

Usain Bolt could break his own record with the help of altitude and the wind

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Imagine the following situation. The 100 metres finals in the London Olympic Games. The Jamaican Usain Bolt wins. Up to this point everything sounds normal except for the fact that he would break his own record again with a time of 9.48 seconds. According to the New Zealand researchers, this would be his record if there were a 2 metre per second tailwind (maximum allowable wind) and the race took place at an altitude of 999 metres. This record will of course have to wait because London lies just 24 metres above sea level. Scientists are sure though that environment conditions affect sports performance even to a great extent.

On the 16 August 2008 the fastest man in the world, the Jamaican Usain Bolt, took a first world record in the Olympic Games in Beijing, China after running the 100 metres in 9.69 seconds. One year later during the world championships in Berlin, Germany he broke his own record with 9.58 seconds.

Independently of the athlete's talent and training, there are various factors that could influence Usain's records: altitude below or above 1000 metres above sea level; the venue, whether the race takes place indoors or outdoors; the type of competition (world, Olympic or other); or whether an electronic timer or [stopwatch](#) is used, etc. In his case, the difference between the two races was the [wind](#).

On the day that Bolt made his first record in the Olympic Games there was no wind whereas in the world championships, there was a tailwind

with a speed of 0.9 metres per second. "Was the new record helped along by the wind?" questions Steve Hollings, lead author of the study that was published in the *European Journal of Sport Science*. He also works in the [Sports Performance](#) Research Institute New Zealand of the Auckland University of Technology (New Zealand).

In their search for the answer, the team employed an empirical approach in order to estimate the effects of wind speed, altitude and other [environmental factors](#) in 44,000 results from 619 male athletes. The study allowed for the identification of additional environmental and other factors such the competition level, the time-keeping method and if the athletes competes inside or outside a venue.

According to performance calculations in Berlin, the Jamaican would have to have run 100 metres in 9.62 seconds without wind. "The wind therefore improved the record by 0.04 seconds," as outlined to SINC by Hollings. But, the scientists go even further and suggest that Bolt could beat his own [record](#) again with 9.48 seconds as long as the speed of the tailwind is 2 metres per second and the race takes place at an altitude of 999 metres. For now though, the London [Olympic Games](#) do not meet all of these requirements.

Altitude helps athletes with the sprint

"Measuring wind speed during the 100 metres, 200 metres and the 110 metres hurdle has been one of the most controversial topics in sports since its introduction in 1936 (and in 1950 for the 200 metres)," states Hollings. Popular belief though is that measurements are not always valid or trustworthy.

Nonetheless, by considering current competition data, the researchers have calculated that a tailwind of 2 metres per second (maximum allowable wind) could provide an advantage of 0.07 to 0.09 seconds

during the 100 metres race.

As well as the wind, altitude and the competition level also have an influence on the performance of athletes in different track and field disciplines. In the five sprints (100, 200 and 400 metres, and the 110 and 400 metres hurdle), the greater the altitude, the faster the athletes ran.

"At altitudes, the athletes could withstand shorter races because air resistance is lower. But in the 1500 metres, 5000 metres and 3000 metres hurdle races and the 10000 metres, shorter times were recorded," points out the researcher, who goes on to outline that racing at altitudes reduces the amount of oxygen available and thus the aerobic performance of the athlete.

The expert confirms that in this type of competition, "analysis demonstrates that [athletes](#) run faster in the 100, 200 and 400 metres and the 110 and 400 metres hurdle when competing in a world championship compared to any other race." According to Hollings, the goals implied in each tournament differ and there is a greater expectation to break records in sprints during world competitions.

As the scientist stressed, "in fact, time performance in big competitions improved slightly by 0.7% in the 400 metres and by 0.8% in the 400 metres hurdle, whereas it worsened by 0.6%, 1.2% and 0.2% in the 1500, 5000 and 10000 metres respectively."

More information: Hollings, SC; Hopkins, WG; Hume, PA.

"Environmental and venue-related factors affecting the performance of elite male track athletes" *European Journal of Sport Science* 12(3): 201-206 [DOI: 10.1080/17461391.2011.552640](https://doi.org/10.1080/17461391.2011.552640), 2012

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