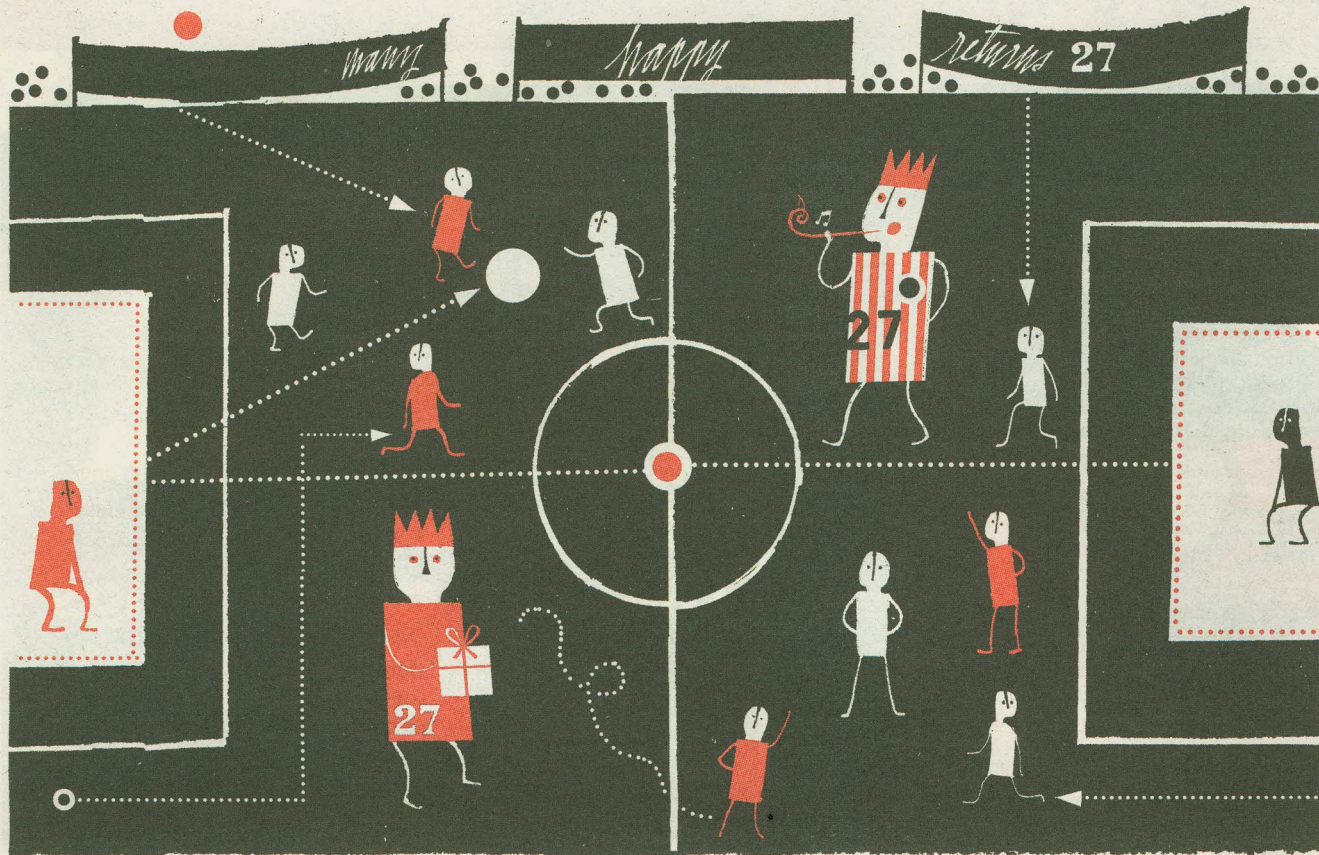


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## sexy maths

JOE MCLAREN



*Happy (birthday) coincidences*



# Happy (birthday) coincidences

**O**ut of the Premier League football fixtures that are played each week, how many matches do you think there are in which two people on the pitch have the same birthday? Rather extraordinarily, the maths predicts that two people will share the same birthday in at least five out of the ten matches (in a group of 23 people — and I'm including the referee).

It is one of the counterintuitive characteristics of randomness that you get such coincidences. I was particularly struck by this when I visited the new exhibition at the Serpentine Gallery in London on Saturday (my team, Arsenal, were playing away at Sunderland, so I had the afternoon off). Currently being exhibited are a series of paintings by the German artist Gerhard Richter that have been created using chance.

Each of the 49 paintings in the exhibition consists of 100 randomly chosen coloured squares arranged in a 10x10 grid. The colours are chosen from a palette of 25 colours selected by Richter. Faced with such randomness, the viewer hankers after something that has some structure, some hidden pattern. And so you are drawn to those regions of the paintings where chance has produced blocks of two, or even three, colours the same, one after the other.

The unexpected thing is that throughout the paintings this happens a lot. It looks as though some design is coming through the randomness. Yet when I worked through the maths of these paintings, the calculations predicted exactly the amount of strange coincidences that I was seeing in the canvases. If people were asked to create a

painting that they thought was random, the likelihood is that most would not paint three consecutive squares the same colour.

Evidence of the reluctance of people to clump things together can be found in the way people choose their numbers for the national lottery. People rarely choose two consecutive numbers, such as 22 and 23. Yet work through the maths and you will find that half the possible combinations of six numbers that can be chosen will have two consecutive numbers. Look at the winning numbers for last Saturday: 17, 18, 28, 29, 32, 40. Throw in

the bonus ball of 39 and you've got three lots of consecutive numbers.

One can use people's desire to spread things out to one's advantage in playing the lottery. This weekend there was just one jackpot winner, who walked off with more than £8 million. Contrast that with what happened on the ninth week of the lottery, when 132 people chose the winning numbers and ended up sharing the jackpot, each getting a measly £122,510. The winning numbers that they all chose were nicely spread out: 7, 17, 23, 32, 38, 42.

Understanding coincidence is important in lots of situations. In legal cases, a person's liberty can depend upon whether something is a rare coincidence, or just an instance of the numbers stacking up (for example, while we may think of DNA evidence as being incontrovertible, this is not necessarily the case). In a poker game, in which only your shirt may be at stake, it still pays to know the odds. For example, in a hand of five-card stud, don't get too excited if you are dealt a pair, as there's nearly an even chance of being dealt one.

So while I was stunned by Grant Leadbitter's 86th-minute goal for Sunderland against Arsenal on Saturday, I was not surprised to discover that the Gunners' Robin van Persie and Sunderland's Danny Collins did more than share the pitch at the Stadium of Light — they also share a birthday: August 6. ●

**Marcus du Sautoy**

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**THE CONUNDRUM**

Here's a game to play on a long car journey with your kids. Look out for vehicles with old-style number plates, such as X847JNK. Take the last two numbers in the registration, in this instance 47. If you were to bet your children that in 20 cars with this style of plate you will see two cars with the same last two numbers, what chance would you have of winning?

Answer on page 28