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Not My Fault: The shaky but enduring legacy of the 1992 Cape Mendocino earthquake

Lori Dengler/For the Times-Standard
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The April 25th 1992 earthquake was felt by almost everyone in Humboldt County and by some as far away as Monterey, Redding and Southern Oregon. Each recollection is unique and communal at the same time. A friend in Petrolia recalled the cacophony in her small house as dishes and pots flew from kitchen shelves, food was ejected out of the refrigerator and the house lurched off its foundation. A man driving in Fortuna thought he had a blowout, stopped and got out to examine the damage. Not finding any, he looked up and noticed dozens of other drivers going through the same exercise. Some people found themselves in less than the optimum situation. I talked to a woman who was in a state of undress as she was trying on clothes at the Bay Shore Mall when the room shuddered and the lights went out. An HSU student recalled being in the shower at the time and a contractor was in a vulnerable position underneath a house sitting on jacks in Eureka. For some the experience was very frightening, and for others a matter of curiosity. In Davis, a man described looking out the window at his swimming pool to see waves travelling on the surface. He didn't notice the shaking himself, but was transfixed by the ripples that continued to cross the pool for minutes.

Personal descriptions of shaking aren't just stories but have scientific value as well. Robert Mallet, an Irish geologist in the 19th century, was the first to come up with a way to compare the size of an earthquake. In studying the Great Neapolitan Earthquake in 1857, Mallet observed that the pattern of damage and people's descriptions of shaking strength or intensity varied in a systematic way. The most heavily damaged buildings were concentrated in a small central zone and the relative damage and strength of shaking decreased in roughly concentric zones moving away from the center. He coined the term intensity to describe the relative shaking strength, put a point in the center of his strongest zone and called it the epicenter. He was the first scientist to use the term.

For more than seventy years, intensity was the only measure of earthquake size. After Mallet, many scientists introduced variants of the intensity scale. The United States adopted the twelve point Modified Mercalli Intensity (MMI) Scale in 1931. The levels were designated by roman numerals and were described in qualitative terms such as "Felt by many people inside, although not always immediately recognized as an earthquake" for intensity III and "Felt by all; frightens most; most find it difficult to stand or walk" for intensity VII.

Richter introduced the magnitude scale in 1935 as a measure of the size of the earthquake source but intensity continued as a description of impacts. By the time of the 1992 earthquake, the USGS would send questionnaires to postmasters in the earthquake felt area and ask their perceptions of the shaking. Many acknowledged that this was not a particularly quantitative methodology as there was so much subjectivity in one individual's responses.

My first Humboldt earthquake was in 1980 and I was teaching geophysics at the time. The earthquake provided me with a nice hands-on field experience for students. I directed them to interview people and collect intensity data. We used a similar survey form to the USGS postmaster survey and ended up with great stacks of qualitative descriptions. There were general agreements as to what was stronger or weaker but considerable variability and I found it very unsatisfying. After similar exercises for other North Coast earthquakes, I decided 1992 was going to be different.

I worked with Kathy Moley who was a geology student at the time to develope a survey form with answers that could be given a numerical value. The first question was pretty simple – Did you feel it? Yes got a one and No got a zero. We had questions about perceptions of shaking strength, reaction, whether they heard noises, if heavy furniture shifted, structural damage etc. The difference between our survey and the USGS postal survey is that every answer got a numerical value and could be entered into a spread sheet. We wanted to end up with numbers that were roughly the same as the MMI scale – a 3 should still be light shaking and a 7 relatively strong. So we weighted the responses, summed them up and calibrated them by comparing them to the USGS values for the same communities. After many attempts we came up with a system that seemed to work pretty well. We could crank out a numerical calculation of intensity for a particular community that didn't involve any subjective determination. For the method to work, we needed at least ten responses for a particular area.

The USGS was highly skeptical of our approach at first. It took another earthquake – the 1994 Northridge event – and a much more detailed study to adjust and validate the methodology. A few years later, Dave Wald at the USGS adapted our questionnaire to the internet and it became the foundation of the "Did You Feel It" Community Internet Intensity that is now in standard use today. Next time you feel an earthquake, be sure to visit USGS recent event page https://earthquake.usgs.gov/earthquakes/map/ and click the Did You Feel it link and remember that it all started right here in 1992.

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