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How Fast We Slow Down Running Longer Distances

By ANDREW GELMAN
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How fast do we slow down?

2.15

If running speed were proportional to time, the increase in time for every equal lap would be exactly 2: that is, doubling the distance would correspond to a doubling of time. But of course the number is greater than 2, corresponding to the increased difficulty of longer runs.

You can see this by making a graph, plotting world running times against distance, in races ranging from the 100-meter dash through middle-distance races like the 400- and 800-meter and the mile, up through marathons and ultramarathons. For each doubling of distance, the world record time is multiplied by about 2.15.

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More precisely, Sandra Savaglio and Vincenzo Carbone published a paper in the journal Nature in 2000 showing two regimes: for sprints of 200 meters to 1,000 meters, a doubling of distance corresponds to an increase of a factor of 2.3 in world record running times; for longer distances from 1,000 meters to the marathon, a doubling of distance increases the time by a factor of 2.1. They found similar patterns for men and women, and for swimming as well as running.

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