

# Research Update

April 2020

"Research Perspective: COVID-19 (Part 1)"

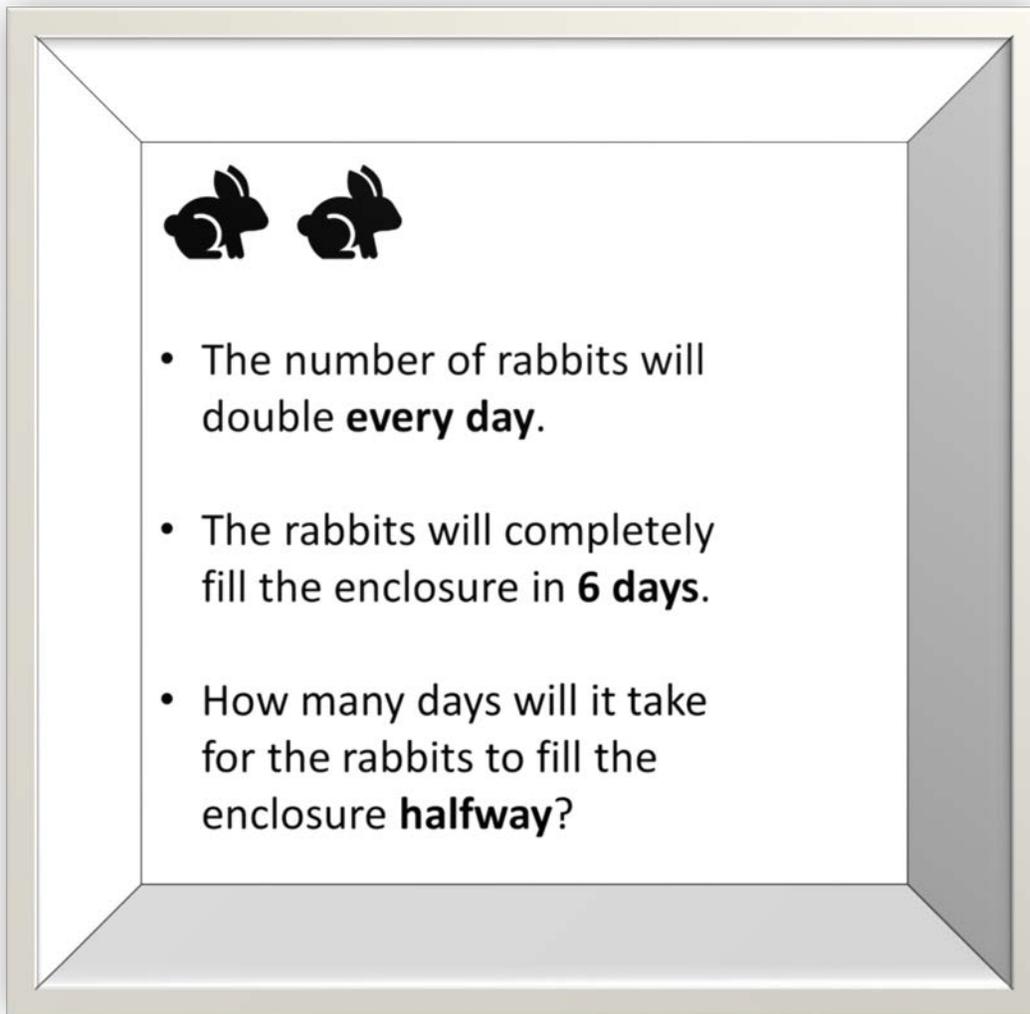
By Ben Callif, Research Associate

Here are the resources I used to compile my data for this memo. There's an immense amount of information to dig into beneath what I've presented here.

- [Milwaukee County COVID-19 Dashboard](#)
- [Wisconsin Department of Health Services: Outbreaks](#)
- [COVID Act Now](#)
- [Our World In Data: COVID-19 Statistics and Research](#)

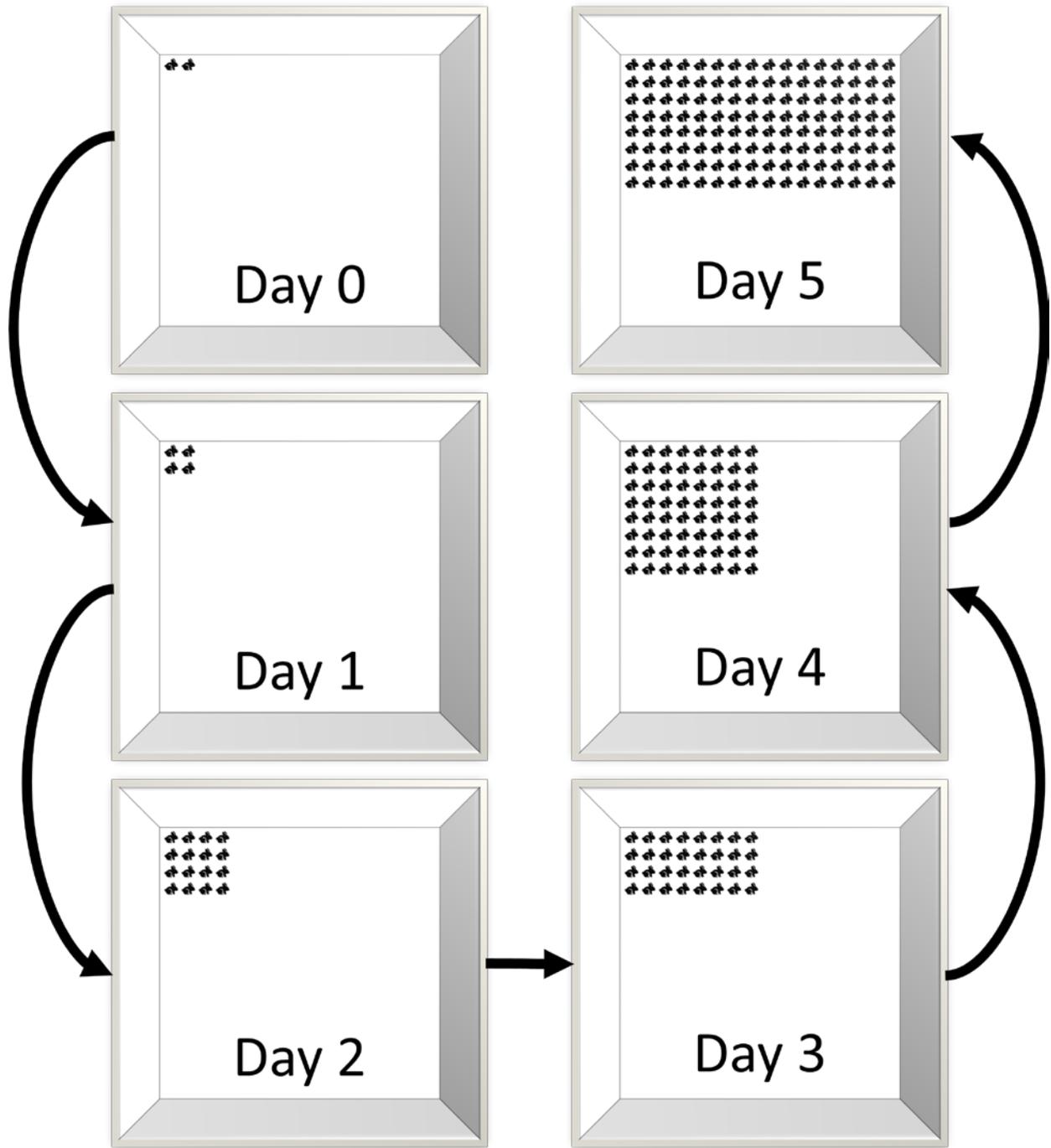
It's been nearly 4 months now since the first cases were reported in Wuhan, and researchers are compiling data at break-neck speed. The first vaccines are already being tested in humans and some countries (like China and South Korea) have essentially contained the spread. Fortunately, the United States is behind the curve and we are just starting to see the initial spread. Unfortunately, people in general have a very difficult time understanding the reality of exponential growth.

For example, imagine an enclosure with two rabbits in it. If the number of rabbits doubles every day, and it takes 6 days to fill the entire enclosure, how many days will it take for the enclosure to be **half full** of rabbits?

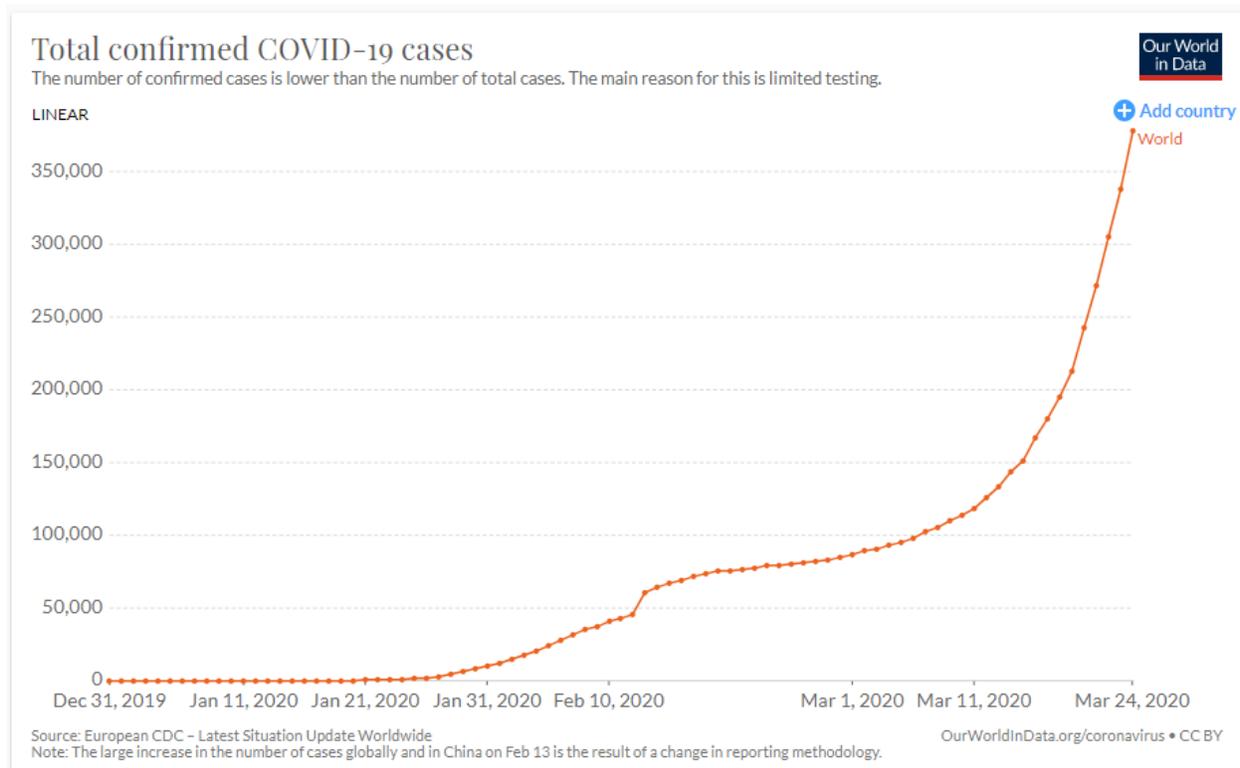


Maybe you already know the right answer, or you figured it out by working through the math. Most people intuitively think “**3 days.**”

But it will actually take 5 days for the rabbits to fill half the space. You can see the progression of this exponential growth in the image below. At 3 days (upper right of the image), the enclosure isn’t even a quarter of the way full. Because the number doubles every day, it only takes one day to go from half full to completely full (day 5 to day 6). If the rabbits were allowed to continue duplicating past the edges of the enclosure, there would be 2,000,000 of them on day 20. On day 60, there would be approximately the same number of rabbits as there are [grains of sand on the entire planet](#). Exponential growth is simply unfathomable.



Infectious diseases spread through populations in this same pattern. We can see this in action through the spread of COVID-19 cases throughout the world (see image below).



It took 43 days to go from 0 to 50,000 confirmed cases of COVID-19; 24 days to go from 50,000 to 100,000 cases; 11 days to go from 100,000 to 200,000 cases; and 6 days to go from 200,000 to 400,000. If this rate continues, the entire world will be infected in less than a week. It's really hard to get an intuitive grasp of this exponential growth.

But don't be alarmed. I wouldn't be writing this if it was all bad news. I want to reassure you (and myself) that everything is going to be okay and that we're doing the right thing by staying home.

It is very important to understand that, because we are changing our way of life, **the rate of contagion will not continue accelerating**. In other words, most of us will be spared from the disease because Milwaukee and Wisconsin have taken measures to disrupt the virus. It will continue to spread exponentially, but **over a much longer period of time**. In the example above, the rabbits doubled every day. But, in reality, cases of COVID-19 seem to double less than that. At the peak of infectious spread, confirmed cases double approximately every 3 days.



As mentioned before, some places (like South Korea and China; see image above) have started to get control over the contagion and have decreased their doubling period to a manageable number. Without authoritarian measures (like China) or an extremely rapid and precise response (like South Korea), we are a

long way from an ideal doubling time. But even doubling every 10 days is *significantly* less frightening than every 3 days. Let's put this into real terms.

In Wisconsin, there were ~450 cases as of Tuesday, March 24<sup>th</sup>. If those cases continue to double every 3 days, there will be ~460,000 cases in one month. But, if those cases slow down to a doubling rate of every 10 days, there will only be 3,600 cases in one month. That's a truly staggering difference. Which brings us to the good news: tens of thousands of lives can still be saved.

As you probably know, the Governor sent out a "Safer At Home" order that took effect on Wednesday, March 25<sup>th</sup> to shut down all non-essential businesses in the state. If people follow this order, we have a good chance of [preventing a catastrophic failure of the healthcare system](#). We won't really know until the order takes hold and new data starts coming in.

To that end, I believe it is important to stay on top of the flow of information. Having a realistic sense of what's happening can be overwhelming, but it helps to prevent panic. **Everything is going to be okay.** It may seem like society has been caught completely off-guard, but [many people saw an event like this coming from a mile away](#). And the more we learn, the more predictable things become. So, we invite you to visit this page that will be updated daily with COVID-19 statistics for Milwaukee and Wisconsin.

Stay calm, stay distant, and stay connected.

Thanks for reading.