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THE SECRET LIFE OF...

THE CROWD SCIENTIST

Marcel Altenburg, senior lecturer in crowd science at Manchester Metropolitan University, uses data and algorithms to help runners have a great marathon experience

I was a military officer, and a runner, and I studied sports and human science, all of which led to an internship at the 2009 Berlin Marathon. Because of my experience in crisis situations, they put me in the control room.

I became obsessed with marathon data. I looked at crowd science and marathons 24/7, and began seeing some patterns.

Some 80 events a year use our Start Right algorithm now. We worked on all the important races of the last few years – the men's world record, the women's world record, the world's largest marathon, the world's largest half marathon, the World Marathon Majors.

The start of a marathon is like a tap. You can open it a lot, or open it several times for a shorter time, or you can open it just a little bit, even a mix of all of these.

A common problem we solve is construction work on a marathon route, perhaps unanticipated or delayed work. Will 30,000 runners still fit through a space that is now only 12 metres wide? We calculate for every runner.

Even at the biggest events, not long ago people would just put the start-line infrastructure up and say, 'That looks right.' We use laser measurements and measure things down to the nearest centimetre.

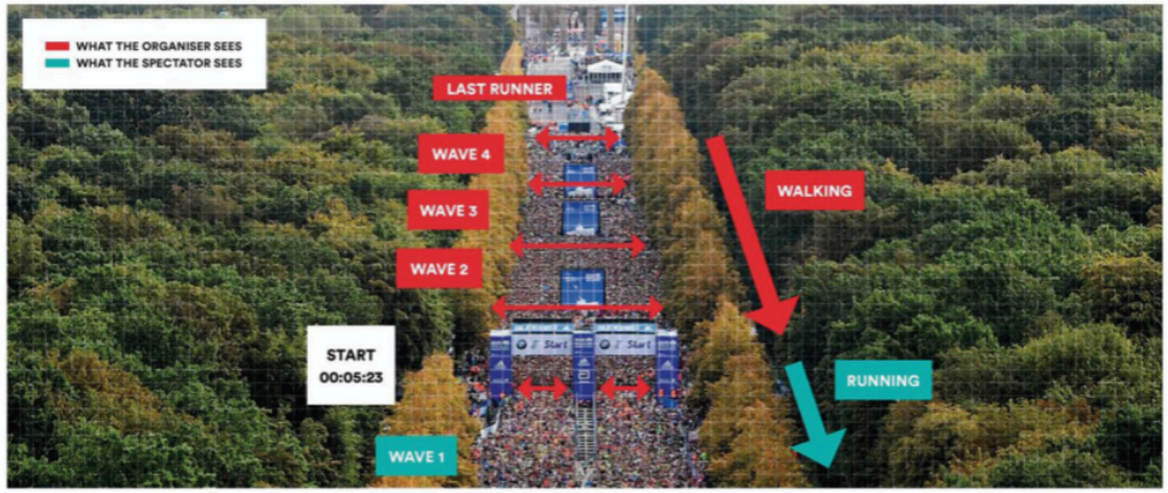
Everything about the start areas is measured. We can determine that a race's ideal start line could be 6.8m wide. And that a 6.5m-wide start line would result in a very different course flow. The difference can be massive once you let 40,000 people through. Half a metre, for example, makes a difference of 53 people per minute. If you do that for 10 minutes, you have about 500 people more on the course than you had intended.

We live-change any threat to the course and runners during an event. Live negotiations happen all the time: traffic jams, police or ambulance calls, a broken water pipe, a bridge needs to open. We quickly calculate: when does the decision need to be made? How many people will it affect? There are 45,000 runners but we can find a 45-second gap for an ambulance to make it across the course.

The runner doesn't gain any advantage if they're starting at the front or back of their pen, as long as they are in the right pen. That pen is calculated exactly for your speed. At the start, we allow three people per square metre – that's comfortable for most people.

We just redesigned the water stations for the Hamburg Marathon, so they can cope with an exact number of people per minute, during the race peak. In the race, we limit to 98 people per metre per minute. More than that and runners might be impeded in their stride. That's important, for people to get the best experience. It needs to be joyful for the runners. It's all a big numbers game.

START ZONE, BERLIN MARATHON 2019. 'We don't define it as a start line but a controlled start zone,' says Altenburg. 'The dimensions and movements of all waves are calculated specifically. All the way to the last starter, they pass different lines and are moving according to controlled times. The area is measured to achieve the ideal starting speed for the organiser, to get the race on the road in time and, especially, to give every runner enough space after crossing the start line. TV and spectators are focusing on Wave 1, while the organiser focuses on the movements of the remaining waves and tightly checks their progression.'



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