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CONTRIBUTORS OPINION

For kicks, we came up with a fairer way to determine the World Cup draw

FIFA's method of determining which teams play each other in the first round needs updating.

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It's official — Canada has qualified for this year's soccer World Cup. The last time that happened, 36 years ago, I was a teenager backpacking through soccer-obsessed Europe.

To determine the cup's initial matches, the 32 participating nations will be divided into four teams in each of eight different groups. The group members all play each other and the top two teams from each group then advance to the knockout (playoff) stage. Longtime fans know that group assignments are critical — it's easier to advance from a weak group than a strong one.

In the upcoming draw, many teams are hoping to be placed in Group A. Why? Qatar, the host nation, is automatically placed first in Group A, and the seven highest-ranked teams are assigned to the other seven groups. Since Qatar's team is a relatively weak, other teams in Group A will have the best chance of advancing.

The group assignments will be determined on Friday in a televised event where teams are selected by drawing balls from urns. However, there are various restrictions: each group must include one team from each of four "pots" (based on team rankings), no group can have more than two teams from Europe nor more than one from South America, etc.

These restrictions make the draw kind of complicated. The organizers (FIFA) proceed by randomly selecting teams, one at a time, and placing each one in the next available group, which will not violate any restrictions. But is that really the best approach?

As a statistician, I wondered how the FIFA draw method would affect the probabilities. Ideally, every valid complete assignment of the 32 teams into eight groups should be equally likely. But under the FIFA method, some assignments are more likely than others, which changes the chances of different team placements.

For example, if every complete assignment were equally likely, then the probability that Canada would be placed in Group A should be 15.4 per cent. However, under FIFA's method, that decreases to 14.8 per cent. Germany's Group A probability should be 13.4 per cent, but decreases to 12.5 per cent. And the United States' probability should be 9.6 per cent, but increases to 12.5 per cent (a 30 per cent increase).

Will these differing probabilities change the essence of the World Cup? No. But they could modify which teams end up in which groups, which could then influence which teams advance and which do not.

So, what's to be done? My English research collaborator Gareth Roberts (a fanatical Liverpool supporter) and I have recently developed several alternative ways to conduct the group draw to ensure that every valid complete assignment is equally likely.

Our first method uses a computer algorithm called a "rejection sampler," which is fast and simple and gives precisely equal probabilities. Unfortunately, it might not provide good drama for a televised draw.

Our second method involves picking teams from balls in urns, similar to FIFA's approach. The difference is that our method carefully adjusts the numbers of balls at each step, in a mathematical way that ensures equal probability of every valid assignment.

Our third — and most unusual — method involves repeatedly swapping the groups of different pairs of teams, to mix up the groups in exciting and unexpected ways. All while keeping the complete assignment probabilities equal, of course — we statisticians wouldn't have it any other way.

Best of all, you can try all of our methods right now, for free, on my website probability.ca/fdraw. See if they don't provide both equal probabilities *and* more excitement!

Will our ideas influence FIFA's draw this Friday? No. But perhaps they could be considered for future World Cups and other tournaments. FIFA, if you're reading this, let's talk.

Jeffrey S. Rosenthal is a professor of statistics at the University of Toronto, and the author of the bestseller "Struck By Lightning: The Curious World of Probabilities."