

# REHEARSING DISASTER

## Understanding Earthquake Preparedness Behavior in an Interactive Environment

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### Introduction

The Pacific Northwest is expecting a huge earthquake along the **Cascadia Subduction Zone (CSZ)**.<sup>1</sup> Many residents are uninformed and unprepared, especially **18-29-year-olds**. Past research has shown that **video games** can increase players' **intent to carry out health-promoting behaviors**.<sup>4</sup> Video games may be an effective tool for promoting earthquake preparedness because they provide opportunities to try out **multiple solutions** within a low-risk environment.<sup>3</sup> Young adults may find this flexibility more useful than typical messaging oriented toward homeowners and heads of families. This project aims to understand earthquake preparedness behavior among Portland's 18-29-year olds by developing a series of **earthquake video games**. This summer, the **programming branch** of our team has worked hard to develop the first game. Meanwhile, the **behavioral science branch** conducted **focus groups** and designed an **experiment** to conduct with the game.

### Programming Fundamentals

The experiment 1 game was developed in Unity, a game development platform that handles many functions like physics, light rendering, and cameras. Using Unity, we are able to create special effects such as the shaking of the earth, explosions, and rain. Also, with our team being located in various locations, communication became just as important as the programming.

### Game Design

Cascadia 9.0 has four levels of increasing difficulty. Each of the four levels:

- Have different setting and characters.
- Have a different solution to avoiding injuries, obtaining clean water, finding shelter, and sanitation.

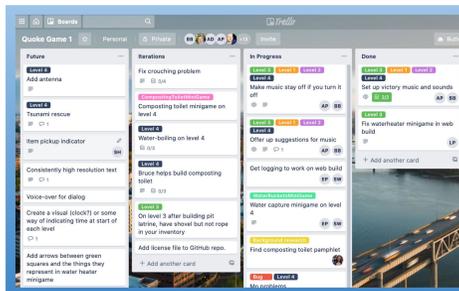
Challenges Faced in the Game				
Solutions	Avoid injury	Obtain Water	Find Shelter	Sanitation
	Drop, cover, & hold on	Purify stored water	Vehicle	Two bucket system
	Shut off gas valve	Harvest and purify water from water heater	Tent	Pit latrine
	Attach bookcase to wall	Collect and purify rainwater	Public shelter	Composting Toilet



### Communication

A few collaboration tools we used will working on this project are:

- **Trello**: we used a customized board with progress columns to keep track of tasks that need to be done and who is currently working on that task.
- **GitHub/Git**: a cloud based version control system that we used to track changes and manage our source code.
- **Zoom**: a video communication platform that we used for web conferences



### Behavioral Science

This summer we conducted **two focus groups** to help us finish the game, design the upcoming experiment, and plan for future games and studies. We used online media (Reddit, Craigslist, and Nextdoor) to recruit 18-29-year-olds in the Portland metro area. We held the groups over online video conference with the software Zoom.

### Focus Group 1: Game

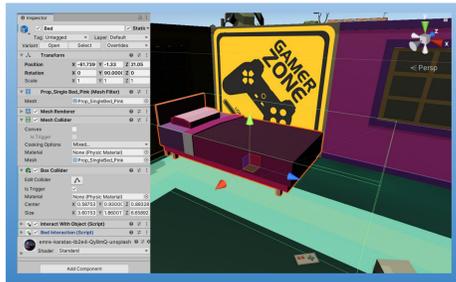
**Topic:** Learning from entertainment media, with playthroughs of levels 1 and 3 of our game as stimulus. **Key lessons:**

- Participants ( $n = 7$ ) valued **freedom of choice** in the game
- Some preferred **cooperative** messages while others preferred **individualistic** ones
- The game must convey **urgency** and explain information without overwhelming the player

### Focus Group 2: Information Seeking

**Topic:** Looking for earthquake preparedness information, with web searching as stimulus. **Key lessons:**

- Participants ( $n = 4$ ) cited **information sources** including: YouTube, community events, loved ones' lived experiences, academic articles, films
- Participants cited **indicators of credibility** including: education level, affiliation with an academic institution, perceived lack of bias, ability to track a source's information



### Unity

Any objects that exists is called a GameObject. Each game object contains components like:

- **Transform** : describes location, rotation and scale of a game object
- **Colliders**: used to stop other game objects from colliding or acts as a trigger to let you know when an object collides
- **Scripts**: written in CSharp and used to have more control over game objects and its components to do specifically what we want them to do.

We created special effects to make our interactive environment more realistic.

- **Earthquake**: we used Cinemachine Virtual camera component to manipulate the cameras to have the functionality and behaviors we have in our scene.
- **Explosions & Rain**: we implemented a powerful and versatile particle system to recreate these.



### Next Steps

**Experiment 1** (fall 2020) will compare the effects of two modes of learning (our video game vs. an internet searching exercise) on knowledge acquisition and motivation to prepare for an earthquake. Two **post-experiment Focus Groups** will then invite Experiment 1 participants to provide feedback. **Future studies** will explore themes of identification, cooperation, self-efficacy, personal responsibility, and the effects of social media on preparedness behaviors.



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**Focus Group participants**

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**Multnomah, Clackamas, and Washington County Emergency Management**

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