Twitter Thread by Trung Phan ■■



Trung Phan ■■
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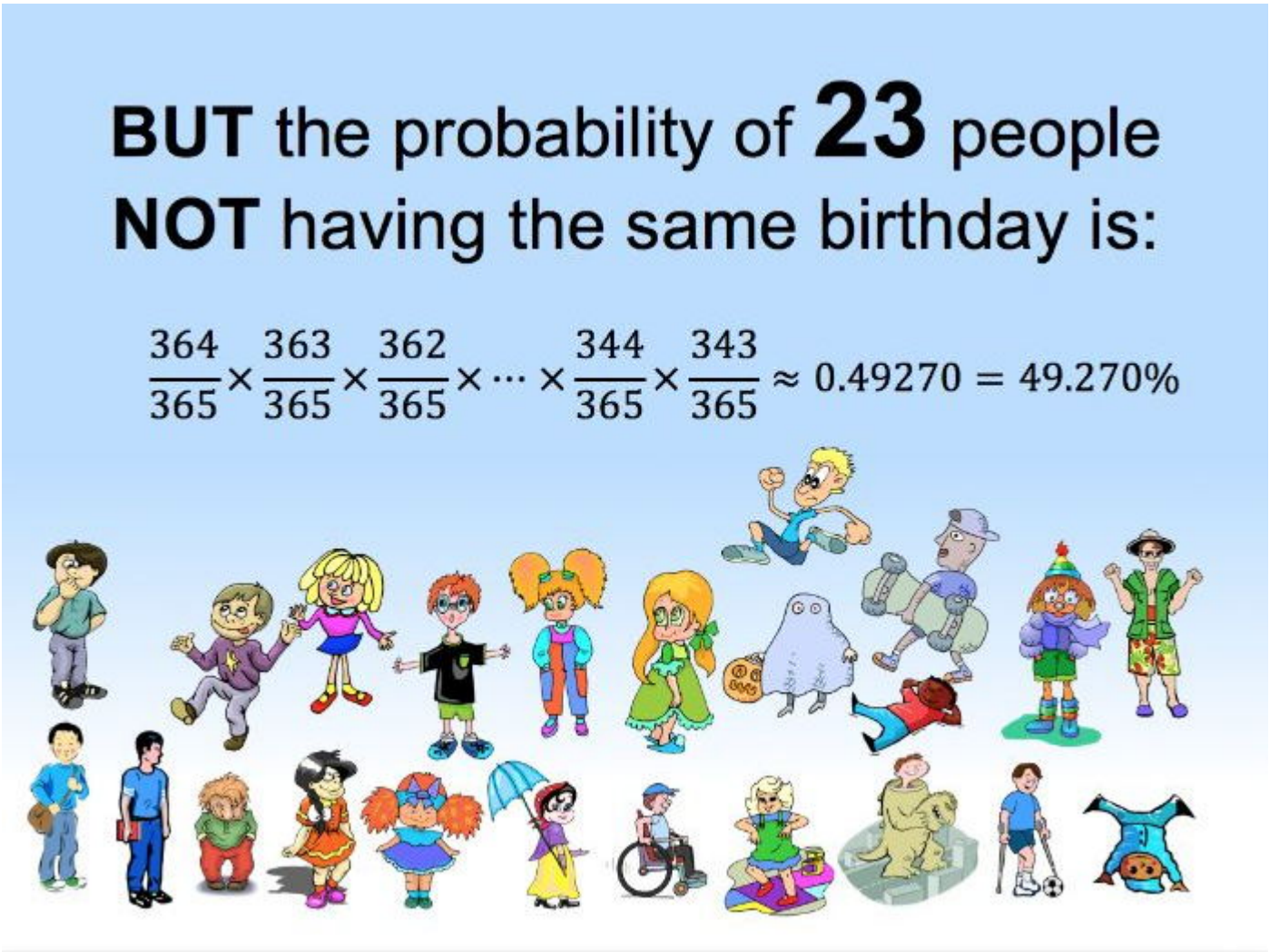
Our intuitions often leads us astray. A good reminder: study counterintuitive math and economic results.

Here are 9 of them ■

The Birthday Paradox

In a room of 23 people, there's a >50% chance that 2 people share the same birthday.

This type of probabilistic thinking does *not* come naturally to many people.



The Coastline Paradox

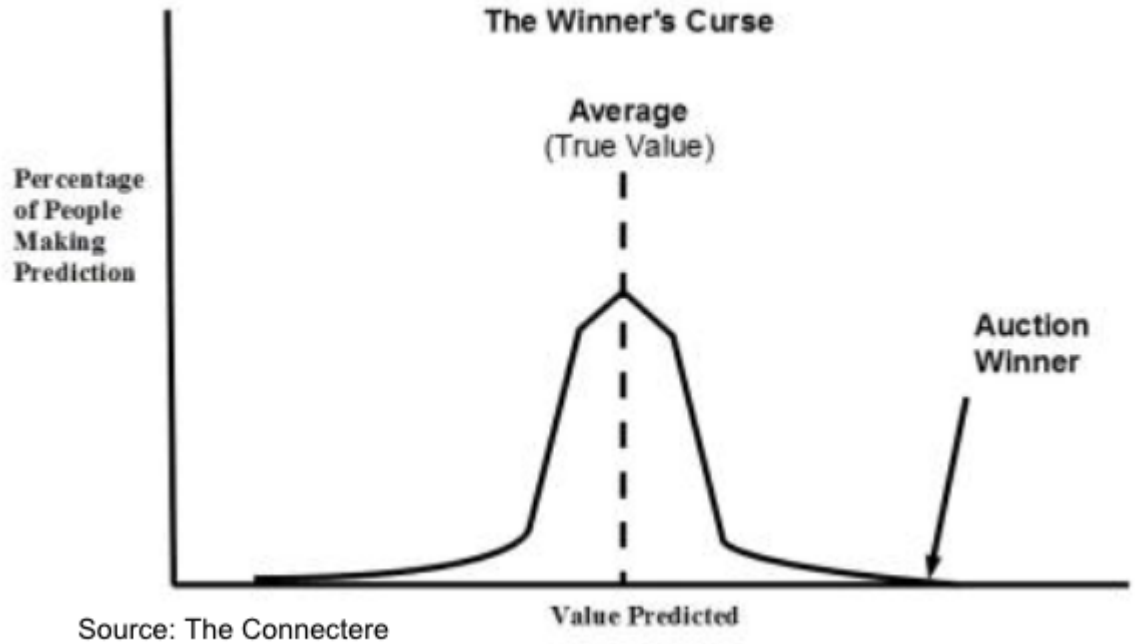
Fractal geometry is also confounding:

The coastline of a landmass does not have a well-defined measurement. As the unit of measurement gets smaller (eg. from KMs to cm), the length increases without limit.



Winner's Curse

In an auction, the winning bid will usually exceed the intrinsic worth of an item leading to a significant overpay (and negative net profit for the winner).

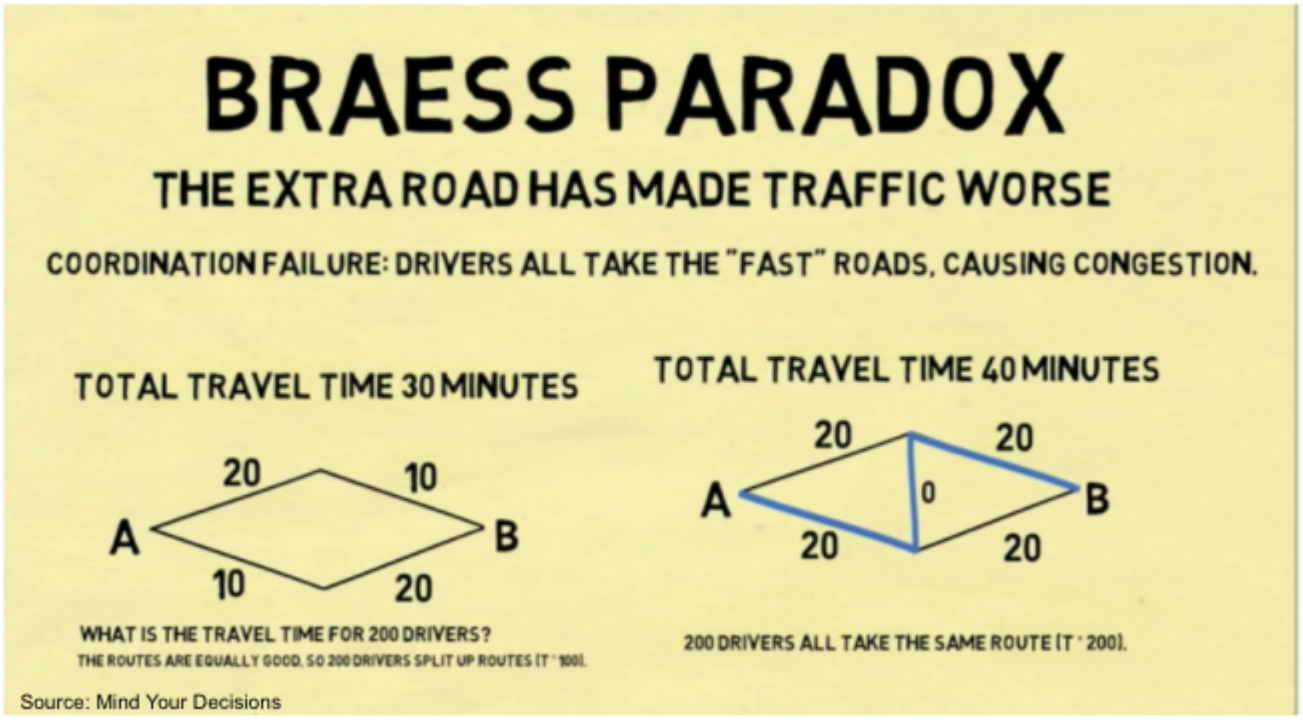


Source: The Connectere

Braess's Paradox

Removing an extra road can make everyone's commute time faster.

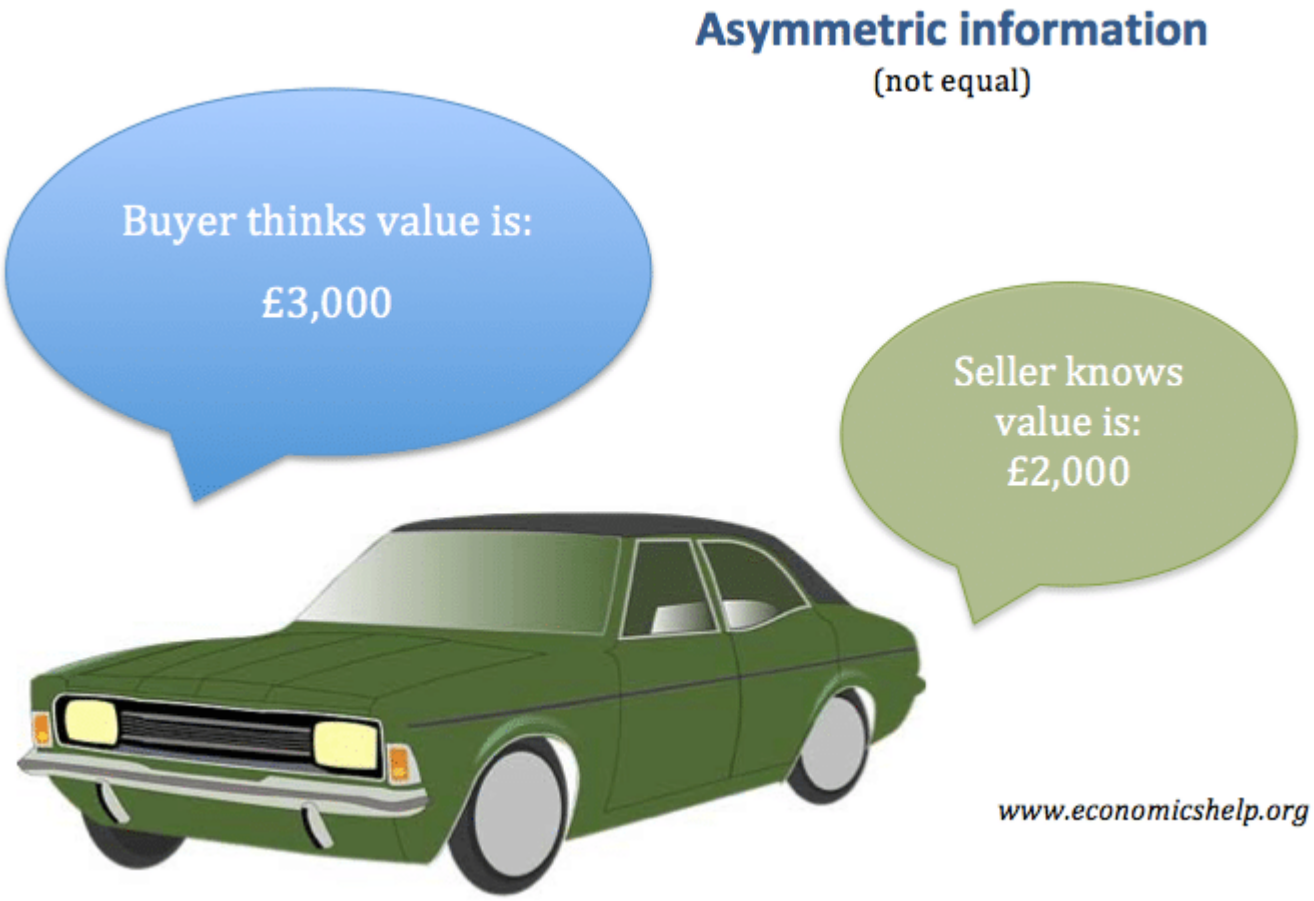
Why? The existence of a "fast" road leads to congestion because everyone uses it. If you remove the shortcut, traffic flows better.



Market for Lemons

If a seller has slightly more info than a buyer (eg used cars), it can lead to market failure:

■■Buyer will pay price below market (b/c they can't confirm quality)
■■High-quality sellers leave market b/c can't get good price
■■Only low-quality sellers remain



The Potato Paradox

If you take 100lbs of potatoes which are 99% water by weight and you let it dry so that they are 98% water, their new weight is 50lbs.

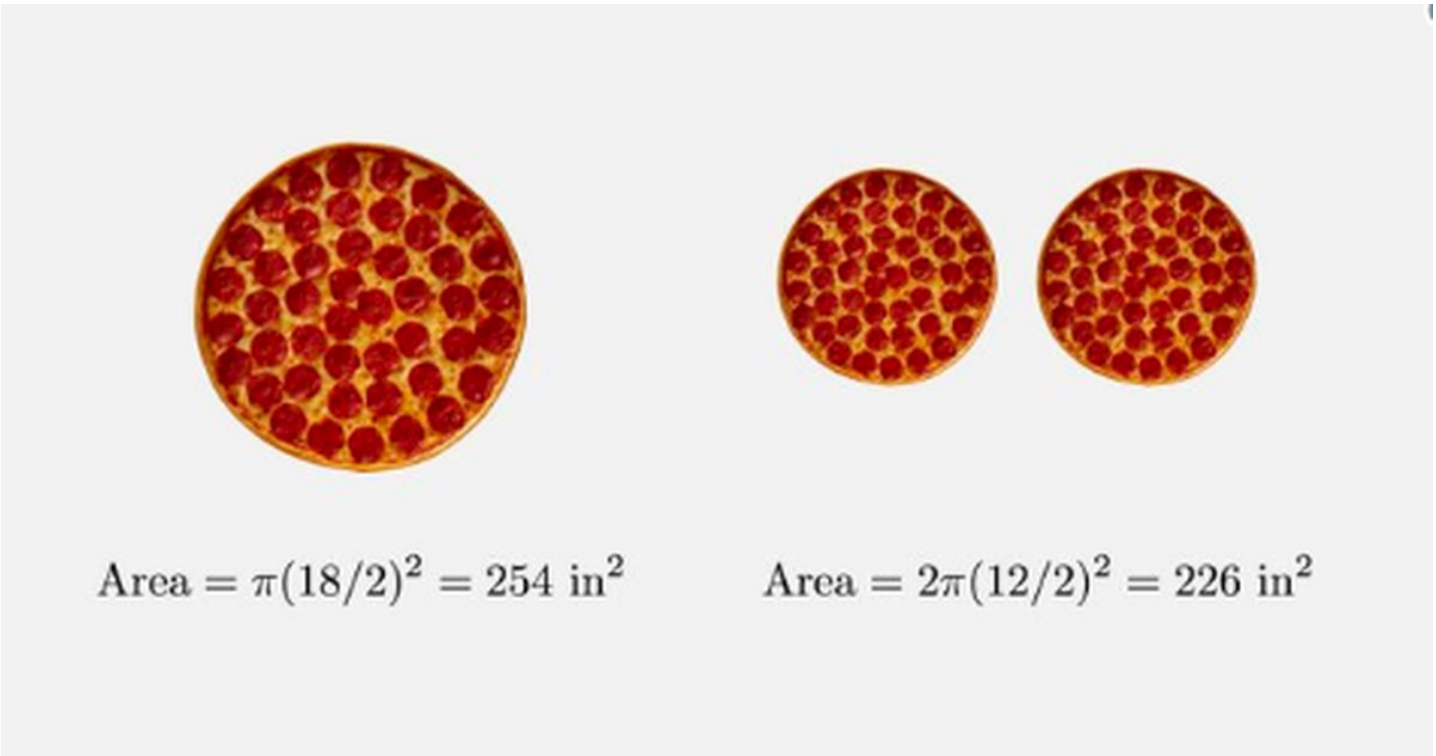


Initial state: 1 lbs solid, 99 lbs water.
Total weight: 100 lbs.
Proportion of total weight that's water: 99/100 = 0.99

Final state: 1 lbs solid, 49 lbs water.
Total weight: 50 lbs.
Proportion of total weight that's water: 49/50 = 0.98

The Pizza Paradox

One 18-inch pizza has more "pizza" than two 12-inch pizzas (still trying to process this fact).



Littlewood's Law of Miracles

An example of the law of large numbers: A person can expect to experience events with odds of one in a million at the rate of about once per month.

(Similarly: in a world with ~8B people, a one-in-billion event will happen 8x a month)



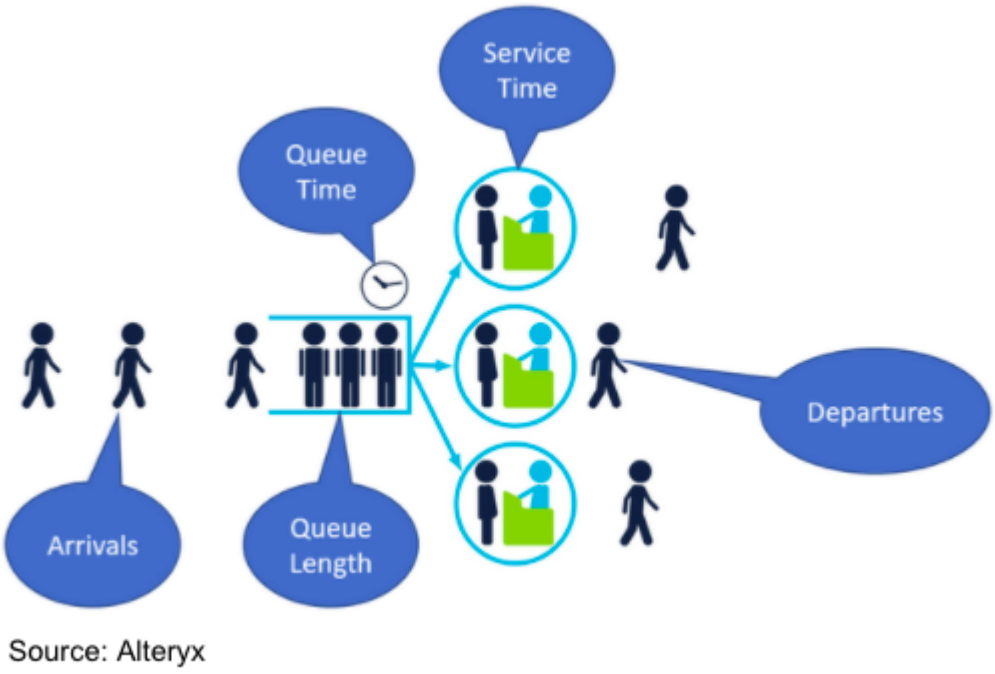
Queuing Paradox

If bank customers take on average 10 minutes to serve and they arrive randomly at a rate of 5.8 per hour...then the waiting time for

■■one teller is *5 hours*

■■two tellers is *3 minutes*

Waiting time is reduced by 93x by adding a second teller.



Source: Alteryx

PS. I write interesting threads like this 1-2x a week. Follow @TrungTPhan to catch them in your feed.

Also check out my weekly Saturday newsletter:https://t.co/jGZs8brnVR

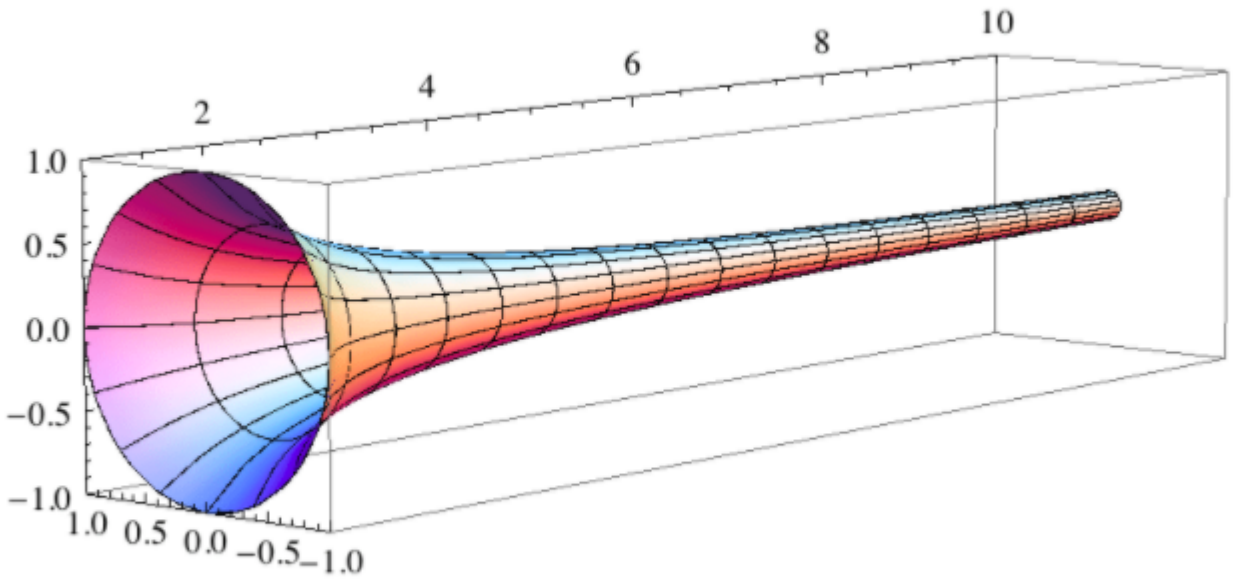
Sources

Here's the breakdown of the queueing theory: https://t.co/2vunn5mMTz

Check this awesome article for dozens more counterintuitive math, science + physics facts: https://t.co/8sejjm6AkH

VERY counterintuitive fact: Gabriel's Horn is a geometric figure with:

■■ *infinite* surface area
■■ *finite* volume



Deep dive on the Birthday Paradox https://t.co/3AAXUUVGP9

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Get a cup of coffee.

Let's talk about the Birthday Paradox.

This is a simple exercise in probability.

But from it, we can learn so much about life.

About strategic problem solving.

About non-linear thinking -- convexity, concavity, S curves, etc.

So let's dive in!

— 10-K Diver (@10kdiver) January 9, 2021