

For Aging Runners, a Formula Makes Time Stand Still

By DAVID LEONHARDT

For hundreds of runners, the New York Marathon on Sunday will bring the same dispiriting experience. Setting out to beat a personal best established when their legs were years younger, they will fall short and become convinced that they simply did not run a good enough race.

Dr. Ray C. Fair knows the agony, and he has a soothing explanation.

Dr. Fair is a professor of economics at Yale best known for devising a mostly accurate formula to predict winners of presidential elections. He is also the finisher of 17 marathons and counting, and he has turned his social scientist's eye to a question that many a serious runner has considered: how can you keep racing against yourself long after you can no longer catch yourself?

His answer comes in the form of the most enjoyable research paper he has written, he said, and a chapter in his recent book, "Predicting Presidential Elections and Other Things" (Stanford University Press, 2002). Studying world records for runners all the way up to 92 years old, Dr. Fair has developed tables that try to track



Jennifer S. Altman for The New York Times

Dr. Ray C. Fair, in Central Park on Saturday, has studied records for runners up to 92 and used his skills in economics to make tables to track the body's deterioration.

the body's physical deterioration and set an ever-moving target.

If a 50-year-old finishes the race on Sunday in four hours, 10 years after having run it in 3 hours 45 minutes, for instance, she can know that she is aging no more quickly than the world's fleetest runners.

"I'm right now at the age where things are getting worse in a bigger way," said Dr. Fair, 61, using colloquial language to describe the increase in second derivatives on his chart. "But there's always something to shoot for. It keeps you young, psychologically, even when you're not up there in the front anymore."

Having been published in The Review of Economics and Statistics, Dr. Fair's work has an academic credibility rare in matters of sport. But his tables are also part of a growing effort to help runners track their times over a lifetime.

In 2001, the New York Road Runners Club began posting on its Web site (www.nyrrc.org) "age graded" times that it calculates for all racers. Finishers in the marathon on Sunday will be able to look up the equivalent of their time for somebody at the peak running ages of the 20's and 30's. A five-hour finish, after all, is much

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more impressive for a 70-year-old than for a 30-year-old.

The New York Marathon's adjustments come from World Masters Athletics, the governing body for many adult track meets. The group made an early effort at adjusting times when it published a set of tables in the late 1980's. It plans to release a second revision of the tables in the next year, said Norman M. Green Jr., chairman of the Masters Long Distance Running Committee of USA Track & Field.

The new tables will include adjustments for women that are based on their times, rather than on men's, as is the case with the current tables.

Dr. Fair became interested in the topic in the 1980's, when he realized that the national circuit of masters races, open to men older than 40 and women older than 35 and divided into age divisions, had created enough data for him to perform the calculations. He studied the tables published by the masters group and decided to approach the problem with the same rigorous technique, known as regression analysis, that is at the heart of much economic research, he said.

A few years earlier, in 1987, he broke three hours in a marathon for the first time, 2:58:45 in Philadelphia, and he wanted to know his chances of doing so again.

"I was combining my statistical knowledge with the fact that I was getting older and running slower," Dr. Fair said.

The answer, he found, was that he had a surprisingly good chance to do so. The masters records showed that the world's best runners lost just a minute or so a year in their 40's.

Two years after Philadelphia, however, he strayed slightly from his predicted path, finishing the New York Marathon in 3:01:45, and he has remained off the pace since then.

"After I finish a race," he said, "all my friends ask me, 'Are you on your regression line?' And I'm not quite on my regression line."

But he said he thought that the reason might have more to do with his weaknesses as a runner, as well as a chronic thigh injury, than his weaknesses as an economist. Other athletes who have used the tables have been able to keep up with their predictions.

John Pistel, a fund-raiser for Amherst College, had not competed in the long-jump in more than 30 years when he decided to take up the sport again in 2000. As an undergraduate at the college in the late 1960's, Mr. Pistel set the school record, which still stands, of about 24 feet.

An Amherst economist who knows Dr. Fair gave Mr. Pistel a version of the tables for the event. His best effort as a 52-year-old was seven feet shy of his Amherst record but almost precisely what Dr. Fair's table for the event predicted.

The reasons the body slows down are as numerous as they are obvious. The heart

can no longer pump blood at the same rate, and the lungs cannot put oxygen into blood at the same pace, noted Dr. Edward G. Lakatta, chief of the Laboratory of Cardiovascular Science at the National Institute on Aging. Tissues cannot extract oxygen from blood as efficiently, and cells are not as good at using oxygen after they receive it. Bones and joints deteriorate as well, Dr. Lakatta said.

For marathoners, the process often begins to affect results shortly after 30. It continues at a steady pace through the 50's, and accelerates after that.

"There is a point," Dr. Green said, "when there is a sudden decline."

Dr. Fair found it to be the age of 60, which is roughly consistent with a long line of medical research. From 60 to 70, mara-

An accurate measure of fitness: moving the bar to take age into account.

thoners lose almost as much time as they did in the 25 years from 35 to 60. Middle-distance runners deteriorate faster at first, but they do not slow down as much as marathoners in their 60's and 70's, he said.

Underlying all the research, of course, is an assumption that ordinary people — or at least ordinary marathon runners — age at the same rate as elite athletes.

If that is not the case, Dr. Fair's tables and the masters tables would be setting the bar at the wrong place for most people.

Scientists have yet to agree on an answer, however.

"This is something people have argued a lot about over the years," said Dr. Roy J. Shepard, an emeritus professor of applied physiology at the University of Toronto who has written widely on aging and exercise. "My own view is that very top people do age a little less rapidly."

Those athletes, Dr. Shepard said, are more likely to keep themselves in peak physical condition and less likely to become injured performing a given activity.

Dr. Lakatta at the National Institute on Aging comes from the opposite camp. The gap between cardiovascular systems of top athletes and other people in their 20's is greater than the gap when the two groups reach their 80's, he said.

Either way, though, the age-adjusted tables offer a simple test for athletes who would otherwise have little way to compare their results over decades: are they keeping up with the very best performers in their event?

For Dr. Fair, the standard has switched, from 3 hours to 3 hours 20 minutes, according to his tables. He will have his next crack at it on Nov. 23, at the Philadelphia Marathon.

Running the Numbers

These tables, developed by the economist Dr. Ray C. Fair, allow runners to continue racing against themselves even as they age and slow down. Using the fastest marathon times ever run by people of a given age, Mr. Fair calculated an "age factor" for every age after 35, which is the last time many people are able to set a personal best.

If a **50-year-old** woman ran a marathon in 4 hours when she was 35, she multiplies:

$$4 \text{ HOURS} \times 1.098 = 4.392 \text{ HOURS}$$

To convert to minutes: $.392 \times 60 = 23.52$.

So her goal is **4:23:30**.

If she beats that time at age 50, she is actually running a better race than she did 15 years earlier.

Because the body appears to slow down at a different pace for shorter distances, Mr. Fair created a separate table for the middle distances, those from 400 to 10,000 meters.



Vincent Laforet/The New York Times

Runners cross the Verrazano-Narrows Bridge at the start of the New York Marathon.

MARATHONS

AGE	FACTOR	AGE	FACTOR
35	1.000	61	1.178
36	1.006	62	1.189
37	1.013	63	1.202
38	1.019	64	1.216
39	1.025	65	1.232
40	1.032	66	1.249
41	1.038	67	1.269
42	1.045	68	1.290
43	1.051	69	1.313
44	1.058	70	1.338
45	1.064	71	1.365
46	1.071	72	1.395
47	1.078	73	1.427
48	1.084	74	1.462
49	1.091	75	1.499
50	1.098	76	1.538
51	1.105	77	1.581
52	1.112	78	1.628
53	1.119	79	1.677
54	1.126	80	1.730
55	1.133	81	1.787
56	1.140	82	1.848
57	1.147	83	1.913
58	1.154	84	1.983
59	1.161	85	2.058
60	1.169	86	2.138

400-10,000-METER RACES

AGE	FACTOR	AGE	FACTOR
35	1.000	61	1.235
36	1.008	62	1.247
37	1.016	63	1.260
38	1.025	64	1.273
39	1.033	65	1.288
40	1.041	66	1.303
41	1.050	67	1.319
42	1.058	68	1.337
43	1.067	69	1.355
44	1.075	70	1.374
45	1.084	71	1.395
46	1.093	72	1.416
47	1.102	73	1.439
48	1.111	74	1.463
49	1.120	75	1.488
50	1.129	76	1.515
51	1.138	77	1.543
52	1.147	78	1.572
53	1.156	79	1.602
54	1.166	80	1.635
55	1.175	81	1.669
56	1.185	82	1.704
57	1.194	83	1.741
58	1.204	84	1.780
59	1.214	85	1.822
60	1.224	86	1.865