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Final Evaluation: Interactive Exhibit

Background

The exhibit I've developed is a science exhibit about earthquakes. More specifically, it focuses on how earthquakes happen: through a buildup of pressure in the ground. Earthquakes are a common natural phenomenon that have the potential to cause extreme damage to people. It is an important topic to have awareness about. My goal is to introduce the concept of how earthquakes happen through a interactive exhibit to provide a base level of understanding and get users interested in natural phenomena and how the world works. Therefore, the main message of my exhibit is: Earthquakes are caused by pressure in the ground, and the more pressure there is, the bigger the earthquake.

The main interactive element in the exhibit will be a set of two blocks, representing tectonic plates. When the user presses the two blocks together, conductive fabric on the sides of the blocks will detect how much pressure is being applied. This will trigger a moving plate. The plate represents the surface of the earth; it will shake based on the amount of pressure. More pressure means more movement. This element serves to show the user the impact of the earthquakes they can create by applying different amounts of pressure between the two blocks. Younger users should be able to resonate with the shaking of the plate as a response to them playing with the blocks, and adults will also be able to understand the different scalings of pressure.

Methods and Findings

I conducted a formative evaluation to evaluate the effectiveness of the exhibit. I first observed a user interacting with the exhibit, and followed up by asking them questions about their experience. I evaluated my exhibit two different users. The first was a college student studying computer engineering, who I will call User 1. The second was a middle aged woman working full time as a computer scientist, who I will call User 2. While I'm sure younger learners would enjoy the act of playing the blocks and watching the plate move in response, I think older users with more knowledge would gain more out of the exhibit by understanding the connection between the amount of pressure applied and the amount of movement in the plate. Therefore, I decided to test with older users.

The first part of the evaluation was the observation period where I watched the user interact with the exhibit on their own. I provided a brief explanation about the context of the exhibit and what it was for, and then let the user begin to interact on their own. User 1 began by reading all of the instructions and information that I had on display on my laptop. He then picked up the two blocks and pressed them together, observing as the plate moved when they made contact. He experimented with just tapping them together and pressing really hard, realizing after a few tries that the plate moved more with a harder press. He said it was hard to see the

difference between the different pressures, but he understood it after messing around for a little bit. His final remark was wondering if there was another component to the exhibit. User 2's first reaction was the pick up the two blocks, recognizing them as interactable. She then read the instructions on what to do and pressed the blocks together. She did not seem to realize they were pressure sensors; instead she pressed the blocks together several times, turning the plate on and off. She said she understood that the blocks were moving the plate, meaning that when the tectonic plates pressed against each other, an earthquake happened.

Once the users were done exploring the main elements of the exhibit, I conducted a short semi-structured interview to gather direct feedback. My interview questions were:

1. How much do you know about earthquakes? Did you learn anything new?
2. What did you find the most interesting or engaging about this exhibit?
3. How did the interactive elements make this better or worse?
4. Was anything unclear and confusing?
5. Finally, the main message is that earthquakes are caused by pressure in the ground, and the more pressure there is, the bigger the earthquake. Does the exhibit successfully convey this message?

User 1 had some basic knowledge about how earthquakes worked and didn't think he learned anything new, however the experience just reminded him of what he already knew and reinforced it. User 2 had little knowledge about how earthquakes worked. She explained that she learned that when you apply pressure between the two plates, an earthquake happens. Both users found the interaction with pressing the blocks together to be very engaging, and that it enhanced the experience. User 1 said it was a cool surprised to see the plate move after pressing the blocks together for the first time, and then it is was just fun the mess around with, especially after he realized he could control the pressure. Both users found interaction with the blocks to be intuitive, but the connection between the pressure applied and amount of plate movement was unclear. User 1 recognized it, but felt it wasn't obvious enough. User 2 only noticed after I explained it to her and demoed it again. She also felt the difference between low pressure and high pressure was not enough. Finally, in response to the last question, both users felt that the concept was strong and agreed that it successfully represents the main message.

Conclusions

Overall, I think the concept of the exhibit is very strong and does convery my main message. However, when prototyping I definitely ran into some roadblocks. Starting with successes, the interactable blocks resonated well with the users and were easy to use. Both of my test users enjoyed playing with them, and the response from the plate movement created a good incentive to interact with the exhibit. The concept of having the plate shake in response to the amount of pressure applied conveys the main message well.

The most significant area for improvement is the scaling of the pressure and the plate movement. The difference between the lowest speed and the highest speed just wasn't enough to create an obvious difference. Additionally, when pressing the blocks together, there is a very small range to create different pressures, maybe around one centimeter. To iterate, I would test

with a motor with a wider range of speeds. Additionally, I would like to test creating more padding between the blocks, to make the feeling of applying pressure more visceral. This could be done with more layers of the conductive fabric by loosely stacking it, or potentially with a sponge/foam between the fabric and the block. Testing would of course be required, but something to help the users feel how much pressure they are applying would make it easier to understand that pressure is what they are manipulating.

Finally, one element of the exhibit I was unable to implement (mainly due to time constraints) was a screen displaying the scaled magnitude of the earthquakes that users wre creating. I think those with more knowledge about earthquakes would be able to resonate with the different magnitudes and it would have added an additional element to reinforce the relation between pressure and earthquake scale. The screen would be incorporated with the information display and would be activated when pressure is read between the two plates.