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News

## Olympic starter's gun 'unfair'

**Pistol may hand advantage to those closest to the starting official.**

**Katharine Sanderson** (</news/author/Katharine+Sanderson/index.html>)

The Olympics may not be the bastion of pure sporting contest that people might think. Although the pistol used to start sprint events in the Games might make good theatre, it may mean that sprinters in lane 1, nearest the gun, get away from the blocks faster.

Most international athletics competitions use speakers behind each athlete to broadcast the start signal. The Olympics uses this system but also increases the drama of the set-piece by having a starting official, complete with pistol.

But when David Collins and colleagues at the University of Alberta in Edmonton, Canada, reviewed reaction-time data for the 2004 Olympic Games in Athens, they saw a marked effect: runners in lane 1 had an average reaction time of 160 milliseconds, whereas those in lane 2 got away in 171 milliseconds. Sprinters in lane 7 (bizarrely the lane with the slowest average reaction time of the eight lanes) took 185 milliseconds to get off the blocks.

Collins also did some experiments of his own, to attempt to see whether the effect is real. He set off trained and untrained sprinters with a range of gun sounds, each with a different intensity. The research is published in *Medicine & Science in Sports & Exercise* [1 \(#B1\)](#).

### Gunning for it

He measured the runners' reaction time, and the time it took them to reach the maximum force they applied as they pushed off, and also the strength of that force, called peak force. In all cases, average reaction times were faster for louder bangs. The peak force wasn't affected by the gun, but in untrained athletes, the time it took them to reach peak force was shortened if they heard a loud bang. This was the only difference between the trained and untrained groups, says Collins.

This difference in peak force between trained and untrained runners shows that the trained athletes are performing optimally. "If they can produce more force [when they hear a loud noise], they should be training harder," points out Matthew Pain, an expert in sports biomechanics at Loughborough University, UK.



Most competitions use individual speakers so everyone hears the same starting blast.

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Collins also tested whether the loudest bang startled the runners, by watching to see if they blinked. When the runners were startled, their reaction times were faster, but startle had no effect on peak force. Collins suggests that this startle response could help Parkinson's sufferers who get trapped in 'freezing' events, where they're unable to move.

John Rothwell from University College London, who studies human movement disorders, argues that freezing events are not likely to be affected by a startle. Freezing always happens during walking, and usually when the patient encounters a door or other obstacle, he explains. "Under those circumstances I doubt whether a startle will help a great deal," Rothwell says.

### Out with a bang

During his experiments, Collins also noted that 21% of his participants recorded reaction times faster than 100 milliseconds – the false start threshold adopted by the International Association of Athletic Federations (IAAF). British sprinter Linford Christie famously fell foul of this rule in 1996, despite claiming that he always set off on "the b of the bang".

The 100-millisecond threshold limit needs to be addressed, says Pain. "If it is possible that a human can move that fast [faster than 100 milliseconds], that should be the limit," he says.

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"I know they can respond faster than 100 milliseconds," says Collins. "The Olympics committee is aware of the issue." The committee currently has no plans to change the system, however.

Collins will be watching the 100-metre event with extra interest in the Beijing Olympics this summer. And he suggests one way in which the organizers could retain the telegenic drama without handing anyone an unfair edge. "To make it fair they should use a silent gun," he says.

### References

1. Brown, A. M. *et al. Med. Sci. Sports Exerc.* 40, 1142-1148 (2008)

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From a science conjecture web page, written in 1998: The speed of sound is roughly 300 metres per second (actually 344m/s). If the runner in the outside lane is 6 metres further away from the starter's pistol than the runner in the inside lane then the sound of the pistol will reach that runner  $6/300 = 0.02$  of a second later. Therefore the inside lane runner has two-one-hundredths of a second advantage. Given that world-level races are won and lost in less than one-hundredth of a second it is important that this effect is taken into account... <http://tinyurl.com/47jznl>

Posted by: **Michael Paine** | 26 Jun, 2008

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