

Age and Peak Performance¹

by Dr. Ursula Weiss



Nowadays, world swimming records are being broken by mere schoolgirls. In other sports too, peak performances are achieved at an increasingly early age, with the result that the age at which young hopefuls start serious training is becoming younger and younger.

What is the most favourable age for peak performances in any given sport? What are the limits, what is the optimum range?

In order to go into these questions a little more deeply, we analysed the ages of competitors at the Munich Olympic Games in 1972, restricting our investigation however to the events in which both men and women were represented in a comparable manner.

For our enquiry, we worked on the assumption that the competitors were in their peak performance phase. Nothing, however, justified the exclusion of young hopefuls and meritorious veterans.

Using the official list of competitors of the Munich Games in 1972² we made a representative selection of events for which we calculated the mean value and the square of the mean deviation for the various ages, and-taking

August 1972 as our starting point-we worked out, to the nearest six months, the mean values of the ages to convert them into years of age. The sum of the values of the ages, divided by the number of competitors, enabled us to obtain the average age of all the competitors covered by our analysis. However, the swimmers and those taking part in athletics events were calculated separately. A statistical verification of the differences was made using test T.

I. Mean age distribution

With but very few exceptions, we noted that in the events under consideration the women were on an average younger than the men. This same observation applies to both swimming and athletics (see Table 1).

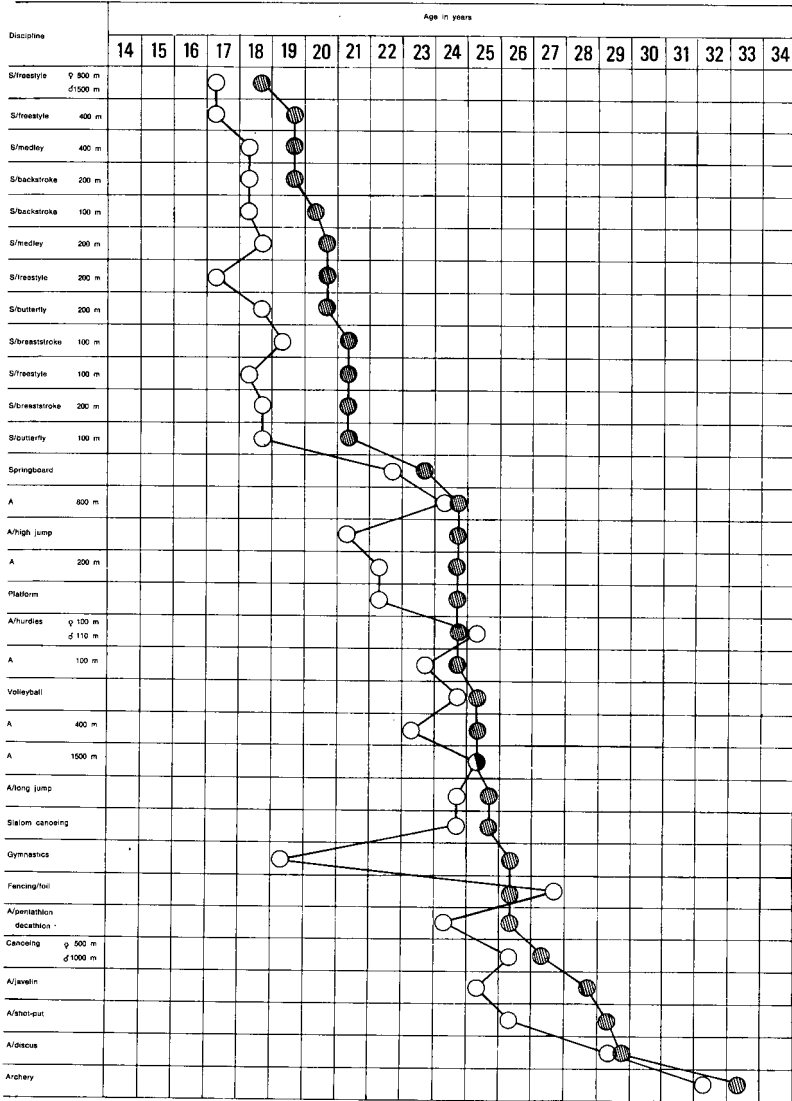
This difference can be accounted for by the fact that a woman reaches maturity 2 to 3 years before a man and that, consequently, she is capable of achieving maximum performance 2 to 3 years before her male counterpart. This does not explain however why the difference remains perfectly perceptible up to quite an advanced age (Graph. 1).

II. The mean age distribution in the different events

Graph. 1 shows the various sports events arranged in increasing order of mean

¹ Article published in the "Revue Suisse de Médecine Sportive" No. 2/1974, under the direction of Dr. Howald of the -Federal School of Gymnastics and Sport, Macolin - Switzerland.

² Official List of Competitors, published by the Organizing Committee of the Games of the 20th Olympiad, Munich 1972.



Graph. 1: Average age - men and women in the various disciplines

S: Swimming

A: Athletics

Age: to the nearest six months

Men ●

Women ○

Events		x	n	s	Age difference in years
All events	Women	50,72	1310	3,86	2,27
	Men	48,45	1659	3,64	
Swimming	Women	54,49	444	2,38	2,33
	Men	52,16	518	2,85	
Athletics	Women	48,63	446	4,15	1,63
	Men	47,0	594	3,43	

Table 1: The average of men and women (the mean values vary insignificantly in the three instances)

x Mean values according to age

n Number

s Standard variation

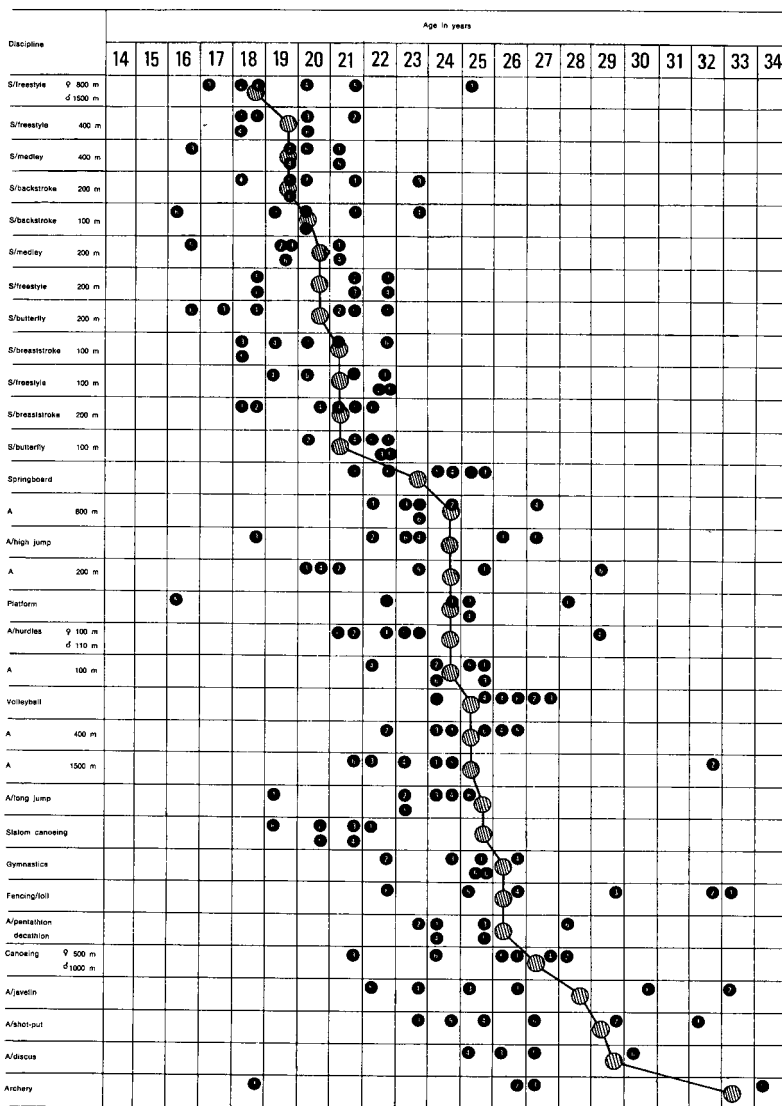
age for men. Thus swimmers, aged on an average between 18 1/2 and 21, are seen to form the youngest group of competitors. After them, there is a big gap up to 23 1/2 to 26 years. In this group, we find most of the athletics events, diving, volleyball, canoe-slalom and gymnastics. With canoeing, the average age increases, and continues to rise with the javelin, shot-put and discus events, to reach its highest point in archery.

If we plot the mean values of the ages of the women on the same graph, we obtain a curve which, except for hurdles, fencing and gymnastics, follows the men's curve with a difference of two years.

What are the reasons for these differences in the mean ages of the men and women in the various events?

— The mean age for both sexes is lowest in the various swimming events. The difference compared with the mean age of all competitors under review is 4.0 years for women and 3.8 for men. The particular position occupied by swimming is due above all to the fact that, at that age, the values for the specific weight of the human body are the most favourable and have a decisive effect on the result. Then again, in swimming, serious training starts at a very early age owing to the fact that, unlike in most other sports, very little demand is made on the passive movement system, which is at the height of its growth. The earlier intensive training starts, the more rapidly the peak performance phase is reached.

— Women's gymnastics occupies another special place. If one

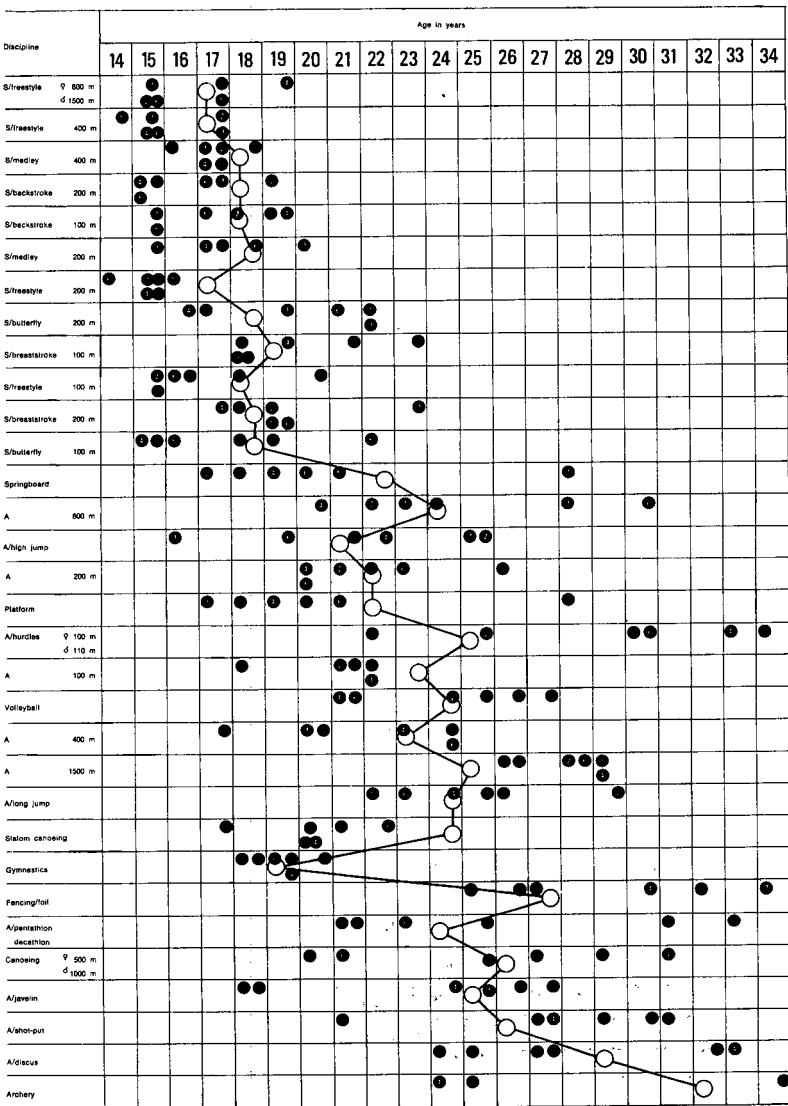


Graph. 2 a: Average age and the first six / Men

S: Swimming A: Athletics

Not included: A / Discus: 1. 35,5 years
2. 35 years

Archery: 4. 38 years
6. 39,5 years



Graph. 2 b: Average age and the first six/Women

S: Swimming A: Athletics

Not included:

S/medley 200 m.: 2. 13,5 years

Archery: 1. 42 years
2. 44,5 years
6. 40 years

A/100 m.: 6. Figures lacking

accepts the fact that in women's gymnastics suppleness is all important while, for the men, it is above all strength that is required, if one considers too that the development of performances and training is very different for these two factors, it is not surprising that the peak performance phase is not reached at the same time.

- For both men and women, we note a difference in age of 2 1/2 to 4 years between swimming and other sports.

For all these events, we have assumed that peak performances are possible only at the end of the period of growth and after a subsequent training of 2 or 3 years. In all these sports events, in fact, results depend to a large extent on speed, strength, visual acuity, and even great technical skill.

- For events such as the javelin, shot-put and discus, the curve rises steeply, especially for men.

One wonders whether the athlete needs to become sufficiently old in order to achieve the necessary weight and at the same time, taking into consideration the increase in his measurements, to be able to perfect the development of his technical movements.

The oldest competitors are found in archery, an event which no longer requires great physical fitness. That is why even the oldest archers have a good chance of success in this sport.

For the trainer, it is important to know whether the mean values of ages shown in Graph. 1 as well as the differences between events and

sexes are in fact generally valid and whether the work of training as a whole should take these age groups into consideration, or whether these values may be expected to change.

A comparison between the mean ages of participants in several Olympic Games would undoubtedly have enabled us to answer this question. We limited ourselves, however, to analysing, in a first phase, the data for Munich and we tried to determine whether the age of the first six in any event does in fact correspond to the average age for the event, or whether they are younger or older than their less successful rivals.

III. Age of the first six in different events

The distribution of the ages of the first six in each event studied follows, for both men and women, with variations of 5-10 years, the curve of the mean values of ages. A little over half of the first six are younger than the mean value: 55.3% in the case of women and 53.6% in that of men. But this slight majority in favour of greater youth does not apply to all sports (see Graphs. 2a and 2b).

If, in a given sport, more than three of the first six are younger than the corresponding average, one can speak of a tendency towards greater youth among the elite; if this number is less than three, then there is a tendency towards increasing age (see Tables 2a and b).

Younger than the average age for sport/women

n = 6 n = 5 n = 4 n = 3 n = 2 n = 1 n = 0

Swimming:

200 m freestyle	400 m medley 200 m backstroke	400 m freestyle 200 m medley 100 m freestyle 100 m butterfly	800 m freestyle 100 m backstroke 100 m breaststroke	200 m butterfly 200 m breaststroke		
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Diving:

Springboard
Platform

Athletics:

100 m	Discus	800 m 400 m 200 m Pentathlon Javelin	High jump Long jump	100 m hurdles Shot-put	1500 m
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Slalom canoeing

Canoeing

Fencing (foil)

Archery

Table 2 a: the number of youngest women participants (younger than the average age for the sport) the first six classified by sport (n = number)

Younger than the average for sport / men

n = 6	n = 5	n = 4	n = 3	n = 2	n = 1	n = 0
Swimming:						
		200 m medley 100 m breaststroke	400 m freestyle 200 m butterfly 200 m breaststroke	1500 m freestyle 200 m freestyle 100 m freestyle 100 m backstroke	400 m medley 200 m backstroke 100 m butterfly	
Diving:						
				Springboard Platform		
Athletics:						
Long jump	110 m hurdles 1500 m Decathlon	600 m 200 m High jump Javelin Shot-put	400 m 100 m	Discus		
Slalom canoeing						
		Canoeing				
Fencing (foil)						
Archery						

Table 2b: the number of youngest men participants (younger than the average age for the sport) the first six classified by sport (n = number)

These tables show then as follows:

- In women's swimming, it is mainly the youngest swimmers who come within the first six. One may even be tempted to think that, in swimming, the mean age values have not yet reached their lowest level.
- In men's athletics, a general trend towards greater youth appears to be occurring.
- In the 1500 m event, the difference in sex is striking (athletics). Among the men, it is mainly the youngest who are best in this event. With regard to the women, on the other hand, one is tempted to think that those who race in this new event are physically well constituted and

trained for this race but too old to be really fast over short distances.

- In canoe-slalom, the striking difference between the mean value of the ages of all competitors and the age of the first six could be explained by the fact that it was the first time this event had been held at the Olympic Games. In the course of the next few years, it will be seen whether or not it is mainly the youngest who will succeed in qualifying for the big international contests in this event or whether, as a result of intensive training over a period of several years, the best will once again be a little older.

U. W.



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