

## Notes Relating to Marks in Examinations for Bodily Efficiency

### Publication/Creation

c1889

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The Civil Commissioners say in their Report of this year that... It is not easy to imagine a topic more suitable for the notice of the anthropological Section than that which is suggested by these remarks of H. M. Commissioners. Anthropologists are ~~not~~ peculiarly concerned themselves with the practice of human measurements, and <sup>in discussing</sup> the most appropriate ways of discussing them. They occupy themselves with defining the bodily efficiency of <sup>individuals</sup> races, and in devising tests to determine whether <sup>the</sup> ~~physical~~ development proceeds normally. The curious disregard of bodily efficiency in those examinations by which youths are selected to fill posts in ~~the~~ which bodily powers happen to be very desirable, must strike the attention of anthropologists with especial force, and they of all persons, are best able to appreciate how much is sacrificed by the neglect.

As the opinion of the military authorities which is quoted above <sup>is</sup> be interpreted to mean that ~~an~~ <sup>literary</sup> ~~examination~~ <sup>of the</sup> ~~of~~ indirect tests of bodily efficiency, <sup>it can</sup> ~~be shown~~ <sup>that</sup> ~~that~~ view is erroneous. <sup>They have been</sup> a vast amount of lax assertion in this tide and on that; some saying that high intellect is ~~not~~ commonly associated with a stunted and weak frame, and others quoting ~~selected~~ instances of high mental and high physical powers being associated together, but we have <sup>not</sup> length <sup>yet</sup> a firm basis of facts. These are the <sup>measurements</sup> ~~observations~~ that ~~have~~ been made during the last two or three years of Cambridge Students, and discussed in an excellent memoir <sup>by</sup> ~~by~~ D. Venn (Journ Anthropol, Inst, vol 10 p 28). The numbers <sup>of</sup> ~~measured~~ <sup>at</sup> ~~at~~ 1895, and they were divided into ~~the~~ three classes, 1) high honor men, 2) low honor men, and 3) ~~of~~ <sup>of</sup> ~~men~~ <sup>men</sup>, that is to say, those who did not compete for honors, but had offered themselves for <sup>merely</sup> an ordinary pass degree. Each person was measured in many different ways with the result that the result was that the physical efficiency of the three classes <sup>was</sup> ~~was~~ the same <sup>both</sup> in ~~the~~ <sup>its</sup> average <sup>figure</sup> and the same in its distribution, except that ~~there~~ <sup>was</sup> a slight inferiority <sup>especially</sup> in eyesight among the high honor men. There was just as much variety in bodily efficiency among the high honor men as among the rest & therefore the fact that a man ~~has~~ <sup>has</sup> succeeded in an ~~examination~~ <sup>examination</sup> ~~after~~ <sup>after</sup> ~~the~~ <sup>the</sup> ~~examination~~ <sup>examination</sup> does not give the slightest clue to the character of his physical powers. <sup>It seems</sup> <sup>more</sup> efficient <sup>control</sup> <sup>is</sup> <sup>found</sup> if note <sup>had</sup> <sup>been</sup> taken of this fact, and <sup>also</sup> <sup>of</sup> <sup>an</sup> <sup>other</sup> <sup>use</sup> <sup>namely</sup> that the difference intellectually <sup>is</sup> <sup>very</sup> <sup>small</sup> between the candidates whose places <sup>are</sup> <sup>not</sup> <sup>at</sup> <sup>a</sup> <sup>great</sup> <sup>distance</sup> either above or below the dividing line between success and failure. The state

would be almost equally well served, as regards their intellectual capacity, whether the selected men were taken at random from among these or as they are now.

They would ~~all be~~ <sup>are</sup> ~~much~~ <sup>are</sup> on a par, so far as their intellectual capacity ~~is~~ <sup>is</sup> concerned, to make good servants to the state, but in their bodily powers they ~~must~~ <sup>are</sup> be very diverse. ~~Therefore it is~~ <sup>Therefore it is</sup> ~~to be~~ <sup>to be</sup> ~~most~~ <sup>is</sup> ~~reasonable~~ <sup>reasonable</sup> that ~~marks~~ <sup>marks</sup> for physical efficiency should be given ~~in order to~~ <sup>in order to</sup> ~~make~~ <sup>make</sup> the most ~~efficient~~ <sup>efficient</sup> ~~selection~~ <sup>selection</sup>. The result <sup>of these marks</sup> would be that among the candidates whose ~~marks~~ <sup>marks</sup> in the present examination system would be ~~likely~~ <sup>likely</sup> to replace ~~them~~ <sup>them</sup> ~~whose~~ <sup>whose</sup> ~~marks~~ <sup>marks</sup> for bookish work ~~just~~ <sup>just</sup> saved them from failure, ~~to~~ <sup>to</sup> advocate no more at present ~~than~~ <sup>than</sup> ~~to~~ <sup>to</sup> introduce ~~marks~~ <sup>marks</sup> ~~in~~ <sup>in</sup> ~~the~~ <sup>the</sup> ~~examination~~ <sup>examination</sup> ~~system~~ <sup>system</sup> ~~for~~ <sup>for</sup> physical efficiency, ~~selecting~~ <sup>selecting</sup> ~~those~~ <sup>those</sup> ~~performances~~ <sup>performances</sup> that are ~~likely~~ <sup>likely</sup> to be tested as for breathing capacity, strength, agility, keenness of eyesight ~~and~~ <sup>and</sup> ~~of~~ <sup>of</sup> hearing. The principles on which ~~the~~ <sup>the</sup> ~~marks~~ <sup>marks</sup> should be given, will be explained in another memoir and need not be considered now. It is sufficient to recollect that statement of H. M. Commissioners that they ~~as~~ <sup>as</sup> who are experts in the ~~art~~ <sup>art</sup> of conducting examinations, ~~see~~ <sup>see</sup> no difficulty in examining for bodily efficiency, and that ~~any~~ <sup>any</sup> ~~pedantic~~ <sup>pedantic</sup> or fanciful system is ~~scarcely~~ <sup>scarcely</sup> possible, now that athletics form so large a part of school and college life. ~~Even~~ <sup>Even</sup> ~~the~~ <sup>the</sup> ~~examiners~~ <sup>examiners</sup> ~~themselves~~ <sup>themselves</sup>, or at all events the circle of their ~~former~~ <sup>former</sup> ~~students~~ <sup>students</sup> ~~and~~ <sup>and</sup> ~~intimate~~ <sup>intimate</sup> ~~friends~~ <sup>friends</sup> ~~are~~ <sup>are</sup> ~~permeated~~ <sup>permeated</sup> with the spirit of athleticism ~~and~~ <sup>and</sup> ~~could~~ <sup>could</sup> well be trusted to shape the tests and methods of examination for bodily efficiency in a reasonable manner, both reasonably ~~and~~ <sup>and</sup> ~~with~~ <sup>with</sup> ~~caution~~ <sup>caution</sup> at first and gradually ~~to~~ <sup>to</sup> ~~increase~~ <sup>increase</sup> ~~the~~ <sup>the</sup> ~~thoroughness~~ <sup>thoroughness</sup>.

My motive for bringing this letter before the Brit. Assoc. is to ~~obtain~~ <sup>obtain</sup> ~~and~~ <sup>and</sup> ~~to~~ <sup>to</sup> ~~stimulate~~ <sup>stimulate</sup> ~~those~~ <sup>those</sup> ~~parents~~ <sup>parents</sup> who ~~now~~ <sup>now</sup> ~~become~~ <sup>become</sup> ~~the~~ <sup>the</sup> ~~disadvantaged~~ <sup>disadvantaged</sup>. Judging from the many private inquiries I have made, I entertain no doubt that if the ~~feasibility~~ <sup>feasibility</sup> and reasonableness and ~~feasibility~~ <sup>feasibility</sup> of the ~~proposed~~ <sup>proposed</sup> ~~reform~~ <sup>reform</sup> were ~~publicly~~ <sup>publicly</sup> ~~widely~~ <sup>widely</sup> ~~appreciated~~ <sup>appreciated</sup> a demand would arise on all sides for the introduction of so salutary a ~~reform~~ <sup>reform</sup>. Certainly not ~~left~~ <sup>left</sup> from the parents of vigorous youths whose athletic gifts, health & vigour are remarkable but whose chance in ~~the~~ <sup>the</sup> ~~a~~ <sup>a</sup> ~~competitive~~ <sup>competitive</sup> ~~examination~~ <sup>examination</sup> based as it is ~~as~~ <sup>as</sup> ~~now~~ <sup>now</sup>, wholly upon ~~head~~ <sup>head</sup> ~~work~~ <sup>work</sup> is ~~scarcely~~ <sup>scarcely</sup> ~~questionable~~ <sup>questionable</sup>, when it is dependent

intended to first see:

The remarks about to be made do not refer to the pass-examination now made by medical examiners in order to eliminate those who in their opinion are absolutely unfit. It is necessary for this is obvious. But ~~it~~ <sup>it</sup> ~~is~~ <sup>is</sup> ~~urged~~ <sup>urged</sup> ~~to~~ <sup>to</sup> ~~give~~ <sup>give</sup> ~~marks~~ <sup>marks</sup> ~~to~~ <sup>to</sup> ~~those~~ <sup>those</sup> ~~who~~ <sup>who</sup> ~~are~~ <sup>are</sup> ~~not~~ <sup>not</sup> ~~only~~ <sup>only</sup> ~~fit~~ <sup>fit</sup>, but also especially fit, so far as bodily efficiency is concerned.

Section H.]

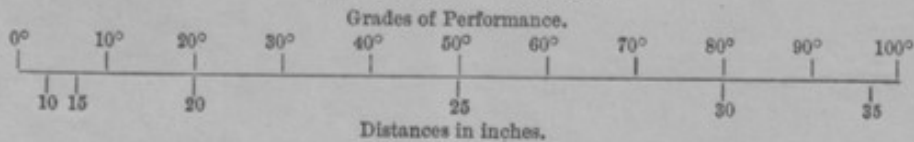
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*On the Principle and Methods of assigning Marks in Examinations on Bodily Efficiency.* By FRANCIS GALTON, F.R.S.

Two separate considerations are involved in the just determination of a scale of marks, which are usually mixed up in unknown proportions. (1) Absolute performance—on the principle that if the daily output of one man is greater than that of another, he should be more highly paid, or marked, in that proportion. (2) Relative rank—on the principle that superiority, however small, ensures success in competitions, and therefore the order of merit deserves recognition independently of the absolute amount of performance. The following diagram shows the ease

*Keeness of Eyesight, measured by the greatest distance in inches at which Diamond Type can be read.*



with which relative rank can be determined on a scale of grades running from 0° to 100°. It is deduced by interpolation from the table of Percentiles, which was derived from measures of males aged 23-26, made at the author's anthropometric laboratory at the International Health Exhibition of 1884 ('Journ. Anthrop. Inst.,' 1885). Though it refers to keeness of eyesight only, the form of the diagram is of general application. Many others were exhibited. When the quality in question has to be considered, not independently, but in connection with some other quality—for instance, as breathing capacity in reference to stature—a page had to be used for the diagram instead of a line. The page consists of a sufficient number of separate lines, each calculated for a different stature, in order. Then 'isograms' are drawn from above downwards to connect all entries of the same value, on the same principle as isobars, isotherms, &c., to which the general name of isogram might conveniently be applied.

A strong reason for giving prominence to rank is, that in many cases it affords the only feasible measure. The degrees of absolute performance corresponding to the various grades of rank may then be approximately reckoned by help of the tables of the calculus of probabilities. A small table by the author ('Journ. Anthrop. Inst.,' 1889) is very convenient for doing this.

The general conclusion is, that before proceeding to decide on scale of marks numerous measures should be discussed, made of persons of the same age and social class as the candidates, so that the quality of the men hereafter to be dealt with shall be statistically determined. The next step is to decide upon the relative weights to be allowed for absolute performance and for relative rank. Then, after a few other obvious preliminaries have been settled arbitrarily, consistent scales of marks could be at once drawn up.





As far as the complaints relate to this Commission, it is allowed that the influence of our examinations on education is only indirect, and the objection made to them rests mainly on the ground that the principle of competition is encouraged by Government example. It is obviously impossible for us to meet indefinite statements of this kind with the same specific evidence which we have opposed to the two other charges. We apprehend, however, that to prove that our examinations are operating to the injury of education, it must be shown either that they are disturbing the general course of education as pursued in schools and universities, or that they encourage a superficial and illiberal method of study. We have not observed in the arguments advanced against our system anything more than general assertions on either of these points, but deeming it to be expedient that the subject should be thoroughly understood, we propose to show in some detail the principles on which some of the most important of our schemes of examination have been founded, and to indicate their educational effect. It should be clearly understood that in following this course we are not seeking to refute objections, but rather to throw light, through the history of this Commission, on a question which is undoubtedly of public importance.

In the case of subordinate appointments in the Civil Service (including situations such as those of Postmen, Office-keepers, Messengers, Warders, and the like) the principle of open competition, as might have been expected, has rarely been applied, and the functions of the Commission (as far as the literary test is concerned) are limited to determining whether the candidates, who are nominated by the Departments, have sufficient knowledge of the elements of education to enable them to discharge their official duties. The Order in Council of 4th June 1870 provides that the rules applicable in each case shall be settled, subject to the approval of the Treasury, by the Civil Service Commissioners and the chief authorities of the Department concerned.

In 1886\* 5,001 persons were examined for situations of this character, the examination, as a rule, being confined to reading, writing, spelling, and the elements of arithmetic.

Situations such as those of Temporary Labourer, Artificer, and the like, having in many cases been placed in Schedule B. of the Order in Council of June 4th, 1870, no examination is required.

There are also a certain number of situations, the schemes of examination for which have been framed with reference to a middle class or commercial standard, which for various reasons have not been included in Schedule A. of the Order in Council of June 4th, 1870, and are consequently not filled by open competition. Thus in 1886 1,045 persons were examined

\* The statistics in what follows have, as a rule, been taken from 1886 and 1887, as 1888, owing to the suspension of examinations, cannot be regarded as a normal year.



It must, however, be admitted that in some way or another from avoidable or from unavoidable causes the competitive examination has something to do with the production of albuminuria. For whilst the urine ascertained to be healthy before the commencement of the examination, becomes frequently during the course of it albuminous, it ceases to be so in nine cases out of ten within a month or two of the close of the competition.

A knowledge of the future course of health experienced by temporary albuminurics would prove inexpressibly valuable to the art of medicine, and I venture to commend the subject to the consideration of the Commission.

It is, I think, especially worthy of notice that during the probationary period, lasting for two years from the date of the first examination, the great majority of the candidates improved in growth and development, in strength, in general health, and in mental capacity.

Among those who lost ground, the chief causes of failure appeared to be found in disobedience to the common laws of health, and especially in the use of tea, coffee, alcohol, and tobacco, not as helps to health but as mere spurs to work.

A critical review of my experience of the medical examinations for the Civil Service in India leads me to the conclusion that there is nothing in the work required of the candidates necessarily injurious to health; and that if done, as it ought only to be done, under just conditions of health, it will be found to favour the development and augment the energies of the physical and mental constitution.

I have the honour to be,

Sir,

Your faithful Servant,  
ANDREW CLARK, M.D.

With regard to the health of candidates for the Army, as we do not hold the medical examinations we have no statistics from which to draw a conclusion. The following facts, however, are sufficient to prove that the experience of the Military Services does not differ from that of the Civil Service. It was thought advisable, some years ago, to consider the possibility of making physical qualifications an element in the competitions for entrance into Woolwich and Sandhurst, and a joint committee of this Department and the War Office drew up a scheme of competition which seemed easy of application. Circumstances caused it to be laid aside at the time, but, on our recently bringing it again under the notice of the War Office, we were informed that the military authorities did not think it necessary to introduce such a competition, being completely satisfied with the physique of the young men who came to them through our examinations. At the same time we may state that should any department in the public service be desirous of testing the physical qualifications of its officers more severely than at present, we anticipate that there would be no more difficulty in determining the relative capacities of the individual candidates in this respect than is experienced in the literary examination. Moreover, encouragement would be given generally to candidates to maintain a good state of health while preparing for the literary examinations, and any tendency to over-pressure would thereby be diminished.

(3.) As to the statement that competitive examination for admission into the public service exercises an injurious effect upon the education of the country:—