

47 Introduction and Application of Multistage Compound Progressive Score Method in Grading of Physical Value

B. Yun

Physical education department, Zhejiang University, Hangzhou, China, shenguosai@163.com.

1 Introduction

Multistage compound progressive score method is based on the foundation of progressive score method, which is a more scientific and rational method that can harmonize the range of quantified – increasing with the score increasing of the hardness distribute cent. Not only can it manifest that more hardness means more pay of strive, so that the notion of getting higher grade according to it, but also avoid the situation that the grade appears on the high side or on the low side with the simple progressive score method. And it also can avoid either that the over hardness of getting the excellence grade or getting the high score even with efforts, because of the relevant items which is over high, thus making people lose their enthusiasm. We thought there are several unreasonable points, with the analysis of point table in the “State Physical Culture Eligibility Standards” decreed by the State physical culture Commission and The State education Commission, which is pushed to all levels and all kinds of schools. The first: the arrange of grade elevation, i. e. in the 100m point table of nineteen year old or over mankind, it is the different hardness from 18"2 to 17"9 which is improved 0"3 and from 12"8 to 12"5 which is improved the same, but these two are all offered 5cents. The second: taking low and ignoring the high, i. e. in the shuttle run of the five – grade schoolboy of the elementary school, the score of 1'29" which is between 1'30" (85 point) and 1'28" (90 point) was kept the lower – 85 cents, which does not manifest the quantified scientific. The third: poor flexibility. With the analysis of the situation of reaching the mark in many schools, the excellence rate of the pupil real getting is very low. In the article, we will introduce a new, scientific and practical grading method – multistage compounds progressive point – score, to make the grading method in physical culture of our country more scientific, rational and standardized.

2 Methods

2.1 Participants

The 1000m running score of the nineteen years old nationality schoolboy

from 30 provinces, municipality and municipality directed under the central authority all over the country declared with the investigation of the pupil's constitution all over the country, totally 5604 persons.

3 Research technique

3.1 Testing and collecting the relevant data, and then figuring its mean ($\bar{x} = 231.71$), standard deviation ($s = 20.35$) and effective number ($N = 5604$) up.

3.2 Listing D value list

When grading the physical culture grade, it is based on position (namely D value) of each score to figure the points up. But the Value means the position according to the standard deviation for unit on the axis of abscissa of normal curve, and because of the symmetrically arrayed with the mean of hub. In order to make the points calculated reflect the hardness of the athletic performance improved much better, we must lie our D value list which reflecting their positions (Table 1).

Table 1. D value list

	S	-5S	-4S	-3S	-2S	-1S	0	1S	2S	3S	4S	5S
$\pm 5S$	D	0	1	2	3	4	5	6	7	8	9	10
	S		-4S	-3S	-2S	-1S	0	1S	2S	3S	4S	
$\pm 4S$	D		0	1	2	3	4	5	6	7	8	

The area inside the $\pm 5S$ occupies the total area 99.99995% , but the area inside $\pm 4S$ occupies the total area 99.99366% . At the practice of physical culture, the width expanse of the $\pm 5S$ curve impacts the balance ship between the curvature changing and the grade progressing. And the parallelism relationship is not so good too. Comparing with the $\pm 5S$ curve, the $\pm 4S$ curve is more practicable.

3.3 Calculating the parallelism proportion that the D value demanding

3.3.1 Confirm the basic point (0 point) and full mark point (100 point)

Confirm the position of $x \pm 1.5s$ (negative correlation means $x - 1.5s$, positive correlation means $x + 1.5s$) is 100 points, so the 100 points is: $231.71 - 1.5 * 20.35 = 201.185$ (second); the position of $\bar{x} \pm 3s$ (negative correlation means $x + 3s$, positive correlation means $x - 3s$) is 0 point, so the 0 point is: $231.71 + 3 * 20.35 = 292.76$ (second).

3.3.2 Calculating the all right rate and the pass muster rate

According to the subject investigated and the object actuality, by the deliberation of the "Delphi method" body of experts, they study out impersonality

the rational excellence rate and pass muster rate. In this case, the excellence rate (90 – 100points) is intended to be 10% , and the rate (60 – 69points) is intended to be 90% .

3.3.3 Calculating the all right rate and the middling rate

According 1.5s, excellence rate and pass muster rate, adopting the backward, calculate the proportion that the area of all right rate (80 – 90points), middling rate (70 – 79points) occupy the total area See Table 2.

Table 2. The list of excellence, all right, middling, pass

Points	proportion	area	positive value	difference deviation	
100			1.5	5.5	
90	10%	50% – 10% = 40%	1.28	5.28	0.22
80	20%	50% – 20% = 30%	0.84	4.48	0.44
70	42.86%	50% – 42.86% = 7.14%	0.18	4.18	0.66
60	90%	50% – 90% = –40%	–1.28	2.72	1.46
0			–3	1	1.72

The calculation procedure of the value in list 3 is as followings:

(1) Calculate: $D1 = 4 + 1.5 = 5.5$; (2) According to the proportion – 10% ,get the area, by checking the list that the positive value is 1.28. $D2 = 4 + 1.28 = 5.28$; (3) Calculate the deviation between D1 and D2 ,getting the value 0.22; (4) Calculate the D3 value, subtracting the deviation between D1 and D2 from D2 ,namely $D2 = 5.28 - 0.22 = 4.84$; (5) $D4 = 4.84 - (5.28 - 4.84) = 4.84 - 0.66 = 4.18$; (6) The positive value of D3 and D4are 0.84 (4.84 – 4) ,0.18(4.18 – 4) ; (7) Check the positive value in the list to get the area, 30% and 7.14% ; (8) After calculation, get their proportions are 20% and 42.86% ; (9) It is same to get the D5’s and D6’s values; (10) $D6 = 4 - 3 = 1$.

3.4 Calculating Zi” Ki’

According the parabola formula: $y^2 = Ki * Di^3 - Zi$ and the points in list of D value, solute the equation and get the list of Zi’s, Ki’s value (Table 3)

Table 3. Zi, Ki value

Point	100	90	80	70	60
Ki	99.0678	50.2690	37.1790	24.5696	188.2486
Zi	6483.8978	700.5083	–2184.6397	–3105.5707	188.2486

(in the formula is progressive fraction for coefficient, for the position of a certain grade at axis of abscissa of the normal curve for the left hand fraction of the basic score point)

3.5 making the point table

According the formula $= x \pm sx ((y2 + s2)/k - 4)$ (positive correlation for “+” negative correlation for “-”) and the 1000 m running mean score of the nineteen year old Han nationality schoolboy declared with the investigation of the pupil’s constitution all over the country in 1995 ($\bar{x} = 231.71$), the standard deviation ($S = 20.35$), and the calculated Z_i, K_i , with the standard like this: excellence (90 – 99 points), all right (80 – 89 points), fail (0 – 59 points), and with the calculation of software package – excle2000, we get the points and the points list (Table 4).

Table 4. The 1000m running score of the nineteen year old school boy

score	time	1/10 s	score	time	1/10 s
100	3:21.19	3:21.2	45	4:26.84	4:26.9
95	3:23.44	3:23.5	40	4:30.02	4:30.1
90	3:25.67	3:25.7	balance	6.28	
balance	4.48		35	4:33.27	4:33.3
85	3:30.08	3:30.1	30	4:36.59	4:36.6
80	3:34.62	3:34.7	balance	6.57	
balance	8.92		25	4:39.97	4:40.0
75	3:41.07	3:41.1	20	4:43.36	4:43.4
70	3:48.05	3:48.1	balance	6.77	
balance	13.43		15	4:46.67	4:46.7
65	4:00.43	4:00.5	10	4:49.66	4:49.7
60	4:17.76	4:17.8	balance	6.3	
balance	29.71		5	4:51.90	4:51.9
55	4:20.72	4:26.9	0	4:52.76	4:52.8
50	4:23.74	4:30.1	balance	35.0	
balance	5.98				

4 Results

According to the table 4, when the score is from 60 to 70, the grade add 1 cent as improve 2:971; when the grade is from 70 to 80, the grade add 1 cent as improve 1:343; when the grade is from 80 to 90, the grade add 1 cent as improve 0:448. It is also concluded that the improvement of grade and the increase of difficulty are closely related to each other according to the grade from 1 – 10 – 20 – 30 – 40 – 50 – 60. With the increase of the difficulty, the point value will build up. It is a scientific and rational method; with the purpose to get the appraisalment in conform to objective law, that difficulty increase and improvement of homologous point value can be incarnated in the term of grade and score corresponding.

5 Conclusions

(1) Progressive score grade means adopt one parabolic form, which is incapable of incarnating the grade bump and wake point value on speaking terms. While multistage compound progressive score grade means was on the basis of grade point, adopting time after time parabolic form, incarnate the grade difficulty and eke homologous point value on speaking terms.

(2) Excellence rate (score 90 – 100) and check out rate (score 60 – 69) of certain sports evaluation item can be judged and confirmed by the specialists, and all right rate (score 80 – 90), middling rate (score 70 – 79) can be calculated with the backward methods. In this way, the problem of inadaptability between improvement of certain section grade and incremental point value during multistage compound progressive score can be solved better.

(3) It is the demand and necessary trend of the evaluation development that scientific and rational grade approach can be used to conform to athletic sports objectively and factually with quantify appraisalment. However, our national physical evaluation appraisalment still stagnate during isometric (grade) given detached valuation models in a great many aspect, which can not adapt with the development of our physical evaluation. Some irrationality or unscientific contradiction available in the process of physical evaluation appraisalment can be solved preferably by multistage compound progressive score means, thereby improve the quality of physical evaluation appraisalment continually.