

Not My Fault: Down the rabbit hole: Earthquakes and COVID on my mind

Lori Dengler/For the Times-Standard
Posted November 15, 2020

“Why is a raven like a writing desk?” asks the Mad Hatter to Alice at Lewis Carroll’s famous tea party. Riddlers and scholars have produced pages of potential answers, demonstrating that any two seemingly unrelated items have properties in common. It popped into my head this morning as I pondered how is COVID like an earthquake.

COVID and earthquakes have been on my mind lately. The deadliest earthquake of 2020 was two weeks ago and nearly every day the pandemic has been breaking new records. Like the raven and the writing desk, they seem pretty different at first glance. The pandemic has a much bigger footprint both in area and scale. In the last two weeks 117 people died in an earthquake and over 100,000 COVID deaths were reported. The worst known earthquake claimed 830,000 lives (China 1556), modest compared to several pandemics with numbers in the tens of millions. The main assault of an earthquake is over in seconds to minutes, where pandemics take years and can produce repeated assaults over centuries. Even the largest of earthquakes affect a relatively small region of the planet; we are sadly learning that the direct impacts of pandemics are global.

A closer look at writing desks and ravens comes up with similarities (quills, legs, bills and so forth). Earthquakes, pandemics and other natural disasters are likewise both disparate and similar. The starting point to reducing impacts for all of them is science and understanding the basic properties of the event, whether ground shaking or contagion. That means years of laboratory work, field observations, modeling, compiling the case histories of previous events, and remembering lessons learned.

Wouldn’t it be nice if we could sum up all that information in a single number that encompasses what we are dealing with and how “big” it is? The media might make you think that an earthquake magnitude, the hurricane category or a tornado Fujita number is all that one needs to know. I know the most about earthquakes so will use this as an example of why it doesn’t work.

Wikipedia summarizes earthquake activity and I frequently refer to their site for background information. Each year starts with two lists – death toll and magnitude. It doesn’t take a very long look to realize that there is little correlation between the two. The 1976 M7.5 earthquake in Tangshan, China likely killed more than 600,000 people and ranks as the deadliest of the past century. It was a thousand times weaker than the century’s largest quake, the 1960 M9.5 in Chile. Even with the Pacific-wide tsunami it generated, the death toll from 1960 was about 6000.

Earthquakes, like real estate, depend on LOCATION, LOCATION, and LOCATION. The 1960 Chile earthquake was centered in a remote area with low population density. The 1976 Tangshan earthquake was beneath a highly populated area of more than a million people and a built infrastructure not designed to withstand strong shaking.

I’m a big fan of PAGER (Prompt Assessment of Global Earthquakes for Response). PAGER estimates the likely loss of life and economic impacts typically within 15 to 30 minutes of earthquake occurrence. Magnitude is an important input, but PAGER also uses estimated shaking strength, population and the nature of building construction to estimate losses. I worked with Dave Wald who led the PAGER team during development of USGS Did You Feel It algorithm. Did You Feel It is one of the inputs for ground shaking strength so I feel I have a very small part in PAGER.

The purpose of PAGER is to provide a quick heads up to responders of whether a particular earthquake is likely to produce significant impacts and over how wide an area. It typically takes days to get a good on-the-ground assessment of damage, especially in remote areas, and PAGER provides a quick categorical picture of what may have happened. PAGER estimates can be viewed by anyone – just go to latest earthquakes at earthquake.usgs.gov, click on the listed earthquake and scroll down.

I knew nothing about the numbers used to describe pandemics before this year. In my March 8th column, I made a foray into epidemics and learned that R0 (R naught) is a measure of how easy it is to transmit the virus from person to person. But like magnitude, it alone can’t predict the impacts. Just as important are other factors such as incubation period, how long someone is infectious, and fatality rates. And, like earthquakes, the social environment and human response influence loss. Investing in understanding how structures respond to

shaking and developing and enforcing strict building codes reduces earthquake losses. Reducing viral transmission through masks, distancing and ultimately, effective vaccines will control the virus.

I think earthquakes are more like writing desks and COVID is akin to the raven. Earthquakes stay in one place. They vary in appearance but we have a good handle on how to describe them, how they behave and interact with our built environment. Ravens move, learn and evolve behaviors and it is difficult to predict what a particular bird will do. It's a harder problem to study than earthquakes with more variables but that doesn't mean it is intractable. There has never been a time where the resources to observe, analyze, model and institutionalize pandemic response has been more important.

The Mad Hatter admits to Alice that there was no answer to the raven/writing desk riddle. Its purpose was to underline the nonsense that Carroll perfected in his two classic Alice books. Later in life he did propose an answer, "Because it (the raven), can produce a few notes, tho they are very flat." With that answer, I can claim that I am like both of them as well.

Note: Learn more about the remarkable world of ravens in Bernd Heinrich's books – Ravens in Winter and The Mind of the Raven.

Lori Dengler is an emeritus professor of geology at Humboldt State University, an expert in tsunami and earthquake hazards. All Not My Fault columns are archived at <https://www2.humboldt.edu/kamome/resources> and may be reused for educational purposes. Leave a message at (707) 826-6019 or email Kamome@humboldt.edu for questions/comments about this column, or to request a free copy of the North Coast preparedness magazine "Living on Shaky Ground."
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