100-meter sprint world record could go as low as 9.48 seconds

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2008 was a great summer for sports' fans. World records tumbled at the Beijing Olympics. Usain Bolt shattered both the 100m and 200m world records, knocking tenths of a second off each. People have been getting faster and faster over the last few decades, which made marathon runner Mark Denny, from Stanford University, wonder whether last century's massive increase in population could account for these dramatic improvements. He also wondered whether there are absolute limits on running speeds and, if so, how close are we to them?

Suspecting that there are, Denny decided to scrutinise the running performances of humans and two other famous racing species, dogs and thoroughbred horses, to find how close modern runners are to their species' peak performances. He publishes his predictions for their top speeds on 28 November 2008 in *The Journal of Experimental Biology*.

Having found records dating back to the 1920s for dogs and the 19th century for humans and thoroughbreds, Denny looked to see whether there were any clear trends; had any of the species' performances already levelled off? Plotting the annual top running speeds for all three species over the years, it was clear that racing horses and dogs have already reached a plateau.

There has been no improvement in the thoroughbred's speed in the Kentucky Derby since the 1940s and two other major US races since the 1970s, while dogs' performances also levelled out in the 1970s. The increasing dog and thoroughbred populations hadn't improved the

animals' performances. However, 'chance might still turn up a faster animal,' says Denny and he predicts that thoroughbreds could improve their top speeds by as much as 1% in the 2012m Kentucky Derby, eventually peaking at a top speed of just over 17m/s.

For humans the results were complicated by the different distances that people race. Looking at the speeds of male race winners through the years, it seems as if men still haven't reached their top speeds at any distance and Denny predicts that male 100·m sprinters could one day get the record down to an incredible 9.48s, running 0.23m/s faster than Usain Bolt's current world record of 9.69·s. Meanwhile, female sprinters' top annual speeds levelled off in the 1970s, suggesting that any improvement in their speed was not due to a population increase. However, Denny suspects that female sprinters have room for improvement too, and predicts that they could eventually knock more than 0.4s of the current 100m world record to cover the distance in 10.19s.

Looking at marathon runners, Denny predicts that males could cut the current world record, held by Haile Gebrselassie, by between 2min7s and 4min23s. And when he calculates the top speed that a human female marathon runner could achieve, Denny suspects that women could eventually cross the 42,195m finishing line in 2h12min41s. He adds that Paula Radcliffe's current world record of 2h15min25s is very close to his average prediction for the maximum marathon speed and suspects that female marathon runners could be the first group to approach his predictions and test whether they hold.

Referenece: Denny, M. W. (2008). Limits to running speed in dogs, horses and humans. J. Exp. Biol. 211, 3836-3849. jeb.biologists.org

Source: The Company of Biologists