjects being required for a pass in the School Certificate examination. But evidently, the hardships of the type given (if they are so regarded) would be lessened by an extended sliding scale of compensation, so that even great weakness in a compulsory subject could be compensated by sufficiently high marks in other subjects. In some examinations this system is introduced to some extent in that one compulsory group may be passed at a slightly lower standard (provided there is adequate compensation in other subjects). To carry the principle much farther would in effect be to give up the compulsory group system for those pupils sufficiently distinguished in other groups. And few educationists wish to encourage further specialisation at so early a stage. On the other hand, many teachers consider that some subjects which are essential for the award of the School Certificate should not be so. Thus, at a large conference of Secondary School Headmasters and Headmistresses of Birmingham and the Midlands, general applause followed a statement by one headmaster to the effect that many boys, quite good in other respects at school, were unable to pass the School Certificate in a foreign language just as probably there were many girls who could not pass in mathe-

In the same school as that already referred to, we find the following extraordinary results in one recent year :

1st boy, with 1,328 marks, had gained School Certificate and matriculation.

2nd boy, with 1,307 marks, had not gained matriculation or even School Certificate.

3rd boy, with 1,303 marks, had gained School Certificate and matriculation.

Pupils numbered 4th to 20th all gained the School Certificate, though No. 20, the bottom of the class, only obtained a total of 877 marks, against a total of 1,307 gained by the 2nd boy, who failed to get a Certificate, through failing—as did the boy in Fig. I—to satisfy the examiners in one of the compulsory groups.¹

The arbitrary nature of some awards is felt especially in reference to matriculation certificates. For a boy who carefully distributes his work over the five essential subjects (in which a 'credit' must be obtained) may gain a matriculation certificate, though he may do worse in the examination as a whole than does another boy who misses by a mark or two a credit in one of the essential subjects.

Such possibilities make all the more deplorable the extreme reverence some people have for the word 'matriculation' as a clue to the type of result gained in the School Certificate examination. The head of the school from which the above results are given told me that a firm of accountants asked him for a good boy for their office. He recommended A, who had got distinction in the School Certificate in both mathematics and English. But A had the magic title matriculation, and the accountants

¹ The method of obtaining the 'total' marks was the same as that described in p. 52. In this case every pupil took at least seven subjects.

insisted on taking one who had, and they chose B—who had 300 marks less than A on the total.¹

¹ Such marked individual anomalies are of course quite consistent with there being a general tendency among large numbers of pupils for the ablest to gain the matriculation standard and not merely satisfy requirements for the School Certificate. It may also be that the matriculation requirements do place a particular demand upon general ability (as contrasted with specific abilities). For this some slight evidence will appear later, and will be discussed in Appendix I (*d*), p. 176.

Chapter II

THE INSTABILITY OF THE MARKING OF EXAMINATION ANSWERS, AND OTHER CRITICISMS OF EXAMINATIONS

IN the previous chapter we have given several reasonable grounds for the distrust of the reliability of examination awards.

We must consider with greater detail a third and more serious ground for lack of confidence in examination awards, namely, personal *variability and unreliability of marking in the examiners themselves*. This is not great in examinations in such a subject as elementary arithmetic, though even here individual examiners may vary in the marks they would allow for 'attempts' and the use of the best or inferior methods. It may, however, be very great in English and history, and to a less extent in all other subjects in which the factor of composition enters.¹

In the marking of essays especially, extraordinary variations occur between the marks of different examiners; and this is most important in view of the prominent place that the essay occupies in many examinations for entrance to secondary schools; for example, in one of the eight centres I have dealt with in Chapters III and IV, the English paper consisted entirely of two short essays. For the School Certificate examination a pass in English is usually compulsory; and for some University Scholarships the essay paper is important, and other questions are often of the essay type.

¹ On the common influence of the factor of composition in humanistic and science subjects, see Professor Burt's report on *The Distribution and Relations of Educational Abilities* (issued by the London County Council, 1917). At a meeting of the Science Masters' Association, in January 1926, Mr. D. Berridge, of Malvern College, expressed the opinion that elementary examinations, even in practical science, tended to become a test of the candidate's power to 'write an essay.'

In view of some striking statements about the unreliability of essay marking, I gave a test in the uniformity of essay marking to a group of teachers who were taking my class for the Masters' degree in Education (Session 1924-5). The topic of the essay was a simple one—"Town versus Country Life"—and the pupils who had written the essays were 11 to 12 years of age. There were seventeen essays. The teachers were asked to mark with special care, and they knew it was a test of their own reliability in marking. A maximum of ten marks was to be awarded for ideas, and ten for expression; spelling was to be ignored.

One essay was outstanding, and was placed first by ten out of thirteen markers. One essay was placed last by seven markers. But all the intermediate essays had most varied places assigned. Thus, the essay of E. S. was placed second by one examiner, third by two others, but sixteenth (out of seventeen) by another, and thirteenth by another. The essay of W. S. was placed first by one marker, sixteenth by another, and at various intermediate places by others.

Suppose we divide the awards into three groups according to order of merit; thus:

Nos. 1-6. Pass first division.

Nos. 7-11. Pass second division.

Nos. 12-17. Fail.

Then of the seventeen pupils, eleven were given a first division pass by some examiners, and a fail by others.

Of course, in the large public examinations a team of examiners would be under a chief examiner, whose business it is to check the standards of the team. But all the essays cannot be re-marked, and the standard of one marker himself varies from time to time. It is extraordinarily difficult to keep the same standard of marking through a long series

of papers; and the re-marking of the fifty or so first marked is no guarantee of consistency throughout.¹

There is a further possibility of error in the influence of suggestion on a chief examiner, who in checking the marks of another is already aware of the marks previously given. Some examining boards are aware of this danger of suggestion, but it is uncertain how far it is generally guarded against.²

The great difficulty of standardising the marking of the essays no doubt accounts for some of the anomalies one hears of at times; as, for example, the instances of pupils who gained *distinction* in English literature in the School Certificate, but failed in English composition! Such cases may be rare; but one school reports seven examples, within four years, of failure in 'composition' together with 'credit' in English literature.

The variations in estimates of style and other values also, no doubt, account for the fact that the public examination

¹ The unreliability of essay marking is dealt with trenchantly by Dr. Ballard in his *New Examiner*. Exact correlations between the orders of merit given by different examiners of essays are given by Godfrey Thomson and Stella Bailes, in the *Forum of Education*, vol. iv, 1926, p. 85. In his book, *The Technique of Examining Children* (London, 1930), Mr. B. C. Wallis describes a scheme for the marking of the essays of young children which seems to have worked well in several large centres. Marks are given for seven aspects of the essay (Vocabulary, Accuracy, Quality of Phrases, Consistency, Quantity of Ideas, etc.). It would certainly seem possible by some such method to avoid great variability in one's own standard, judging by a recent enquiry of one of my research students, Mr. O. J. Cotton. He remarked six sets of essays after three months, and thus obtained two orders of merit. The marks for two sets of descriptive essays (added together) gave, on re-marking, an order correlating with the first marking to an extent of 0.93, in a class of 31 boys, ages 14-16. Imaginative essays gave a correlation of 0.93 (33 boys, ages 12-14). Two sets of narrative essays gave a correlation of 0.95 (25 boys, ages 10-12). (The significance of such correlation figures is explained on p. 57. The adding of the marks of two essays would, however, probably steady the orders.)

² The danger is not ignored by the Joint Northern Matriculation Board authorities. See the admirable exposition of their methods given in *Secondary School Examination Statistics*, by J. M. Crofts and D. Caradog Jones (London, 1928), especially p. 42.

results of school pupils in such 'composition subjects' as English and history differ more from the school estimates of the pupils than do the examination results in mathematics and French (while the School Certificate order in English composition differs still more widely from the order of merit drawn up by the schools).¹

Now as just mentioned, this difficulty in standardising the marking of essays is especially serious in view of their critical importance in some examinations. Undoubtedly there are good reasons for such importance. It is surely reasonable that university teachers, including teachers of science, are stressing the importance that students should be able to write decent intelligible English before coming to the university. Apart, however, from the problem of standardising, there is a further difficulty in ensuring that students shall have the capacity. It seems possible for a pupil to write good English when he is thinking carefully about structure and style, and then to relapse when the thought of style and correct composition is ousted by the practical purpose of the moment. How else can one account for such facts as the following? A student who had matriculated with *credit* in English literature wrote to a principal of a training college as follows:

"DEAR SIR,—

"I am so very grateful to you in being so kind and for causing you so much trouble, and I cannot express my thanks for your great kindness for returning my acceptance form.

"I am, etc." ²

¹ *Op. cit.*, p. 47. The correlations given by Dr. Crofts are about 0.75 for French, Latin, and mathematics, and about 0.65 for English, history, and geography. In one examination the average correlation for three years, of English composition in School Certificate with the schools' estimates, was only about 0.4.

² This is taken from a "Discussion on English in the School Certificate Examination as a qualification for admission to Training Colleges," by S. Hoole, *Forum of Education*, vol. v, 1927, p. 46.

The unreliability of the marking of the essay is attached to some extent to all subjects in which answers involve English composition as an important factor. Thus the report of an enquiry as to the reliability of examinations in English literature, which reaches me as I revise the draft of this chapter, shows that seven experienced examiners marking fifty-seven scripts in English written in the Durham University School Certificate examination gave most varying judgments on many candidates. Thus seven candidates who were failed by two examiners were awarded among them by the other examiners twenty-two passes, sixteen credits, and one special credit.¹

The instability of the marking of examination papers has been thrown into relief by the remarkable constancy of the marking of mental tests. Now it seems to me that mental tests can never replace examinations. For we need, as a rule, tests of attainment as well as tests of capacity, especially for entry upon university courses. At the same time it is remarkable how reliable mental tests have in some cases proved, even at the university stage; for example, at Columbia University the performance of the students in the intelligence tests given on entry proved a more reliable prophecy of their success at the end of their first year's work than did the results of the entrance examination, and much more reliable than the secondary school marks. As to the authorities at Columbia it was written :

“From an attitude of healthy, if not severe, scepticism towards the use of intelligence tests for this purpose, the whole college administration came, within the space of two years, to consider the intelligence tests as an indispensable

¹ Full particulars of this enquiry are given in the *Journal of the Assistant Masters' Association*, December 1931.

part, not only of the admission machinery, but also of the administration of the college in the Dean's Office." ¹

I mention this example, not as an argument for mental tests for university entrance, but to indicate one good quality in mental tests, namely, their freedom from subjective variations in marking, and the possibility of exact comparisons. If tests which have so little relation in context to the knowledge required for university studies are so reliable a guide to success, in spite of the fact that they do not test interests or qualities of character, e.g. conscientiousness and persistence, as examinations do, then the tests must be very accurate from the point of view of marking and standardisation. And, indeed, so it is found. In a large city, where the entrance examination to secondary schools is supplemented by mental tests, the marking of the latter is done by clerks, while of course the marking of the papers has to be done by specially selected examiners, with a skilled chief examiner to standardise results.

Yet the unskilled clerks produced in far less time, from the results of the mental test, an order of merit which was thought to be so like that given by the examination that it was suggested by some that the mental tests were unnecessary, and could be dropped. Wisely the authorities decided to retain them, as a check on future examinations. It might, indeed, just as well have been suggested that the trouble and expense of the elaborate examination could be dispensed with. But we have not sufficient evidence as yet that tests are adequate for such selection, and even if we had, public opinion is by no means ready for the dropping of the examination test. Many parents and even teachers resent

¹ See R. Pintner, *Intelligence Testing* (London, 1924), p. 276. At the end of the chapter are numerous references to papers recording the results of the application of tests to college students.

the use of such novel tests for which the children cannot be prepared.¹

Later we shall consider briefly the evidence so far available as to the reliability of mental tests for the selection of pupils for secondary schools, or as a supplement to the ordinary entrance examination in English and arithmetic.

A fourth reason for suspecting the reliability of some examinations as a comparative estimate of the ability of candidates is that pupils come from different schools, in which *the standard of teaching (in different schools) may vary greatly*; so that children who have been specially well taught (or at least well taught from the point of view of preparation for the examination) have an advantage. This criticism applies more particularly to the admission examinations for secondary schools.

Incidentally this fact has an unfortunate repercussion on some schools in areas where the entrance examination is regarded as a test of the work of the elementary schools. This is unfair to those schools who draw their pupils from poorer homes, where not only are the conditions for work less favourable both physically and mentally, but where the children may possibly be of lower inborn mental capacity.

A fifth ground for suspicion as to the reliability of selection, both of pupils at 11 + for the secondary schools, and to a less extent of scholars for the universities, is *special cramming*. I find a universal conviction among teachers whom I have consulted that some parents have their chil-

¹ I may record, as an example, the criticism of a parent about the following test: "A guard in an express train walks from the back van to the front, in the direction in which the train is going. Then he turns and walks back, this time walking against the motion of the train. On which journey does the guard walk the farther?" An indignant parent actually wrote to the Press about this, and said that he had put the question to a man who had been a guard for twenty years, and even *he* could not answer it.

dren of 10 or 11 specially coached out of school hours for the entrance examination to secondary schools, in the hope especially of getting free places and maintenance grants. As I write I have before me a book just published, the express purpose of which is to help in this special preparation for entrance scholarship examinations for secondary schools: it consists of test papers, many of the questions being culled from examination papers set by various local authorities in such examinations. Such *ad hoc* preparation within the elementary schools or outside is mentioned by some heads of secondary schools as one of the reasons why some pupils near the top of the list in the entrance examination fall behind (in the secondary school) other pupils who have not been specially crammed for the entrance examination.¹

At the universities the point is put somewhat differently. It is that certain students gain admission and others gain scholarships, because of the special thoroughness of the preparation given in their schools; but they are 'spoon-fed,' and often unable to adapt themselves to the freer and fuller methods of study at the universities.²

A further point of criticism in reference to the entrance examination at 11 + for secondary schools is that *the usual simple examination in English and arithmetic is incapable of selecting aright the pupils who are most fitted for the varied secondary school curriculum*—who possess in the right degree, not only sufficient *general* intelligence, but also the specific

¹ In a class of 74 graduate students I found that 34 had direct personal knowledge of the special coaching—out of school—of elementary school pupils preparing for an entrance examination into a secondary school. This proportion is especially significant, in that a substantial part of the class had never been pupils in an elementary school.

² Cf. the recent statement by a vice-chancellor of a modern university (Sir Charles Grant Robertson) to the effect that our university students come up to the university over taught.

abilities needed to do good work in foreign languages, mathematics, and science.

Most diverse views exist among teachers as to this. Some heads of secondary schools (boys' and girls') with whom I have discussed this are confident that the requisite abilities cannot be selected at 11 + on the usual examinations. Some others seem equally confident the other way. The question will receive further consideration in later chapters.

Lastly, there is the general criticism that, though examination success implies certain types of ability and certain valuable qualities of character, *there are other kinds of ability, required and revealed not only in later life but in the life of the school, which examinations do not test.* The kind of criticism I have in mind is often expressed by business men who speak of 'practical ability' or 'common sense,' as contrasted with academic ability; but it is also expressed strongly by some experienced teachers, of whom I may quote as an example the late Headmaster of Bromsgrove School, Mr. R. G. Routh, who on the occasion of his last prize-giving said, as to the School Certificate, that "not only did it keep a number of people out of posts for which they were very well fitted, since it was regarded as essential for entry into the Services and professions, but it was a test only of certain academic achievements which could be passed with great ease by some boys at the age of fifteen, but which others, by no means their inferiors in many respects, found the greatest difficulty in passing at the age of eighteen."¹

The problem is worthy of more systematic enquiry. On the whole, few will doubt the existence of a general relation between academic success (as compared with *bad* academic failures) and success in the affairs of after life. One enquiry,

¹ Reported in the *Birmingham Post*, June 27th, 1931.

made by Dr. Edgar Schuster, into subsequent success in the professions of the Law, of the Church, and of Teaching, showed a decided superiority in professional status of those who had obtained first-class honours at the universities as compared with those who had only obtained third-class honours.¹

On the other hand, the recent confessions of Mr. Winston Churchill and Sir Eric Geddes, though they may be somewhat embellished, recall to mind other men who were for one reason or another failures at school, but who revealed marked ability later.

This question, however, is wider than our own immediate problem, which is to test the reliability of examination success at one stage by examination success at a later and presumably more reliable stage, more reliable in the sense that it is a truer estimate of the man as he will become.

Under this head a reference should be made to one aspect of the problem seldom thought of. Are there not some excellent qualities which actually lead to poorer performance in examinations? Occasionally I have learned how the unselfishness of students in devoting time and energy to helping at home, especially during times of sickness or special poverty, has necessitated the neglect of university work; and the same thing no doubt occurs more frequently among senior school pupils. Also there is to be

¹ See *Eugenics Laboratory Memoirs*, 1-5 (London, 1907). Dr. Schuster blended his figures for Teaching and the Church, and found that 'distinguished positions' (Bishoprics, Deaneries, Professorships, Headships of Public and First-class Grammar Schools, etc.) were obtained by 68 per cent. of the first-class honours men within the whole group, but by only 32 per cent. of third-class honours men. One would, however, in any case expect a close relation between high honours and such posts in the teaching profession. In the Law the figures were less striking, 46 per cent. of the first-class graduates gaining positions of distinction, against 22 per cent. of the third-class honours men. In all, 3,508 men were traced under 'Church and Teaching,' and 634 under 'Law.'

reckoned the service given to school or university in various official positions. Once, after I had lectured to a University Students' Society on some of these aspects of examinations, one of my own students came up to ask my advice. He told me that his university teachers gave him to understand that if he worked his utmost he was fairly sure to gain first-class honours. He was, however, giving a good deal of time to university official matters (including, I think, some post connected with the University Christian Union), and he was quite certain that if he continued this work he would be unable to gain the coveted 'First.' What, he asked, was he to do?

No doubt this aspect of the problem is not important for most students.¹ It merges, however, into one of more general influence, the examination reward gained, especially at earlier (school) stages, by narrow concentration on examination work, to the neglect of wide human interests in the affairs of everyday life, in politics and social problems, or in the Church; in scientific and other hobbies, or in wide general reading. Such interests may tell favourably at later stages in life, and indeed they begin to tell in some subjects at university stage, in a way they do not in the more elementary work at school.

SOME PRESENT-DAY PROPOSALS

Distrust of the reliability of examinations and the wish to avoid some of their harmful influences, and especially to avoid the hard-and-fast distinction between pass and fail in the School Certificate, have led recently to some striking proposals. For example, Dr. Edwards suggests that to

¹ The Vice-Chancellor of Birmingham University says that he regards this as a very important problem for many of the very best students. ;

every pupil leaving school at the age of 16, there should be given a School Certificate showing a record (a) of his work and success at school, and (b) of his performance in the public examination; but without classification into 'passes' or 'failures.'¹ Again, a very important committee of the New Education Fellowship goes so far as to say that the right line of development is "towards the award of the school-leaving certificate *by the schools themselves*—such as are certified as worthy to be trusted with this task."²

Even at university entrance stage there are suggestions made that the present tests are unreliable, in that they let through some who are merely crammed and 'spoon-fed,' but who are lacking in general intelligence and especially in initiative and independence of thought. Consequently some are proposing that school reports or some estimate of personality should have weight in deciding admission to, and scholarships for, the universities.³

Such revolutionary proposals now 'in the air' make all the more important an attempt to discover as far as possible the *facts* concerning the reliability of examinations.

Finally, the question of the reliability of examination awards both at 11 + and to scholarships to the universities is of public importance, because of the large sums of public money now spent on free places and maintenance grants at secondary schools and on university scholarships.

From the evidence to be given later it certainly looks as though a considerable portion of such public moneys is being expended on the wrong persons or for a wrong purpose.

¹ See his pamphlet, *A New Proposal*, in reference to the School Certificate.

² *Interim Report of Examinations Enquiry Committee*, 1931.

³ This is already the method followed in admitting to some (and I imagine all) of the Education departments of universities.

It is with a view to supplying some evidence on these questions that I have given in this book an account of an enquiry into the reliability of each of these levels of selection by examination.

THE PRESENT ENQUIRY

First we shall enquire into the reliability of the public examinations for pupils at about 11 years of age who seek admission (and free places or scholarships) to secondary schools. We shall judge this reliability by the success of those pupils in the secondary schools themselves, so far as that success can be judged by the position in school at the end of the fourth or fifth years, by success or failure in the School-leaving Certificate examination, and also by reference to the reports of the heads of the secondary schools. We shall ask—"Do the pupils who do best in the entrance examination at 11, also do best in the examinations or the school work at 16 years of age?"

The reliability of this School Certificate examination will itself be tested by the estimate of pupils by the schools themselves. Later, the reliability of the examination taken right at the end of the school period, i.e. the Higher School Certificate examination and other examinations for scholarships at the universities, will be tested by reference to the results gained at the end of the university period. We shall ask—"Do those who secure Scholarships at about 18 maintain their pre-eminence and justify their awards in the final university examination at 21 or 22; do those who secure scholarships on entering the university secure better degrees than those who do not?"

It may be argued that any given School Certificate or even degree examination is an incomplete means of estimat-

ing the success of a pupil at that stage, and therefore is an incomplete test of the reliability of the entrance or scholarship examination on which the pupil's selection is based. This is no doubt true ; but in itself it is a striking admission of the fallibility of examinations.

We must bear in mind, moreover, that final degree examinations are searching tests involving usually over half a dozen papers in the final year (in addition to earlier tests) : they are taken when students are relatively mature ; and some elements of luck are reduced by their being internal examinations. As regards the School Certificate, the result is based usually upon six or seven subjects instead of merely upon English and arithmetic as in most entrance examinations for secondary schools.

Furthermore, for our most important enquiries we shall reduce the element of luck and the variability of marking, etc., by combining the results of a given School Certificate examination with the school's own order for the same pupils, so that each pupil is examined in each subject twice, a dozen or fourteen papers in all.

It should be made clear at once that this book is no violent appeal for the drastic reduction of examinations. We do not ignore their value. It may be admitted that some forms of public examination for the above purposes are essential, and will probably always remain essential.

In view, however, of the enormous influence of these selective examinations on the careers of pupils, it is important that we (including the general public) should have as clear an understanding as possible as to what these examinations mean and as to their reliability. The losing of a School Certificate, dependent as it may be on the loss of a few marks which might have been given by another examiner (or gained by the setting of a different question)

may mean prevention from entering a chosen profession. The award of a scholarship at a university to a student who cannot afford to go without one, may mean an entirely different future career. At least as critical is the selection at 11 years of age of a pupil in an elementary school.

Chapter III

THE CHIEF AIMS OF THE ENTRANCE EXAMINATION AND SOME STRIKING WEAKNESSES

THE AIM OF THE ENTRANCE EXAMINATION

It may be well to be clear first as to what should be the main objects of the examination at 11 +. The purpose is no doubt to decide whether a given child is or is not fit for secondary education. This, however, is not the sole purpose of the examination, as some have suggested, for the accommodation in the secondary schools is limited, in some places extremely limited; the entrance examination ought at least to decide which child is better fitted than others for secondary education. The main problem is not merely to say whether a child has a certain degree of ability or not; in other words the examination is not a mere qualifying examination. *Order of merit is important*, especially near the admission.

Furthermore, in some centres it makes a great difference to a pupil, not merely whether he passes or fails, but where he comes in the entrance examination. Near the top, a child of relatively poor parents gets a free place, together with a scholarship or grant and a small allowance. If in the next lower group, he gets a free place; in the next group, admission is on payment of fees; and in the last group, admission is on payment of fees only if he passes a further examination. A great majority of the pupils (and possibly a great majority of the enquiries) enter the secondary schools of this type. Thus an entrance examination fails to place candidates in a fairly rel

an injustice to some and rewarding others beyond deserts; and it is our intention later in this book to test the validity of such orders of merit by the subsequent performance of the same pupils in the secondary school.

It is to be supposed, however, that in some centres the entrance examination simply determines whether a free place shall be given or not. Nevertheless, children are not divisible into two homogeneous groups, those fit and those unfit for secondary education. There is bound to be a wide margin of doubt about whom differences of opinion may be expected. Consequently, a delicacy of discrimination in the selection, especially near the border-line of passes, is of great importance.

And, from the lists of the entrance examinations which we are to study, that such border-line children are so closely together, so many get nearly the same marks, that discrimination is extremely difficult, and the result of things, likely to be unreliable, even if a selection follows. For example, in one of our schools the following situation :

mark for admission to schools in the area	225
only just above this—i.e. from 225 to 229	65
below this admission mark—i.e. from 224 to 220	65

There were 130 boys who are within five marks of the admission mark. If the marks are reduced to percentages, the admission mark is 100 per cent. If the marks are reduced to percentages, all these boys are actually within 5 per cent. of the admission mark; yet 65 are accepted and 65 rejected. If nothing further is to be done, it is almost as well put the names in a bag and draw them out.

It is in an examination in which this situation exists that we find the very best of the centres we

studied, judging from several lines of evidence to be given later.

Let us take another and quite typical centre. Here the figures were still more striking. There were, in the entrance examination of this centre: (1) intelligence tests, (2) written examination papers in English and arithmetic, (3) an oral test. A maximum of 100 marks was given for each of these three parts. If we reduce this total maximum of 300 to 100 we get the following figures:

Top boy, (1)	78 per cent.	(12)	} 61 per cent.
Second, (2)	72 per cent.	(13)	
etc. (3)	70 per cent.	(14)	
(4)	} 67 per cent.	(15)	} 60 per cent.
(5)		(16)	
(6)	66 per cent.	(17)	
(7)	} 63 per cent.	(18)	} 59 per cent.
(8)		(19)	
(9)		(20)	} 58 per cent.
(10)		(21)	
(11)		(22)	} 57 per cent.
		(23)	

The first 18 boys (with 60 per cent. of the marks or over) are the boys who obtained free places. Notice how close they are, especially after the first five. After number six, 12 boys are only separated by 3 per cent. at the most! Number nineteen, only 1 per cent. behind, has to pay fees, if he enters at all. We may be sure that, with another examination the next week, or even a re-marking of the same papers by different examiners, the just-fails might easily replace the just-passes. I may add that one of the four boys who only just scraped in with 60 per cent. proved the best of the lot five years later, being top of the school order, top in the School Certificate examination order, the only one of the year to gain matriculation, and the only one a prefect!

Let us now turn to a question of practical importance intimately connected with this closeness of the pupils around the admission-level mark.

THE SUBSEQUENT PERFORMANCE OF BOYS WHO ONLY JUST GAIN ADMISSION

What is the subsequent performance of the very 'tail' of the admissions into the secondary school? If the performance of the tail is good, then we cannot be sure (in view of the facts we have just reviewed and which will be greatly amplified later) that we are not excluding many pupils from the secondary school who are quite fit for it. The performance in the School Certificate of boys at the top, in the middle, or at the bottom of the entrance examination will be considered in detail, and for eight centres, later. Here, as a preliminary example, I will give the performance of the tail (the last three admitted) in the two centres from which the above figures were taken.

In the first mentioned, I had reports from seven schools. Three, however, only give results of School Certificate four years after entry, and it does not seem fair to say that pupils of the age of 11 + at entry prove unsuitable for secondary school education if they have not obtained a School Certificate by the age of 15 +. Many boys in the public schools do not reach the standard of School Certificate before 16 or even 17 years of age. We will confine ourselves, therefore, to results gained after five years in school. (These I have obtained for twelve examination-years from four schools with large entry lists, varying from 63 to 99.)

Taking the 36 pupils who constitute the *bottom* three in the twelve various entrance examination lists, we find that 17 gained a School Certificate in either four or five years

(one of them reaching matriculation standard). In view of the closeness to one another of the pupils at the bottom of their entrance lists (separated as they were by only 1 per cent. of the marks), it is fairly certain that some pupils just below, and possibly well below, the entrance level, would have also gained a certificate. This becomes still more probable when we find, as we shall later, that there is so little relation between the order of merit in the entrance examination and the order of merit in the School Certificate.

Even this centre then, where there was large accommodation for secondary pupils, where the entrance examination was most efficiently conducted, and was one of the most successful (judging by more exact evidence to be given later) in discriminating between the pupils at 11 +, there seems to be a decided probability that many pupils not admitted would have justified their admission—if we take obtaining a School Certificate in four or five years to imply that.

In the second centre for which the marks were given above, I found that of the bottom four boys bracketed equal in the list given, every one gained School Certificate, and one, as already mentioned, matriculated—though the top boy in the entrance examination failed even to get School Certificate; while in another year, two of the three bottom boys gained School Certificate (one with matriculation). It seems clear then that in this centre also (and the school was the only secondary school for boys in the town) pupils just excluded from free places might have amply justified the award had it been given them—because for practical purposes we cannot regard the just-fails at entrance as appreciably worse than the just-passes when the lists of marks are of the type given.

These results are confirmed by individual reports, which

show that some border-line pupils, who only just gain admission, do exceedingly well, and sometimes far better than most of the pupils much higher up in the entrance examination. One of these I have already quoted. The Head of another school, whose results have been given elsewhere, stated that one boy who was eighty-eighth on the list for his school, and barely escaped refusal, proved by far the most brilliant boy of the year, matriculating at 15 with three distinctions. In another centre, of the 25 boys taking the School Certificate examination, the one who had been the twenty-fourth in the entrance examination was the only one who obtained first-class honours, and one of three to reach matriculation standard. Another Headmaster told me how a senior mistress had begged for the admission of the next pupil on the list, on the ground of personality and home background, though he felt they could take no more. After continued pressure he agreed—and the girl proved one of the best they had had, on general grounds, for several years.

We have exemplified this point so far by reference only to two examination centres. The totals for the ten schools (in five centres) from which I got reports as to the bottom three pupils at entrance were as follows :

Number of pupils in bottom three at entrance	.	.	.	.	.	67
Number obtaining School Certificate	.	.	.	.	.	30

Taken together, these are fairly representative of the ten centres from which statistics were obtained for this enquiry ; indeed, judging from the full evidence which will be given shortly, these particular centres had decidedly more reliable entrance examinations than the average. Of these centres, then, we may say that, at this most critical stage of a pupil's life, when the question of obtaining a secondary

education or not is for the great majority finally settled, we must suspect that a number of children are being excluded from admission to secondary schools (or free places) who would profit from them as much as many admitted.

ARE THE ENTRANCE EXAMINATIONS ADMITTING PUPILS UNSUITABLE FOR SECONDARY EDUCATION?

Before going on to our main enquiry, I may touch on this second problem of immediate practical importance. As would be gathered from Chapter I, I should not personally regard the failure to obtain a School Certificate as proof of a boy's being unsuited for secondary education; those who do will find ample evidence later of the admission of such unsuitable pupils. Indeed, it is already known that a large proportion of the pupils in the secondary schools leave without a School Certificate.¹

There is another line of evidence, however, as to unsuitability. I obtained from the Heads of six large schools statements as to how many pupils left the school before four years with bad reports on their work: I was surprised to find that the numbers were 140 out of 797, i.e. about 17 per cent. (These do not include those who left for economic or other reasons, but whose work was reported as satisfactory—who formed an additional 9 per cent.) This means that over one-sixth of the pupils admitted to these schools were unsatisfactory. They can hardly be regarded as suitable pupils for secondary schools with their existing curricula. Again, these schools were actually above the average from the point of view of reliability of

¹ See the Board of Education *Report* for 1930: Section C, on Secondary Schools. Of those who reach the School Certificate class and sit for the examination, just over 70 per cent. obtain a certificate; but many of course leave before reaching that class.

their admission examinations, judging by the evidence to be given later. Finally, when we look back to the *entrance* examination records of these unsatisfactory pupils, we find they were not massed near the bottom ; they were not those who just scraped in. They are found exactly as often in the middle group at the entrance examination as in the bottom group—and only slightly less often in the top group. The actual percentages for the 140 bad reports were :

Top third at entrance	.	.	.	14·3 per cent. had bad reports.
Middle third at entrance	.	.	.	19·1 per cent. had bad reports.
Bottom third at entrance	.	.	.	19·2 per cent. had bad reports.

Thus in entrance examinations even better than the average of those tested, the examination order fails to discriminate clearly between the good and the bad, and fails to exclude many who are apparently unfit for secondary education, taking as our criterion the report of the Heads. Here again then we see how important it is that the order of merit at the entrance examination should be a reliable one.

We will now proceed to consider the reliability of these various entrance examinations more carefully, and in particular to use more objective criteria than the reports of the Heads, valuable as these undoubtedly are.

Chapter IV

THE METHODS OF OUR ENQUIRY AND RESULTS FROM FIRST CENTRES

METHODS OF TESTING THE RELIABILITY OF THE ENTRANCE EXAMINATION

THERE are several ways of testing the reliability of the entrance examination at 11 +, besides those used in Chapter III.

(a) The first and crudest method is to find whether the pupils who did best in the entrance examination were more successful than the weaker ones in *gaining a School Certificate* four or five years later.

(b) Another way is to compare the order of merit of pupils in the entrance examination with their *order of merit in the secondary school* at 16 or 17, based on *the schools' own examinations*, combined perhaps with marks of the weekly work for the last term or two.

(c) A third method is to find the *order of merit in the School Certificate examination*, and compare that with the order of merit of the same pupils in the entrance examination. This of course takes the School Certificate as a criterion of success, and few would accept that as final. But by considering the sum total of marks gained in the School Certificate examination (instead of merely whether the certificate was gained or not) one can lessen the element of chance to some extent. Most would admit that the performance in the School Certificate examination, if one takes sufficiently large numbers of pupils in various areas, is one useful index of success of the pupils; at least, to deny this is to admit an unreliability of examinations greater than is suggested in this book.

(d) A fourth and more accurate method of testing the prophetic value of the entrance examination is to *blend the order of merit in the school certificate examination with the school's own order of merit* at that stage, based on the school's own examination (or examination plus weekly work). This averaging of two examinations should certainly lessen errors due to 'luck,' to varying standards of marking, and so forth.

THE METHOD OF ENQUIRY

My first step was to write to a number of Heads of secondary schools, most of them known to me personally, to ask if they could supply the following information :

- (1) The order of merit of pupils in the entrance examination in a given year—say 1924.
- (2) The order of merit of the same pupils still at school in the School Certificate examination four or five years later; and whether the School Certificate was gained.
- (3) The school's order of merit for the same pupils at School Certificate stage, based on the term's work or school examinations, or both.

These particulars were asked for three or four recent and successive years.

As to calculating the order of merit in the School Certificate examination, the following suggestion was made :

INSTRUCTIONS FOR HEADMASTERS

The examination marks may be given according to the scheme the Head thinks fairest in his own school. But the following method, suggested by one Head, is recommended :

- (a) Take the total marks of the *best six* subjects (or seven if *all* pupils in school take seven).

- (b) Add *half* the marks gained in any additional subject, even if the examination in that subject is not passed.

In practice this question of the basis of the order proved a simple one, for the usual custom seems to be that all pupils in a class take the same subjects, though occasionally an extra subject is taken by a few pupils. In these latter cases it was felt that if an extra subject was attempted some credit should be given for it, even if the examination in it was not passed; but that to add all the marks gained in it was to give too great an advantage to the pupil attempting an extra subject.¹

Results of this enquiry were sent me by 22 schools in different parts of the country, from Lancashire to Devon and from Kent to Monmouth. They dealt with entrance examinations conducted by ten different authorities, and comprised chiefly entrance examinations during the years 1923 to 1927. Many other Heads would have helped in the enquiry, but had not particulars of the entrance orders of pupils sufficiently far back. Where Directors of Education possessed these particulars they were almost invariably most willing to co-operate. Sometimes, however, full particulars were not available.

¹ This and several other points in the method of enquiry were decided on in consultation with four Headmasters, with whom I discussed fully this enquiry, and to whom I tend my warm thanks for the help given at this early stage—Mr. J. R. Brown, Headmaster of George Dixon Secondary School, Birmingham; Mr. H. P. Lunn, Headmaster of Yardley Secondary School, Birmingham; Mr. J. Manton, Headmaster of King Edward's Grammar School, Aston; and Mr. H. Watson, Headmaster of Dudley Grammar School. Another important point which they discussed with me was the question of taking the order at entry as given by a Local Education Authority's examination, which usually includes an allowance for age. It was felt that this was the right course to adopt, for reasons stated in the note on Age Allowances in Appendix I (i), p. 182. It is there shown also that our results are unaffected, even if this age allowance is ignored.

THE GAINING OF A SCHOOL CERTIFICATE AS A TEST

Let us consider the simplest way of testing the relation between success at entrance examination and success at School Certificate stage.

Suppose we take the lists of pupils in order of merit at the entrance examination (ignoring for the time those who leave before sitting for the School Certificate examination), and divide the pupils into three groups according to their performance in the entrance examination. Thus :

- (a) The top group One-third of the pupils.
 (b) The middle group One-third of the pupils.
 (c) The bottom group One-third of the pupils.

Now, if we consider how these groups fare in the School Certificate examination, we find that, in one centre, B for example, the figures for a range of four years of School Certificate examinations were as follows :

SCHOOL CERTIFICATE

	Passed	
	In 4 years	In 5 years
Top groups	25 out of 33	27 out of 33
Middle groups	25 out of 32	28 out of 32
Bottom groups	24 out of 33	31 out of 33

We see that, though the top group is very slightly better (by one pass) than the bottom group in the record at 4 years, after 5 years the bottom group scores actually four more passes than does the top group. Judged by this standard, the bottom group is at least as good as the top.

Five out of the eight examination centres (namely A, B, C, E, and F) for which such figures were obtained showed

results of this kind. Adding their totals we get the following results :

TOTALS FROM FIVE CENTRES

	S.C. gained in 4 years			S.C. gained in 5 years ¹		
	Top Thirds	Middle Thirds	Bottom Thirds	Top Thirds	Middle Thirds	Bottom Thirds
	50/99	48/92	42/99	74/99	74/92	74/99
Percentages	50·5	52·2	42·4	74·8	80·5	74·8

Here we find the remarkable fact that in five of the eight centres thus tested, the boys in the middle group at the entrance examination beat those at the top at entrance, whether we considered the four- or the five-year courses ; while the bottom group do as well as the top group in the five-year results, and are very little behind them in the four-year results.

THE ORDER OF MERIT IN THE SCHOOL CERTIFICATE EXAMINATION

The actual gaining of the School Certificate is, however, an uncertain test ; for as we have seen (in Chapter I), a few marks more or less in a compulsory subject may make all the difference between passing and failing, and a pupil A, with a total of marks 50 per cent. greater than that of pupil B, may fail to gain a certificate, though B gets one. We can, however, test the reliability of the entrance examination in a better way, namely, by comparing the *order of merit* of the pupils in the entrance examination with the order of

¹ Two schools sent their pupils in for the School Certificate examination only after five years at school ; in the other schools practically all students took the examination after four years, trying again the next year if they failed.

merit in the School Certificate, or in the schools' own lists four or five years after entry, or in both combined.

Now we can get a rough idea of the resemblance of two orders by comparing them directly as in Fig. II. There I have shown the order of merit of a class of boys of 11 + in the entrance examination in a certain school in Town A, and also the position of each boy at the end of five years. The arrow lines show whether the boy goes up or down as

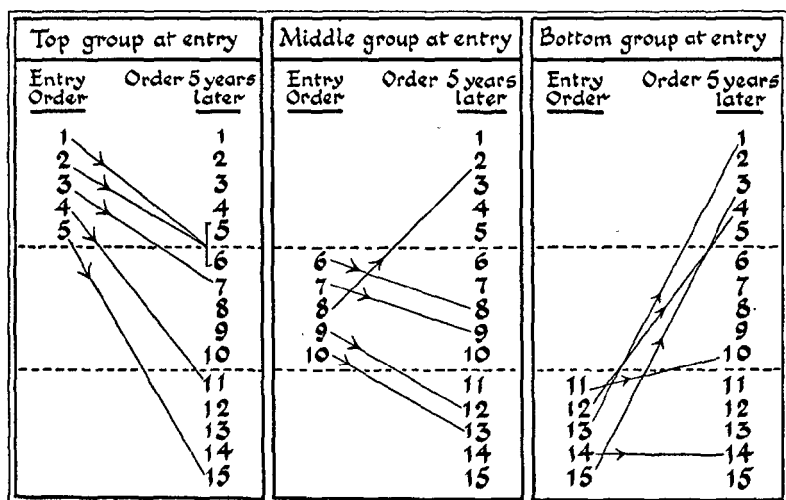


FIG. II.

This order is an average order got by blending the order of merit in the School Certificate examination with the order in the school's own examinations held in the same term.

he passes from the entrance examination to the examinations at the end of five years.

As will be seen, we have divided the 15 boys, as before, into three groups at the entrance examination—top, middle, and bottom. Now, if we inspect Fig. II, three striking facts emerge:

(1) Not one of the boys in the top group at entry

remains in the top group in the order of merit five years later.

- (2) Only one of the boys in the bottom group at entry remains in the bottom group five years later.
- (3) Three out of five boys in the bottom group at entry are, after five years, above *all* the boys who were in the top group at entry.

One can say by inspection here that there is little resemblance between the two orders—probably most people would surmise that there was a tendency for those who did well at entry to do badly five years later.

It is not, however, always so easy to see the lack or presence of resemblance between two orders, especially when the number of boys in the class is large. Consequently mathematicians have devised a way of finding and stating the degree of resemblance or correlation. We need not here trouble with the method of finding the degree of resemblance, and fortunately the way of indicating it is quite simple. The degree of resemblance or 'correlation' between two orders may be indicated by a decimal figure or percentage. If the orders were exactly the same the figure would be 1.0. A high degree of resemblance between two orders would be indicated by 0.7 or 0.8. A very slight degree of resemblance only is indicated if the figure is below 0.3 or 0.2. The figure representing the actual degree of resemblance of the two orders in Fig. II is — 0.10, indicating practically no correlation between the two orders.¹

¹ The practical use of this way of reckoning the resemblance between two orders is so easy to understand, so frequently convenient, and so often met with nowadays in statistics about educational and psychological studies, that it is well worth while even for the non-mathematical to be familiar with it. Briefly we may say that if two orders, A and B, resemble one another completely (the pupils being in the same order in B as they are in A), then their correlation is 1. If the orders are exact

It will give those unfamiliar with such correlation figures some further idea of their value if I mention that a group of half a dozen intelligence tests which can be applied in two hours to a class of boys will give an order of merit which correlates with the estimates of the intelligence of those boys made in collaboration by several teachers who know them well, to the extent of 0.8 or more. Even the attempt to estimate the relative general intelligence of a group of 30 boys (previously unknown) merely by means of a conversation of about ten minutes with each, gives a correlation of about 0.2 or 0.25 with the estimates made by teachers who know them well.¹ Specially trained interviewers may, on the basis of half an hour's interview, even produce an order of merit as to general intelligence of pupils which correlates to the extent of about 0.5 with estimates made by persons who know the pupils well.²

With all the possibilities of error due to 'luck,' to varying standards of marking of different examiners, and so on, the order of merit of pupils in the School Certificate examination correlates with the order of merit in the schools' own examinations (held the same term) to the extent of about 0.8 on the average for all centres, as we shall see later.

opposites, so that the top boy in A is bottom in B, the second in A bottom but one in B and so on, the correlation is — 1. If there is no more resemblance between the two orders than would be given by mere chance, the correlation is 0.

The whole theory of correlations is thoroughly expounded by W. Brown and Godfrey Thomson in *Essentials of Mental Measurement*. An exposition which is especially useful on the application of correlations to school examinations and masters' estimates of pupils is given in *The Science of Marking*, by Terry Thomas (London, 1930).

¹ See, for example, E. H. Magson, "How we Judge Intelligence" (*British Journal of Psychology*, Monograph Supplements No. 9). Also C. W. Valentine, "The Relative Reliability of Intuitive Judgments of Character among Men and Women," *British Journal of Psychology*, vol. xix. (1929), p. 213.

² See Cyril Burt's contribution to *A Study in Vocational Guidance* (Report No. 33 of the Industrial Fatigue Research Board, 1926).

Furthermore, the order of merit *after one year in the secondary school* correlates with the order of merit in the School Certificate examination to the extent of about 0.69, as indicated later in Chapter VI.

In view of these facts it is astonishing to find that in five of the eight centres in which the comparison was made, when the order of merit in the entrance examination was compared with the order of merit in the School Certificate examination four or five years later, the correlation on the average was practically zero. That is, there was *no resemblance between the two orders of merit*, no tendency for the boys high in the entrance examination to be high in the School Certificate, or for those low in the entrance examination to be low in the School Certificate. The highest figure for any of these five centres (A, B, C, D, and E) was 0.15. The lowest was actually a negative correlation, -0.15. The number of pupils in some centres was small, but the total number for these five centres was 235. The rough average correlation for these five centres was almost nothing, the actual figure being 0.03. (For details, see Appendix I (a), p. 174.) I may add that Centres A, B, C, and E were four of the five centres in which the top groups at entrance did slightly worse than the middle groups in securing the School Certificate, and little or no better than the bottom groups. Centre D made no report as to 'pass' or 'fail' in the examination.

It was to give a more concrete idea as to what this low correlation means that I have shown already in Fig. II a graphic representation of the changes in order, which give rise to a correlation of about the same amount (actually a slightly lower correlation, namely, -0.10).

RELATION BETWEEN ORDER IN ENTRANCE EXAMINATION AND THE SECONDARY SCHOOL'S OWN ORDER OF MERIT AFTER FOUR OR FIVE YEARS

Let us now take the other test of the pupils' success in the secondary school, namely, the order of the same pupils in the *school's own examinations* a few months before the School Certificate examination. In the school examinations the pupils' papers are marked by their own masters; and to some extent the marking would be influenced, unconsciously, by the masters' impressions of the pupils' work through the year; so that the school examination to some extent may introduce a valuable addition to the mere examination test. In some schools, indeed, the school order was based partly on the work of the year; and in one a boy's order in the school examinations was slightly changed if it was felt that the examination order did not fairly represent his deserts.

Of the five centres we have just considered, D gave no report of its own school examinations. The average correlation in the four other centres between orders at entrance and four or five years later was 0.08 for 221 pupils, again indicating practically no resemblance. (Details in Appendix I (*b*), p. 175.)

A more accurate test, however, is obtained if we *blend the order* in the School Certificate examination with the school's own order for the same pupils at about the same time as the School Certificate examination.

Blending the orders for each of the centres just considered, we obtain the following correlations. As this is the most reliable figure, I give each centre separately.

AVERAGE CORRELATIONS OF ENTRANCE ORDER AND "BLENDED" ORDERS

Centre A	— 0.06 (25 pupils).
Centre B	0.11 (80 pupils).
Centre C	0.05 (66 pupils).
Centre E	0.13 (36 pupils).

The figures still indicate no appreciable correlation, the average being 0.06. If we include Centre D (in which only the School Certificate order was obtained, and which gave an average correlation of 0.00 for 22 pupils with the entrance examination) we may say that in five of the centres the entrance examinations for the years concerned and in these representative schools, failed deplorably to indicate the relative future performance of the pupils admitted, so far as that performance can be judged by two very full and independent examinations, each in six or seven subjects, taken four (or five) years after entrance.

We are using as our criterion of success the School Certificate examination and the schools' own examinations held about the same time. But how far can we trust these?

As a check on the reliability of these examinations, the School Certificate and the schools' own examinations at the end of the four-year period, I found the correlation between the respective orders of merit in these two examinations themselves. The rough average correlations for the four centres just mentioned were: Centre A, 0.75; Centre B, 0.69; Centre C, 0.87; and Centre E, 0.87—an average of nearly 0.8, indicating a high degree of resemblance between the two orders. The blended orders may therefore be taken as representing with a high degree of reliability the *examination capacity* of the pupils in the subjects taken in these examinations.

The entrance examinations then failed badly in the prophecy of *examination capacity* four or five years later in these schools.

It is important to bear in mind that such a result involves not the slightest reflection upon the schools concerned. The efficiency of the schools is practically irrelevant to this

particular point. And if it were not, I have good reason to know that they are schools of high efficiency, several with a Headmaster (or Headmistress) who has distinguished himself among his fellows.

The centres dealt with so far, though of course small in number, are fairly representative of all types. They include one fairly large city, two small towns, and two smaller towns under county authorities. It is true that only one school for each centre was dealt with; but in three cases it was the only boys' school in the town; in a fourth it was one of two; in the fifth one of three, and itself a co-educational school. Also, in some schools the number of pupils in a class was very small, but in every case the results of two, three, or four years (or classes) were studied; so that the average was based upon twenty-six correlations in all.¹

RELATION BETWEEN ORDER AT ENTRANCE AND THE PASSING OF THE MATRICULATION EXAMINATION

Before considering other centres, a word must be said about one other comparison that may be made—namely, that between entrance examination and the securing of “matriculation” after four or five years.

As soon as we confine ourselves to matriculation successes, the numbers become so small for most of the centres that they are not of much value. They will be considered more carefully in reference to Centre J, where the numbers are larger.

Of the centre A, B, C, E, and F, only 17 per cent. of the pupils sitting for the School Certificate examination in four years gained matriculation, and only 29 per cent. in five

¹ For the influence of selection on correlation, see end of Appendix I (a), p. 174, and especially Appendix I (j), p. 184.

years, against 76 per cent. of the pupils in these same centres who gained the School Certificate. (Centre D made no return as to matriculation.) Evidently a test which results in the success of only a very small proportion of pupils is of little value as a criterion of the entrance examination as a whole, and especially of its reliability near the border-lines of pass and fail.

If it be suggested that the severer standard for matriculation makes a good test for showing the very pick of the pupils, the results do not testify much to the reliability of the entrance examination concerned even from this point of view. In one centre (A) the bottom group at entrance gained more matriculation certificates than the other two ; in another centre (C) the middle group obtained the most ; in yet another (E) the bottom group practically equalled the middle. Taken together as the table below shows, the middle groups did nearly as well as the top groups ; while the bottom groups score 19 per cent. of successes against 38 per cent. by the top groups.

The figures for the five centres were as follows (Centre D made no returns as to matriculation) :

	Matriculation gained in 4 or 5 years by		
	Top Third	Middle Third	Bottom Third
Centre A . . .	2/10	2/9	3/10
Centre B . . .	14/33	8/32	6/33
Centre C . . .	9/32	11/31	4/32
Centre E . . .	9/15	5/13	5/15
Centre F . . .	4/9	3/8	1/9
Total. . . .	38/99	29/93	19/99
Percentages . .	38·4	31·2	19·2

Looking at it in a different way we may say that 19 of the

boys from the bottom groups at entrance beat 61 boys from the top groups (who failed to gain matriculation), while one-third of the middle groups beat over two-fifths of the top groups. Hence, even taking matriculation as a reliable general criterion, which the small percentages of success do not allow us to do, we see that the entrance examinations in these centres do not indicate reliably even the very ablest boys.

(The value of matriculation as a test is further discussed in Appendix I (*d*), p. 176.)

THE NATURE OF THE ENTRANCE EXAMINATIONS IN CENTRES A, B, C, D, AND E

Was there anything peculiar about the entrance examinations of the centres we are considering? One point important for the efficiency of an entrance examination is the granting of an age allowance. It is obviously unfair to compare a boy of $10\frac{1}{2}$ with one of 12 without giving the former some allowance for age, and an age allowance is now fairly common in entrance examinations.¹ Considering these five centres, we find that A, B, C, and E have age allowances, while D gave no age allowance. Evidently, the failure to give a correlation cannot be attributed to absence of age allowance.²

We seem compelled to conclude that for some reason or other in these five centres of those eight for which correlations were obtained, the entrance examination, in the years studied, gave practically no guidance as to how the various

¹ As to age allowances, and the methods of making them, see references in the note on age allowance in Appendix I (*f*), p. 182.

² In Centre E there was also an interview; and in the second of the two years taken for Centre A the entrance examination included intelligence tests and an oral test.

pupils would do in their school career. What these reasons are we shall discuss later. We shall consider in particular whether it is due to the factor of luck, or to instability of marking; or whether it is due to the varying rates of development of different boys—one going ahead quickly—one slowing off (and I shall bring evidence to show that this cannot account for the absence of correlation); or whether it is due to the difficulty of testing in a simple examination in English and arithmetic all those specific abilities involved in the study of the many subjects of the secondary school curriculum—especially foreign languages, mathematics, and science.

So far as regards these centres, we cannot rely upon the selection of pupils, either for the award of scholarships or free places to the best pupils, or for mere admission. Those just on the border prove as good as those at the top. And in view of this we must conclude also that those just below admission may be as good as most admitted (or given free places), and better than some.

Chapter V

RESULTS FROM FURTHER CENTRES, AND SOME CONCLUSIONS

LET us now turn to the results gained in the other three centres in which orders of merit were also given both for entrance and School Certificate. These Centres I have labelled H, I, and J.

CENTRES H AND I

In Centre H, though there was no allowance for age in the entrance examination, there was an appreciable correlation between the order at entrance and at School Certificate—namely, 0.39 for boys and 0.60 for girls for the year of entry, 1923. The numbers of pupils were 24 boys and 15 girls, so that the correlation figure for the girls is very uncertain.¹ We may, however, agree that here is some evidence of a definite resemblance between the orders in Centre H.²

If we take the alternate method of checking the entrance examination, namely, the performance at School Certificate of the top third in the entrance examination as compared with the middle and bottom groups, we find that each group scores nearly the maximum possible number of passes, the figures being for the respective groups 12/13, 12/13, and 11/13. As regards qualifying for matriculation, the middle group does as well as the top group, but there is a falling off in the bottom group, the numbers being 7/13, 7/13, and 2/13 respectively.

¹ With small numbers of pupils mere chance correlations may occur, i.e. the 'probable error' is high. Thus *positive* correlations based on very small numbers are untrustworthy; but the *absence* of a correlation with small numbers is suggestive. (See Note on Probable Errors, Appendix I (c), p. 175.)

² In Centre H I did not obtain the school's own order, so that I cannot give the correlation of entrance with blended final orders for that centre.

In Centre I the correlations in a girls' high school were obtained for three years. The correlations of entrance order with School Certificate order were as follows :

Entry 1921, 11 pupils	Correlation = 0.44
Entry 1922, 13 pupils	Correlation = 0.64
Entry 1923, 16 pupils	Correlation = 0.25

a rough average of 0.44.

Here the numbers of pupils in the various years were so small that these correlations, taking each year alone, are very unreliable ; and, again, the correlation is lowest where the number of pupils (year 1923) is highest, and so most reliable.

Still, the average based on 40 pupils indicates a definite though still small resemblance between order at entrance and in School Certificate. Furthermore, the correlations of entrance order with the schools' own order five years later were, for the same three years, 0.27, 0.55, and 0.34, an average of 0.39, so that the rough average of all six correlations is 0.41. Also, the average of the correlation of entrance with the blended orders was 0.42.

As regards the mere gaining of the School Certificate in Centre I, the top and middle groups at entrance do about the same, the bottom groups doing less well, the numbers being respectively—top third, 14/16 ; middle third, 12/15 ; bottom third, 9/16. Also, the figures for 'matriculation' were 8 for the top third, 6 for the middle, and 3 for the bottom group.

Here is a second centre then in which the correlation figures (on an average of three successive examination years) show an appreciable resemblance between the order at entrance and the order at School Certificate stage, and where the performances of the top thirds also show a decided superiority to those of the bottom thirds in the

mere securing of the School Certificate (or matriculation). We have seen, however, that this last is not a very reliable test; and, further, 9 of the bottom group of pupils get the Certificate, while 2 of the top group fail to do so.

The examination in Centre I, I may add, included a viva-voce examination.

CENTRE J

I now come to Centre J, in which I secured the largest number of results based upon twelve schools. Let us consider first the performance in School Certificate of the top, middle, and lowest groups of pupils at entrance. The totals here given are based upon the figures for two, three, or four different years in the various schools, and the figures relate to the School Certificate examinations of 1927 to 1931 inclusive (i.e. entrance examinations of 1923-1927).

SCHOOL CERTIFICATES GAINED IN CENTRE J

	In 4 years after entry. Total of 11 schools.	In 4 or 5 years after entry. Total of 10 schools. ¹
Top thirds . . .	142/284	215/284
Middle thirds . . .	102/286	179/286
Bottom thirds . . .	63/284	150/284

Expressed as percentages, these figures are as follows :

	Percentage gaining S.C.	
	In 4 years.	In 4 or 5 years.
Top thirds . . .	50.0	75.7
Middle thirds . . .	35.6	62.6
Bottom thirds . . .	22.2	52.8

On this rough grouping we get a decided superiority of the top groups to the bottom groups, and a superiority of

¹ One school gave only results of four-year courses, and so does not contribute to the five-year results. It will be noticed that the totals of the middle thirds are greater than those of the others. In dividing the classes into thirds, there was often, of course, an odd boy or two, and these were allocated to the middle group more frequently than to the others.

the middle to the bottom groups, a better result than that of the other centres.

Yet here again we find that over one-fifth of the pupils in the bottom groups at entrance beat one-half of those in the top groups in gaining the School Certificate after four years at school; while after five years over half the bottom groups have beaten one-quarter of the top groups. Furthermore, it has to be borne in mind that pupils low down at the entrance examination may sometimes be placed in a five years' course for the School Certificate, while others above them at entry, even if not really abler, were placed in a four years' course, so that the former would have no chance of gaining School Certificate in four years.

Instead of School Certificate awards, let us consider the gaining of matriculation standard after five years from entrance, which gives us numbers comparable to School Certificate gained after four years. We find the percentages are as follows:

PERCENTAGE GAINING MATRICULATION IN FOUR OR FIVE YEARS

Top thirds	.	.	.	.	$121/284 = 42.6$ per cent.
Middle thirds	.	.	.	.	$81/286 = 28.3$ „ „
Bottom thirds	.	.	.	.	$42/284 = 14.8$ „ „

Again a decided superiority of the top group, though one-seventh of the bottom groups beat half the pupils in the top groups.¹

ORDER AT ENTRANCE AND FOUR OR FIVE YEARS LATER IN CENTRE J

Let us turn to consider the actual correlations between the entrance examination order and the order in the School

¹ The use of matriculation as a criterion of success is a complex though interesting problem. Some further figures and discussion are given in Appendix I (d), p. 176.

Certificate examination in Centre J. (The details of these are given in Appendix I (e), p. 179.) We will take only the classes in which the number of pupils taking the School Certificate examination was 18 or over. This restriction still left me with twenty-six classes from twelve different schools, the total number of pupils being 625.

The average of the correlations between these orders at entrance and the School Certificate was 0.40. This figure is decidedly better than that of most of the centres; slightly lower than for H and I, but more reliable because based upon many more classes and pupils. The correlation indicates a definite tendency for those who were high in the entrance examination to be higher at School Certificate stage than were those that were lower at entrance; but the resemblance of the two orders is still small.

Let us consider the supplementary test—the order of merit of pupils in the schools' own tests, four or five years after entrance. This school order was in two schools based half on the records of the year's work and half on the schools' own examinations at the end of the School Certificate year; in another it was based primarily on the examinations, but the order was adjusted somewhat if it was felt by the teacher that a pupil had markedly failed to do himself justice; in the rest of the schools concerned the school order was entirely based on the schools' examinations. I obtained school orders of this type from nine schools in Centre J. The average correlation of fourteen such school orders (with order at entrance) from these schools was 0.39, agreeing very closely with the average correlation (0.40) of the School Certificate orders of the same pupils with entrance orders. (For details, see Appendix I (f), p. 180.)

RELATION BETWEEN ORDER AT ENTRANCE AND "BLENDED" ORDER AT SCHOOL CERTIFICATE STAGE

As a further check, however, let us blend the order in the School Certificate examination with the school's own order—in the hope (as with earlier centres) that one test will to some extent counteract the chance errors of the other. Of fourteen blended orders of this kind which I obtained in Centre J, the average correlation with the entrance examination was 0.39 (again in classes of 18 or over). These fourteen classes, however, were not quite representative of the whole group: the average of their correlations of entrance order with the School Certificate alone was only 0.36 against 0.40 for *all* the classes taken in J. (Details in Appendix I (f), p. 180.) They did not include the *later* years for some schools, when the correlations increased.

The fact that the blended orders gave approximately the same correlation with entrance examinations, as did the School Certificate orders and school orders for this same group of schools and classes, confirms the steadiness of an average of a large group of correlations for School Certificate.

Seeing then that these fourteen blended orders give a correlation with entrance order of 0.39, and the fourteen corresponding school orders also gave a correlation of 0.39, we are safe in taking as our measure of the reliability of J's entrance examination the average of the twenty-six correlations with School Certificate—namely, 0.40.

In order to afford a concrete idea of what such a correlation represents, I give Fig. III, which represents a correlation of 0.36 found between entrance order (1924) and School Certificate order (1928) in a school in Centre J.

In Fig. III a smaller proportion of boys underwent large

changes in order than was the case in Fig. II (p. 56), which represented a correlation very similar to the average for Centres A, B, C, D, and E. Yet even in Fig. III great divergences still appear.

Top group		Middle group		Bottom group	
Order at entrance	Order in Sch. Cert.	Order at entrance	Order in Sch. Cert.	Order at entrance	Order in Sch. Cert.
1	1		1		1
2	2		2		2
3	3		3		3
4	4		4		4
5	5		5		5
6	6		6		6
7	7		7		7
8	8		8		8
	9		9		9
	10	9	10		10
	11	10	11		11
	12	11	12		12
	13	12	13		13
	14	13	14		14
	15	14	15		15
	16	15	16	16	16
	17		17	17	17
	18		18	18	18
	19		19	19	19
	20		20	20	20
	21		21	21	21
	22		22	22	22
	23		23	23	23

FIG. III.

Note especially :

- (i) The top boy at entrance drops to 10th four years later, and the 3rd to 18th.
- (ii) No. 12 at entrance rises to 2nd, while close by him at entrance, No. 15 drops to bottom but one.
- (iii) The bottom boy at entrance, who only just succeeds in getting into the school, rises to nearly half-way up at School Certificate stage, while No. 18 soars to 6th.

Still, on the whole, Fig. III represents a decidedly greater degree of resemblance than did Fig. II ; and this exemplifies the fact that the average correlation is decidedly higher in Centre J than it was in Centres A, B, C, D, and E. This higher correlation is also more reliably demonstrated than were the correlations in Centres H and I.

In Centre J, with the exception of one or two early years, the entrance examination included questions of a mental test type, and in the two most recent years the order of admission was based partly on papers of mental tests, and partly on papers in arithmetic and English.

IMPROVEMENT OF EFFICIENCY OF ENTRANCE EXAMINATION OF CENTRE J IN LATER YEARS

At the same time that mental tests were introduced in Centre J, certain other changes were made (e.g. more detailed standardisation of essay marking, etc.), and I thought it of interest to see if these changes were followed by higher correlations with later school work.

Taking the 11 orders available (for classes of 18 pupils or over) for the years of entry 1926-1927, we find an average correlation of entrance order with School Certificate of 0.46 (the lowest being 0.12 and the highest 0.68). For the preceding three years the average of fifteen classes was 0.35 (range 0.11 to 0.58). (See Appendix I (e), p. 179, for details.)

Thus there is an indication of some increase in the correlations following the use of the mental tests and the other changes introduced in 1926.

Yet even this higher correlation of 0.46 leaves us with marked divergences between the orders, as shown in Fig. IV, where we have the two orders in a school in Centre J giving a correlation of that size—viz. 0.46.

It will be seen at a glance from Fig. IV that even the correlation of 0.46 is consistent with a few striking changes in order. Note especially:

- (1) That of the two boys bracketed 14th at entrance one rises to 3rd and the other drops to 20th.

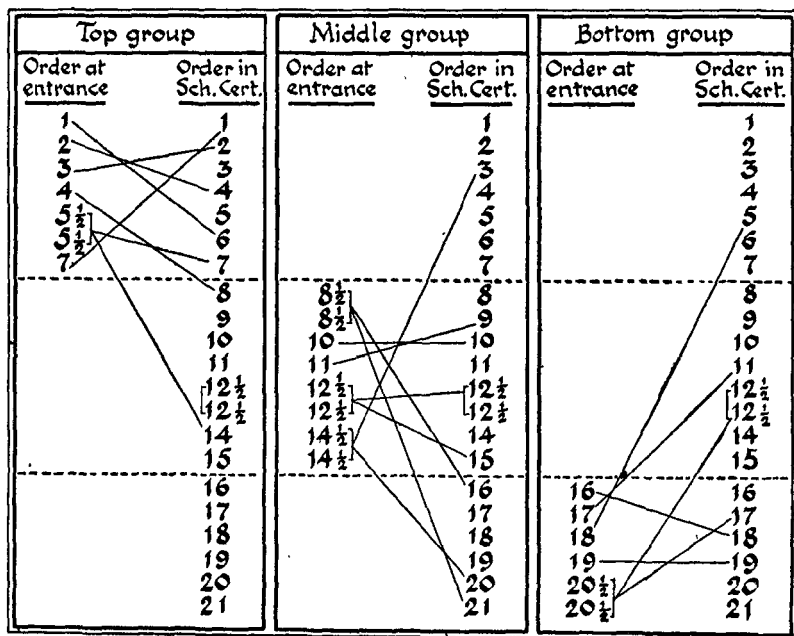


FIG. IV.

- (2) One boy bracketed 8th at entrance drops to the bottom of the class, while the 18th rises to 5th.

The average correlation of 0.46 for the most recent years of Centre J, however, suggests a definitely improved entrance examination, and one far above the centres A, B, C, D, and E, though of course they too may be now making improvements in their methods.

Even in Centre J, however, there remains considerable divergence between the orders in the entrance examination

and the orders in the examination four or five years later. It has indeed been calculated that even if an admission test correlates with success at final performance to the extent of 0.5, this means that one-third of the pupils admitted should have been replaced by pupils who failed in the admission test.¹ In most of the other centres these divergences are even greater. In none is the resemblance so great as to assure us that the most deserving pupils are gaining scholarships or free places, or that the examination is keeping out those unfitted for secondary education, or that it is not excluding some who are so fitted and even more deserving of scholarship awards than are many who gain them.

I should like to make it clear again that I am bringing no general charge of incompetence against those responsible for these examinations. In one or two cases I surmised from various indications that the examinations were planned and conducted in an amateurish way. In the majority of cases, however, I have no doubt that they are most carefully considered. Many such entrance examinations throughout the country are in the charge of an experienced examiner ; in two of the groups we have studied they were supplemented by mental tests and in some by an interview.²

The centres I have discussed may not be a fair sample ; but personally I very much doubt if many are as good as the best here studied, though in a few more reliable intelligence tests may be in use. The plain fact is that at present

¹ See Dr. A. S. Otis, *Statistical Method in Educational Measurement* (p. 223), Chicago, 1926. The statement quoted is, of course, dependent upon conditions as to number of cases, normal distribution, etc.

² Useful information as to the variety of arrangements made for such admission examinations is given in a report on *Examinations in Public Elementary Schools* by a Joint Committee of the Association of Education Committees and the National Union of Teachers (London, 1930) ; and also in the Board of Education pamphlet, No. 63, on *Free Place Examinations* (1928), in which a criticism of methods and organisation, based on a study of 57 examining authorities, is given.

there is no well-established agreement as to how best to select pupils for the type of education now usual in secondary schools.

This must not, however, be taken to imply that the solution lies in restricting the number of entries into secondary schools. Our low correlations, together with the examples of the crowded border-lines given in Chapter III and the subsequent success of many pupils near the bottom at entrance, indicate that there are still many who fail to gain admission who are worthy of a secondary education. It has been suggested to me that an economist in education may seize on some of our findings as evidence that we ought to spend less on education after 14 years of age. To such I would point out that, even if at present many of our awards are misplaced, the right alternative may be further education of a different kind from the present secondary school curriculum. Lastly, further research will undoubtedly make our selection of pupils more efficient.

Chapter VI

CAUSES OF DISCREPANCIES BETWEEN ORDERS AT ENTRANCE TO SECONDARY SCHOOLS AND ORDERS FOUR YEARS LATER

It may be best to give first what seem to be partial causes of discrepancies between performance in the entrance examination and performance four or five years later, and then to show that certain factors have not as much influence as is sometimes imagined.

(1) One probable cause, in certain cases, is that the special coaching of some pupils for the entrance examination places them above their 'true' position relative to other pupils of equal innate abilities, who have not been so crammed. This explanation was stressed by several Headmasters with whom I discussed the problem.

It may be said that special cramming at School Certificate stage may also upset the 'true' order of merit. But pressure and coaching specific for the examination may be more general than; while most children from the elementary schools are allowed to take the entrance examination in their stride without any special preparation.

(2) Apart from special coaching, the fact that the candidates in the entrance examination come from several (sometimes many) different schools, where the standard of teaching and work may vary greatly, means that some pupils have an inevitable advantage over others in the entrance examination. When pupils get together in the same secondary school this advantage soon ceases to affect their relative positions, those who have actually greater ability but had not been prepared so well as others in the primary schools now coming more to the top. The Headmaster of the secondary school in Centre B, for example, was able to point definitely to an elementary

school where the standard of work was low, and where there was no special preparation for the entrance examination, and he was able to indicate a group of four boys from this school, who were very low down in the entrance examination, but did very well later on in the secondary school—one nearly bottom at entrance gaining first-class honours in the School Certificate in four years.

That (1) and (2) are not the sole causes of our discrepancies, however, is suggested by the fact that mental tests, when given alone, give little better prophecy of future success. For mental tests, though partly dependent on previous education, are far less so than is success in the English and arithmetic examinations. (For the value of mental tests in entrance examinations see *Note* at end of this chapter.)

(3) Apart from the two above-mentioned causes, the order of merit in the entrance examination may be unstable because of the various types of 'luck' (in questions, variations of 'form,' etc.) which we discussed in Chapter I. These factors no doubt vary greatly from examination to examination, and we shall discuss the matter more fully later in the chapter.

(4) A fourth possible cause of changes in order during the four years is that qualities of character, diligence, persistence, and the like may tell more and more as time goes on. No doubt these are already tested to some extent before the change over to the secondary school; for in the first instance the slackest pupils will not usually be recommended by the Heads of their elementary schools for admission to the entrance examination. Secondly, apart from this elimination, qualities of character are already involved to some extent in the work required to pass the examination in English and arithmetic. It should, how-

ever, be noted that so far as success in the entrance examination depends on *innate* abilities (as it does largely in good mental tests), rather than on acquired knowledge, so far such success will be independent of qualities of character. We shall show directly that qualities of character cannot be the sole cause of the changes in the order of merit.

(5) The usual greater 'scatter' of marks in arithmetic in the entrance examination will give that subject an excessive and possibly determining influence, unless precautions are taken to avoid this, as shown elsewhere (p. 177).

(6) Lastly, and perhaps most important of all, the entrance examination in our centres was, as is usual, only in arithmetic and English—together with (in two centres) some mental tests. The School Certificate examinations and the schools' own examinations, on the other hand (even after only one year), include as a rule English literature, history, geography, algebra and geometry, French, some science, and possibly Latin. In most, if not all of these, specific mental capacities and interests are probably involved, which are not tested by the English and arithmetic tests in the entrance examination.

Even if performance in the various school subjects depends chiefly upon general ability or abilities, no experienced secondary-school teacher will question the importance of specific abilities (or interests) for mathematics and foreign languages; one may have a pupil who is good in every branch of school studies except one. The same applies, though perhaps to a lesser degree, to the physical sciences, and sometimes apparently to history and geography, 'interest' perhaps being the greater factor here.

Thus, even if by good tests of general intelligence pupils

are well selected from the point of view of general ability, the specific abilities may be inadequately tested.¹

We shall return to this question of specific abilities and interests. First, however, let us consider several other conceivable causes of the discrepancy between orders at entrance and four years later.

IS OUR CRITERION, PERFORMANCE AFTER FOUR YEARS, ITSELF RELIABLE?

It may be suggested that the causes of discrepancy lie in the unreliability of the orders in the School Certificate examination and the schools' own orders after four or five years. These are of course not infallible; but we have seen that they correlate very highly with one another.² Also, the School Certificate examination is usually based on six or seven subjects—probably a dozen or more papers; while the schools' own examinations would usually add eight or ten more papers; so that the element of luck is greatly reduced, when orders are based on the *total* marks.

Also, when combined these two examinations form a better test than either taken alone. Now, in all the schools (except one) for which we have been able to obtain blended orders (of School Certificate plus school orders) we have seen that these blended orders give no higher correlation with the entrance orders than do the School Certificate orders or the school orders taken alone.

¹ Dr. H. G. Stead gives evidence of the importance of both general and specific abilities for various groups of secondary-school subjects in the "Correlation of School Subjects," *Forum of Education*, vol. i, 1923, p. 27. A more recent and as yet unpublished research, by Mr. J. H. Wilson, suggests that success in the varied subjects of the School Certificate depends more on specific abilities than has been thought by some psychologists.

² The average for the four centres, A, B, C, and E, was about 0.8 (see Chapter IV, p. 61). The average for eight classes in Centre J, namely 0.82, is given later in Table I (p. 87).

This is a notable result. We must surely believe that the blending of the orders does tend to give truer estimates of the relative capacities of the boys at the time (so far as they can be tested by examination) than does one alone.

The fact that this more reliable order at School Certificate stage gives no higher correlation with entrance examination order, suggests again that it is not the unreliability of the School Certificate examination which results in such low correlations with entrance order; but rather that the explanation lies in the nature of the entrance examination, or in other causes.

The discussion in Chapter I will have shown clearly that the present writer is far from believing that gaining, or failure to gain, a School Certificate is a completely reliable measure of a pupil's worth, or even of his scholastic attainments; but to suggest that it is of no value as a test of pupils' successes in the school course, especially in large numbers, is to adopt a sceptical attitude as to the value of examination success far beyond that adopted in this book. Also, we are here chiefly concerned with the inter-correlation of examinations. So far as examinations are reliable, they ought to agree with one another—that is, of course, if they profess to be general assessments of the students' capacities as a whole.

Furthermore, the criticism in Chapter I as to the School Certificate examination referred chiefly to the possible dependence of the award of the Certificate on a narrow margin of marks in one subject. The position taken in this enquiry is that the *total* marks are a more reliable index, and that the combined marks of the School Certificate and the schools' own examinations are more reliable still.

Such a combination should compensate to some extent the pupil who, through 'bad form' on some day or through

exceptional 'bad luck' in the questions of one or two papers, has not done himself justice either in the School Certificate or in the school's own examination. For closely as the orders of these two examinations resemble one another, their high correlation is consistent with a few

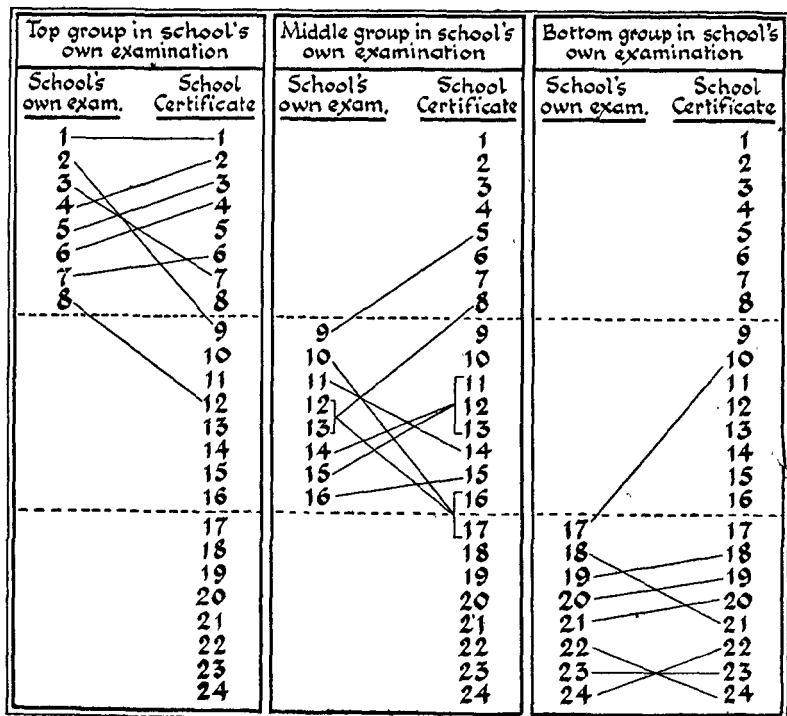


FIG. V.

marked divergences as is shown in Fig. V, which represents the performance in School Certificate and the schools' own examinations, giving a correlation fairly typical for Centre J, namely 0.88.

It will be seen that there are one or two individual changes of considerable size—e.g. from 2nd to 9th, and 17th to 10th. Substantially, however, each group remains

in the same group for both examinations, and the greater resemblance of these two orders (giving a correlation of 0.88) than that between school entrance and School Certificate (with a correlation of about 0.36) may readily be seen by comparing Fig. V with Fig. III, p. 72.

THE INFLUENCE OF QUALITIES OF CHARACTER ; AND OF VARIATIONS IN RATE OF MENTAL DEVELOPMENT

Everyone will agree that qualities of character affect the order of merit in school work—and one would expect such qualities to tell more and more as time passes—though some pupils have only temporary slack periods and then recover. Also we have agreed that some pupils are likely to shoot ahead of others through more rapid mental development ; it is already known that the clever young boys in a class tend to pass the older ones in the course of time.

The influences of these two factors are hard to separate in our enquiry ; but we can test at least their joint effect. Leaving the entrance examination for the moment, we can ask—How much change is there *within the school's own orders* over a period of, say, four or five years ? This will give us a clue as to how far change goes on with the mere passing of years.

Evidence on this point was obtained first from a large high school for boys. There I took the position in school of groups of boys between 12 and 13 years of age, after at least a year in the school to give them time to 'settle down' and get appropriate moves. These positions I compared with their positions four or even five years later. The results of four classes showed an average correlation of 0.79 for four groups comprising 74 boys in all. (Details, Appendix I (g), p. 180.)

Of course, this correlation of 0.79 still allows for con-

siderable changes in a few individuals—one forging ahead, another failing to fulfil his earlier promise ; but the average of these correlations in the high school, viz. 0.79, is far higher than the average correlation between entrance and School Certificate examinations, although the interval (of four or five years) between the two stages tested is as great as that between entrance and the usual School Certificate stage at a secondary school.

To gain further evidence on this question of changes in position due to different rates of development, I obtained from several schools in Centre J the *order of merit after one year at school*, in order to compare it with the order at School Certificate stage. Figures were obtained from six schools (regarding the boys' and girls' divisions of a co-educational school as separate schools).

The correlations (for fourteen classes of 18 pupils or more in six schools) were obtained between the order after one year in school and the order in School Certificate (three or four years later), and the average of these was 0.69 for 298 pupils. (See Appendix I (*b*), p. 181, for details.)

Thus, there is a decidedly greater resemblance between (*a*) the order after one year in the secondary school, and the order in the School Certificate examination three or four years later, than between (*b*) the entrance examination order and the order in the School Certificate, the average correlation for which, for these fourteen classes, was 0.37.

In other words, a considerable change in orders must occur in the first year. If it be replied that we are comparing a three-year period (first year to School Certificate at four years, as it was in most cases) with a four-year period (entrance to School Certificate), the answer can be supplied with a further figure. We can compare the entrance order with the *school order three years later*. We find then no greater

resemblance, namely, a correlation of 0.35 as against 0.67 between first year order and School Certificate.¹

That is, the changes (*a*) between the orders at entrance and three years later are nearly twice as great as the changes (*b*) between first year order and School Certificate also three (or even four) years later.

In short, *the big changes come in the first year in the secondary school*, the first year of more varied studies ; and this finally is confirmed when we compare the order at entry with the order after one year in the secondary school. For nine classes (of the same group of fourteen just referred to) the figures were as follows :

Correlation of entry order and first year order in secondary school, 0.43.

It may be suggested, however, that the age allowance made in the entrance examination (but not in the first year order) would tell rather heavily in this comparison.² The younger boys have not yet had much time to make up for their deficiency for which the age allowance was made. They may be regarded as still needing some age allowance at the end of their first year. So let us compare the order at entry without age allowance with the order after one year in the secondary school. We find it is still only 0.46 (for eight of the classes, comprising 170 pupils). As after all the age allowance at entry professes to arrange the candidates according to their then fitness for secondary-school work, the former correlation (0.43) is probably the more relevant one. But suppose we take the average—say 0.44. Once again we have evidence that there is a more decided change between the entry and the end of the first year than there is between the first year and the fourth or even fifth

¹ Based on seven of the above-mentioned fourteen classes.

² The question of age allowance is discussed briefly in Appendix I (*i*), p. 182.

year, the correlation for which was 0.69. Indeed, the correlation between entry order and first year order is scarcely greater than that between entry order and School Certificate order four or five years later.

In other words, it is evident that changes with the mere passing of time are not the main factors in causing big changes in the orders of merit. It seems most likely that this greater change of order, which occurs in the very first year, is due to the great change in the type of work done in the secondary school as compared with that tested in the entrance examination. The first year examination would include at least one foreign language, mathematics, some science, history, and geography.

Notice that we cannot attribute this greater resemblance of the first year order and the fourth year to the fact that they are both orders *within the school*; for we have compared the first year order with that of the public School Certificate examination.

CHANGES FROM YEAR TO YEAR IN THE SECONDARY SCHOOL

In the last section we have shown that the changes in order from entry to School Certificate stage cannot be entirely due to different rates of growth. There is a big change at once—bigger in the first year than in all the other three or four years put together.

Yet, as already indicated, there are undoubtedly some changes due to the factor of differential growth or to the increasing influence of character qualities. This is not the sole remaining cause, however, of the variation even simply within the school, from year to year; for there is the instability of the schools' own yearly examinations to be remembered.

For a small group of classes I was able to get the orders for the same boys at entrance and after one year, two years, three years, and four years in the school. Thus we obtained the correlations between the orders for each year and the next. They were as follows :

TABLE I

CORRELATION OF ORDERS FROM YEAR TO YEAR IN THE SECONDARY SCHOOL
(Based on average of eight classes—169 pupils)

	Entrance order with 1st year order	1st year order and 2nd year	2nd year order and 3rd year	3rd year order and 4th year	4th (or 5th) year school order and order in School Certi- ficate of the same year
With age allow- ance .	0.43	—	—	—	—
Without age allowance .	0.52	0.74	0.81	0.79	0.82

It will be seen that the correlations of orders, separated by one year, within the secondary school—based on the schools' own examinations in similar subjects—are themselves on the average 0.78—not much more than the correlation of first year order with School Certificate three or four years later.¹ Indeed, the correlation of the first year and second year orders, viz. 0.74, is practically the same as that between first year and School Certificate order *three* years later, viz. 0.71 for the same group of classes (except one for which this figure was not obtained). In other words, the passage of two more years does not appreciably lower the resemblance of the later order to the first year order.

Roughly speaking, the variability of the schools' own orders from year to year is represented by a drop in cor-

¹ In this average the fifth column is not of course included, as it involves an order in the School Certificate—not an order within the school merely.

relation from complete resemblance (1.0) to about 0.8—that is, a drop of about 0.2.

The number of classes covered by Table I above is small, and they had to be taken from only four schools. They suggest, however, that the mere instability of the schools' own examinations and the *temporary* variability of a boy from year to year are the main cause of the changes of orders *within the school* and not a steady continuous pulling ahead due to character qualities, or to continued and progressive growth at different rates; in spite of the fact that undoubtedly the younger able boys tend to move ahead of the older less able ones.

INFLUENCE ON SCHOOL ORDERS OF TEACHERS' KNOWLEDGE OF PUPILS

The question may be raised as to how far the high correlation of one school order with another is due to the fact that masters are influenced in their marking of examination answers by their knowledge of the boys. Such knowledge may have a steadying effect on the marking of the same boy's work at different times. A boy who has once been judged very good will tend to be marked high, it is suggested. This has been called the 'halo' effect on the marking of answers. I have mentioned elsewhere this undoubted possibility. In the case of the orders dealt with in Table I (p. 87), however, such influences could only be very slight; for in all these schools there was a common examination each year for all the four parallel classes; and in the examination, one master marked one or two questions throughout the papers in a given subject, and would only know one section of the pupils, while another master would mark another question, and so on.

Furthermore, that 'halo' effect cannot be an important

factor in causing high correlation from year to year is shown by the fact that the correlation of first year school order with the order of the School Certificate examination (marked by *external* examiners) was actually as high (0.63) as the correlation of first year with fourth year school order (0.62) for the five of the above-mentioned classes (115 pupils) for whom these correlations were obtained.

On the whole, it seems clear that the relatively high degree of resemblance of school orders from year to year, in the examples we have just considered, is not due appreciably, if at all, to any such 'halo' effect.

To resume our main argument, we may point out that the order of merit after one year in a secondary school is a moderately good prophecy of attainment after four or five years (represented by a correlation of 0.69 in the secondary schools and 0.8 in the high school). True, the differences between the orders at one year and the orders at four years leave room for considerable advance or regression in individual cases; but at least the order of merit after one year is a better guide as to where a boy will be three or four years later than the entrance examination is as to where he will be *one* year later.

From all lines of evidence then it seems unlikely that different rates of development, or the effect of qualities of character, are the most important causes of changes in order of merit from entrance to fourth year, unless we suppose that such influences occur almost entirely during the first year in the secondary school, a most improbable supposition. We may also point out that no improvement in the entrance examination could overcome irregularities due to the development of character. So far as such factors exist, they are reasons for not regarding it as settled at 11 + years

of age once and for all whether a child shall have further education beyond the age of fourteen.

The large *immediate* changes in order during the first year in the secondary school (nearly twice as great as the changes in the next three years at the school) point, however, to some further cause.¹

INSTABILITY OF THE ENTRANCE EXAMINATION AS A CAUSE OF DIFFERENCES BETWEEN ORDERS AT ENTRANCE AND FOUR YEARS LATER

We have still to consider more carefully the mere *instability* of the entrance examination test, instability in the sense that a repetition of a similar test (but with different questions) on the next day might give different results. This is the type of unreliability due to (a) the various kinds of 'luck' referred to in Chapter I, the special liking or disliking of the particular questions set, the specially good or bad 'form' of the examinee on the particular day, etc.; or to (b) variability in marking by different examiners.

Of course, stability is no guarantee of the efficiency of the examination. For a similar order may be given by two examination papers, which is nevertheless a bad order for the purpose of selecting the pupils; but if a very different order is given on a repetition of the examination, obviously we cannot trust the examination.

Such instability is almost certainly one factor at work. We have seen that the School Certificate order, based on about ten or a dozen papers, correlates with a similar examination in the schools at about the same time to the extent of 0.8—a drop of 0.2 from unity. One may fairly

¹ H. G. Stead has offered some evidence of change in a character-quality affecting school work. See "Factors in Mental and Scholastic Ability," *Brit. Journ. of Psychology*, vol. xvi, (1926), p. 199.

assume that the instability of the entrance examination in only arithmetic and English—perhaps only two and at the most four papers—is at any rate greater than this. When, however, mental tests form a substantial part of the examination, such instability should be considerably reduced.¹

We have already seen that if an essay forms an important part of the English paper, the mere instability of marking may be great, though it may be greatly reduced by adopting a systematic scheme for marking.² Instability, due to varying *suitability* of the essay topic, or to varying 'form' of the pupils, is another factor. Few centres, I imagine, are likely to rely on the essay alone; though in one of the three centres whose papers I saw, the English paper consisted entirely of essays; and only two topics were given, both of which had to be attempted. With such a paper instability would surely be very great. (The average correlation of the essay paper in one School Certificate examination with the order of merit (in composition) given by the schools is only about 0.41.)

Where the English papers of the entrance examination include different types of questions, the instability of the order of merit will vary with the type of question. If many questions are set involving special knowledge (e.g. of grammatical rules), much will depend obviously on whether the appropriate instruction has been given: pupils from one school might do well on one paper and badly on another. In such papers, too, general intelligence may not be so important as knowledge of particular facts. Again,

¹ We know that the best types of intelligence tests give, when repeated, orders correlating as highly as 0.9. One would not, however, expect so high a correlation as this with the *selected* group chosen for the entrance examination. (See note on the influence of selection, Appendix I (j), p. 184.)

² See Chapter II, p. 26.

if answers, even short ones, are of the essay type, the personal factor of the marker may tell heavily.

Instability due to such factors may be a very important cause of the prognostic unreliability of the entrance examinations in some of the centres we have considered. In the entrance examination for one centre, for example, the order of merit in English (for 65 boys admitted to the main secondary school) showed no correlation with the order in arithmetic—a striking result, suggesting that one paper at least hardly depended to any marked degree on general intelligence as contrasted with special knowledge and training. Indeed, the Headmaster of the school concerned said that both papers were such as to call rather for special training or information rather than for innate ability.¹

I had evidence, however, that English papers of the type sometimes set in these entrance examinations *may* be of a high degree of ‘stability.’ At my request the English papers previously set for one county entrance examination in 1930 were given to a class of 40 pupils (of 11 and 12 years), and the order of merit on the combined papers was drawn up. A week later the two papers in English set for the same examination in 1931 were given to the same class and another order of merit obtained. The two orders correlated as highly as 0.9, when teacher A was the examiner, and 0.93 when teacher B was the examiner—correlations comparable with those given by the repetition of a good intelligence test. Here a detailed scheme of marking the

¹ Previous thorough ‘selection’ of pupils of such a nature that all examined were about the same level in general intelligence (or in any ability largely involved in both arithmetic and English) would explain such absence of correlation. And some degree of selection of this type there usually is in the first selecting of pupils who shall be candidates for the entrance examination. But there was no reason to suppose any such thorough previous ‘selection’ as would so level all the 65 boys entering the school. (See Appendix I (j), p. 184, for a note on the influence of selection.)

English papers was agreed upon ; and the question papers were in my opinion, very good ones.

Elementary arithmetic papers may be expected to correlate at least as highly with one another. One of my advanced students set a paper of ten questions in arithmetic (of a type usual in entrance examinations) to his class of 33 pupils ; a paper of ten similar questions was set a few days later, both being marked by the same teacher. The two orders correlated to the extent of 0.93.

Where, as above, the marker of the papers knows the pupils, it is possible (as already indicated) that this knowledge has a steadying influence on the marks which may increase the correlation, at least in English. The teacher knowing that Jones is *usually* good (or weak) in English may unconsciously err on the generous (or severe) side when Jones writes a specially weak (or good) answer in one paper. With an external examiner this steadying influence would not be present, so that such correlations might tend to be somewhat lower. But with carefully arranged bases of marking, such influences should be small.

A more serious factor in the big public entrance examinations is that the numbers of pupils are so large that the markers of the answers may find difficulty in keeping their own standard the same throughout. This is balanced to some extent by the checking of the chief examiner, but he cannot re-mark every script, so that occasional lapses may be missed ; and further, even the chief examiner's own standard is likely to oscillate.

It would, however, be of great value if some local authorities could arrange for a similar set of papers to those set in their secondary school entrance examination to be done by the same pupils in their schools with similar restrictions as to time, etc., the week after the entrance

examination, in order to see how far the repeated test gave a similar order of merit ; or at least a ' repeat ' examination might be given to a large section of border-line pupils—just above and just below the admission mark—and this second examination might be used to make the final selection.

As pointed out already, the ' stability ' of the entrance examination is likely to be greater when good mental tests are used : and we have seen that in two of the centres we have dealt with mental tests were used ; and their introduction was followed (in the only centre where it could be tested) by a raising of the correlation of entrance examination and fourth year order.

On the whole, while we should, I think, regard the ' instability ' of the entrance examination as an important cause in some centres of the low correlation with order of merit in School Certificate four or five years later, we cannot regard it as necessarily so great (when the examination is well managed and includes mental tests) as to be the sole or even chief cause of the great change in order of merit even in the first year.

Summing up this chapter as to the causes of the great discrepancy between orders at entrance to the secondary school and orders four years later, we may conclude tentatively (for the subject needs further detailed enquiry) that the chief causes are those mentioned at the beginning of the chapter, namely :

- (1) The special cramming of certain pupils, putting them above their true position in the entrance examination.
- (2) The superior teaching some pupils obtain in certain elementary schools as compared with that in others.
- (3) The inherent inability of an examination in arithmetic

and English (and possibly even of good tests of general intelligence) to indicate relative ability for (or latent capacity for interest in) the many varied subjects studied in the secondary school. The entrance examination is further limited in this respect if the usual greater scatter of the marks in arithmetic papers than in English is not corrected.

(4) Different rates of mental development and the gradual influence of good or bad qualities of character. These undoubtedly tell in individual cases; but they do not seem to be as widespread as some have thought, and they cannot account for all or nearly all the changes in order of merit.

(5) The 'instability' of the entrance examination—in the sense that a similar examination a few days later might give very different results at least within a considerable range of the critical border-line. This is probably an important cause in some centres.

PRACTICAL SUGGESTIONS BASED ON THE FINDINGS OF PART II OF THIS ENQUIRY

These results, I suggest, indicate first the need for further research and experiment in the mode of admission to secondary schools. The extension of the use of the best type of intelligence tests is desirable on the ground that success in them depends much less on special previous education, and also because their stability is usually greater than that of examinations in English or arithmetic.

Some types of general intelligence tests, however, though a valuable help, do not ensure satisfactory selection, if we judge by the evidence so far available.¹ Probably tests of specific abilities needed in various secondary-school

¹ The main evidence on the value of such tests is summarised in the *Note* at the end of this chapter.

subjects (especially languages, mathematics, and science), which are already being devised and used, may eventually prove of further help. For example, such tests of ability for French (needing only 45 minutes) have been found to correlate with first term's work in French to the extent of about 0.8; while another set of tests also gave a correlation with first term's Latin of 0.8.¹

Possibly better guidance may be obtained by more careful noting of the recommendations of the primary school heads, and 'weighting' recommendations of those heads who prove to be most reliable, where cases are followed up. In Centre J the pupils not recommended by the primary heads usually do badly in the entrance examinations. A considerable number, however, succeed in passing the minimum standard required and in beating (in the entrance examination) some of those who are recommended. But among the small number of cases, namely fifteen, I have been able to examine in one centre, eight did badly (four leaving because of bad reports), only one obtained School Certificate in five years, and one other was also taking the examination in his fifth year.

In two enquiries in the United States of America it has been found that the records of work in the elementary school give a better prophecy of success in the high school than do intelligence tests—the best correlations being as high as 0.64 and 0.79.² In some instances, however, the

¹ See, for example, *Prognosis Tests in Modern Foreign Languages* (New York, 1929), pp. 24 and 25, and other publications of the American and Canadian Committee on Modern Languages, especially *A Summary of Reports on Modern Foreign Languages*, by R. H. Fife (New York, 1931). Also "Psychological Tests of Mathematical Ability," by Leslie Fouracre, *Forum of Education*, vol. iv, 1926, p. 201; and "Investigation of Mathematical Ability in the Class Room," by W. S. Flack, *Forum of Education*, vol. iv, 1926.

² See the account of the enquiries by C. C. Ross and T. L. Kelly given by P. M. Symonds in *Measurement in Secondary Education* (New York, 1927), especially p. 399.

correlation was decidedly lower ; but undoubtedly methods might be devised for the better standardisation of the reports of the heads of elementary schools, just as they have been for the standardisation of marking examination papers.

A further recommendation that seems to follow from our findings as to the instability of the entrance examination is that if possible a 'second chance' should be provided, though a somewhat higher standard might reasonably be demanded at the later examination, even for the same age. For in the long run the pupils who gain say 40 per cent. in only one of *two* examinations will not be as good as those who gain 40 per cent. in the first and only examination.

Finally, the findings of this and the previous chapters are, I suggest, an argument for leaving open a door at a later stage than 11 + for transition to a secondary type of education (something more than a second chance in another entrance examination six months later, useful as that may be).

They are also an argument for an *exit* from the secondary school, perhaps at the end of one year (when, as we have seen, most pupils have revealed their true ability for secondary-school work), with a transference to a different type of school, central, technical, or senior, especially if and when the school-leaving age is raised to 15 ; or as an alternative, there should be available, within the secondary school, courses of a more practical and less academic type, adapted to the needs of pupils who prove unfitted for the usual present-day curriculum of the secondary schools.

NOTE ON MENTAL TESTS IN ENTRANCE EXAMINATIONS

We may profitably consider some of the evidence so far available as to the value of mental tests in entrance examina-

tions for secondary schools in England.¹ Such tests are being used in an increasing number of centres. In 1929 twenty-two county boroughs and twenty-three county authorities included mental tests in some form in the entrance examinations at 11 +.²

Of the Education Authorities who have used intelligence tests for the purpose, a few have followed up the pupils to see how they fared in the secondary schools and how reliable the tests were.

At Bradford it was found that the tests gave a more reliable prophecy of school marks than did the entrance examination.³ Other and more thorough investigations agree on the whole in finding that a combination of intelligence tests plus the written entrance examination gives the best forecast of what the pupil will do, not only in his first and second, but even in his fourth year at school.⁴

In connection with my own enquiry I also had figures supplied by one Headmaster who tested his scholars on entrance with Spearman's intelligence tests, and found they gave (on the average of four classes) a decidedly better prophecy than did the entrance examination (for Centre G)

¹ Only applications of tests for this specific purpose can be dealt with here. The general problem of the relation between general intelligence and scholastic achievement is a very wide one, with a considerable literature, especially that based on researches in the United States of America. A recent work, which includes a summary of much of this work, is *Educational Achievement in Relation to Intelligence*, by C. W. St. John (*Harvard Studies in Education*, vol. 15, Cambridge, U.S.A.).

² See p. 189 of Report on *Examinations in Public Elementary Schools* (London, 1930).

³ See Board of Education Report on *Psychological Tests of Educable Capacity*, 1924, p. 152.

⁴ See especially A. Donald Amos, "Examination and Intelligence-test Forecasts of School Achievement," *Brit. Journ. of Educational Psychology*, 1931, vol. i, p. 73. (In the two correlations with fourth year work, however, the mental tests proved as reliable as the combined tests and entrance examinations.) See also D. W. Oates, "Predicting School Achievement," *Journ. of Education*, August 1929.

of the pupils' work, even of the first term, as judged by weekly marks and terminal examination combined.¹

We have also seen in our own enquiry that the best entrance examination we have dealt with included mental tests, and that there was a decided improvement in the prognostic value of the entrance orders in the two years after tests were introduced. Accounts of experimentation with the Northumberland Tests (by Mr. J. W. Collier and also by Mr. J. B. Russell), though not yet complete, suggest that these may prove more successful still in the prognosis of secondary-school success. (I hope to publish these in the near future in the *British Journal of Educational Psychology*.)

On the whole, it seems safe to say already that the combination of written examinations plus carefully selected intelligence tests is likely to supply a more reliable means of selecting pupils for secondary schools at 11 + than will the examinations alone.

Nor is this surprising, in view of the fact that some pupils have special advantages in respect to teaching or even individual coaching for the entrance examination.

With the tests, however, all are much more at a level; and the intelligent boy who has been badly taught does as well as his fellow who has been well taught or coached.²

The correlations were as follows :

Entrance Examination, 1928

Between entrance examination and term's work, 0.29.

Between Spearman tests and term's work, 0.43.

The total number of pupils was 59.

Entrance Examination, 1929

Between entrance examination and form order at end of 1st term, 0.03.

Between Spearman tests and form order at end of 1st term, 0.57.

N.B.—The number of pupils here was only 14.

Special coaching has some effect on the performance in tests, but relatively slight in some tests, e.g. Burt's Reasoning Tests; also, the effects of coaching can almost be eliminated by giving a number of examples of the tests in the actual publication of the tests themselves.

It may be said that the examinations are to some extent a test of character—of perseverance or of interest in work. It is for this reason, perhaps most of all, that their retention at present as a means of selection at 11 + is desirable. Though it should be noted that tests are beginning to invade this province: Dr. D. W. Oates, for example, has found that certain tests of Will and Temperament, correlated with school order four years later even slightly higher than did the combined entrance examinations in English and arithmetic.¹

¹ The coefficients were respectively 0.42 and 0.40. *Op. cit.*, p. 9.

PART III

THE RELIABILITY OF THE AWARD OF ENTRANCE
SCHOLARSHIPS AT THE UNIVERSITIES



Chapter VII

THE RELIABILITY OF ENTRANCE SCHOLARSHIP AWARDS AT PROVINCIAL UNIVERSITIES

IN view of the large numbers of scholarships now given at provincial universities, the reliability of their award is a question of wide interest. It has been estimated that over 40 per cent. of the students in all our British universities are in receipt of some emoluments, Oxford and Cambridge having a somewhat lower, and the other universities a higher, percentage than 40 per cent.¹ But these apparently include students receiving grants from the Board of Education in order to prepare for the teaching profession. In the present enquiry these latter have been omitted from the main results, as such students are not selected merely on the basis of public examinations: it is true that their performances in the Higher School Certificate and other examinations are taken into account, but personality and the report of the Head of the school are also considered, and this process of selection seems to be justified, as will be shown later.

By far the greater proportion of university scholarships are entrance scholarships, and we shall confine ourselves here to these.

For my own enquiry I first obtained figures from five provincial universities in England and Wales (one being a University College in Wales) over periods of three or four years, except for one university, which only furnished particulars for one year. The periods cover degree awards from 1925 to 1929.

This gave me a grand total of 2,088 students, of whom 864 were scholarship holders and 1,224 were non-scholars—

¹ Ernest Barker, *Universities in Great Britain*, p. 54.

the proportion of scholars being thus about 41 per cent. The scholarships included all those awarded by the universities themselves and by county or borough authorities (usually on the results of the Higher School Certificate) and a number of special school scholarships. (A few scholarships tied to special schools were omitted from the results of one or two of the universities.)

The tables below show the performance of entrance Scholars and Non-scholars in the university degree examinations in Arts and Science ; Law, Commerce, and Medicine were omitted as introducing complications.¹

First let us take the performances of all Scholars in Arts and Science.

TABLE II
PERFORMANCE OF ENTRANCE SCHOLARS IN FINAL DEGREE EXAMINATIONS

	No. of Students	Percentage
1st-class honours	237	27.4
2nd-class honours	299	34.6
3rd-class honours	61	7.1
Pass degree	221	25.6
Fail	46	5.3
	<hr/> 864	<hr/> 100.0

It should be made clear that in the universities third-class honours are not regarded as a very creditable performance. It is no guarantee of general *ability* higher than that needed for a pass degree, though it implies more specialised studies. My own experience, in the Education Departments of two universities, has made me welcome into the post-graduate course a pass graduate at least as readily as one with third-class honours ; for sometimes other reasons than lack of ability have led a student to be content with a pass course. Even leaving on one side those with third-class honours, we see that 31 per cent., or nearly one-

¹ Details for the separate universities are given in Appendix II (a), p. 188.

third, of the Scholars have only a pass degree or a failure. Five per cent. actually fail to get a degree at all. But perhaps the most significant thing is that nearly two-fifths of the Scholars obtain nothing better than third-class honours, a pass degree, or a failure.

These are surely startling facts. Though I should be far from suggesting that a student has not gained much from a university because he has got only third-class honours or a pass degree, yet one surely expects better of those picked for scholarships. The results suggest that *large numbers of scholarships are being given to students scarcely worthy of them.*

THE RELATIVE PERFORMANCE OF SCHOLARS AND NON-SCHOLARS

Let us now look at the fact from another point of view, comparing the performance of Scholars and Non-scholars. This comparison is given in the next table.

TABLE III
PERFORMANCES OF SCHOLARS AND NON-SCHOLARS COMPARED

	Scholars. Percentage	Non-scholars. Percentage
1st-class honours . . .	27.4	8.3
2nd-class honours . . .	34.6	24.9
3rd-class honours . . .	7.1	7.9
Pass degree	25.6	42.0
Fail	5.3	16.9

Total number of students : Scholars, 864 ; Non-scholars, 1,224.

Of the Non-scholars 33 per cent. gain first- or second-class honours ; so that one-third of the Non-scholars beat over one-third of the Scholars. The fact that such a large number of Non-scholars do better at the university than nearly two-fifths of the Scholars is disturbing. It suggests strongly that, within a considerable range near the border-

line, the reliability of awards is extremely low, and that many students are entering the modern universities with scholarships much more deserved by other students.

The superiority of Scholars to Non-scholars would be still less if we included among the Non-scholars students who are in Education Departments, and who were left out of our previous reckoning. This will be seen from the footnote below.¹

¹ THE PERFORMANCE OF STUDENTS IN UNIVERSITY EDUCATION DEPARTMENTS

In the great majority of cases, students in Education Departments are not scholarship holders; for example, out of 238 students in three university education departments, only 48, about one-fifth, held scholarships. [At University A, out of 59 students in the education department 18 obtained a scholarship to the university. At University B, out of 111 students 11 had scholarships. At University C, out of 68 students 19 had scholarships.]

I obtained particulars as to the degree results of 390 Education Department students in one Welsh and four English university centres for two years. The figures were as follows:

TABLE IV
PERFORMANCE OF STUDENTS IN EDUCATION DEPARTMENTS IN DEGREE EXAMINATIONS

	No. of Students	Percentage
1st-class honours . . .	44	11.3
2nd-class honours . . .	192	49.2
3rd-class honours . . .	46	11.8
Pass degrees	108	27.7
Total	390	100.0

As these figures were gathered from students in post-graduate courses, those who had failed in the degree were already ruled out. Therefore, in comparing these results with those of Scholars, we must also leave on one side the failures among the Scholars. We then find that, while a higher percentage of Scholars get 'firsts', the percentage of students getting only a 'third' or a 'pass' is about the same among Scholars and Education Department students. A much higher percentage of Education Department students get first- or second-class honours than is the case with Non-scholars outside Education Departments (about 61 per cent. against 40 per cent., failures being ignored in both cases), a superiority too great to be explained by the fact that one-fifth of the Education Department students are also Scholars.

If, then, we had included Education Department students in our general statistics the superiority of Scholars to Non-scholars would have been even less than it was

It occurred to me that some students who would have competed for and perhaps gained scholarships might have been ruled out because their parents had an income above some given minimum, and so were not able to claim financial need.

With this in view I made enquiries of the five universities concerned, and also of a representative sample of six county education authorities and six city authorities in the immediate neighbourhood of one or other of the five universities. The replies show no such restriction for the award of scholarships, though the *amount* of the extra maintenance allowances may and usually does vary with the income of the parents. We may thus rule out the possibility of the performance of Non-scholars being in any appreciable degree improved by the inclusion, among Non-scholars, of able students refused scholarships because of the amount of their parents' incomes.¹

It is possible, however, that a few of the Non-scholars who do very well are students who did not compete for scholarships—though such numbers are likely to be small, in view of the fact that so large a proportion of university students, entering the Faculties of Arts or Science, do so with a Higher School Certificate on which such university scholarships are usually awarded. In any case, they do not affect the fact that so many of the Scholars do so badly.

Furthermore, so far as such students exist who would have welcomed both the value and the honour of a scholarship, they indicate a weakness in the general system of scholarship awards—and an argument in favour of the increase in the number of internal scholarships—which will be recommended later.

¹ The only city that reported such a limit for scholarships had rejected only one applicant on financial grounds in the preceding five years.

SCHOLARSHIPS AWARDED DIRECTLY BY THE UNIVERSITIES

So far we have considered the performance of all types of Scholars, including those elected directly by local authorities and a few by schools. The performance of many of these was so poor that I tried to find how far the universities themselves were responsible for the selection of such inferior material. With this in view I considered separately those Scholars chosen directly by the universities themselves. It proved that these university Scholars proper did much better at their universities than did the other Scholars. The figures were as follows :

TABLE V

	University Scholars proper		Other Scholars	
	No.	Percentage	No.	Percentage
1st-class honours . . .	94	43·6	143	22·1
2nd-class honours . . .	80	37·0	219	33·8
3rd-class honours . . .	16	7·4	45	6·9
Pass degree	21	9·7	200	30·9
Fail or withdraw . . .	5	2·3	41	6·3
	<hr/> 216	<hr/> 100·0	<hr/> 648	<hr/> 100·0

Here are some striking differences. Twice as many university Scholars as other Scholars gain first-class honours ; while the number of university Scholars gaining only a pass degree is barely 10 per cent., against 31 per cent. for other Scholars. Among the latter, failures are also much more frequent.

The poor performance of Scholars, then, is due chiefly to those who were awarded their scholarships by bodies other than the universities themselves : 44 per cent. of these, or nearly one-half, fail to justify the award of a scholarship, and are beaten by one-third of the Non-scholars.

Even among the university Scholars proper, nearly one-fifth gain only third-class honours, a pass degree, or none at all, and this group is beaten by one-third of the Non-scholars—and by three-fifths of students in education departments.

THE RELATIVE PERFORMANCE OF MEN AND WOMEN SCHOLARS

A further analysis was made of the degree results obtained by men and women respectively who held scholarships awarded directly by the universities. The figures are shown in Table VI. To increase the numbers I took the awards made in the five selected universities over a period of six or seven years for each—for the years of entry from 1921 to 1926 or 1927 inclusive. These awards, and the results gained by the Scholars in the degree examinations, were gathered from the calendars of the respective universities, together with information kindly supplied by Registrars.

TABLE VI
RELATIVE PERFORMANCE OF MEN AND WOMEN UNIVERSITY SCHOLARS

	Men		Women	
	No.	Percentage	No.	Percentage
1st-class honours . .	197	50.0	47	26.0
2nd-class honours . .	122	31.0	101	55.8
3rd-class honours . .	19	4.8	12	6.6
Pass degree . .	36	9.1	17	9.4
Fail or withdraw . .	20	5.1	4	2.2
Totals . .	394	100.0	181	100.0

It will be seen that, in proportion, nearly *twice as many men gain firsts as do women*. The separation of the women

leaves the men Scholars with an appreciably better record than that of all university Scholars taken together, but we still find nearly one-fifth of the university men Scholars with a third-class, a pass degree, or none at all.

When the results are analysed under Arts and Science separately, as in Table VII, we see that the poorer record of the women is not due simply to inferior work in Science.

TABLE VII

RELATIVE PERFORMANCE OF MEN AND WOMEN UNIVERSITY SCHOLARS IN ARTS AND SCIENCE

	ARTS				SCIENCE			
	Men		Women		Men		Women	
	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
1st-class honours	38	44.2	34	24.1	159	55.2	13	36.2
2nd-class honours	39	45.4	89	63.1	83	28.8	12	33.3
3rd-class honours	4	4.6	8	5.7	15	5.2	4	11.1
Pass degree	5	5.8	10	7.1	31	10.8	7	19.4
Totals	86	100.0	141	100.0	288	100.0	36	100.0

(The relative number of failures cannot be given for this group of Scholars, as the Calendars do not reveal in which Faculty the Scholars are who fail.)

The number of women Scholars taking science is very small for comparison with the men; but it will be seen that *in Arts, the superiority of the men in the gaining of firsts is even greater than it is in Science.*

THE RELATIVE PERFORMANCE OF SCHOLARS IN ARTS AND IN SCIENCE

Let us now see if there is any difference in the apparent reliability of scholarship awards in Arts as compared with Science. These are shown separately in Table VIII, men and women being counted together.

TABLE VIII

PERFORMANCE OF SCHOLARS AND NON-SCHOLARS IN ARTS AS COMPARED WITH SCIENCE

(All Types of Scholarships Included)

Scholars

	ARTS		SCIENCE	
	Total	Percentage	Total	Percentage
1st-class honours . . .	73	22.5	164	30.4
2nd-class honours . . .	154	47.4	145	26.9
3rd-class honours . . .	29	8.9	32	5.9
Pass degree	52	16.0	169	31.4
Fail	17	5.2	29	5.4
Totals	325	100.0	539	100.0

Non-scholars

	ARTS		SCIENCE	
	Total	Percentage	Total	Percentage
1st-class honours . . .	28	5.8	73	9.8
2nd-class honours . . .	187	39.1	118	15.8
3rd-class honours . . .	42	8.8	55	7.4
Pass degree	173	36.1	341	45.8
Fail	49	10.2	158	21.2
Totals	479	100.0	745	100.0

The first thing that strikes one in comparing Scholars in Arts and Scholars in Science is that the *Science Scholars* win a decidedly higher percentage of firsts. This may at first suggest either that the awards of scholarships in Science are more reliable, or that firsts are more frequently given in Science; and indeed, the table shows that to Non-scholars also more firsts were given in Science than in Arts. But it will also be noted that *there are far more failures and pass degrees in Science than in Arts*. This method of approach, however, is superficial. We need a more

exact way of determining the relative reliability of scholarship awards in Science and Arts.

We can get a more reliable estimate of this by the following method :

To a student who gains 1st-class honrs. we award the position mark of 1.

To a student who gains 2nd-class honrs. we award the position mark of 2.

To a student who gains 3rd-class honrs. we award the position mark of 3.

To a student who gains a pass degree we award the position mark of 3.

To a student who fails, we award the position mark of 5.

We can then find the average of the position marks of all the Scholars in Arts and the average of the position marks of all the Non-scholars in Arts. Evidently the smaller the mark the better the students have done, e.g. if all scholars got first-class honours the average mark would be 1. If we adopt this method we get the following results.

AVERAGE CLASS GAINED							
						Arts	Science
Scholars	.	.	.	.	.	2.18	2.24
Non-scholars	.	.	.	.	.	2.70	3.08

It will be seen that the average 'class' of the Science Scholar is about the same as that of the Arts Scholar; but the average class of the Non-scholar in Science is appreciably poorer than that of the Non-scholar in Arts, chiefly because of the higher percentage of failures and pass degrees in Science than in Arts.

The superiority of the Scholars to the Non-scholars in *Arts* can now be measured by the ratio of the average clas

of *Non-scholars* to the average class of *Scholars* in *Arts*; this is :

$$\frac{2.70}{2.18} = 1.24. \quad \text{This we may call the superiority index.}$$

The superiority of *Scholars* to *Non-scholars* in *Science*

$$\frac{3.08}{2.24} = 1.37.$$

Thus the *superiority of Scholars to Non-scholars is slightly greater in Science than in Arts*. This may be due to the fact that in some universities an honours degree in Science can only be taken after a pass degree, and necessarily involves four years. So that the lack of financial support of the *Non-scholars* may lead to some of them, who are quite competent to gain good honours, leaving before they can take the honours examination. Where this is not the case, however, it seems possible that the examinations for Science scholarships select those competent to do well in Science at the university somewhat better than is the case with Arts. The difference, however, is not great, and there are other complicating factors which make this suggestion very uncertain.

THE FREQUENCY OF AWARD OF HIGH HONOURS IN ARTS AND SCIENCE

This is a point which is relevant to our enquiry; it obviously bears on the evidence as to the success of *Scholars* and *Non-scholars* in the two Faculties. In the method just described we avoided any difficulty due to difference between awards in Arts and Science by comparing the scores of the Arts *Scholars* with the scores of the Arts *Non-scholars*; and so with the Science students.

But to compare the results of Arts Scholars (or Non-scholars) and Science Scholars (or Non-scholars) directly we must bear in mind the difference in the frequency of high awards in Arts and Science.

TABLE IX
AWARDS OF HONOURS DEGREES ONLY IN ARTS AND SCIENCE

	Class	ARTS		SCIENCE	
		Total	Percentage	Total	Percentage
Scholars . .	1st	73	28.5	164	48.1
	2nd	154	60.2	145	42.5
	3rd	29	11.3	32	9.4
Totals .		256	100.0	341	100.0
Non-scholars .	1st	28	10.9	73	29.6
	2nd	187	72.8	118	48.0
	3rd	42	16.3	55	22.4
Totals .		257	100.0	246	100.0
Scholars and Non-scholars .	1st	101	19.7	237	40.4
	2nd	341	66.4	263	44.8
	3rd	71	13.9	87	14.8
Totals .		513	100.0	587	100.0

Table IX gives the percentage of awards (first-, second- and third-class) *among honours students only*. This appears to confirm the impression, not uncommon in the provincial universities, that Science is more generous than Arts in its awards of firsts. It is seen to be so here for both Scholars and Non-scholars. Among all students gaining honours degrees in the Science faculties, 40 per cent. gain first-class against 20 per cent. in Arts.

The figures as given in Table IX, however, must not be taken alone. For it is possible, and it seems to be the case in some universities, that there is a more general weeding

out of candidates for an honours course in Science than there is for Arts. Thus, our earlier Table VIII (p. 111) showed that, among both Scholars and Non-scholars, a relatively greater number of Science students are con-
 fessed to pass courses than is the case with Arts.

Table X below summarises the figures for both Scholars and Non-scholars, and shows what proportion of *all* students in Arts and *all* students in Science gain firsts, seconds, etc.

TABLE X
 COMPARATIVE PERFORMANCES OF *all* STUDENTS IN ARTS AND SCIENCE

	ARTS		SCIENCE	
	Total	Percentage	Total	Percentage
1st-class honours . . .	101	12.6	237	18.5
2nd-class honours . . .	341	42.4	263	20.5
3rd-class honours . . .	71	8.8	87	6.8
4th degree	225	28.0	510	39.7
5th	66	8.2	187	14.5
Totals	804	100.0	1,284	100.0

From Table X it will be seen that, if we assume that *en masse* the Science students are as good as but no better than in Arts, then the examiners in Science are more generous in the awards of firsts, but more severe in the award of seconds, than is the case with Arts.

To be more exact, the proportion gaining firsts in Science is half as big again as the proportion gaining firsts in Arts; but the proportion gaining only a pass or fail in Science is also half as big again as in Arts.

Again, if we group 'firsts' and 'seconds' together as 'good honours,' 55 per cent. of the students in Arts gain such good honours degrees, against only 39 per cent. of

the Science students. If we calculate the average class gained we find the following :

Average class gained by all students in arts	.	.	.	.	.	2.48
Average class gained by all students in science	.	.	.	.	.	2.73

On the whole, then, Arts students gain slightly high awards.

The subject is a complicated one, with different factors relevant in different universities. It is for each university to consider its own results in the light of its own regulations.

THE RELATIVE DIFFICULTIES OF GAINING 'FIRSTS' IN DIFFERENT SUBJECTS

The problem exists, not merely between Arts and Science, but between subject and subject within each Faculty. In a given university and among the neighbouring schools supplying most of its students, a rumour may get abroad, deservedly or not, that it is easier to get a 'first' in one subject than another. Mere percentages cannot decide for us whether such is, or is not, the case. For a greater proportion of Firsts in Subject A than in Subject B may be due to one or more of several causes :

(1) The students of A may include a larger proportion of great ability in their subject than is the case with Subject B.

(2) The teaching in Subject A may be more effective than that in Subject B.

(3) The examiners in Subject A may be on the average more generous in the awards of first-class honours than those in Subject B.

(4) Subject B may be reputed to be an easy subject, and so attract a large number of weak students, who lower the proportion of firsts.

It is no doubt difficult to say what exactly should be involved in the award of first-class honours ; but broadly interpreted, explanations (1) and (2) above will hardly be accepted by many as accounting for the difference between first-class honours awards in Arts and Science.

It is also extremely difficult to discuss thoroughly what can be meant by the equality of ability in different subjects or the frequency of high ability in different subjects. What is an 'equal degree of ability' for chemistry and French to mean? If different specific abilities are involved, how can we say that one is equal to the other, unless perhaps there is some reference to the frequency of a high degree of the *specific* abilities for chemistry or French found in the community as a whole? Or does it refer to comparative *general* ability plus some reference to frequency of the *specific* abilities? We do speak of a man as one of *exceptional* ability'; and unless we do compare two students in different subjects by reference to general ability of a type common to both, it would seem we must fall back upon the rarity of the specific ability shown.

Meanwhile, the superficial judgment of the strictness of standard of an honours school by the general impression of teachers of other subjects is dangerous. For we do not know the extent to which general or specific factors are involved in a given subject.

In a post-graduate Education Department one has good opportunities of observing in an individual student the variability of capacity for different subjects. I have known students with a very low honours, or a pass degree, reveal a psychological ability, judged by the external and internal examiners, to be of first-class honours standard ; on the other hand, I have known students with firsts or seconds in various subjects—Arts or Science—who would apparently

have only gained a third-class if they had taken an honours course in philosophy or psychology.

Complex as the problem is, it is undoubtedly highly desirable that, so far as possible, a 'first' should mean a similar standard in different subjects; otherwise a species of 'unreliability' attaches to the results of the examinations, and they are liable to be misunderstood, not only by the general public, but even by those closely associated with the administration of education and the selection of teachers.

CONCLUSIONS AS TO SCHOLARSHIP AWARDS IN PROVINCIAL UNIVERSITIES

Summing up this chapter we may say that the facts recorded earlier as to the poor performance of over one-third of the Scholars are at least very disquieting; especially unreliable are scholarship awards not made by the universities themselves.

There is not the slightest suggestion that extreme care is not taken in the selection of Scholars, or that the existing methods of selection are not used to the best advantage. But the question is seriously raised as to whether so much can be justifiably spent on entrance scholarships, seeing that one-third of the Scholars do so badly; and whether part of the money might not better be spent, still within the universities, on *internal* scholarships to students who reveal their genuine ability for work at a university level at the end of their first or second year there; such internal scholarships might be made of greater value as a compensation for the students' greater expenditure during the first year. As a partial alternative there might well be more post-graduate scholarships for the pick of the graduates—

which our modern university teachers are constantly pressing as one of our most urgent needs.¹

One important consequence of partially substituting internal scholarships for entrance scholarships would be to lessen the pressure and specialisation of work in the last years of school of those preparing to try for a scholarship.

Finally, further research should be made into the particular type of scholarship award which proves the most unreliable. For the enquiries summarised in this chapter indicate that scholarship awards made by bodies other than the universities are particularly unreliable, nearly one-half of such scholars failing to justify their awards.

¹ Since this was written, I have learned that the University of Leeds has abandoned the practice of giving entrance scholarships, and substituted for them internal scholarships.

Chapter VIII

STATE SCHOLARS AND SUBSEQUENT PERFORMANCES

WE now come to a more highly selected group of university Scholars. As a general rule the State Scholars, confined as they were, until quite recently, to 100 men and 100 women each year, constitute the majority of the best scholarship holders in the modern universities at least. They also supply a number of Scholars to the ancient universities, the average for the seven years here considered (1920-1926 awards) going to Oxford and Cambridge being about 50 men and 20 women per annum. The scholarships were awarded on the results of the Higher School Certificate examination, on which also the majority of other modern university scholarships are based. So State Scholars are, broadly speaking, the top of the list of Scholars in the Higher School Certificate examination.

We will consider first those State Scholars who proceeded to modern universities, and compare these results with those we have discussed in the last chapter. The table on page 121 shows the comparative performance of State Scholars (men and women) in modern universities with that of all types of Scholars and Non-scholars in provincial universities ('modern' is substituted for 'provincial,' because London University is included in the figures for State scholarships).

It is evident that State Scholars in modern universities on the average do decidedly better than 'all Scholars.' Especially do they show fewer failures and pass degrees. Taking the same criterion as before of a satisfactory result for a Scholar (*viz.* the gaining of at least a second-class honours degree), we may say that about 91 per cent. of the State Scholars are satisfactory, against 62 per cent. of 'all

TABLE XI
MODERN UNIVERSITIES

	State Scholars		University Scholars proper	All Scholars	Non- scholars
	No.	Percentage	Percentage	Percentage	Percentage
1st-class honours .	194	42.5	43.6	27.4	8.3
2nd-class honours .	220	48.3	37.0	34.6	24.9
3rd-class honours .	23	5.0	7.4	7.1	7.9
Pass degrees .	15	3.3	9.7	25.6	42.0
Fail	4	0.9	2.3	5.3	16.9
Total . . .	456		(Fail or withdraw)		

The figures (based on the results of 456 State Scholars) are for the years of entry 1920-1926, and include results up to December 1929. The universities include all those in England and Wales, except Oxford and Cambridge.

The results in the last three columns are those given in the previous chapter, and so refer to five selected provincial universities.

It should be pointed out that Table XI includes State Scholars at the University of London; and it is found that not quite so high a percentage of State Scholars gain first-class honours at London University as they do at other modern universities. On the other hand, the total for State Scholars in Table XI also includes two universities included in the other enquiry on provincial universities and where first classes seem to be slightly more frequently gained than in the five selected provincial universities; so that on the whole the results given in this table are fairly typical of the State Scholars in the five selected provincial universities dealt with in the preceding chapter. It should also be noted that 'all Scholars' include the small number of State Scholars at the five selected universities, which will slightly raise their average performance.

Scholars.' On the other hand, they do little better than the university scholars proper. (But see later the results when men and women are considered separately.)

We are left with about 9 per cent., or *nearly one-tenth of this* (modern universities) *group of State Scholars who prove unsatisfactory.* Again I do not wish to assert that it was not worth while giving a university education to any of the third-class honours or pass men who had State Scholarships. But it seems doubtful whether they were of the

intellectual calibre one might expect from those gaining the highest scholarships given by the State; or else some deficiency of character, failure of health, or other misfortune, has led to neglect of work at the university. It may be reasonably objected that some of the third-class honours students were border-line seconds, and that in accordance with what we have said in Chapters I and II about 'luck,' the variation of 'form' or of examiners' standards, then border-line thirds might well have got seconds in another test; but these we may balance against the seconds who were border-line thirds in the degree results, and who on re-testing might well have got thirds.

We find also that this one-tenth of the State Scholars in modern universities are beaten by one-third even of the Non-scholars, who gain firsts or seconds; while *over half of the State Scholars (57 per cent.)* who gain second- or third-class honours or less *are beaten by about 8 per cent.* of the Non-scholars who gain firsts. This too was before the number of State Scholarships was raised from 200 per annum to 308, the number awarded in 1931. The increase in numbers means that the awarders have to go much farther down the list of order of merit in the examination for scholarships.

A full consideration of the performance of State Scholars at Cambridge and Oxford would involve a reference to some points which will come better in the chapter on Scholarships at the Ancient Universities. But I may say briefly here that men *State* Scholars do nearly as well at Oxford as all the *College* Scholars of five of the largest men's colleges massed together, gaining an average class of 1·8 against 'all Scholars' 1·7, the average of Exhibitioners being the same as that of State Scholars.

THE RELATIVE PERFORMANCE OF MEN AND WOMEN STATE SCHOLARS

When we look into the performance of men and women we find that the women greatly lower the average performance of State Scholars at the universities. At the modern universities first-class honours are gained by 63 per cent. of the men State Scholars, but by only 33 per cent. of the women; the percentages of firsts for modern university Scholars proper were: for men 50 per cent., for women 26 per cent. For each sex, then, the State Scholars are better than the university Scholars proper; the approximate equality of these two types of Scholars mentioned above is due to the fact that the greater proportion of women among the State Scholars lowers their average score. Taking all the universities (ancient and modern), the percentages of firsts gained by State Scholars are: men 52.5, women 28.5. Table XII gives the numbers and percentages of all classes.

TABLE XII
STATE SCHOLARS IN ALL UNIVERSITIES

	Men		Women	
	No.	Percentage	No.	Percentage
1st class	250	52.5	128	28.5
2nd class	183	38.5	256	57.0
3rd class	31	6.5	51	11.4
Pass	11	2.3	9	2.0
Fail	1	0.2	5	1.1
Total	476		449	

N.B.—A number of Scholars who, through death, ill-health, etc., failed to complete their courses are omitted from the above Table, as are one man and one woman who obtained a Class IV at Oxford.

Thus the women not only gain 'firsts' far less frequently than do the men; but they get a greater proportion of 'thirds' and, so far as our figures go, of failures. Regulations until 1930 required that the same number of State Scholarships must be awarded to women as to men, and it is, I think, no secret that the examiners had to go well below the marks of the lowest man State Scholar in order to include the requisite number of women. In view of the poorer performance of the women recorded here, it is evident that the change of regulations in 1930 was justified, the Scholarships being now awarded to boys or girls in proportion to the numbers of each sex taking the Higher School Certificate in one or more previous years.¹ It will be interesting to see how far this regulation brings the performances of the two sexes nearer together in their final degree examinations.

I append a Table showing the relative performances of men and women State Scholars in different subjects.

TABLE XIII

PERCENTAGE OF FIRSTS GAINED BY MEN AND WOMEN STATE SCHOLARS
IN DIFFERENT SUBJECTS

(The actual number of students taking a given subject is put in parentheses.)

	Men	Women
Engineering (30)	70%	
Mathematics (89)	59%	
Natural Sciences (162)	59%	
Modern Languages (37)	57%	
		Modern Languages (123) 40%
Classics (57)	39%	Classics (26) 38%
		Natural Sciences (33) 36%
History (40)	35%	
		Mathematics (41) 29%
English (14)	21%	English (120) 21%
		History (92) 17%

¹ See the *Report of the Board of Education* for 1930, p. 64. The most recent report shows that in 1931 State Scholarships were awarded to 188 men and 120 women (List 154, H.M. Stationery Office, January 1932).

Two notable facts emerge from Table XIII :

(1) In every subject the men gain a higher percentage of firsts than do the women, except in English, which is only taken by 14 men and where the percentages are the same.

(2) Even in Modern Languages, a subject in which women are popularly supposed to excel men, the percentage of firsts is higher among the men.

Chapter IX

ENTRANCE SCHOLARSHIP AWARDS AT THE ANCIENT UNIVERSITIES : WITH RESULTS FOR OXFORD

HERE, as in the chapter on provincial universities, we are only concerned with the award of entrance scholarships. Internal scholarships are awarded on the results of the university work at the end of one or more years ; and there seems to be no reason to doubt the general agreement that these internal awards prove extremely reliable.¹

The discussion of results at Oxford and Cambridge must differ somewhat from that on the modern universities :

(1) First, we have now not only Scholars but Exhibitioners to consider, as well as Non-scholars, whose usual name, 'Commoners,' we shall here adopt. Such Commoners at entrance may later win an internal scholarship ; but for our purposes they remain and are classed as Commoners.

Exhibitions may be regarded broadly as minor scholarships—worth now perhaps £30 or £40 against a usual £60, £80, or £100 per annum for scholarships.

The results for Scholars and Exhibitioners will be shown separately, but for comparison with provincial universities they should be considered together, as provincial university Scholars usually include all receiving such awards.

(2) We ignore for the time being pass degrees. Practically no Scholars at Oxford and Cambridge take a pass degree. We shall compare the performance in the final honours degree examinations of Scholars, Exhibitioners,

¹ At Cambridge, for example, internal scholarships are usually given because of the gaining of a first-class in Part I of a Tripos ; and it will be seen later that this is a very reliable prophecy of success in Part II.

and Commoners. That is, we shall compare the scholars with *picked* Commoners only—those who take an honours degree. As will be seen later, this makes some of our results the more striking.

(3) The question also arises as to whether we are concerned with a higher standard of attainment by say first- and second-class honours men at Oxford and Cambridge as compared with the modern universities. There is no doubt that there are far more men of a very high degree of ability at Oxford and Cambridge. The scholarships there are admittedly of higher standard, and the pick of the scholars of our best schools will almost invariably choose to go to Oxford or Cambridge if they can afford it.

Admitting, however, that a group of men and women at the top of the first-class honours are, as a group, superior to our first-class honours students at modern universities, it does not follow that the lowest standard required for a first or second at Oxford or Cambridge is necessarily higher than that required for a first or second in the same subject at a modern university.¹

¹ On this point I have asked the opinion of some half-dozen professors in modern English universities who have examined both in modern universities and in Oxford and Cambridge. They represent between them six different subjects, three Arts and three Science. They all agreed that the minimum requirement for a first (or a second) is no higher in an ancient than it is in a modern university. Another lecturer consulted said that, as regards Classics, it was difficult to compare the standard required for a Tripos Part II at Cambridge with that of the final honours at the modern university with which he was familiar; but that some 'firsts' he had known at the latter would not have gained a first in Part II at Cambridge. Another Cambridge lecturer remarked on this, that the converse would sometimes be true, that a 'first' in Part II might not gain a first in some modern universities.

An Oxford graduate who is a lecturer in a modern university made enquiries on this question among three colleagues who had also been students at Oxford: all had examined in a modern university, and one also at Oxford. Together they represented among them English, history, and a modern language. All agreed that while among students just reaching a first class the performances *on the questions set* may be as good in the modern university as at Oxford, the questions set at Oxford were less strictly confined to a prescribed syllabus, and were often of a

For our present purposes, however, it is not a vital point to decide the relative standards of the old and modern universities. We are concerned primarily with the relative performance of Scholars and Commoners *within the same university*.

As to scholarship awards at Oxford and Cambridge the following points may be mentioned :

(a) The competing students are somewhat older than those competing for modern university scholarships. In many cases a student who sits for a Higher School Certificate in July will compete for Oxford or Cambridge scholarships the following December or spring. This greater maturity means greater stability ; adolescent changes are more completely over.

(b) The Scholars are to some extent selected in the first instance by the schools themselves, who advise A to be content with a modern university scholarship and to go to a modern university at 18, but advise B to wait another six months and compete for a scholarship at Oxford or Cambridge. No doubt sometimes the schools err and, as a Cambridge tutor suggested to me, fail to advise a boy to try for a scholarship who subsequently proves himself well worthy of one.

(c) A definitely higher standard of attainment is required for a scholarship at Oxford or Cambridge than is required for ordinary scholarships at a modern university. This somewhat different type ; so that an equal show of knowledge on the Oxford papers required a wider range of reading and a higher degree of ability than the reaching of apparently the same standard in a modern university examination.

Personally, I am inclined to think there is considerable truth in this suggestion, especially as regards certain subjects.

Indeed, the answer to the whole question varies no doubt considerably, not merely according to the university concerned, but according to the particular subject in a particular university. For as already remarked, the examiners in one subject in a university may be generous in giving firsts, while the examiners in another subject are grudging.

means that the student can be tested on work that more nearly resembles the work done at the university itself. Also, there are not only papers in the student's special subject, but a general or essay paper; though how far the performance on this general paper is taken into account it is difficult to discover. Several Cambridge tutors told me it was only brought into consideration when marginal cases were being decided; another that the custom varies from college to college. An Oxford teacher, however, openly stated at a recent Congress of British universities that a colleague of his, in marking the papers for a history scholarship at Oxford, ignored the special history papers, and recommended on the basis of the general paper, without, he said, any less successful results than usual!

The particular types of examination papers, however, adopted at Cambridge at least, do not seem to introduce any distinction of critical importance in the matter of selecting the best men; for I analysed the results gained by Scholars at one Cambridge college, where scholarships are usually awarded on the Higher School Certificates and not on the special examinations for Cambridge college scholarships, and it proved that the Scholars at this college did at least as well in their honours degree examinations as those of three of the other four large colleges examined.

Our main problem as to the ancient universities is, how do entrance Scholars and Exhibitioners do as compared with the best of the Commoners? We will take Oxford first.

OXFORD UNIVERSITY

Five of the colleges, including three of the largest, were selected. Particulars as to the performance of Scholars were supplied through the kindness of the Heads or Tutors of three colleges: the results of other colleges were

obtained from the University Calendar, in which also the results sent to me by the colleges were checked. The figures are given below in Table XIV.

TABLE XIV

RESULTS IN THE FINAL HONOURS SCHOOLS FOR FIVE MEN'S COLLEGES,
IN 1925-1930 INCLUSIVE
Total Number of Students, 1,102

	Entrance Scholars		Entrance Exhibitioners		Commoners taking Honours Degrees	
	No.	Percentage	No.	Percentage	No.	Percentage
Class I . . .	91	44·6	30	32	58	7·2
Class II . . .	81	39·7	53	56	285	35·5
Class III . . .	27	13·2	10	10	344	42·8
Class IV . . .	5	2·5	2	2	116	14·5
Totals . . .	204		95		803	

AVERAGE CLASS

Scholars, 1·73 ; Exhibitioners, 1·83 ; Commoners, 2·65.

From Table XIV two things clearly emerge : (1) The superiority of Scholars to Commoners in gaining 'firsts' (44·6 per cent. against 7·2 per cent.) is much greater than it was in the provincial universities (27·4 per cent. of all Scholars against 8·3 per cent. of all Commoners), although at Oxford we are comparing Scholars only with the *pick* of the Commoners, namely, those who take honours degrees.¹

¹ In the text we have compared *all* Scholars with *all* Commoners in provincial universities, but at Oxford only Scholars (and Exhibitioners), with Commoners *taking honours degrees* ; I am informed that Scholars practically never take a pass degree at Oxford. If it be thought fairer, we may compare also in provincial universities only Scholars and Commoners taking honours degrees. We then find the following :

Of Oxford Scholars and Exhibitioners, 40 per cent. (as above) gain firsts.

Of Oxford Commoners taking honours, 7·2 per cent. gain firsts.

Of provincial university Scholars, nearly 40 per cent. gain firsts.

Of provincial university Commoners taking honours, 20 per cent. gain firsts.

By this method the *relative superiority* of Scholars to Commoners appears still greater at Oxford as compared with the superiority of Scholars to Commoners at the provincial universities.

As, however, 'scholarships' at provincial universities include both large and small awards, it is better to compare them with scholarships and exhibitions combined at Oxford. Adding together then Scholars and Exhibitioners at Oxford, we find 40 per cent. of all such gaining firsts—still a much larger proportion of firsts than at the provincial universities—and about 45 per cent. gaining seconds.

In comparing the Oxford results, however, with those of provincial universities, we must remember that the latter included women, who lowered the proportion of 'firsts' gained by Scholars; and also that they included many scholarships not awarded by the universities themselves. Confining ourselves to men only and to scholarships awarded by the provincial university authorities, we saw (Table VI, p. 109) that 50 per cent. of men Scholars obtained 'firsts' and 31 per cent. 'seconds.' Thus these provincial university men Scholars get a higher proportion of 'firsts' than do the Oxford Scholars and Exhibitioners combined; but the provincial university Scholars get a somewhat larger proportion of 'thirds,' passes, and failures—namely, 19 per cent. against about 15 per cent. at Oxford. Taken on the whole, it looks as though the two groups of men Scholars do about the same, relatively to the standards of their respective universities, but of course this is quite consistent with a superior performance of the *pick* of the 'firsts' at Oxford as compared with the pick of the 'firsts' in modern universities.

(2) The second fact that emerges from Table XIV is that the great majority of Scholars and of Exhibitioners justify their awards, if we take, as we did in provincial universities, the criterion to be the gaining of first- or second-class honours. Of Scholars 84 per cent. gain a first or a second, of Exhibitioners 88 per cent.

Yet grouping Scholars and Exhibitioners we find that about 15 per cent. are placed in Class III or Class IV, which will scarcely be considered a satisfactory performance. It is claimed by some Oxford men with whom I have conversed that the presence of a fourth-class honours at Oxford slightly raises the level of Class III as compared with a third at Cambridge, where there is no fourth class; and it is true that we find a lower percentage of firsts and seconds at Oxford in the final honours schools than we do in Part II of the Triposes at Cambridge, which most nearly corresponds.

Suppose we allow this claim, and regard one-third of the Oxford third classes as reaching a standard equivalent to a low second at Cambridge or a modern university, then we get only about 11 per cent. of Scholars and Exhibitioners who fail to justify their awards, whereas in the provincial universities it was about 38 per cent. of 'all Scholars' or 19 per cent. of men Scholars selected by the universities.

Nevertheless, two criticisms can be made of these Oxford results:

(a) *The distinction between the awards of scholarships and exhibitions seems very insecure.* It is true that a higher percentage of Scholars gain firsts (44 per cent. against 32 per cent.), but the Exhibitioners show actually a lower percentage of thirds and fourths. Again, 30 Exhibitioners gaining firsts beat 113 Scholars getting seconds, thirds, or fourths.

The average classes¹ gained by Scholars and Exhibitioners were almost the same, the figures for the various groups being:

Scholars, 1·73; Exhibitioners, 1·83; Commoners, 2·65.

Thus on the average this group of Exhibitioners is almost

¹ Calculated by the method used for provincial universities (p. 112), except that at Oxford and Cambridge the very rare failures and pass degree awards are ignored.

as good as the Scholars. The superiority index of Scholars to Exhibitioners is only 1.06.¹ It should be added, however, that the five colleges selected include one in which the Exhibitioners actually do as well as the Scholars of the other four colleges, and this college provides more than its share of Exhibitioners ; but even if this college is left out, the remaining Exhibitioners (49 in number) gain an average class of 1.97 against an average of 1.81 for the Scholars of the same colleges, a superiority index for the Scholars of only 1.08.

Or, looking at it in a different way, in these colleges there are 42 Exhibitioners with firsts or seconds who might have replaced the 26 Scholars who gained only thirds or fourths. Also in the particular college referred to, there were 21 Exhibitioners with firsts who might have replaced the 18 Scholars with seconds, thirds, or fourths. Thus we may still say that the distinction between the awards of scholarships and exhibitions at Oxford seems insecure.

It is possible that at Oxford (as I found is the case at Cambridge) some colleges find that they have not enough scholarships to award to men who have been declared by the examiners to be of scholarship standard ; and so some potential Scholars have to be content with exhibitions. So far as this is the case, the grounds for criticism of the discriminating power of the examiners are lessened ; but they are not entirely removed, for presumably the exhibitions would be given to the men who were judged weaker than the others ; yet many of them beat some of the Scholars. Also, even if the examination accuracy were unquestioned, there remains a weakness in the system as a whole which labels and rewards as exhibitioner the man who proves to be superior to the Scholar.

¹ The *superiority index* is explained in Chapter VII, p. 113.

(b) Perhaps more serious is the fact that 58 Commoners gaining first-class honours beat 113 Scholars and 65 Exhibitioners who got seconds, thirds, and fourths ; and 285 Commoners gaining Class II beat 32 Scholars and 12 Exhibitioners who got thirds and fourths. Even ignoring the group of Commoners who got seconds, we may infer that a sounder award would have given scholarships or exhibitions to the 58 first-class Commoners instead of to the 44 Scholars and Exhibitioners who got only thirds or fourths, and to 14 of the weakest of those who got seconds.

This gives us 58 Commoners who got no award, but who deserved one, out of the 299 awards made. That is, about 19 per cent., or roughly *one-fifth of the awards were misplaced* ; not in the sense that all these Scholars did so badly as to be undeserving of a scholarship or exhibition, for most obtained at least a second class, but in the sense that there were other better men who obtained no award.

No doubt it may be replied that the classing in the Honours Finals is not infallible. There is of course no absolute standard ; and no doubt some of the best Scholars in Class II might, with other papers, or on a different day, or with different examiners, have obtained a first ; so, however, might some of the Class II Commoners ; and conversely some of the Class I Scholars might have obtained a second. Uncertainties then seem to balance one another.

We might indeed go further and say that the 30 Exhibitioners who got firsts as well as the 58 Commoners (in all 88) were more deserving of a scholarship than the 32 Scholars who got thirds or fourths and the weaker of the Scholars who got seconds. This would give us 88 misplaced awards out of 204 scholarships, that is, 43 per cent., or about two-fifths, the same proportion as we found by a somewhat similar method in the modern universities.

Leaving on one side, however, the distinction between Scholars and Exhibitioners and confining ourselves to Commoners with firsts, we may at least say that about one-fifth of the awards were misplaced, judging by the performance of students in the final degree examinations.

As with the provincial universities, we have to consider whether the possession of adequate means rules out some men from scholarships who would otherwise get them. From my enquiries, however, I gather that at Oxford and Cambridge such men would almost invariably be enrolled as Scholars, even if they did not receive any emolument. There remain, however, a small number who, not needing financial aid, refrain from competing for a scholarship, and among these there may be some who would gain firsts and so improve the records of the Commoners. It will, however, I think be agreed by those familiar with conditions at Oxford and Cambridge that such students are not numerous enough to account for the above facts to any substantial degree.

As already suggested, the schools no doubt make occasional errors in recommending some pupils not to try for scholarships, who afterwards beat Scholars in the degree examinations. So far as this is the case, there is a weakness in the general system of selecting Scholars; and incidentally a further argument in favour of the substitution of additional internal scholarships or exhibitions for some of the entrance exhibitions—as will be suggested later.

Finally, we have to bear in mind that at Oxford (as at Cambridge) some of these Commoners who do so well in the final honours examinations will have been awarded internal scholarships on the earlier examinations ‘Moderations’ (at Cambridge, Part I of a Tripos or the ‘Mays’), so that errors in the awards of entrance scholarships at the

ancient universities are to some extent compensated for later, which is not so to anything like the same extent at most modern universities.

WOMEN STUDENTS AT OXFORD

Similar analyses were made of the degree results of the students of two women's colleges at Oxford over a period of six years (1925-1930) for one college and seven (1922-1928) for the other. The results are given in Table XV.

TABLE XV

WOMEN STUDENTS AT OXFORD. RESULTS OF FINAL HONOURS EXAMINATIONS
(Total number of students, 389)

	Scholars		Exhibitioners		Commoners	
	No.	Percentage	No.	Percentage	No.	Percentage
1st class . .	14	22	8	23	15	5
2nd class . .	35	54	24	71	163	56
3rd class . .	12	19	2	6	100	34
4th class . .	3	5	—	—	13	5
Totals . .	64		34		291	

The numbers here are small for the purpose of analysis. But so far as they go, they indicate the following :

(1) Most striking fact of all, perhaps, the Exhibitioners actually do better than the Scholars. The average class gained by each group is as follows :

Scholars, 2.06 ; Exhibitioners, 1.82 ; Commoners, 2.38.

This performance of the exhibitioners is not due to the special excellence of the exhibitioners in one particular college, as was partly the case with the men.

It is possible that for these colleges the number of candidates of undoubted scholarship standard is so great that exhibitions have to be awarded to women who are

declared by the examiners to be practically as good as those to whom Scholarships are awarded. If so, we should say that the error of selection lies less with the entrance examination, and rather with the whole system that gives students of practically equal capacity an inferior label and a smaller award.

(2) Grouping Scholars and Exhibitioners together, we find that 23 per cent. get firsts, against 40 per cent. of the men. The proportion, however, of the women who get lower than a second (17 per cent.) is about the same as that of the men (15 per cent.); so that if we consider what proportion of the women fail to justify the award of the scholarship or exhibition, we find it is about the same as that of the men—a result very similar to that found in the provincial universities.

If, as with the men, we allow one-third of the third classes to reckon as equal to low seconds at Cambridge or a provincial university, then 12 per cent. of the women Scholars and Exhibitioners fail to justify their awards—against 11 per cent. of the men. (In the provincial universities the figures were: men, 19 per cent.; women, 18 per cent.—for Scholars selected by the universities themselves.)

A sounder award would have given scholarships at least to the 15 Commoners who gained firsts instead of to the 15 Scholars who gained only thirds or fourths; so that at least 15 scholarships out of 64 went astray in this sense—about one-quarter, against one-fifth among the men (by the same method of reckoning).

Or following the stricter method, we may say that the 8 exhibitioners as well as the 15 Commoners who got firsts were more deserving of a scholarship than the 15 Scholars who got thirds or fourths, and the weaker of the

Scholars who got seconds. This would give us 23 misplaced awards out of 64 scholarships, or one-third—nearly as large a proportion as among the men.

As with the men, however, we must make some allowances for women Commoners who gain firsts, but who never competed for scholarships.

(3) The performance of the women Commoners is on the whole better than that of men Commoners taking honours schools. A slightly lower percentage of women gain firsts, but a lower percentage gain only thirds or fourths. The average class of the women Commoners is 2.38, slightly better than the 2.65 for the men, not surprising in view of the keen competition for entrance to the women's colleges at Oxford—as at Cambridge.

As the women Scholars (and Exhibitioners) do worse than the men Scholars (and Exhibitioners) it follows *a fortiori* that *the superiority of Scholars to Commoners among the women is not so great as it was among the men.*

(4) There is a striking resemblance between the women Scholars (and Exhibitioners) at Oxford and the women Scholars of the provincial universities, in the percentage who gain firsts, seconds, and lower than seconds. As, however, the percentage of firsts is not so high among the men Scholars at Oxford, as in the provincial universities, we may say that *the superiority of men to women Scholars in Oxford is not so great as it is in the provincial universities* (confining ourselves to scholarships awarded by the provincial universities themselves). This, together with the relatively good performance of women Commoners at Oxford, confirms the general impression that even *relatively* to the men, the competition for scholarships (or even admission) for women at Oxford is greater than it is at the provincial universities.

Chapter X

ENTRANCE SCHOLARSHIP AWARDS AT CAMBRIDGE, AND A COMPARISON WITH RESULTS AT OXFORD

TUTORS at three Cambridge colleges very kindly provided me with figures showing the performance of Scholars and Exhibitioners in their own colleges. These were checked by reference to the University Calendar, from which were extracted also the performances of Commoners in these colleges, and of all students in two other colleges. Thus, figures from five of the largest men's colleges were obtained for the years 1922-1929, providing a total of 2,904 students taking honours degrees.

At Cambridge the degree examinations are somewhat more complicated than at Oxford, from our present point of view. Usually an honours student takes two 'tripos' examinations, first in Part I at the end of one or two years, and then a more advanced examination (Part II) a year or two later. The examination in Part II is usually the closest parallel to the Oxford Final Honours examinations. But there are two modifications to this general rule :

(a) Some students, instead of taking Part II in the same subject as that in which they took the Part I examinations, change over to another subject, and take the Part I or even Part II examination in the new subject. Separate figures will be given for such students.

(b) Some students are content to take Part I only. A degree can be obtained on Part I only in certain subjects, for example, the natural sciences; and some triposes, e.g. the mechanical sciences tripos, are not divided into Part I and Part II.

Part I of the tripos examinations is usually taken at the end of the second year, and sometimes even at the end of

the first year especially by Scholars and exhibitioners in mathematics and classics.

In order best to compare the performance of Scholars, Exhibitioners, and Commoners in Part I examinations, we will first exclude those subjects (like law, moral sciences, anthropology, theology, mechanical sciences, etc.) which are not the subjects in which the scholarship examinations are taken; and also English, in which there was no separation into Part I and Part II until 1929. This still leaves us with the triposes which attract by far the larger proportion of honours students.

The results are given in Table XVI.

TABLE XVI

RESULTS IN TRIPOS EXAMINATIONS, PART I, FOR FIVE MEN'S COLLEGES, 1922-1929. SUBJECTS: MATHEMATICS, CLASSICS, MODERN LANGUAGES, HISTORY, NATURAL SCIENCES

	Entrance Scholars		Entrance Exhibitioners		Commoners	
	No.	Percentage	No.	Percentage	No.	Percentage
1st-class hon. . .	310	76.2	115	41.1	123	10.0
2nd-class hon. . .	82	20.1	140	50.0	562	45.5
3rd-class hon. . .	15	3.7	25	8.9	549	44.5
Totals . . .	407		280		1,234	

In this first hurdle after entry to the university we see that nearly all Scholars and Exhibitioners justify their awards, if we take again as our criterion the gaining of first- or second-class honours. Only 3.7 per cent. of Scholars and 8.9 per cent. of Exhibitioners get lower than a second.

It is true that 123 Commoners gaining firsts beat 97 Scholars and 165 Exhibitioners who only get a second or a third. But this comparison cannot at this stage fairly

be made, as we do not know how many Commoners took two or even three years to Part I against one or two years taken by some Scholars.

RESULTS OF PART II TRIPOS EXAMINATIONS

As we have said, Part II examinations are more comparable with the final honours at Oxford in most subjects. Let us consider now Part II results for the same colleges and the corresponding period (one year later) which we have studied for Part I.

Of the students considered under Part I, the following percentages passed in Part II one or two years after Part I :

Scholars, 72% ; Exhibitioners, 53% ; Commoners, 38%.

(Part II is taken in the same subject as that taken in Part I by the great majority of these students, approximately 85 per cent. of Scholars, 81 per cent. of Exhibitioners, and 75 per cent. of Commoners.¹)

It will be noticed that at this stage we have a further process of selection : only a certain percentage of Commoners take a Part I tripos, and of these only 38 per cent. go on to Part II ; so that to an even greater degree than in Part I, we are comparing Scholars with picked Commoners. Table XVII, p. 142, shows the results of all these in Part II examinations.

In this group 92 per cent. of the Scholars and 81 per cent. of the Exhibitioners get a first or second, and so we may say that, taken together, 88 per cent. justify their awards, if we are satisfied with that criterion. (The figure is 90 per cent. if we confine ourselves to Part II examina-

¹ The term 'same subject' is used here in a broad sense. In some triposes, Part II would include examinations in material considerably different from that studied for Part I—as in Classics, where Part II may deal largely with Ancient History or Philosophy. In the Natural Sciences tripos the student can take one subject instead of three or four taken for Part I.

TABLE XVII

PART II OF ALL TRIPOSES. NUMBER AND PERCENTAGE GAINING FIRSTS, SECONDS, ETC.

	Scholars		Exhibitioners		Commoners	
	No.	Percentage	No.	Percentage	No.	Percentage
1st class . . .	157	55.7	59	34.7	80	11.1
2nd class . . .	102	36.2	78	45.9	333	46.0
3rd class . . .	23	8.1	33	19.4	310	42.9
	282		170		723	
Average Class .		1.52		1.84		2.32

In this table we give results for Part II of *all* triposes, as these are more comparable with the Oxford figures, which include some students who take at the university subjects other than that in which they won their scholarship, and other students who take 'moderations' (the earlier examination) in their scholarship subject—say classics, and who then change over to another subject, say history. Later we shall give another table of Part II results, confining ourselves to those students who took Part II in the same subject as that in which they took Part I, and it will be seen that the various percentages of successes are very similar to those given above in Table XVII.

tions taken in the *same* subject as that taken for Part I.) I may say in support of this criterion at Cambridge that the senior tutor of one of the largest colleges told me they had adopted the following attainments as tests of satisfactory performance by their Scholars. They thought a Major Scholar ought to get a first in Part I and in Part II of the triposes; a Minor Scholar should get at least a first in Part I and a second in Part II, and an Exhibitioner at least a second in Part I and a second in Part II.

Accepting, then, the criterion of "at least a second class," we see that only about 12 per cent. fail thus to justify their scholarship or exhibition award. (The figure was 15 per cent. for Oxford or 11 per cent. if we allowed one-third of the Oxford third classes to reckon as equivalent to a Cambridge low second class.)

Combining Scholars and Exhibitioners in the above table, we find that nearly 48 per cent. gain firsts, as with Oxford a great superiority over the Scholars (men and women) of provincial universities, where only 27 per cent. gained firsts, but almost the same proportion as among *men* Scholars only, selected by the provincial universities themselves (50 per cent.). Table XVIII gives a convenient summary for the purpose of this comparison.

TABLE XVIII

COMPARISON OF MEN SCHOLARS (AND EXHIBITIONERS) AT OXFORD, CAMBRIDGE, AND PROVINCIAL UNIVERSITIES (RESULTS OF FINAL EXAMINATIONS)

Oxford		Cambridge (Tripos, Part II only)		Provincial Universities (Scholars selected by Universities themselves)	
	Percentage		Percentage		Percentage
1st class . .	40.5	1st class . .	47.8	1st class . .	50.0
2nd class . .	44.8	2nd class . .	39.8	2nd class . .	31.0
3rd class . .	12.4	3rd class . .	12.4	3rd class . .	4.8
4th class . .	2.3			Pass. . .	9.1
				Fail, or withdrawn	5.1

ACCURACY OF DISCRIMINATION BETWEEN SCHOLARS, EXHIBITIONERS, AND COMMONERS

In one respect the award of scholarships seems more reliable at Cambridge than at Oxford ; for *the superiority of Scholars to Exhibitioners* is more decided than it was at Oxford, as will be seen from the average class gained and from the fact that not only the Scholars' percentage of firsts is much higher than that of the Exhibitioners, but their percentage of thirds is lower, as was not the case at Oxford.

Nevertheless, in Part II of the triposes, 80 Commoners

getting firsts beat 125 Scholars¹ and 111 Exhibitioners getting seconds or thirds. A more accurate selection would have given awards to these 80 Commoners at least, instead of to the 56 Scholars and Exhibitioners who got only thirds, and to the 24 weakest who got relatively low seconds. On this estimate 80 awards out of 452 went astray, that is 18 per cent., remarkably close to the 19 per cent. which a similar way of reckoning gave us in the Oxford awards (see p. 134). (If we confine ourselves to Part II examinations, in which *the same subject* was taken as in Part I, this percentage for Cambridge becomes 18·7.)

We might indeed go further, and say that errors were made in not awarding scholarships to those Exhibitioners who gained firsts in Part II, and so proved more worthy of scholarships than did the Scholars who got only a second or a third. Along these lines we should get the following estimate: all the 125 awards to Scholars who get seconds (102) or thirds (23) might better have been given to a like number of Exhibitioners and Commoners who get firsts (139). By this estimate the total errors in awards of scholarships (only) would be 125/282, that is 44 per cent.—a very similar figure to that for Oxford calculated

¹ This superiority of Scholars to Exhibitioners at Cambridge would be greater still were it not for the fact that the Exhibitioners of one large college (A) do about as well as the Scholars of the other colleges, and nearly as well as the Scholars of their own college. Thus 59 per cent. of the Exhibitioners of this college get firsts in Part II against 63 per cent. of the Scholars. The question arose as to whether the excellent performance of the Exhibitioners at College A was due to a larger proportion taking classics or mathematics (in which triposes firsts are more frequently gained). Analysis, however, showed that this was not so. Of the *Scholars* at A a considerably larger proportion take classics or mathematics than is the case at other colleges. In Part II of other triposes the Scholars of College A do very little better than those of other colleges, and not quite so well as their own Exhibitioners! The number of Exhibitioners, however, in this group is only 26.

Details of the average classes obtained in the various colleges for Part I are given in Appendix II (c), p. 190.

in the same way, which was 43 per cent. (see p. 134).¹ This, however, is no doubt a severe criterion of reliability. If we overlook the award of mere exhibitions to men who finally beat many of the Scholars, on our previous method of reckoning we find that about *one-fifth of all these 452 awards for the period in the five colleges have gone astray, and should have gone to Commoners.*

How far this misplacement is through the erroneous estimation of ability in the entrance examinations we cannot say. Three supplementary causes of the deterioration of the Scholars have been mentioned to me by Cambridge tutors. One is that some Scholars with first-class ability have not the qualities of character needed to ensure steady work in the greater freedom of university life as compared with school. A second is that a few break down in health. A third is that some Scholars come up to the university coached and crammed to their utmost capacity; and some of their special abilities (perhaps chiefly for absorption) could be made most of only under close supervision and instruction. In the different and more individual work for advanced honours courses they are found lacking, and are passed by others with more of the special capacities needed, but who were not so thoroughly prepared for the entrance examination. One tutor told me that they recognised that School *x* (a big public school) sent its pupils up thoroughly prepared for the scholarship examinations, but that pupils from School *y*, though they did worse in the scholarship examination, usually surpassed the former in higher university work. This of course is a rather vague and general impression and, like all such,

¹ It is true that, as pointed out in footnote 1 on p. 144, the exhibitioners at one particular college did exceptionally well. Yet considering the awards within this college alone, those 'gone astray' were almost two-fifths (following the same method of reckoning).

needs confirmation; and it suggests a fruitful line of enquiry in both the ancient universities as to the relative performance from different leading schools in (a) entrance scholarship examinations, and (b) success in Part I and especially Part II triposes.

If it be replied that this would be an objectionable proceeding, it should be pointed out that the general impression already exists in some minds, and it is desirable at least that such should not exist on a false basis.

STUDENTS TAKING PART I OF TWO DIFFERENT TRIPOSES

Let us consider now those students who, having taken a Part I tripos, proceed to take another Part I tripos in a different subject, instead of taking a Part II examination.

Judging from a period of six years, over half the Scholars and Exhibitioners who do not take a Part II tripos take a second Part I in a different subject. Some of the remaining students will be medical students only taking Part I in natural science and taking their degrees on that part; others will take the mechanical sciences tripos (on which also a degree can be taken), both of which may be very creditable performances for Scholars.

As to Scholars and Exhibitioners taking a second Part I, Table XIX, p. 147, shows the different classes gained by this group of students.

The most notable fact here is that *Exhibitioners do practically as well as Scholars* in the second Part I tripos which they select, though they were definitely inferior as a group to the Scholars in the first Part I, which would be as a rule in the subject in which they won their scholarships.

Combining the Scholars and Exhibitioners again, we find that in this second Part I 88 per cent. gain firsts or seconds, exactly the same proportion as those who gain

TABLE XIX
SHOWING CLASSES GAINED IN BOTH TRIPOSES BY STUDENTS TAKING
PART I IN TWO DIFFERENT SUBJECTS

Scholars			Exhibitioners		
	In the first Part I	In the second Part I		In the first Part I	In the second Part I
Class I . .	24	16	Class I . .	10	13
Class II . .	10	16	Class II . .	18	14
Class III . .	1	3	Class III . .	4	5
	<hr/> 35	<hr/> 35		<hr/> 32	<hr/> 32

firsts or seconds in a Part II. So this smaller group also justify their awards to the same extent, if we accept as a criterion the gaining of a second class even in Part I of a second tripos, on the ground that some credit must be given for doing so satisfactorily in a new subject.

As the number of Scholars and Exhibitioners taking Part I of two triposes was small, and as the labour of tracing in the Calendar all the Commoners doing the same would have been very great, a comparison with Commoners was not made. So we cannot say what proportion of these scholarship and exhibition awards were misplaced in the sense used before.

SHOULD FEWER ENTRANCE SCHOLARSHIPS (OR EXHIBITIONS) AND MORE INTERNAL SCHOLARSHIPS BE AWARDED ?

A question of some practical importance arises as to whether it would be better to be stricter in the award of entrance scholarships (possibly by awarding no exhibitions), and to award more internal scholarships on the results of Part I examinations. (A recommendation of this kind was made for provincial universities in Chapter VII.)

The proposal raises the difficult problem as to whether

many students of the type who now gain entrance scholarships would be able to afford even one year at Cambridge without a scholarship. But leaving this difficulty for the moment, let us consider whether the results of Part I tripos examinations would be a more reliable basis for the award of scholarships than are the present examinations for entrance scholarships. We take again performance in Part II as our criterion of success.

First let us consider those students (the great majority) who take Part II, if at all, *in the same subject* as that taken for Part I (or in a selected subject of the same group).

Taking our earlier criterion—the gaining of a first or second in Part II as justifying the award of a scholarship—we find as follows, for a period of six years :

Of *all Scholars*, 13 out of 257, or 5.1 per cent. get only a Class III in Part II.¹

Of *all students gaining a first in Part I*, 14 out of 387, or 3.6 per cent., get only a Class III in Part II.

So, from this point of view, there is little to choose between (a) Scholars, and (b) *all* students (whether Commoners, Exhibitioners, or Scholars) who gained a first in Part I.

Let us now use the more exact means of comparison, viz. the average class gained.

Average class gained in Part II by 257 entrance Scholars =
1.43.

Average class gained in Part II by 387 students who had gained a first in Part I = 1.41.

Here again we find that a first in Part I is no better augury for success in Part II *in the same subject* than is the

¹ This percentage differs from the 8 per cent. in Table XVII, p. 142, since the latter includes Scholars who took a different subject in Part II from Part I.

gaining of an entrance scholarship at least a year, or more frequently eighteen months, before the taking of Part I. This is a valuable testimony to the entrance scholarship examination.

Exhibitions.—So far, however, we have only considered Scholars. If we take Exhibitioners, we find that of 149 Exhibitioners proceeding to Part II in the same tripos as in Part I only 37·6 per cent. get a first, while 16·1 per cent. get only a third. So Exhibitioners, as a group, are definitely inferior to the whole group of men who gained a first in Part I. This latter group, however, includes nearly all the Scholars. Suppose we consider the proposal to award entrance scholarships as hitherto, but to reserve the money now spent on entrance exhibitions for the award of scholarships on the results of Part I tripos examinations; would such awards be more reliable?

To decide this we must assume that the Scholars have already been selected at entrance. Hence we must compare Exhibitioners as a group with the group of Non-scholars who have gained a first in Part I. This gives us the following figures:

Of Exhibitioners, 56 out of 149 or 37·6 per cent. gain a first in Part II, and 16·1 per cent. get a third.

Of all students (other than Scholars) gaining a first in Part I, 91 out of 163, or 56 per cent., gain firsts in Part II, and only 9 out of 163, or 5·5 per cent., get a third.

It is evident that, leaving Scholars out of consideration, a first in Part I is a much better augury of success in Part II than is the winning of an entrance exhibition. Thus *it would be more reliable to award exhibitions as internal scholarships on the basis of the gaining of a first in Part I.*

On the other hand, those colleges which are already able to give a scholarship to every Commoner who gains a first in Part I would not be well advised to reserve any exhibitions for those who gain a *second* in Part I. For of those who gain a second in Part I (even including Scholars) only 44 out of 347 (or 12 per cent.) gain a first in Part II, while 25 per cent. get only a third, a definitely worse performance than that of entrance Exhibitioners.

From the enquiries I have been able to make, I gather, however, that not all colleges can give scholarships to *all* students who gain a first in Part I; while one of the largest colleges pays considerable attention to personal qualities of students and the reports of college tutors in awarding internal scholarships, so that a man who gains a first in Part I *may* fail to win a scholarship, while another with a very good second may be awarded a scholarship. I may add here I learnt that in the award of entrance exhibitions some colleges (if not all) give great weight to reports on personal qualities of the individual applicants. The less one regards examination awards as infallible, the more one will welcome the influence which such other qualities might be allowed in the winning of internal scholarships.

Let us now consider the performance in a tripos Part II taken in a different subject from that taken in Part I. Here our numbers are more restricted. They suggest decidedly, however, that transference to a new subject for Part II is made more frequently by those Scholars whose results in Part I are disappointing. Thus, among Scholars who transfer to a new subject for Part II, 18 out of 52 had failed to get a first in Part I, against only 33 out of 257 of those Scholars who persisted with the same subject for Part II.

When divided into classes (as in Appendix II (*d*), p. 190)

the number in each subgroup is very small for a comparison of percentages. It is safer therefore to consider the *average class* gained in the new Part II.

These are as below :

TABLE XX

PERFORMANCE IN TRIPOS PART II TAKEN IN A NEW SUBJECT

Average class of all <i>Scholars</i>	1.92, based on 52 cases.
Average class of all students who gained a <i>first in Part I</i>	1.70, based on 54 cases.
Average class of all <i>Exhibitioners</i>	2.05, based on 36 cases.
Average class of all students (other than <i>Scholars</i>) who gained a first in Part I	1.65, based on 20 cases.

It will be seen that for this small group a first in Part I was a better augury for success in Part II than was the gaining even of an entrance *scholarship*.

As regards *Exhibitioners*, these gain on the average something worse than a second in Part II (2.05), whereas the class gained in Part II by all students (other than *Scholars*) who gained a first in Part I was 1.65.

So that again the award of the exhibitions would have been more accurate on the basis of Part I ; indeed, for this small group the same is true for *scholarships*.

Summing up this section, we may say that the award of exhibitions at least would be decidedly safer if it were deferred until Part I was taken—always taking success in Part II as our criterion.

In many colleges, however, it may be possible to give *scholarships* to all who gain a first in Part I (or a first class in first-year 'Mays' examination), as well as to move up to *scholarship* rank those entrance *Exhibitioners* who gain a first in Part I ; and apart from this, no doubt serious economic objections may be raised against the deferring of awards to men who only reach exhibition standard in the

admission examination ; though against these factors can be set the greater possibility of considering personal qualities in the award of *internal* scholarships. Such balancing of pros and cons, however, is not our present concern, which is merely with reliability as tested by success in the highest examination.

WOMEN STUDENTS AT CAMBRIDGE

I am indebted to Miss Major, late Mistress of Girton College, to her successor, Dr. Wodehouse, and to Miss A. B. Dale, of Newnham College, for figures from their respective colleges, the one for six years (1926-1931), the other for seven years (1924-1930). Analysis gave the following results :

TABLE XXI

WOMEN STUDENTS AT CAMBRIDGE TRIPOS EXAMINATION, PART II

	Scholars		Exhibitioners		Commoners	
	No.	Percentage	No.	Percentage	No.	Percentage
1st class . .	33	23·7	10	15·4	34	9·1
2nd class . .	95	68·4	43	66·2	251	67·3
3rd class . .	11	7·9	12	18·4	88	23·6
Totals . .	139	100·0	65	100·0	373	100·0

As with Oxford, the numbers of women are small for analysis, but we may note the following :

(1) The discrimination between Scholars and Exhibitioners is much better here than in the two Oxford colleges. The Scholars have more firsts than the Exhibitioners in proportion, and decidedly fewer thirds. The average class gained by each group was :

Scholars, 1·84 ; Exhibitioners, 2·03 ; Commoners, 2·14.

(2) Of the Scholars and Exhibitioners, about one-ninth fail to obtain second-class honours, and so do not justify their awards ; 11.3 per cent., to be exact, against 12.4 per cent. of the men—the corresponding figures at Oxford being 17 per cent. for women and 14.7 per cent. for men.

(3) Grouping Scholars and Exhibitioners together, we find that 21 per cent. get firsts, against about 48 per cent. of the men (of the Oxford women, 23 per cent. got firsts against 40 per cent. of the men). So the best women (among the Scholars and Exhibitioners) at Cambridge do not as a group compare quite so favourably with the best men as is the case at Oxford. As a prejudiced Cambridge man, I leave it to the reader to judge whether this result is due to the Cambridge women being inferior to the Oxford women, or whether it is because the Cambridge men are superior to the Oxford men !

THE RELATIVE RELIABILITY OF SCHOLARSHIP AWARDS IN DIFFERENT SUBJECTS

Are the awards of scholarships in, say, mathematics or classics, more reliable than those for history or modern languages ? This can best be studied by comparing the average class gained in each subject by the Scholars with that of the Commoners—as was done with the provincial universities. The separation of the tripos results into different subjects leaves us with too few numbers in some triposes on which to base any reliable conclusions, but the results for the six largest triposes (Part I) are given on p. 154.

It will be seen that the best average for Scholars is in classics ; it is nearly a first. Indeed, 99 out of 116 Scholars got a first in Part I. Very close is mathematics, while the lowest average class for Scholars is in modern languages. It must be borne in mind, however, that Part I in classics

TABLE XXII

AVERAGE CLASS GAINED BY SCHOLARS, EXHIBITIONERS, AND COMMONERS IN DIFFERENT SUBJECTS OF THE TRIPOS EXAMINATIONS, PART I. (The numbers in parentheses give the number of students in the category.)

	Mathematics	Classics	Natural Sciences
	Average Class	Average Class	Average Class
Scholars . . .	1.21 (126)	1.15 (116)	1.39 (83)
Exhibitioners . .	1.46 (69)	1.67 (43)	1.81 (74)
Commoners . . .	2.34 (143)	2.16 (93)	2.32 (434)

	History	Modern Languages	Mechanical Sciences
	Average Class	Average Class	Average Class
Scholars . . .	1.31 (32)	1.52 (50)	1.34 (29)
Exhibitioners . .	1.82 (45)	1.65 (49)	1.47 (17)
Commoners . . .	2.44 (350)	2.32 (214)	2.46 (267)

and mathematics and history are admittedly preliminary examinations, while mechanical science is a final examination, and natural science Part I may be. Further, the simple figure cannot be taken alone. The examiners for one tripos may be more generous than those for another.¹ To get the relative reliability of the scholarship awards in different subjects, we must first compare the performance of Scholars and Commoners in the *same tripos*. Then the ratio of the average class of the Commoners to the average class of the Scholars gives us the *index of superiority* of Scholars to Commoners in that subject; and similarly for Commoners and Exhibitioners. We arrange these superiority indices in order of size in Table XXIII.

¹ A table is given in Appendix II (b), p. 189, showing the frequency with which firsts, seconds, or thirds are awarded in the various triposes.

TABLE XXIII

SUPERIORITY INDICES IN TRIPOS, PART I, OF

Scholars to Commoners				Exhibitioners to Commoners			
1. Mathematics	.	.	1.93	1. [Mechanical Sciences.	.	1.67]	¹
2. Classics	.	.	1.88	2. Mathematics	.	1.60	
3. History	.	.	1.86	3. Modern Languages	.	1.40	
4. Mechanical Sciences	.	.	1.83	4. History	.	1.34	
5. Natural Sciences	.	.	1.67	5. Classics	.	1.29	
6. Modern Languages	.	.	1.53	6. Natural Sciences	.	1.28	

¹ Only 17 Exhibitioners in mechanical sciences.

As to Scholars, it will be seen that mathematics and classics draw most reliably the distinction between Scholars and Commoners, not unexpectedly perhaps. Probably the papers set in Part I of the tripos in these subjects resemble the scholarship papers more than is the case with other triposes, though the high degree of discriminative power is not shown by classics when distinguishing Exhibitioners from Commoners. It may be surprising to find history so very close to classics and mathematics in the table. I have heard in Cambridge the idea expressed that scholarship awards in history and English were especially unreliable. Yet the superiority of Scholars to Commoners in history is nearly as great as it is in classics. The number of Scholars in history in this group was small, however, viz. 32. It must also be remembered that if a large number of very weak students select a given subject, they will lower the average performance of the Commoners, and so raise the superiority index.

Delicacy of discrimination at the top is probably best shown by the superiority of Scholars to Exhibitioners in a given subject. This is as follows :

SUPERIORITY INDEX OF SCHOLARS TO EXHIBITIONERS (TRIPOS, PART I)

1. Classics	.	.	1.45	4. Mathematics	.	1.21
2. History	.	.	1.39	5. Mechanical Sciences	.	1.10
3. Natural Sciences	.	.	1.30	6. Modern Languages	.	1.09

Again, it is surprising to find this discrimination between Scholars and Exhibitioners more accurate in history than in mathematics. Of course, if in a given subject there is a large number of men of high and approximately equal ability, a number sufficient to absorb not only all scholarships but all exhibitions also, then this would lower the superiority of Scholars to Exhibitioners. It is possible that this may occur to a greater extent in mathematics and classics than in history.

If we average all the three superiority indices (Scholars to Commoners, Exhibitioners to Commoners, and Scholars to Exhibitioners) we find mathematics most reliable—by a very small margin, classics and history being almost bracketed second (the indices being 1.58, 1.52, and 1.53 respectively).

When we come to Part II, mathematics gains pre-eminence for reliability in discriminating between Scholars and Commoners; but again with history surprisingly close. And now classics drops—which we might expect from the fact that in some sections of Part II in classics the kind of work differs so greatly from the largely linguistic work involved in Part I. The figures for Part II are :

SUPERIORITY INDICES OF SCHOLARS TO COMMONERS IN PART II

1. Mathematics	1.54	No. of Scholars	73
2. History	1.52	No. of Scholars	26
[3. Modern Languages	1.47] ¹	No. of Scholars	14
4. Classics	1.37	No. of Scholars	74
5. Natural Sciences	1.30	No. of Scholars	55

¹ It will be seen that the number of Scholars was very small in modern languages and history.

The superiority index in Part II, however, cannot be taken as indicating the reliability of a scholarship award in subject x as tested by degree examination in subject x . For

sometimes a Scholar in x , after taking Part I in x , proceeds to take Part II in another subject. Some history Part II candidates, for example, may have been Scholars in classics, and some candidates for the natural science tripos Part II may have been Scholars in mathematics or even in classics. Scholars taking Part II in mathematics and classics, however, were almost exclusively scholars in those subjects alone.

THE PERFORMANCE OF STUDENTS WHO TAKE UP A NEW SUBJECT FOR PART II OF THE TRIPOS

As evidence of the dependence of scholarship awards on abilities specific to the subject in which the scholarship was obtained, it is of interest to consider the performance of students who, after taking Part I in one subject, take Part II in a different subject. On this I was able to obtain figures through the infinite patience of my colleague, Mr. W. G. Emmett, who traced in the university calendars over a period of six years the careers of Scholars, Exhibitioners, and Commoners who took Part I in one subject and Part II in another. The comparative results are given in Table XXIV, p. 158.

Of course, one would expect that students who change over to a new subject in Part II would not do as well as those who continue with the same subject; and this appears clearly for each group—Scholars, Exhibitioners, and Commoners. But we are interested now in the question whether the superiority of Scholars (or Exhibitioners) to Commoners remains as great as when all continue in the same subject. The superiority index of Scholars to Commoners taking the *same* subject in Part II as in Part I is 1.58; the superiority index of Scholars to Commoners taking a *different* subject in Part II is only 1.25. The number of

TABLE XXIV

COMPARATIVE PERFORMANCE IN PART II TRIPOS EXAMINATIONS

- (a) Of men who took Part II in the same subject as Part I.
 (b) Of men who took Part II in a different subject from that taken in Part I.

	Taking <i>same</i> subject in Part II as in Part I			Taking <i>different</i> subject in Part II from Part I		
	Performance in Part II			Performance in Part II		
		No.	Percentage		No.	Percentage
Scholars	Class I	144	61.8	Class I	14	27
	Class II	76	32.6	Class II	28	54
	Class III	13	5.6	Class III	10	19
Exhibitioners.	Class I	53	39.0	Class I	6	17
	Class II	58	42.6	Class II	22	61
	Class III	25	18.4	Class III	8	22
Commoners	Class I	69	12.8	Class I	10	5.5
	Class II	248	46.0	Class II	90	49.5
	Class III	223	41.2	Class III	82	45

Exhibitioners taking Part II in a different subject (36) is very small as a basis for generalisation, but their results are similar to those of the Scholars: the superiority index for Exhibitioners to Commoners was 1.27, where the same subjects are taken in Part II, but somewhat less (1.17) when a new subject is taken.

As we have seen earlier (Table XIX, p. 147), when students having taken Part I in one subject take Part I in another subject (instead of taking a Part II examination), the decided superiority of the Scholars to Exhibitioners in the first Part I almost disappears when all take Part I in another subject (superiority index, 1.07). Again, the numbers were very small for generalisation; but all the above sets of figures agree in suggesting that *when, either in Part I or Part II, a new subject is taken after the first Part I* (which in the

great majority of cases is taken in the subject on which the scholarship was awarded) *then the superiority of Scholar to Exhibitioner or Commoner greatly declines* ; and so does the superiority of Exhibitioners to Commoners. This is comprehensible if the excellence of performance in the various subjects at this advanced university stage depends to a considerable extent on abilities or interests specific to the particular subject itself, rather than on general ability or abilities which can be equally well adapted to any new subject.

It is, of course, conceivable that there is some peculiar selective influence at work which would lead the weaker Scholars to change their subjects more frequently than do the weaker Exhibitioners or Commoners, and the weaker Exhibitioners to change more frequently than do the weaker Commoners. But there seems to be no reason for thinking this. And in the case of the students taking Part I of two different triposes, we have the records of the two triposes for exactly the same students, and the reduction of the earlier superiority of Scholars to Exhibitioners when a new Part I is taken is more striking in this set of figures than it is when Part II is considered.

All the evidence, then, points to the great importance of abilities or interests specific to each subject for success in any of these tripos subjects.

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CONCLUSION

Chapter XI

SUMMARY OF RESULTS AND SUGGESTIONS.

IN view of the extensive ground we have covered, and the numerous items of evidence on both major and minor problems raised, it may be useful to attempt a general survey of our enquiry.

In the first place, I should like to emphasise again the limits of our main problem. We have been concerned with the *reliability* of examinations as tested by subsequent performance at school or university—this being estimated by more complex and thorough examinations taken at a more mature age, and also by estimates of heads of schools based largely no doubt upon academic performance. Such criteria are themselves by no means the only criteria of value. It would have been of great interest if we could have followed our students still farther, and seen how they fare in after-life—as Dr. Schuster did in his enquiry as to university students (see p. 35). Nor is business or professional success the final test of education. To get our ideal criterion we should have to find all that was of value in character and ‘culture’ in later life—a task which no psychological statistician is likely to attempt.

To deny, however, that success in subsequent and more substantial examinations is one valuable test of the prognostic reliability of an earlier examination, is to assume an attitude of complete scepticism as to examinations which goes beyond that of critical caution which this book advocates.

There is one further general observation that may be made. Some may say that almost entirely we have been

using *written* examinations as criteria of success ; and they may legitimately urge that the ability to discuss a topic or argue a problem by word of mouth is as important as to be able to write about it.

If in reply to this others contend that specific disabilities or inhibitions may hinder a candidate from doing himself justice in such oral discussion, may not the same also be true for written examinations, though no doubt to a lesser extent ?

So far, however, as such criticism (of the confining of our criteria to written tests) is valid, so far is it a further criticism of the whole system of awarding scholarships and degrees entirely or almost entirely on written examinations. To discuss the possibilities of avoiding this limitation, and the possibility or desirability of bringing in even qualities of character as a basis for the award of scholarships at universities (or schools), has not been within the range of our enquiry.

Nor has it been our concern to estimate all possible advantages of examinations. To do this would need a long discussion of their value as a stimulus to many pupils, as a useful guide to some teachers, as a necessary test of attainments, and so on. The contention here has been merely that there are certain grave weaknesses in the attempt to make estimates by examination even of the probable future *academic* success of the candidates ; and this is a question of great practical importance, especially in view of the many scholarships awarded in schools and universities. It is also argued that a weakening of the faith in the infallibility of examinations should lessen the insistence by business or professional men on certain paper qualifications, and so reduce to some extent the excessive pressure of examinations upon studies at school.

We may now summarise the main findings and proposals of this enquiry, giving some further consequential suggestions not mentioned in the previous chapters. Though I have of course only been able to study samples of examinations, yet our enquiry as to entrance examinations to secondary schools dealt with ten examination centres, and included the results of over 1,600 pupils in nearly sixty school classes. Also, the enquiry as to university scholarships dealt with five provincial universities, covering over 2,000 students, and with five large men's and two women's colleges in each of the ancient English universities, comprising over 4,000 students.

GENERAL CONCLUSIONS APPLYING TO ALL TYPES OF EXAMINATIONS

(1) Examinations are liable to *instability* in the sense that a different examination paper of the same type, or the same answer paper marked by a different examiner, may give an appreciably different result.

(2) Such *instability* is partly due to 'luck,' in the sense that a particular set of questions happens to suit a particular candidate well or badly. This element of weakness can be met, but only partially, by avoiding too narrow a range of questions, and by giving adequate choice.

(3) Another cause of such instability is varying 'form' in the candidates. This can partly be met by offering the possibility of a further examination either for all or at least for border-line cases.

(4) Instability may also be due to varying standards of different examiners. This can be reduced to some extent by a discussion among examiners of standards and of markings, and by the checking of standards by a chief examiner; such work of the chief examiner, however, is

no guarantee against momentary lapses of an individual sub-examiner in his standard, and a chief examiner's own standard is not absolutely constant.

(5) The instability due to the four above-mentioned factors may vary greatly in examinations of different kinds. In the text are given examples of different orders given by similar examinations taken at about the same time, showing very little resemblance (especially when answers of an essay type are involved). On the other hand, some papers of the type used for entrance examinations to secondary schools may give remarkably similar orders, at least when marked by the same individual. Further research into the stability of examinations at all stages is urgently needed.

(6) So far as the instability of examination results depends on varying standards of marking, the introduction of mental tests or questions of a mental-test type greatly reduces such instability; but this is not possible in examinations of a higher type—e.g. for university degrees.

(7) The *prognostic reliability* of an examination is greatly reduced when candidates have been trained by teachers of very varying capacity, or when some have been specially coached. The influence of such factors is lessened by the use of mental tests.

THE ENTRANCE EXAMINATIONS TO SECONDARY SCHOOLS

(8) In the entrance examination to secondary schools here considered, the pupils at the border-line were very close together in marks. This means that, even with relatively 'stable' examinations, a repetition of the tests might have put a very different group of pupils among the 'just passed.'

(9) In most of the centres studied there was practically

no relation between the order of merit in the entrance examination and the order of merit at the end of the secondary-school career. This greatly emphasises the uncertainty as to whether the right pupils were selected, not only near the border-line pass mark, but within a wide range of it.

(10) The unreliability of the entrance order will also lead to an unfair apportioning of scholarships or free places.

(11) Detailed reports from Heads of secondary schools confirm these suggestions of uncertainty, by showing that a large number of pupils (about one-fifth of those in the schools studied) proved unsuited for the secondary-school course.

(12) On the other hand, some pupils who only just scrape through the entrance test prove highly successful; in a few instances, indeed, the last or nearly last becomes eventually the first of the entrance group.

(13) In view of the great unreliability of most of the entrance examinations studied, and of the uncertainty near the border-line of all, it is desirable that a second chance should be provided; but the standard for this second test should be slightly higher.

(14) As the order of merit after one year in the secondary school proves a much more reliable prophecy of satisfactory performance at the end of the school career, it is desirable that the awards of free places and scholarships should be seriously reconsidered at this stage; that those who have failed to justify their awards should be deprived of these, and that pupils who failed to get them at the entrance examination, but have done very well within the school, should now receive appropriate awards.

(15) The difficulty of ensuring a right selection for secon-

dary schools at 11+ also suggests that a way of entrance to secondary schools should be open at a later stage; and also that transference from the secondary school to another type of school should be facilitated, or that a wider range of courses appropriate for different types of pupils should be available within the secondary school.

(16) It should be emphasised that the failure of many pupils to succeed in the secondary-school course does not imply that they are necessarily unworthy of some type of further education after fourteen years. The right adjustment, it is suggested, for such is to transfer them to central or senior or technical schools, or to modify the curriculum for them in the secondary school.

(17) In the entrance examination in one centre an appreciable improvement was found to follow the introduction of *mental tests* and a systematic scheme for the marking of essays and other answers. Results, however, gathered in this enquiry as to the use of mental tests confirm those previously published in suggesting that the tests at present in use do not *alone* give much more reliable estimates of future school successes than do the most carefully planned entrance examinations, though they are valuable as a supplement.

(18) It is suggested that one of the main reasons why the entrance examination and the present mental tests fail is that they do not detect the presence or absence of specific abilities needed for the wider curriculum of the secondary school. This is confirmed by the fact that once the pupil has been tested in all the branches of study in the secondary school—by the end of the first year, and especially by the end of his second—the order of merit is very steady from year to year. The further development of tests of specific abilities, e.g. for foreign languages, or

mathematics, may in the future be of considerable service in selecting the pupils more reliably for secondary-school work.

(19) That the changes from entry order to order at School Certificate stage are not due to mere passing of time and different rates of development of different pupils is shown by the fact that there is a change between entry order and order at the end of the first year greater than the change between the order at the end of the first year and order at the end of the fourth year.

(20) Definite evidence has been given showing that the great resemblance between orders of merit from year to year within the secondary schools studied is not due appreciably to the teachers' knowledge of the pupils.

(21) It is suggested that more exact observations should be made as to the prognostic value of the reports of the Heads of elementary schools on their own pupils, and that special weight should be given to the reports of those Heads who are found to be specially reliable.

SCHOOL CERTIFICATE EXAMINATIONS

(22) As to the School Certificate, the dependence of the gaining or loss of the Certificate on a few marks more or less in one subject introduces grave anomalies. A more elastic (but steeply graded) scale of compensation is suggested. At present a boy A with 50 per cent. more marks than B (on the total) may fail to get a Certificate while B gains it.

(23) Though the mere gaining or loss of a School Certificate may give a most unreliable estimate of the pupil, the relation between the order of merit in the total marks in the School Certificate examination and in the schools' own examinations at the same time is a very close

one. This also suggests that relatively more weight should be given, in some School Certificate examinations at least, to the total marks in determining the award of the Certificate.

(24) As is already recognised, special uncertainty attaches to the marking of answers of an essay type. But it is not usually known how possible it is for a candidate to write correct English for the moment in an essay test, while thinking chiefly of the importance of correct writing, and yet to lapse into his natural bad English on other occasions. From this point of view, marks for English in all papers in a School Certificate examination would seem to be a sounder test than a separate essay paper; if it be argued that subject examiners will not pay adequate attention to English, or that their estimates cannot be equated, it may be considered whether a special examiner in English composition may not see the papers in all or most subjects, to assess the candidates' capacity for writing English.

SCHOLARSHIP AWARDS IN PROVINCIAL UNIVERSITIES

(25) As to scholarships in the provincial universities, nearly two-fifths of the awards examined were given to students who proved unworthy of them, if we take as our criterion the attainment of at least second-class honours; and one-third of the Non-scholars beat two-fifths of the Scholars.

(26) On further analysis, it proved that the weakness was chiefly due to scholarships not awarded by the universities themselves. Of the holders of these, nearly a half prove unworthy of their awards. Of Scholars selected by the universities themselves the proportion is one-fifth.

(27) Men university Scholars gain first-class honours

twice as often relatively as do women Scholars. But the proportion of women who fail to reach the standard of second-class honours is practically the same as that of the men.

(28) The *superiority of the men to the women Scholars* in the gaining of first-class honours is not, as sometimes thought, due to the special weakness of women in science. The superiority shows itself even more in the Arts subjects.

(29) In comparing the performance of *Scholars in Arts* with *Scholars in Science*, it is important to bear in mind that, while firsts are more frequently awarded in Science, there are also proportionately more failures and pass degrees in Science than in Arts.

(30) The superiority of Scholars to Non-scholars is slightly greater in Science than in Arts, but not sufficiently to warrant our saying that scholarship awards in Science are more reliable than scholarship awards in Arts.

(31) One aspect of the reliability of examination awards is the comparative ease of gaining a first in different subjects. The difficulty is pointed out of defining exactly what is meant by saying that the standards in two different subjects are equal; and it is argued that any comparison requires a reference to the degree of general ability involved in both subjects, and to the relative frequency in the whole population of the specific abilities involved in the two subjects.

(32) In view of the great unreliability of the scholarship awards in these provincial universities, it is suggested :

- (a) That fewer entrance scholarships should be given, and that more internal scholarships should be awarded after one or more years in the university.
- (b) That the bodies (other than the universities) who award scholarships should model their procedure

(in selecting) more on that of the universities, or should hand over the selection to the universities themselves.

In any case, further research into the reliability of individual school or county or borough scholarship awards seems highly desirable.

THE AWARDS OF STATE SCHOLARSHIPS

(33) If we use the same criterion as before, about one-tenth of the State Scholars fail to justify their awards—and are beaten, at the provincial universities, by one-third of those who have no scholarships at all; while half the State Scholars in modern universities are beaten by about one-tenth of the Non-scholars. This too was before the number of State scholarships was increased.

(34) Among State Scholars at universities the men do decidedly better than the women. Again, this is not due to superiority of the men in certain subjects. The men gain a higher percentage of 'firsts' in every subject (including modern languages) except English, in which the percentages are the same. This result would seem to justify the recent change made by the Board of Education, by which the women are not necessarily given as many State scholarships as the men.

SCHOLARSHIP AWARDS AT OXFORD AND CAMBRIDGE

(35) The awards of scholarships at Oxford and Cambridge seem definitely more reliable than the awards (taken *en bloc*) at the provincial universities; in that the superiority of Scholars to Non-scholars (even to the *picked* ones who take honours degrees) is greater. This superior reliability, however, is reduced if we consider separately, as we should, the Scholars elected by the provincial universities them-

selves. Even thus, however, a smaller proportion of Scholars and Exhibitioners at Oxford and Cambridge fail to justify their awards (by getting at least a second class)—about one-tenth, against one-fifth of the men Scholars in provincial universities. (The Oxford figures are based on the assumption that one-third of the third-class honours awards are counted as equivalent to 'seconds' at Cambridge and elsewhere.)

(36) At Oxford, however, the distinction between Scholars and Exhibitioners seems insecure. At Cambridge the discrimination between Scholars and Exhibitioners in the entrance scholarship examinations seems much more reliable. These statements remain true, even if one eliminates one Oxford and one Cambridge college at which the Exhibitioners do extremely well—nearly as well as Scholars of the other colleges here studied.

(37) At Oxford, one-fifth of the scholarships and exhibitions were 'misplaced,' in the sense that they might better have gone to Commoners who got 'firsts' instead of to Scholars and Exhibitioners who got 'seconds' or something lower. The proportion is almost exactly the same at Cambridge if we consider the Tripos examination Part II as the best test.

(38) The poor performance of some Scholars in the final honours examinations is due in some cases to breakdown in health, or to weakness in some qualities of character. It seems doubtful, however, whether such causes can account for so large a section doing badly; and again it looks as though errors of selection are made at the scholarship examinations, perhaps inevitably. Unequal coaching is a disturbing factor here also; and some students excellent at school work prove inferior in the different and freer studies of the university.

(39) In view of the excellent later performance in the Cambridge Tripos Part II of students who gain a first in Part I, it is suggested that it would be safer to award more internal scholarships on Part I results instead of exhibitions given on entrance scholarship examinations. Possibly a similar principle could be adopted at Oxford.

(40) It is notable that where Scholars and Exhibitioners change their subject, after taking a Part I tripos examination at Cambridge, and take Part I of a different tripos, the Exhibitioners do practically as well as the Scholars in the new tripos ; and when Part II is taken in a new subject the superiority of Scholars to Exhibitioners is also greatly reduced. These facts point to the importance of specific abilities for a high performance in entrance scholarship examinations and in university examinations in the same subjects.

(41) As regards *women students* at Oxford and Cambridge, here the lesser superiority of Scholars to Commoners is possibly partly due to a keener competition among women even for entrance at Oxford and Cambridge. At Oxford, in the two colleges studied, the discrimination between Scholars and Exhibitioners is quite insecure, the Exhibitioners (for the six years taken) actually doing slightly better than the Scholars in the final honours examinations. At Cambridge this discrimination is sounder. Yet even there, the superiority of Scholars to Exhibitioners is only slight.

(42) The *relative reliability of scholarship awards in different subjects* at Cambridge was tested by estimating the superiority of the performance of Scholars to that of Exhibitioners and Commoners in the several subjects. In some subjects, notably history, the unreliability is not as great as has been thought, relatively to others. On the whole,

the awards in mathematics are the most reliable, with history and classics bracketed a very close second.

(43) The relative frequency of the awards of 'firsts' at Cambridge is much greater in some triposes than in others. Firsts are more frequently given in classics and mathematics than in any other tripos. This is true both for Part I and for Part II examinations. The percentage of Firsts is extremely low in economics, English, law, and history.

In conclusion, I should like to protest strongly against any general inference from this enquiry that a reduction in expenditure is justified, either on secondary education (or at least on education after 14 years) or on scholarships to modern or ancient universities.

As indicated in the text, various other alternatives are possible. Indeed, the enquiry shows that there are many pupils not obtaining entrance or scholarships to secondary schools, or scholarships at the universities, who would be likely to do as well as many who at present gain these awards and thoroughly justify them.

Furthermore, we may expect further research to improve our methods of selection at all stages. Indeed, much might immediately be done if some practical way could be found of readjusting erroneous selections shortly after entry to the secondary schools—and after one year in the university, or by changing some entrance scholarships into internal or post-graduate scholarships, especially at the provincial universities.

If further enquiry shows that some university scholarships tied to particular schools or awarded by local education authorities are continually being awarded to Scholars who prove unsatisfactory, the question may well be considered whether such awards should not be made by

methods in which a wider basis of comparison can be obtained (as with provincial university scholarships proper, or college scholarships at Oxford and Cambridge), and so a sound minimum standard of attainment required ; and thus, if a candidate of sufficient merit was not forthcoming in any year, the scholarship might be withheld and reserved to give a much-needed post-graduate scholarship to the next Scholar from that school or town who should distinguish himself in the final degree examinations.

APPENDIX I—TO PART II

ENTRANCE EXAMINATIONS TO SECONDARY SCHOOLS

ALL correlations here and elsewhere were worked by Spearman's more accurate 'rank' formula (ρ).

I (a) CORRELATION OF ENTRANCE EXAMINATION WITH SCHOOL CERTIFICATE EXAMINATION, CENTRES A, B, C, D, AND E

For each centre the correlations of the various years given were first averaged. These average correlations for individual centres were as below; these averages were then themselves averaged, giving 0.03. This is only a rough average, for greater weight should really be given to those correlations based on the greater numbers of pupils. As will be seen below, a true average would give greater weight to the figure for Centres B and C, and less to D, slightly raising the average.

For Centre A.	. . . . .	-0.15	(The average for two examinations in successive years (1924 and 1925), 30 pupils in all.)
For Centre B	. . . . .	0.15	(The average for four examinations in four successive years (1921-1924), 81 pupils in all.)
For Centre C	. . . . .	0.05	(The average for three examinations 1924-1926, 66 pupils in all.)
For Centre D	. . . . .	0.00	(The average of two classes in the examination of 1925, 22 pupils in all.)
For Centre E	. . . . .	0.11	(The average of three examinations, 1923-1926, 36 pupils in all.)

The numbers of pupils in the different years for any given school were almost the same, except in C, where the numbers and correlations for the three years were: (1) 19 pupils, $\rho = 0.19$; (2) 28 pupils, $\rho = 0.00$; (3) 19 pupils, $\rho = -0.05$. It will be seen that giving the greater weight due to (2) would lower the average correlation for Centre C.

If it be objected that the correlations given above refer to highly *selected* groups, it may be pointed out that the high correla-

tions of School Certificate examination with school order after four years (about 0.8), and of school order after one year with School Certificate after four years (viz. about 0.7), also refer to similar selected groups. (See note on Selection, Appendix I (j), p. 184.)

I (b) CORRELATION OF ENTRANCE EXAMINATION WITH SCHOOLS' OWN EXAMINATIONS, CENTRES A, B, C, AND E

Correlation of entrance examination with secondary schools' own examinations four or five years later. Averages for same years and classes given in Appendix I (a).

Centre A	.	.	.	.	.	.	.	.	—0.05
Centre B	.	.	.	.	.	.	.	.	0.09
Centre C	.	.	.	.	.	.	.	.	0.04
Centre E	.	.	.	.	.	.	.	.	0.24

All these school orders were based on the schools' own examinations held just about the same time as the School Certificate examination, except that in C the marks for work throughout the year counted equally with the schools' own examinations at Christmas and later.

I (c) NOTE ON PROBABLE ERRORS FOR CENTRES A, B, C, D, E, H, AND I

In reference to the correlations for Centres A, B, C, D, and E, the coefficients were negative, or so extremely small that it was not worth while giving probable errors.

In Centre H the P.E. of the correlation of entrance order with School Certificate order (0.39) for the 24 boys would be something over 0.12. Following the requirement that to indicate a genuine relationship a correlation coefficient for 30 cases should be more than three times the P.E., and that when the number is less than 30 it should be still greater in proportion, we see that this coefficient is very doubtful. The correlation of 0.6 for the girls—15 in number—is still less certain. The usual formula would give a P.E. of about 0.12, but as the number of pupils was

only 15, the P.E. is much higher. (See W. Brown and G. H. Thomson, *Essentials of Mental Measurement* (1921), p. 103.) Thus it is not *certain* that even the correlation of 0.6 in this case indicates any essential relation between success in School Certificate examination and success in the entrance examination; but the average of the two positive correlations (boys and girls) justifies the concession made in the text that this Centre H may claim some degree of resemblance between entrance order and order at School Certificate.

In Centre I, similarly each of the correlations is in itself very unreliable. But the average of the six correlations, each group of three based on 40 pupils, suggests a slight positive correlation for Centre I.

I (d) MATRICULATION AS A TEST OF SUCCESS

A comparison is given below of the performance in Centre J of top, middle and bottom groups at entrance as regards the gaining of School Certificate and Matriculation. School Certificates gained in four years were compared with matriculation certificates gained in four or five years because only thus could similar numbers and percentages be obtained.

CENTRE J

	School Certificate gained in Four Years	Matriculation gained in Four or Five Years
Top groups . . .	142/284 = 50.0%	121/284 = 42.6%
Middle groups . . .	102/286 = 35.6%	81/286 = 28.3%
Bottom groups . . .	63/284 = 22.2%	42/284 = 14.8%

In this table the relative superiority of top group to bottom group at first sight appears greater in the matriculation figures than in the School Certificate, the data being $\frac{42.6}{14.8}$, or 2.88, for matriculation, as compared with $\frac{50.0}{22.2}$, or 2.25, for School Certificate.

On the other hand, the *failure* to gain the awards may with

equal validity be taken as the basis of comparison in the two cases, for those who fail are all classed in one rank just as are those who pass, and a measure of relative superiority can thus be obtained from the inverse ratio of failures in the two groups considered. From this standpoint we find that 57.4 per cent. of the top group and 85.2 per cent. of the bottom group *fail* to get matriculation, a relative superiority of top to bottom group of $\frac{85.2}{57.4}$, or 1.49, while 50.0 per cent. and 77.8 per cent. respectively fail to get School Certificate, a relative superiority of 1.56; so that regarded in this way Matriculation turns out to be a *less* reliable criterion of success than School Certificate. This indicates that the attempt to compare the value, as criteria, of Matriculation with that of School Certificate awards by either method indicated above is not satisfactory.

Apart from these considerations, however, there are a number of inherent factors which might conceivably bring about a closer connection between performance in the entry examination and the gaining of matriculation than between performance at entry and School Certificate awards.

In the first place, it has been suggested that such closer connection is to be expected on general principles of correlation; if of the successful candidates for entrance examination the School Certificate winners are *more* nearly 50 per cent. of the whole than are the winners of matriculation, then the matriculation results should correlate more closely with the entrance examination than do the School Certificate results.¹

Again, pupils low down at entry would tend to have no maintenance grant or even free place, and so would be less likely to stay on for a fifth year to gain matriculation if the School Certificate examination is passed in four years, though they may be really abler than others above them in the entrance order to whom grants were awarded.

Further, there is a danger that a greater scatter of marks in an

¹ Mr. Frank Sandon makes this suggestion, and expresses his opinion that this is the explanation of the apparent difference.

arithmetic paper as compared with English will give undue weight to arithmetic if its marks are added without modification to those for English in order to produce the order of merit in the entrance examination. Now, for all those who do not take Latin, mathematics is compulsory in most matriculation examinations : and a good many pupils who do take Latin rely on mathematics to provide the essential credit in the Science group of subjects. Hence the special importance of mathematics for matriculation as compared with School Certificate may provide a closer link with the entrance examination where arithmetic is emphasised. For although the abilities for arithmetic, algebra, and geometry are by no means identical, they are more closely allied than say arithmetic and languages, and, still more important, the mathematics in the matriculation examination includes arithmetic.

Then again, as suggested in the text (Chapter VI), the entrance examination in English, arithmetic, and intelligence tests gives great scope for the display of general intelligence, but little for specific abilities required for some secondary-school subjects. Now in matriculation a credit standard is required in five subjects, representing at least three different groups. It is possible that general ability becomes of greater importance relative to specific abilities, in gaining the higher positions in various subjects : that is, that to score between 50 per cent. and 60 per cent. in a language or a Science depends relatively more upon a general function or functions than does the attainment of a mere pass at 40 per cent., for which some specific abilities may compensate more for weakness in a general function or functions. I do not say there is any evidence for this ; I merely suggest it as a possibility. Obviously much will depend upon the type of questions set—the presence or absence of a few questions requiring a high degree of a general function (whether one ‘g’ or a wide group factor).

Again, it is also possible that certain compulsory subjects for matriculation (Latin or mathematics) may themselves require for success relatively greater *general* capacity than do the other subjects. But the evidence on this point is so far conflicting.

Finally, it must be borne in mind that even if the entrance examinations had been very reliable in predicting success in matriculation of the very pick of the entrants, that would not meet our main criticism that the entrance examinations are weak in discriminating low down in the pass list and especially near the border-line of failure.

I (e) CORRELATIONS OF ORDERS IN ENTRANCE EXAMINATION WITH SCHOOL CERTIFICATE EXAMINATION IN CENTRE J

	Year of Entry	Length of Course	Number of Pupils	Correlation Coefficient
School 1 (boys) .	1923	4 years	18	0.58
	1924	4 years	23	0.36
	1925	4 years	34	0.39
School 2 (boys) .	1924	4 years	18	0.39
	1924	5 years	27	0.51
	1926	4 years	30	0.46
	1927	4 years	21	0.46
School 3 (boys) .	1923	4 years	19	0.33
	1924	4 years	24	0.27
	1924	5 years	19	0.18
School 4 (girls) .	1923	4 years	20	0.32
	1924	4 years	24	0.11
	1927	4 years	23	0.44
School 5 (boys) . . .	1923	4 years	19	0.28
School 6 (girls) . . .	1924	5 years	19	0.44
School 7 (boys) . . .	1923	5 years	21	0.19
	1925	4 years (A)	33	0.48
	1926	4 years	18	0.65
	1927	4 years	20	0.12
School 8 (boys) . . .	1924	5 years	23	0.43
School 9 (girls) . . .	1926	4 years	18	0.51
	1926	5 years	20	0.39
School 10 (boys) . . .	1926	5 years	19	0.60
	1927	4 years	24	0.68
School 11 (girls)	1926	4 years	46	0.35
School 12 (boys) . . .	1926	4 years	45	0.45

Boys 19 classes = 455 pupils. Rough average correlation, 0.41.
 Girls 7 classes = 170 pupils. Rough average correlation, 0.36.
 Total 26 classes = 625 pupils. Rough average correlation, 0.40.

I (f) CORRELATION OF 'ENTRANCE ORDERS' WITH 'BLENDED ORDERS' OF SCHOOL CERTIFICATE AND SCHOOLS' OWN EXAMINATIONS IN CENTRE J

	Year of entry	Length of course	Number of Pupils	Corrins. of entrance order with Sch. Cert. order.	Corrins. of entrance order with school order at S.C. stage	Corrins. of entrance order with blended S.C. and school order
School 3 . . .	1923	4 years	19	0.33	0.58	0.52
	1924	4 years	24	0.27	0.15	0.23
	1924	5 years	19	0.18	0.29	0.23
School 4 . . .	1923	4 years	20	0.32	0.53	0.50
	1924	4 years	24	0.11	0.07	0.06
	1927	4 years	23	0.44	0.54	0.46
School 5 . . .	1923	4 years	19	0.28	0.41	0.40
School 6 . . .	1924	5 years	19	0.44	0.16	0.31
School 7 . . .	1923	5 years	21	0.19	0.09	0.15
School 8 . . .	1924	5 years	23	0.43	0.32	0.39
School 9 . . .	1926	5 years	20	0.39	0.43	0.43
School 10 . . .	1926	5 years	18	0.57	0.60	0.59
	1927	4 years	22	0.67	0.79	0.75
School 12 . . .	1926	4 years	45	0.45	0.45	0.47
Average for 316 pupils				0.36	0.39	0.39

Note.—These classes were not, of course, specially selected. They were the only ones for which I obtained figures for both School Certificate and the schools' own orders, each based on 18 or more pupils.

I (g) CORRELATIONS BETWEEN ORDERS, IN A HIGH SCHOOL, OF BOYS OF 12 TO 13 YEARS AND THEIR ORDERS AT 17 TO 18 YEARS

Order at age 12-13 years, compared with order at 17-18 years :

1924 to 1929, $r = 0.77$ (14 boys).

Order at age 13-14 years, compared with order at 17-18 years :

1924 to 1928, $r = 0.79$ (19 boys).

1925 to 1929, $r = 0.80$ (22 boys).

Order at age 14-15 years, compared with order at 18-19 years :

1926 to 1930, $r = 0.78$ (19 boys).

The method of procedure was as follows : the boys of 12 years were found distributed in four forms—e.g. 1st, 2nd, and 3rd

(lower and upper), the order in each form being based on school examinations and the work of the year, all subjects being included, except mathematics. Each form order was now divided into three. This gave twelve different groups or positions, and each boy's group was noted. A similar procedure was followed for the same boys when they were 17-18 years old, these classes being Upper VI (which counted as one group only and was not divided), Lower VI, Upper V, and Lower V. This gave ten positions or groups. The number of boys in each of these forms was small, only one group containing over 20 boys. But the steadiness of the correlation about 0.79 is noticeable, and the total number of boys on which the average was based was 74. (For this correlation the Pearson Product-Moment formula was used.)

I (b) CORRELATIONS OF (a) ORDER AT END OF ONE YEAR IN SECONDARY SCHOOL WITH ORDER IN SCHOOL CERTIFICATE (CENTRE J), COMPARED WITH CORRELATIONS OF (b) ENTRANCE ORDER WITH SCHOOL CERTIFICATE

(THE NUMBER OF PUPILS IN EACH CLASS IS GIVEN IN PARENTHESES)

	Year of entry	Length of course	Corrln. of sch. order at end of one yr. with order in Sch. Cert.	Corrln. of order at entrance with order in Sch. Cert.
School 2	1924	4 years	0.46 (18)	0.39 (18)
	1926	4 years	0.68 (30)	0.46 (30)
	1927	4 years	0.69 (21)	0.46 (21)
School 3	1924	4 years	0.71 (24)	0.27 (24)
	1924	5 years	0.44 (19)	0.18 (19)
School 4	1923	4 years	0.75 (20)	0.32 (20)
	1924	4 years	0.76 (24)	0.11 (24)
	1927	4 years	0.47 (22)	0.44 (23) ¹
School 7	1925	4 years (B)	0.87 (23)	0.24 (23)
	1926	4 years	0.82 (18)	0.65 (18)
	1927	4 years	0.68 (20)	0.12 (20)
School 9	1926	4 years	0.68 (18)	0.51 (18)
	1926	5 years	0.76 (19)	0.39 (20) ¹
School 10	1927	4 years	0.84 (22)	0.68 (24) ¹
Average			0.69 (298)	0.37 (302)

¹ Certain pupils in these School Certificate classes were absent from the school examinations at the end of the first year.

I (i) AGE ALLOWANCES IN THE ENTRANCE EXAMINATIONS

In an examination with an age limit of say 11 ; 0 to 12 ; 0, it is obviously unfair to compare the examination marks of a child of 11 years 1 month with those of a child of 11 years 11 months, without giving the younger some age allowance. As an example of the effect of giving no age allowance, we may quote the results of an examination in a large city. In the 1923 entry for the preliminary examination in Manchester, the following numbers of candidates of different ages reached a 50 per cent. mark :

Age 11 : 11	.	.	.	.	.	.	451
Age 11 : 9	.	.	.	.	.	.	331
Age 11 : 6	.	.	.	.	.	.	234
Age 11 : 3	.	.	.	.	.	.	162
Age 11 : 0	.	.	.	.	.	.	108

(The numbers for intervening age months were similarly graded, with one slight exception.)¹

In order to make up to the younger child for his shorter time at work which prepares him for the examination, increasing numbers of centres give age allowances at their entrance examinations—only two of the centres we studied did not.

The intention is presumably so to adjust the age allowance as to give the 11-year-old an equal chance of competing with a 12-year-old of the same ability. If the age allowance compensates the 11-year-old adequately for his one year less schooling, then if he is an abler boy than the 12-year-old he will beat the 12-year-old and take his place in a vacancy in the secondary school.

In our enquiry the question at once arose : if there has been an age allowance for the order at entry, should we compare such an order with an order at School Certificate where there is no age allowance? I discussed this question with a group of four Headmasters, and we were finally unanimous in thinking that it

¹ Reported on p. 200 of *Examinations in Public Elementary Schools* (Report of the Joint Committee of Associations of Education Committees and the National Union of Teachers, London, 1930).

was proper and fair to keep the age allowance at entry in spite of there being none for the order four or five years later. The reasons which influenced us were as follows :

(1) A difference of twelve or even six months at about 11 years means a big difference in the length of tuition in the subjects of the examination in arithmetic and English ; whereas all start level within the secondary school as regards the new subjects ; and apart from that, six months more schooling is relatively less when two boys of 16 are compared (after say ten years at school) than it is when the boys are only 11—after five years at school.

(2) Apart from length of school life, six months' greater maturity at 11 is of relatively greater significance than it is at 16.

(3) In addition, the younger set of boys would often be grouped together for a five-year course while the older ones take a four-year course. This was the case in a considerable proportion of the classes which came under our view.

As a check on our decision, however, I obtained the entrance order *without* age allowance in nineteen classes (representing four of the centres), and then found the correlation of these orders with the orders in School Certificate. It averaged 0.32. For the same classes the correlation of School Certificate and entrance order *with* age allowance was 0.31. In two centres the correlation was slightly lower when age allowance at entry was ignored ; in one (the largest) the correlations were about the same ; in one centre the correlation was slightly higher without age allowance—but this was based on only one class.

Also in two other of our eight centres no age allowance was given ; so we may in any case safely regard our results as unaffected by the inclusion of age allowance even if one does not agree with the view expressed above—namely, that it is fairer to include the age allowance at entry.

Presumably the Heads of elementary schools would only recommend for admission to the entrance examination younger pupils who were thought at least as good *for their age* as the older ones. The tendency to present only pupils in given

classes would send forward young pupils who were really better (for their age) than the older. The correlation figure, however, suggests that such selection and pressing forward of young pupils of higher I.Qs. has not gone too far in the centres studied. For if the youngest at entrance were naturally much 'cleverer' they would gradually move up in the order of merit—passing some of the older who beat them in the entrance order when age allowance was ignored. This would tend to bring the order of merit at four years nearer to the order of merit at entrance *with age allowance*.

In comparing the order at entrance with order after *one* year only, the question of including age allowance is somewhat different. The extra six or even twelve months of maturity is relatively much greater at 11 years: the extra schooling before entry to the secondary school has also greater weight, though some important subjects at the secondary school are entirely or largely new to the pupils. Hence, in comparing entrance order with order after one year we have given (p. 87) correlations both with age allowance and without age allowance.

I (j) NOTE ON THE EFFECT OF SELECTION ON CORRELATIONS

If 1,000 children are well tested for intelligence, and 30 selected who are all of exactly the same I.Q., then in English and arithmetic tests these 30 would give no positive correlation, if the first selection by intelligence secures that a general (or group) factor is found to an equal degree in each of the 30; and if special ability in arithmetic tends to be given by a kind providence to those weak in English (and vice versa), there would be a negative correlation between the arithmetic and English, even though both may involve a general factor (or group factor) to a high degree.

But the kind of selection that occurs for entrance examinations is very different. At most all we do is to pick out the best, say 100 out of 500 candidates, or perhaps 2,000 out of 10,000 possible candidates, based on simple examinations, or examinations plus

mental tests. The fact that these are by no means even approximately equal in general intelligence is shown (a) by great difference in performance in mental tests of those just getting into any given secondary school (e.g. the range of scores for the intelligence tests for Centre J for 113 pupils recommended for admission into a typical school was from 101 to 45 in a typical year, the maximum being 120); (b) by the fact that high correlations *are* given by these pupils between two examinations in the second and third years in the secondary schools, and even between School Certificate order and schools' own examinations in the fourth and fifth years, when the process of selection has been carried farther by the lagging behind of those not able to reach the School Certificate class; and (c) by the high correlations between performance in school after one year with performance after four or five years.

Again, we found that even in the centres where the correlation between entrance examination and School Certificate order was practically nil, the correlation between school order in the fourth year and School Certificate was very high—about 0.8. Yet this was after further selection in some cases by division into four-year School Certificate course pupils and five-year course pupils, and after previous selection had taken place by the dropping out of some weaker pupils.

Finally, even if in any entrance examination it proved that the pupils selected for the secondary school were all of about the same capacity as judged by the entrance tests, we could have no confidence that those below this mark would be appreciably weaker, or that the examination was really serving its purpose.¹ And not only may some below the lowest level for admission be as good as those just above, but pupils approximately equal in capacity would be receiving, some free places and money awards, some free places only, others admission on payment of fees, and others admission subject to a further oral examination.

¹ The influence of selection is fully dealt with in *The Essentials of Mental Measurement*, by W. Brown and Godfrey Thomson, chapter vii.

I (k) THE RELIABILITY OF THE ENTRANCE EXAMINATION TO A JUNIOR TECHNICAL SCHOOL

As this book goes to press results are received from a junior technical school in another centre, which so far as they go confirm those given for Centres A to J.

The entrance examination to this technical school included arithmetic, English, a general knowledge paper, and in addition geometrical drawing. The boys were aged 13 years, and no age allowance was given. The papers were set and marked by the staff of the school.

A comparison has been made between the order of merit in the entrance examinations (for 1930 and 1931) to this technical school and the school's own orders of merit at the end of the first, second, and third terms.

The orders at the end of each term were based on the class work and the terminal examinations, in which the subjects were mathematics, English, technical drawing, history, geography, woodwork, metalwork, and German.

The correlations obtained were as follows (the numbers of pupils are shown in parentheses) :

	Correlation of Order at Entrance with Order at end of :		
	First Term	Second Term	Third Term
Group A . .	0.76 (22)	0.67 (22)	0.64 (22)
Group B . .	0.54 (24)	0.43 (24)	0.49 (24)
Group C . .	0.42 (22)	0.53 (22)	0.44 (22)
Group D . .	0.06 (22)	0.36 (23)	0.39 (23)
Group E . .	0.43 (23)	0.20 (23)	0.29 (23)
Average . .	0.40 (113)	0.44 (114)	0.45 (114)

The correlations were calculated by Spearman's footrule method (R), and converted to the product-moment coefficients (r) by means of a table.

It will be seen that the average correlation of the order at entrance with that at the end of the first year (third term) is only 0.45 for 114 pupils, a figure which is practically the same as that obtained for Centre J, viz. 0.46. For the four groups

A, B, C, and D, the orders for the fourth term were also obtained, and the average correlations of these with entrance order was practically identical with the average correlations for the second and third terms.

This entrance examination then proves no more reliable than some of the entrance examinations to secondary schools, although the candidates are somewhat more mature.

APPENDIX II—TO PART III

PERFORMANCES OF SCHOLARS AND NON-SCHOLARS IN THE UNIVERSITIES' DEGREE EXAMINATIONS

II (a) PROVINCIAL UNIVERSITIES

Performance of Scholars and Non-scholars (*Percentages only*) in Individual Universities (Arts and Science Combined)

	Universities						All Universities
	Class	A	B	C	D	E (1 year only)	
Scholars	I	25.2	30.7	26.1	27.4	34	27.4
	II	37.9	31.3	34.8	32.1	41	34.6
	III	8.4	3.1	7.4	10.1	2	7.1
	Pass	19.5	28.8	29.7	24.4	16	25.6
	Fail	9.0	6.1	2.0	6.0	7	5.3
No. of students represented		100.0	100.0	100.0	100.0	100	100.0
		190	163	299	168	44	864
Non-scholars	I	8.4	8.0	8.8	6.6	9	8.3
	II	27.6	31.8	18.6	26.8	22	24.9
	III	7.5	9.0	6.3	11.6	5	7.9
	Pass	35.0	36.8	52.8	31.8	47	42.0
	Fail	21.5	14.4	13.5	23.2	17	16.9
No. of students represented		100.0	100.0	100.0	100.0	100	100.0
		214	299	430	198	83	1,224
Scholars and Non-scholars combined	I	15.3	16.0	15.9	16.1	18.1	16.2
	II	32.5	31.6	25.2	29.2	28.3	28.9
	III	7.9	6.9	6.7	10.9	3.9	7.6
	Pass	27.7	34.0	43.4	28.5	36.3	35.2
	Fail	15.6	11.5	8.8	15.3	13.4	12.1
No. of students represented		100.0	100.0	100.0	100.0	100.0	100.0
		404	462	729	366	127	2,088

II (b) CAMBRIDGE UNIVERSITY TRIPOS EXAMINATIONS, PARTS I AND II

Frequency of Class Awards—Firsts, Seconds, or Thirds, in the various Triposes (Men students only),

Tripes, Part I

	Classics	Mathematics	Modern Languages	Natural Sciences	Mechanical Sciences	Theology	Geography	History	Law	English	Economics
Class 1	53.5%	48.2%	22.5%	21.3%	19.9%	15.1%	13.4%	10.8%	8.6%	8.4%	2.9%
Class 2	30.9%	29.0%	46.0%	43.1%	31.6%	43.4%	32.7%	48.6%	32.7%	50.0%	35.5%
Class 3	15.6%	22.8%	31.5%	35.6%	48.5%	41.5%	53.9%	40.6%	58.7%	41.6%	61.6%
No. of students	243	325	302	568	297	53	52	406	220	166	138
Average class	1.62	1.74	2.09	2.14	2.28	2.26	2.40	2.30	2.50	2.33	2.58

Tripes, Part II

Class 1	55.0%	50.3%	25.4%	31.3%	—	—	—	13.1%	8.3%	—	4.8%
Class 2	29.2%	33.1%	55.6%	48.6%	—	—	—	59.5%	35.2%	—	49.4%
Class 3	15.8%	16.6%	19.0%	20.1%	—	—	—	27.4%	56.5%	—	45.8%
No. of students	120	157	63	179	—	—	—	244	278	—	83
Average class	1.61	1.66	1.94	1.89	—	—	—	2.14	2.48	—	2.41

The figures given include all students (Scholars, Exhibitioners, and Commoners) for the same five colleges and for the eight years on which all the other tables in the text are based.

Pass Degrees at Cambridge.—For the sake of comparison with provincial universities it should be noted that about one-third of the degrees taken at Cambridge are pass degrees, almost all being taken by Commoners.

Figures kindly supplied by the Registry of Cambridge University show that of 8,738 B.A. degrees (in Arts and Science) conferred during the seven academic years 1922–1923 to 1928–1929, 5,560 or 63.7 per cent. were honours degrees, and 3,178 or 36.3 per cent. were ordinary or pass degrees.

II (c) CAMBRIDGE TRIPOS EXAMINATIONS, PART I. (ALL SUBJECTS.) AVERAGE CLASS AND SUPERIORITY INDICES FOR THE FIVE RESPECTIVE COLLEGES

	A	B	C	D	E	Total
<i>Average Class :</i>						
Scholars	1.15	1.40	1.29	1.31	1.42	1.31
Exhibitioners	1.45	1.65	1.84	1.82	1.72	1.72
Commoners	2.42	2.36	2.52	2.36	2.38	2.40
<i>Superiority Index :</i>						
Scholars/Exhibitioners	1.26	1.18	1.43	1.39	1.21	1.31
Scholars/Commoners	2.10	1.68	1.95	1.80	1.67	1.83
Exhibitioners/Commoners	1.67	1.43	1.37	1.29	1.38	1.39
Years of examinations {	1922-8 incl.	1922-9 incl.	1922-9 incl.	1922-9 incl.	1922-9 incl.	

Note.—It was no part of the object of this enquiry to consider the relative performances of different colleges. Nor must the figures given above be taken as an exact representation of the degree of difference between Scholars (etc.) of different colleges. To do this we should have to ask whether a larger proportion of Scholars in, say, College A took the mathematical or classical tripos (in which firsts are frequent) than in other colleges. And analysis did show this was the case for Scholars of College A—though not for the Exhibitioners. Again, College B is reputed to send a particularly large proportion of its students in for the natural sciences tripos, in which, as is shown in the preceding table (Appendix II (b)), firsts are far less frequent than in classics or mathematics.

II (d) PERFORMANCE IN PART II OF TRIPOSES TAKEN IN A DIFFERENT SUBJECT FROM THAT IN PART I

Performance in Part I		Performance in Part II							
		Class I		Class II		Class III		Total	
		No.	Per-centage	No.	Per-centage	No.	Per-centage	No.	Per-centage
Class I	Scholars	11	32	21	62	2	6	34	100
	Exhibitioners	5	50	5	50	0	0	10	100
	Commoners	2	20	8	80	0	0	10	100
	Total	18	33	34	63	2	4	54	100
Class II	Scholars	3	19	5	31	8	50	16	100
	Exhibitioners	1	4	17	68	7	28	25	100
	Commoners	6	8	45	56	29	36	80	100
	Total	10	8	67	56	44	36	121	100
Class III	Scholars	0	—	2	—	0	—	2	—
	Exhibitioners	0	—	0	—	1	—	1	—
	Commoners	2	2	37	40	53	58	92	100
	Total	2	2	39	41	54	57	95	100

II (e) THE GENERAL ABILITY INVOLVED IN CLASSICS AND MATHEMATICS

One sometimes hears the statement that a man who is good in classics or mathematics can do anything well; and it is sometimes suggested that he has better all-round ability than those who do well in other subjects.

Although this interesting topic does not come strictly within the scope of our enquiry, its investigation was taken up, as much of the relevant statistical material was already available.

The table below gives the later performance of men, who, having gained a first class in Part I of the classical or the mathematical Tripos at Cambridge, subsequently took a different subject for their next examination (either a Tripos Part I or Part II). For purposes of comparison similar data are also shown for those who gained a first class in Part I of other subjects than classics or mathematics.

LATER PERFORMANCE IN A DIFFERENT SUBJECT OF MEN GAINING A FIRST CLASS IN TRIPOS PART I

Original Subject in which a First Class was gained	Performance in New Subject				
	Number of Students gaining			Total	Average Class gained
	1st Class	2nd Class	3rd Class		
Classics . . .	23 = 36%	35 = 56%	5 = 8%	63	1.71
Mathematics . .	51 = 46%	49 = 45%	10 = 9%	110	1.63
Other subjects .	25 = 42%	31 = 53%	3 = 5%	59	1.63

Note.—The figures include all the cases in the five selected colleges over a period of seven years (viz. 1922–1928, the years in which the first Tripos was taken), and most of the cases in the other colleges of the university over a period of nine years (1921–1929). The difficulties of tracing the later performance of *all* first-class students in the latter colleges rendered a complete list impossible, but those included probably represent more than three-quarters of the total, and of course are in no way selected.

The numbers given above are not very large, but they suggest that a first in classics or mathematics, though almost an invariable guarantee of success in a new subject, is no greater guarantee than is a first in Triposes other than classics or mathematics.

When regard is paid to the time taken in preparation for the new subject, the performance of men who took a first in subjects other than classics or mathematics is still more meritorious ; for while 71 per cent. of such students (in ' other ' subjects) took their new subject *one* year after Part I of the Tripos, only 61 per cent. of the classics men and no more than 10 per cent. of the mathematics men took only one year, the remainder all taking two years.

This superiority cannot be attributed to the taking of Part II (rather than Part I) in the new subject by a smaller proportion of the ' other subjects ' men : for analysis showed that while 65 per cent. of these took a Part II examination, only 61 per cent. of the classics and 41 per cent. of the mathematics men did so, the remainder all taking Part I in their new subject.

Furthermore, 75 per cent. of the mathematics men took as their ' new ' subject either Natural or Mechanical Sciences, usually closely allied to the first subject taken. The ' new ' subjects taken by the other students were more varied and would usually differ more from the first subject taken.

Classics and ' other subjects ' men took a very similar range of studies for their second subjects.

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