

The secret to Usain Bolt's speed may lie in synchronicity

June 15 2015, by Manuel Varlet

[Usain Bolt](#)

[is one of the greatest athletes of all time. He is the fastest man in the world, holding the 100 metre sprint record of 9.58 seconds, which he achieved at the final of the](#)

[2009 IAAF World Championships](#) in Berlin.

Bolt's growing collection of [world records](#) and Olympic medals gives the impression that no one can stop him. But he might not only be a stellar athlete, endowed with longer strides than his competitors and more powerful muscles. He might also have a clever trick up his sleeve.

Our recent study with Associate Professor Michael J. Richardson published in the [Journal of Experimental Psychology: Human Perception and Performance](#) suggests that Bolt might actually gain a benefit from running in step with his competitors.

The study surprisingly found that the steps of Usain Bolt in the 2009 final in Berlin were synchronised with the steps of second-placed [Tyson Gay](#), running just to his right.

Using a frame-by-frame video analysis, the study shows that almost 30% of Bolt's and Gay's steps were synchronised, pounding the track at the same time. This is particularly surprising because Bolt naturally runs with longer strides, and thus a slower tempo due to his height.

Overall, Bolt took 41 steps whereas Gay took 45 to 46 steps during the final, so such a high percentage of synchronised steps was unexpected. However, the study suggests that this synchrony was no accident, nor was it inconsequential.

It was a greater level of the synchrony than occurred during the semi-finals, where the two sprinters ran separately. And greater than one would expect by chance alone. Instead, it seems that there was an active process of synchronisation between Bolt and Gay during the final, perhaps coupled by visual and/or auditory information, which led to more coordinated strides.

A universal phenomenon

Over the last few decades, researchers in various fields have paid a lot of attention to the process of synchronisation. It underlies the emergence and stability of coordinated behaviours in a variety of complex systems on Earth and in the universe at large.

The components of many systems tend to "entrain" to each other, and tend to process as a unit. This can take place in anything from neurons in the brain through to fireflies lighting up at night. Interestingly, human movement systems also appear to follow a similar process.

The movements of two or more people interacting together tend to spontaneously entrain to each other. Without specific intention or instructions, their movements can become perfectly synchronised simply due to the exchange of visual and auditory information.

The steps of two family members can entrain to each other when walking side-by-side. The rhythmic applause of a crowd in a concert hall can become spontaneously synchronised after a short time.

Although this phenomenon is relatively well documented, the synchronised strides of Bolt during the 100m final raise the question of whether interpersonal synchronisation has beneficial effects.

Previous research has shown that interpersonal synchronisation can facilitate successful social interactions. Synchronisation can enhance feelings such as affiliation or connectedness of people interacting and the occurrence of pro-social behaviours, even the efficiency of their communication.

But such beneficial effects do not explain why Bolt's strides were synchronised during the final. Could being in sync with his competitors benefit his sprinting performance?

Enhanced individual motor performance

Bolt takes larger but slower strides. So, to run faster, he can either perform even larger strides or increase his tempo. Our study suggests that the synchronisation of his strides with Gay might have facilitated the latter.

Paced by Gay's faster tempo, Bolt might have increased his own tempo while keeping his long strides, thus moving faster. If this is true, it would not be the first evidence of enhanced running performances via entrainment to external pacing signals.

Some recent research has shown that running performances can be enhanced when listening to auditory rhythms such as the beats of [simple metronomes](#) or music. Music with a prominent and consistent beat can also help to maintain optimal movement tempo and facilitate running efficiency.

Other studies have found positive effects of external pacing for

rehabilitation of abnormal locomotion patterns occurring with ageing or pathologies.

Although further research would be necessary before concluding that running in sync with other people is the way to be faster, these findings clearly open new perspectives for understanding and using spontaneous synchronisation with other people to enhance individual motor performances.

It is likely Bolt didn't even know he was synchronising his steps with Gay. But his doing so may have contributed to his world-record performance. One might wonder: how fast Bolt would have run had Gay not been there – or if Gay had run at an even higher tempo?

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Source: The Conversation

Citation: The secret to Usain Bolt's speed may lie in synchronicity (2015, June 15) retrieved 27 June 2024 from <https://phys.org/news/2015-06-secret-usain-synchronicity.html>

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