

Physics confirms sprinters are performing better than ever before

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In this month's *Physics World*, Steve Haake, director of the Centre for Sports Engineering at Sheffield Hallam University in the UK, reveals that the men's 100 m sprint will be one event not to miss this summer.

Haake has developed something called the "performance-improvement index", which uses very simple [physics](#) to compare the relative improvement of top athletes in different sports over the last 100 years.

The model shows that the [performance-improvement](#) index in the men's 100 m sprint is increasing at a time when those of other events, such as javelin and swimming, have plateaued or decreased.

Some of the reasons for these changes, which Haake describes in this feature, are because of technological interventions that have changed the face of the sport. The performance of javelin throwers, for example, was improving drastically up until the mid-1980s, to a point where officials were concerned for crowd safety.

At the time, javelins would float to the ground and land flat, meaning it was very hard to tell where the tip had hit the ground. As such, the International Association of Athletics Federations (IAAF) changed the specifications of the javelin itself, moving its centre of mass towards the tip by 4 cm and so forcing the javelin to land on its tip, thus reducing throwing distances by about 9 m.

Haake also describes the step-change in the men's 100 m in the

mid-1970s with the introduction of fully automated timing.

In swimming, an unprecedented 25 and 47 world records were broken in 2008 and 2009, respectively, with tight-fitting, full-body swimsuits seen as the main reason.

The swimsuits, which have now been banned by swimming's ruling body (FINA), were relatively tight and reduced the cross-sectional area of the body by pulling it into a more cylindrical shape, thus reducing drag. They were made from [polyurethane](#), which also affected the way the water flowed over the body.

As Haake writes, "One way of finding out how exactly technology affects sporting performance is to examine the physics involved. We can then try to quantify the effect of technology on sporting events – and find out whether it really is all about the equipment."

More information: From Monday 9 July, this month's edition of Physics World will be freely available as a PDF download from <http://physicsworld.com>.

The Steve Haake feature, along with a selection of videos of him talking about the physics of running, swimming and cycling, can be viewed online from Thursday 12 July.

Provided by Institute of Physics

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