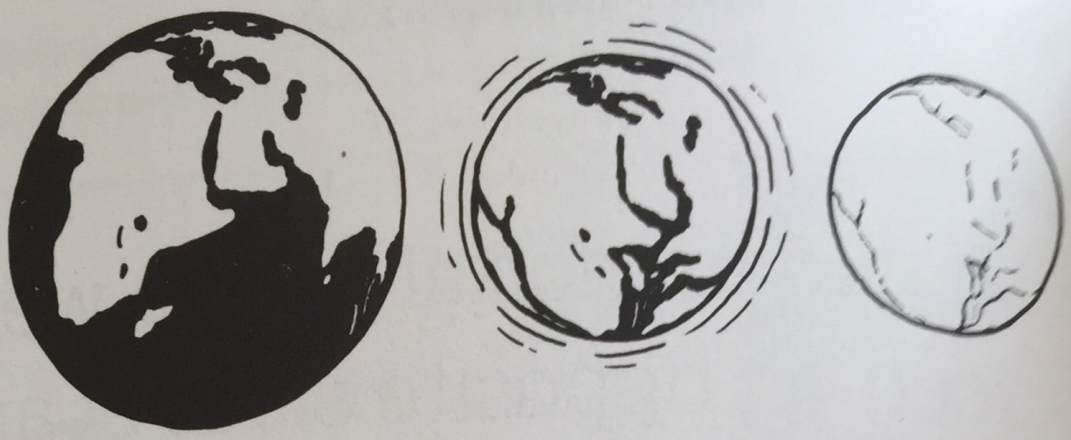
LOST IMMORTALS

Q. If two immortal people were placed on opposite sides of an uninhabited Earthlike planet, how long would it take them to find each other?
100,000 years?
1,000,000 years?
100,000,000,000 years?

—**Ethan Lake**

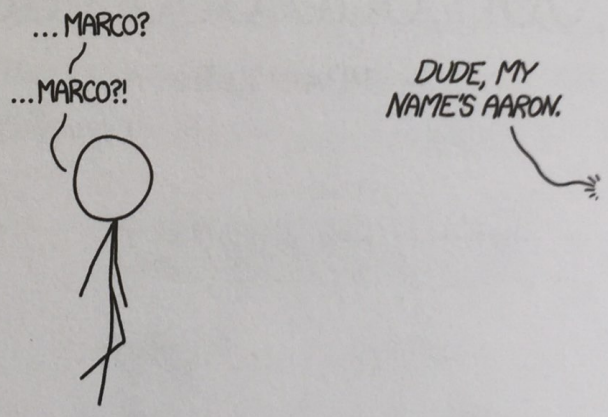
A. WE'LL START WITH THE simple, physicist-style[1] answer: 3000 years.

That's about how long it would take two people to find each other, assuming that they were walking around at random over a sphere for 12 hours per day and had to get within a kilometer to see each other.



We can immediately see some problems with this model.[2] The simplest problem is the assumption that you can always see someone if they come within a kilometer of you. That's possible under only the most ideal circumstances; a person walking along a ridge might be visible from a kilometer away, whereas in a thick forest during a rainstorm, two people could pass within a few meters without seeing each other.

We could try to calculate the average visibility across all parts of the Earth, but then we run into another question: Why would two people who are trying to find each other spend time in a thick jungle? It would seem to make more sense for both of them to stay in flat, open areas where they could easily see and be seen.[3]



Once we start considering the psychology of our two people, our spherical-immortal-in-a-vacuum model is in trouble.[4] Why should we assume our people will walk around randomly at all? The optimal strategy might be something totally different.

What strategy *would* make the most sense for our lost immortals?

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2 Like, what happened to all the other people? Are they okay?

3 Although the visibility calculation *does* sounds fun. I know what I'm doing next Saturday night!

4 Which is why we usually try not to consider things like that.

If they have time to plan beforehand, it's easy. They can arrange to meet at the North or South Pole, or—if those turn out to be unreachable—at the highest point on land, or the mouth of the longest river. If there's any ambiguity, they can just travel between all the options at random. They have plenty of time.

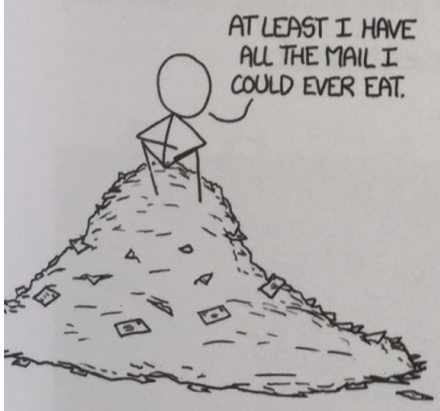
If they don't have a chance to communicate beforehand, things get a little harder. Without knowing the other person's strategy, how do you know what *your* strategy should be?

There's an old puzzle, from before the days of cell phones, that goes something like this:

> *Suppose you're meeting a friend in an American town that neither of you have been to before. You don't have a chance to plan a meeting place beforehand. Where do you go?*

The author of the puzzle suggested that the logical solution would be to go to the town's main post office and wait at the main receiving window, where out-of-town packages arrive. His logic was that it's the only place that every town in the US has exactly one of, and which everyone would know where to find.

To me, that argument seems a little weak. More importantly, it doesn't hold up experimentally. I've asked that question to a number of people, and none of them suggested the post office. The original author of that puzzle would be waiting in the mailroom alone.



Our lost immortals have it tougher, since they don't know anything about the geography of the planet they're on.

Following the coastlines seems like a sensible move. Most people live near water, and it's much faster to search along a line than over a plane. If your guess turns out to be wrong, you won't have wasted much time compared to having searched the interior first.

Walking around the average continent would take about five years, based on typical width-to-coastline-length ratios for Earth land masses.[5]

Let's assume you and the other person are on the same continent. If you

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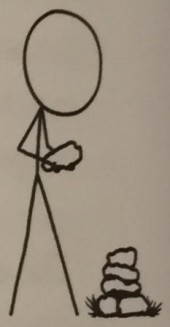
5 Of course, some areas would present a challenge. Louisiana's bayous, the Caribbean's mangrove forests, and Norway's fjords would all make for slower walking than a typical beach.

both walk counterclockwise, you could circle forever without finding each other. That's no good.

A different approach would be to make a complete circle counterclockwise, then flip a coin. If it comes up heads, circle counterclockwise again. If tails, go clockwise. If you're both following the same algorithm, this would give you a high probability of meeting within a few circuits.

The assumption that you're both using the same algorithm is probably optimistic. Fortunately, there's a better solution: Be an ant.

Here's the algorithm that I would follow (if you're ever lost on a planet with me, keep this in mind!):



If you have no information, walk at random, leaving a trail of stone markers, each one pointing to the next. For every day that you walk, rest for three. Periodically mark the date alongside the cairn. It doesn't matter how you do this, as long as it's consistent. You could chisel the number of days into a rock, or lay out rocks to plot the number.

If you come across a trail that's newer than any you've seen before, start following it as fast as you can. If you lose the trail and can't recover it, resume leaving your own trail.

You don't have to come across the other player's current location; you simply have to come across a location where they've been. You can still chase one another in circles, but as long as you move more quickly when you're following a trail than when you're leaving one, you'll find each other in a matter of years or decades.

And if your partner isn't cooperating—perhaps they're just sitting where they started and waiting for you—then you'll get to see some neat stuff.