Intro to VR: Final Project

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Overview

We decided to focus our project for social good on users experiencing anxiety or in general need of some sort of environment to help calm them. To this end, we've decided to create an assortment of calming environments. Our whole project might include a variety of ~10 different calming scenes. However, in the scope of the class we hope to focus on three. We've created Trataka candle lighting, waterfall and gong sitting, and stargazing scenes.

Research

In order to best help our target user, we did a lot of research on some of the different environments, sounds, and effects that can help calm people down and reduce anxiety. We found a few different research articles on possible calming experiences:

- Waterfall Gong Scene
    - Calming percussion (gongs and singing bowls): https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871151/
    - Running water noises: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5842016/
- Trataka Candle Lighting:
    - What is Trataka meditation? https://pzizz.com/blog/trataka/
    - Effect of Tratak Candle Flame Meditation on Concentration and Memory Level of the College Athletics Team https://www.worldwidejournals.com/paripex/recent_issues_pdf/2015/July/July_2015_1437032106__120.pdf
    - Effect of Jyoti Trataka in Reducing Stress Among Female Teachers Due To Extensive Copy Checking https://www.researchgate.net/publication/351939061_EFFECT_OF_JYOTI_TRATAKA_IN_REDUCING_STRESS_AMONG_FEMALE_TEACHERS_DUE_TO_EXTENSIVE_COPY_CHECKING
- Stargazing
    - Stargazing to relieve stress: https://www.sciencedirect.com/science/article/pii/S2212571X21000202
    - Case study of stargazing to help calm anxiety: https://www.hospiceofdayton.org/star-gazing-eases-anxiety/
    - Stargazing as a form of Tibetan meditation, Dzogchen: https://www.pbs.org/thebuddha/blog/2010/Mar/1/sky-gazing-meditation-lama-surya-das/

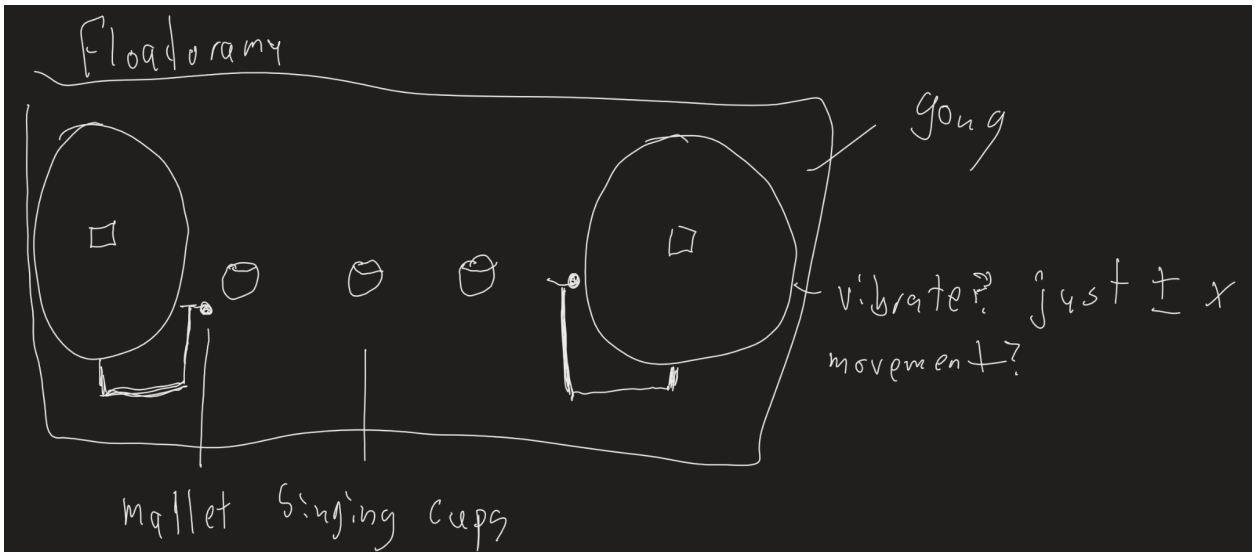
Brainstorming

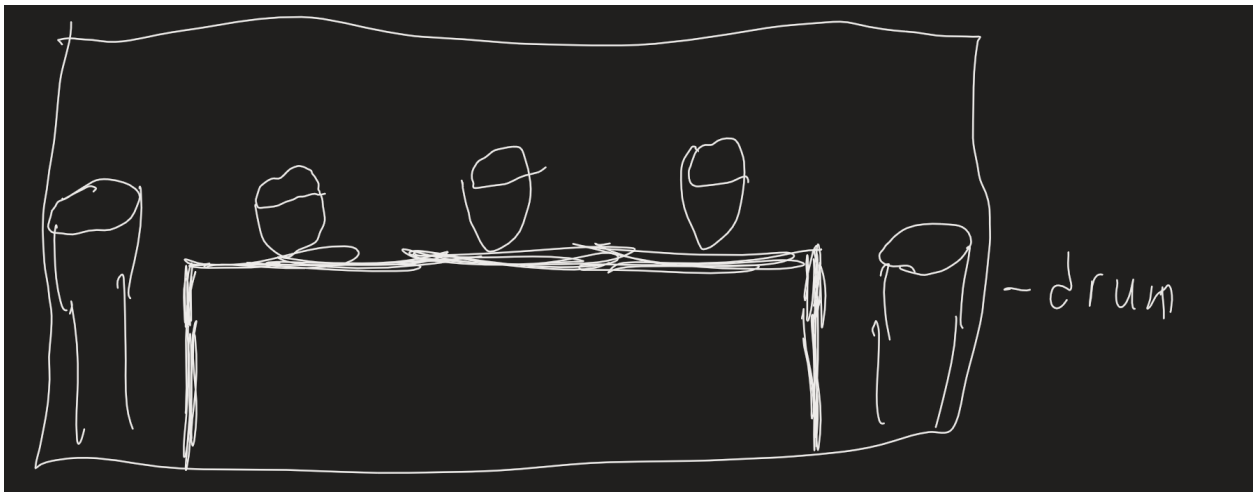
For all of our scenes, we decided to make the user stationary within the scene. This is due to the fact that our use case is for a user to be able to pull out their headset and use it whenever stressed. Thus, it is most likely the user will have limited space, so a seated environment would

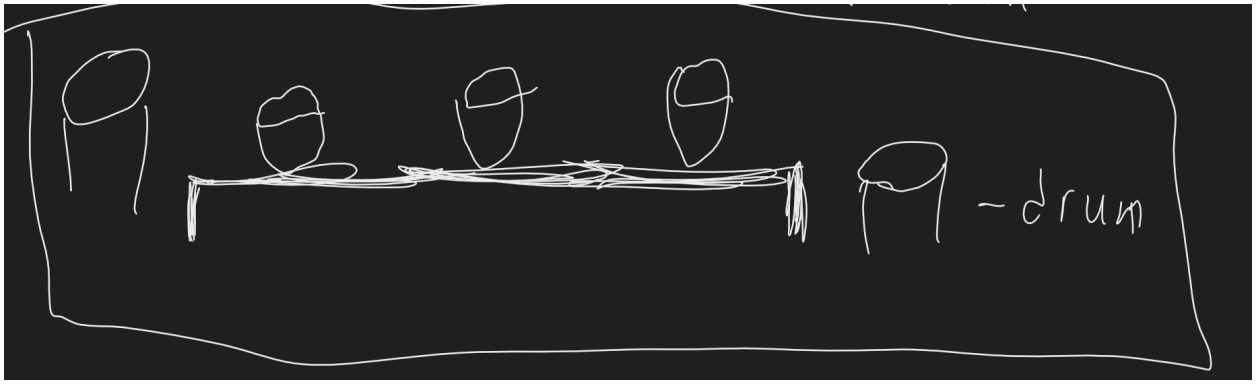
be most reasonable. Furthermore, movement that doesn't match the body might not be calming and worsen the situation.

Waterfall Gong Scene:

Percussion Placement Ideas:

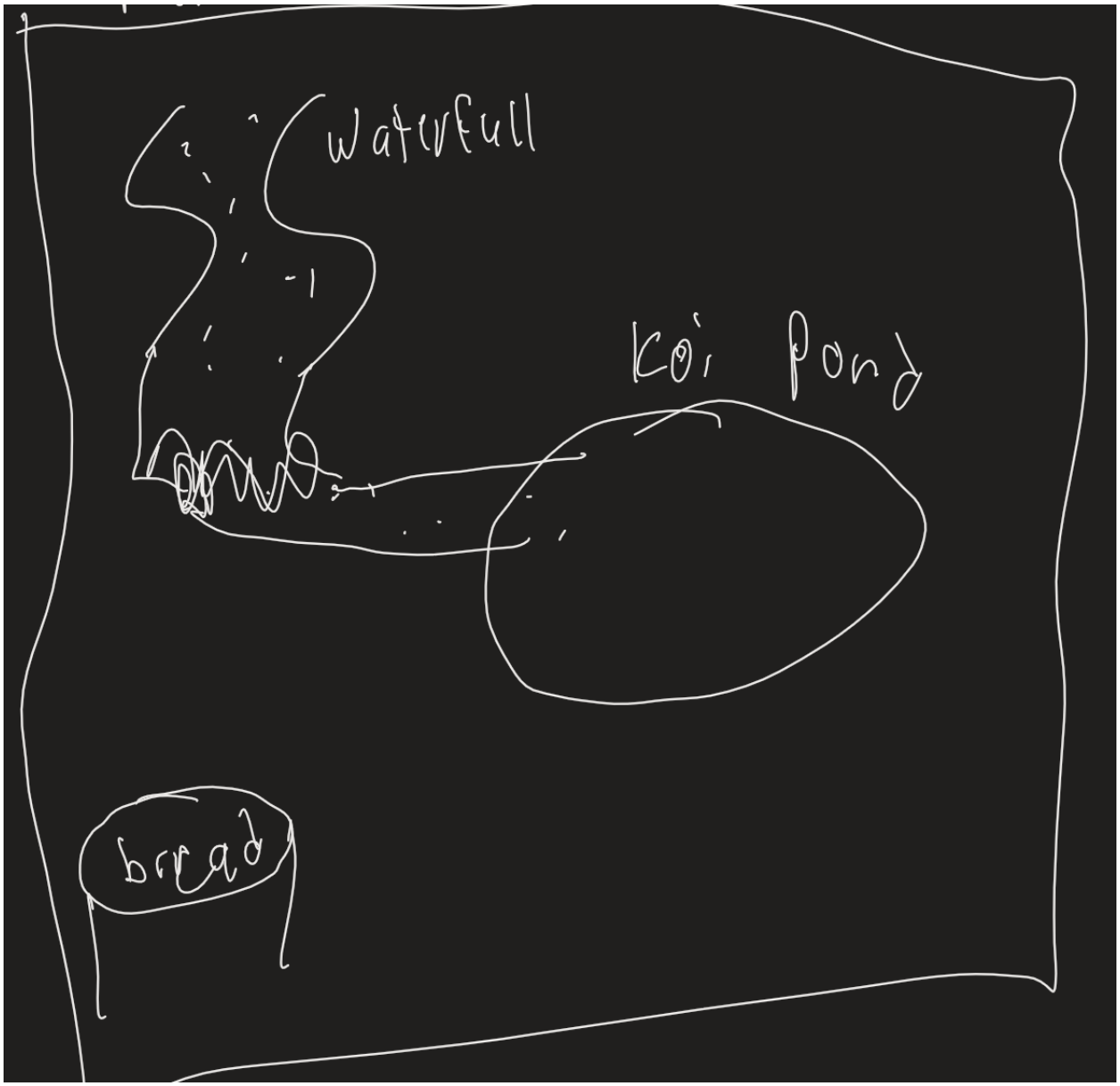


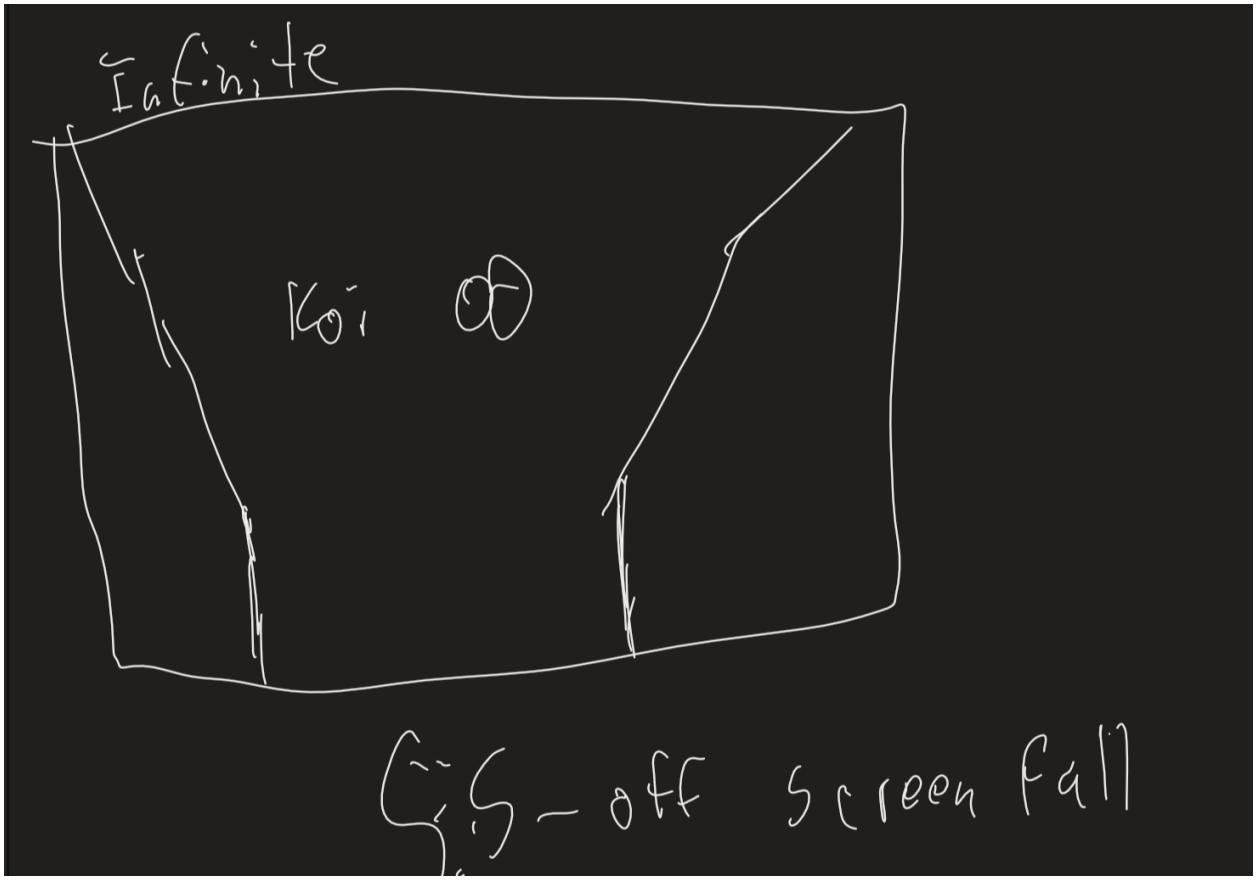


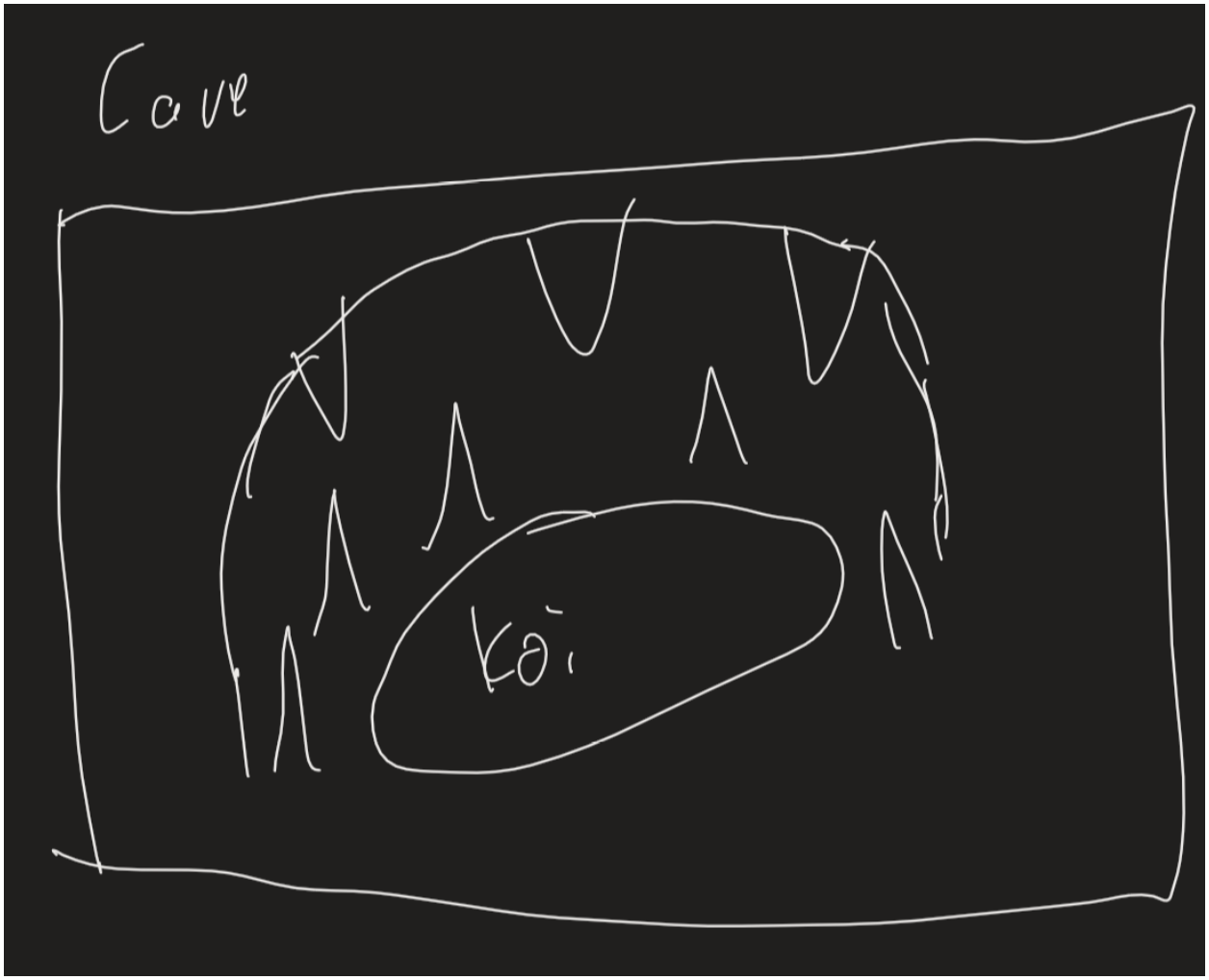


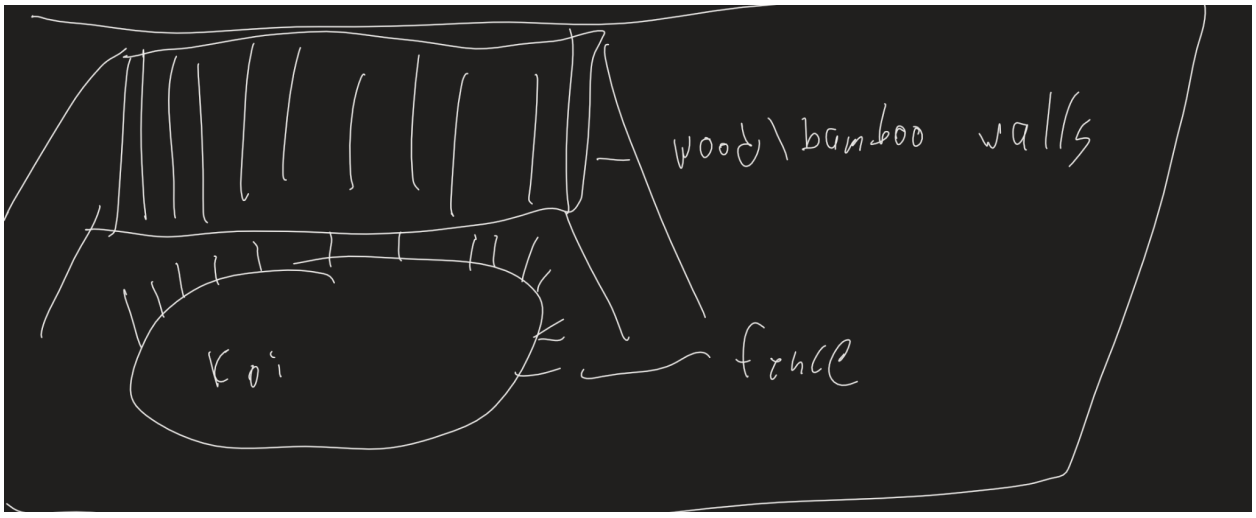
Conclusion:
After doing this brainstorming, we realized that while multiple different percussion options are the most fun and entertaining, it is not the most calming. The most calming option was to stay simple with 1 single gong. However, to give users some interaction to focus on, we made multiple different actions available with the mallet. Users can pick up the mallet and hit the gong, throw the mallet and have it return, or simply hold and observe the mallet.

Water and Koi Ideas:




Infinite
Koi
S;S - off screen fall



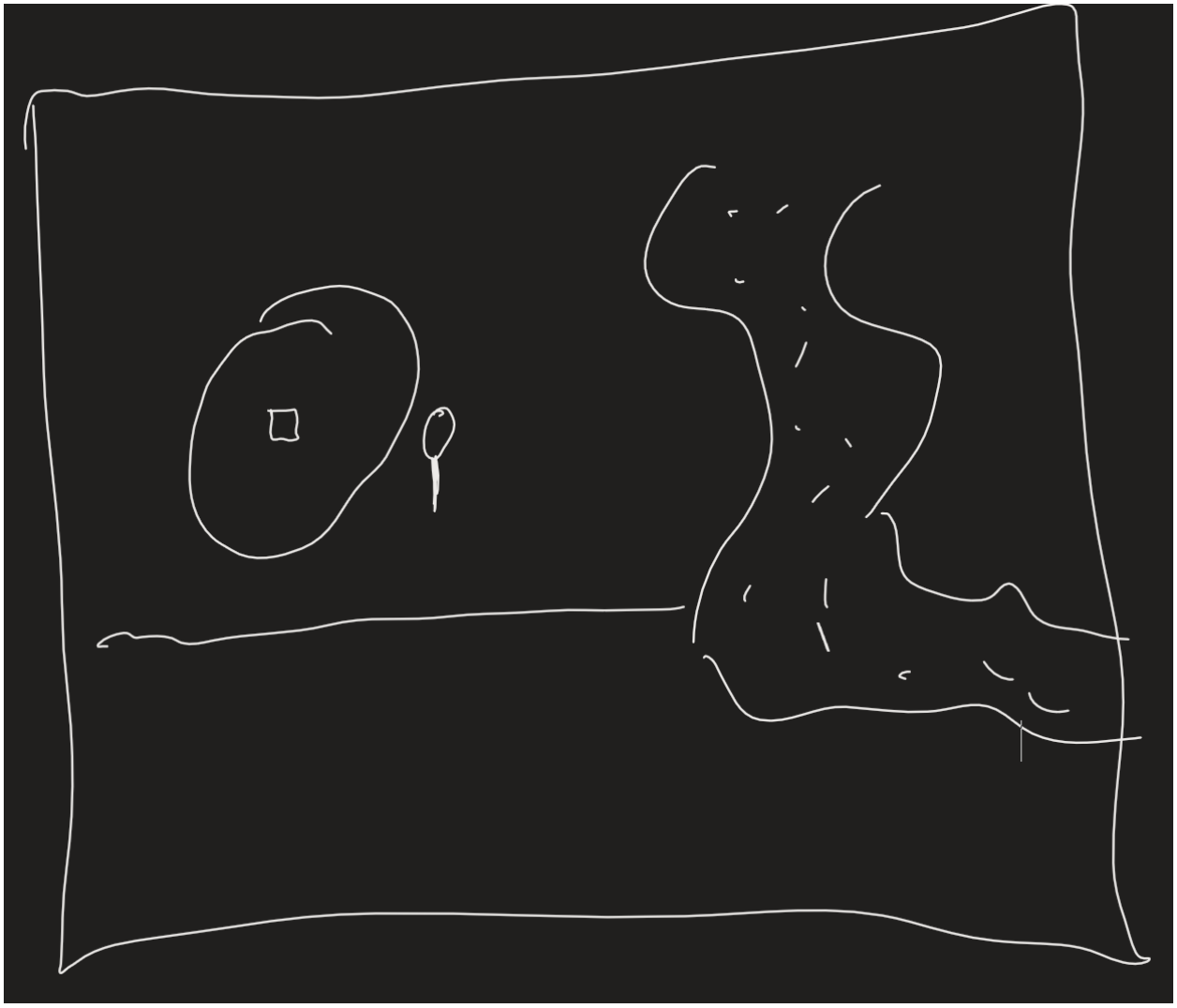


Conclusion:

We wanted to create a scene where running water noises were incorporated. Our first instinct was a koi pond, but then we realized that any inaccuracies in koi movement or animation might not be relaxing. The user might be even unconsciously upset with the wrong movement, and

thus not be relaxed. Thus, we decided to make a scene with running water, but no animals to animate.

Final Design:



This scene design includes the gong, mallet, waterfall, and waterfall noises. The gong can be rung with the mallet. The mallet can also be thrown and dropped without worry, because it will always return to its initial position after being thrown out of reach (after a small delay).

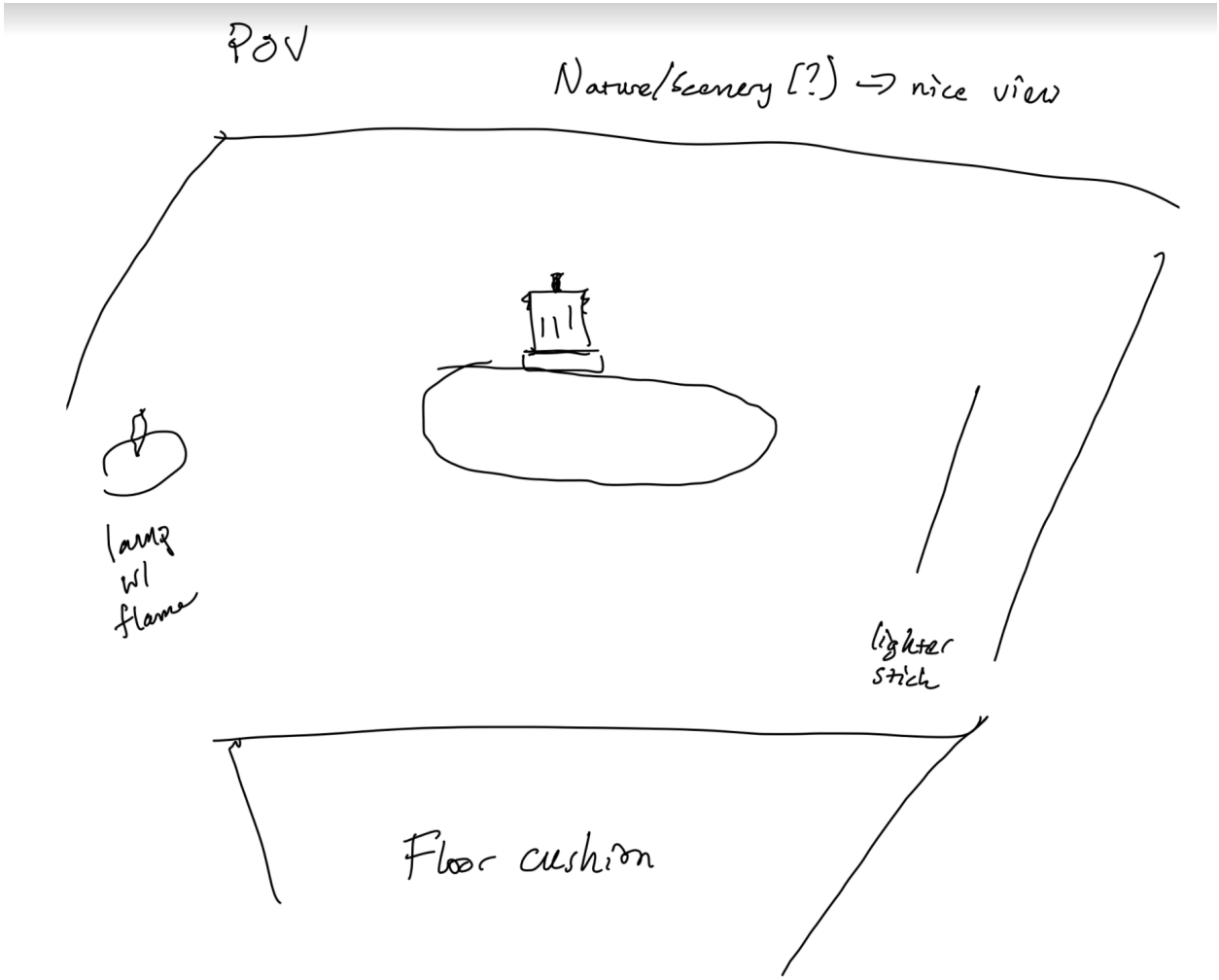
Trataka Candle Scene:

In the Trataka Candle Meditation Scene, I looked at research about how to properly set up the guided meditation space. Several things that the research pointed out were that the participant should be in a low light environment where they can relax and focus directly on the candle flame. It is extremely important that the candle be placed directly at eye level to the user for the meditation exercise to work properly. I created a calming “de-stress” room that has zen props to

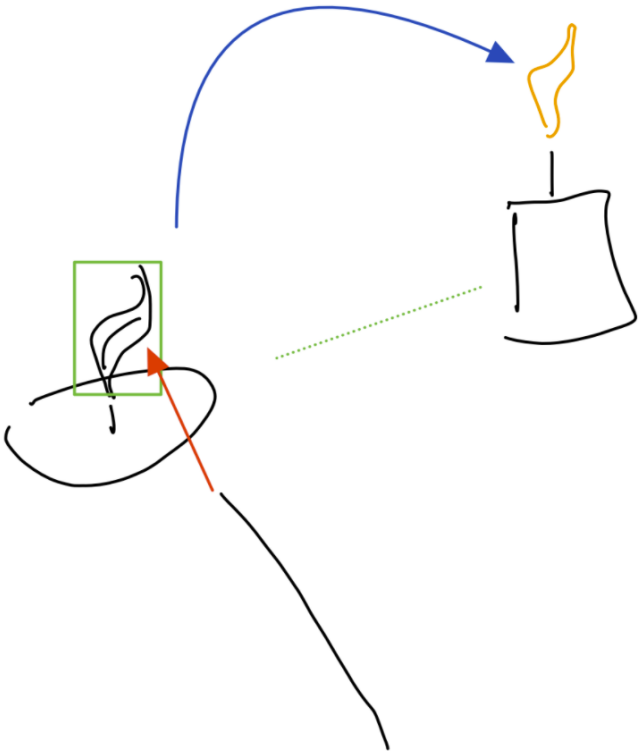
subconsciously help the user enter a relaxed meditative state. I added mood lighting to keep the room from being bright, while also not too dark as to be able to see the stool and give the user a sense of presence and not induce anxiety by being in too dark a space. The candle is placed on a stool in front of the user at eye level, where the user can ceremonially light the candle and begin their meditation session to calming music. The music selected was designed specifically for relief from stress, anxiety, insomnia and depression. The music is also designed to increase a sense of positive energy within the body of the user/practitioner of the meditation. It was also noted that comfortable cushions can increase the feeling of relaxation in a guided meditation exercise; I added floor cushions to imply this virtually for the user. There is a lamp and a match stick on two pillows near the user for a ceremonial lighting of the candle to occur. I have also included a bell next to the match for the user to exit the meditation scene and go back to the main menu. To do so, the user must “snuff out” the candle by placing the bell on top of the candle to extinguish the flame.

Meditation audio: https://www.youtube.com/watch?v=BWMcR35D-cE

General Layout

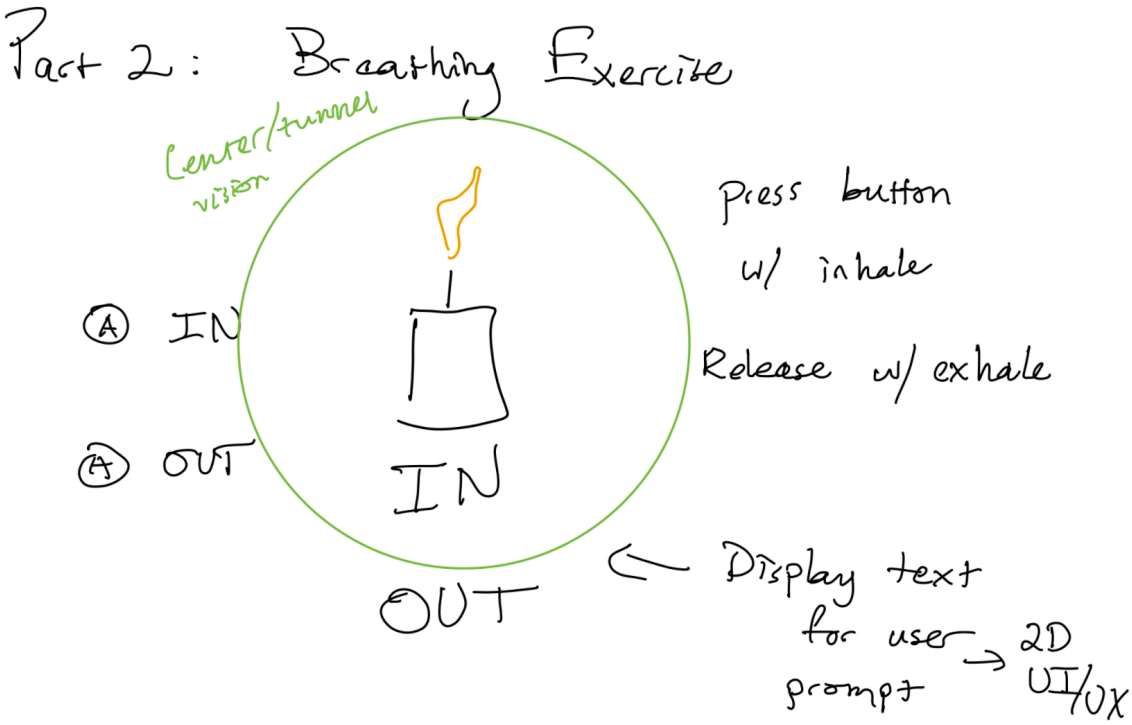


Interaction Storyboarding



Part 1

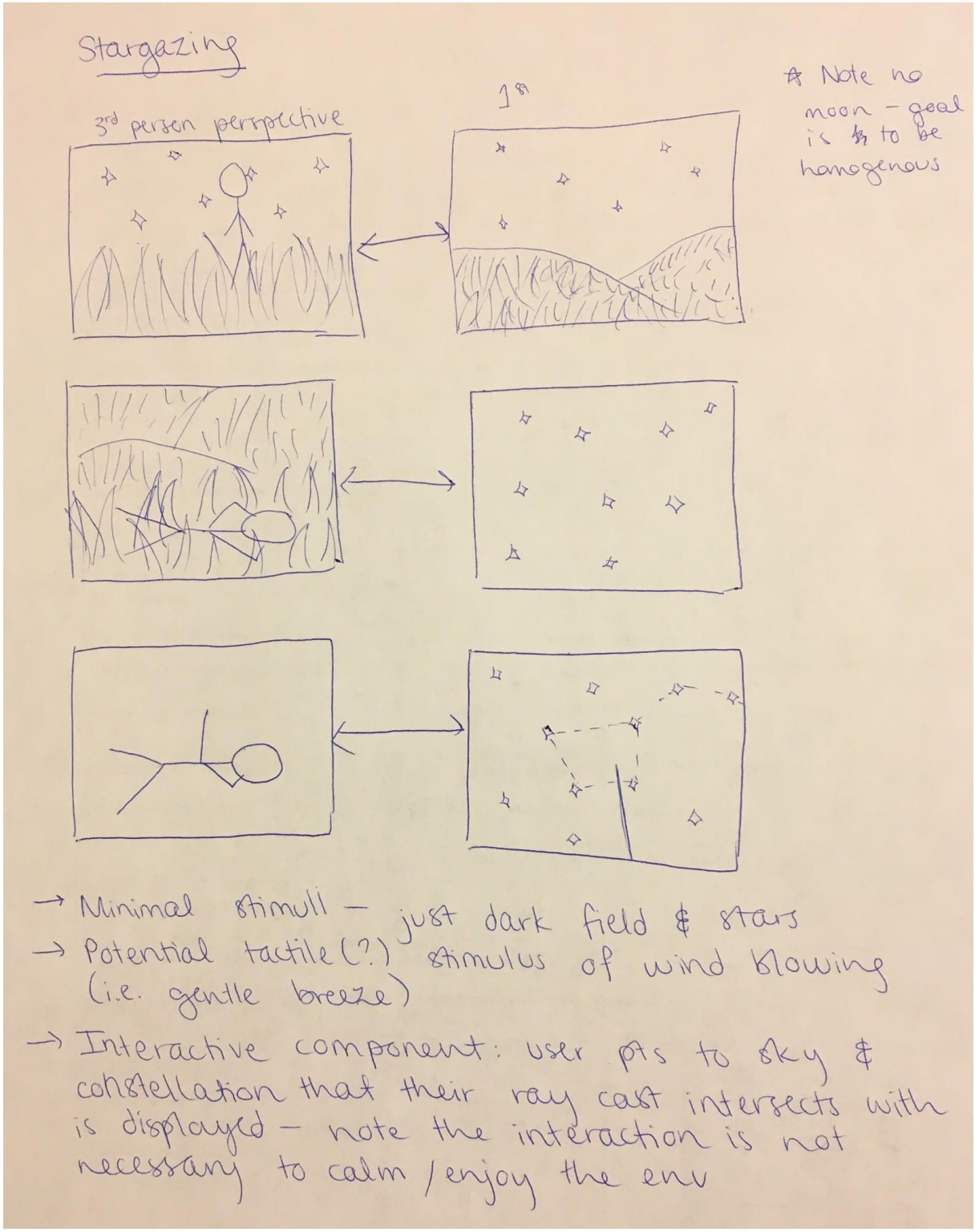
light candle from lamp w/ stick



Stargazing Scene:

The stargazing scene took a while to think about -- initially, the ideas we started out with for the third scene were “sitting in nature” and “creative building exercise”, both of which were quite vague. It took a lot of brainstorming to further these ideas into more tangible exercises.

Sitting in Nature



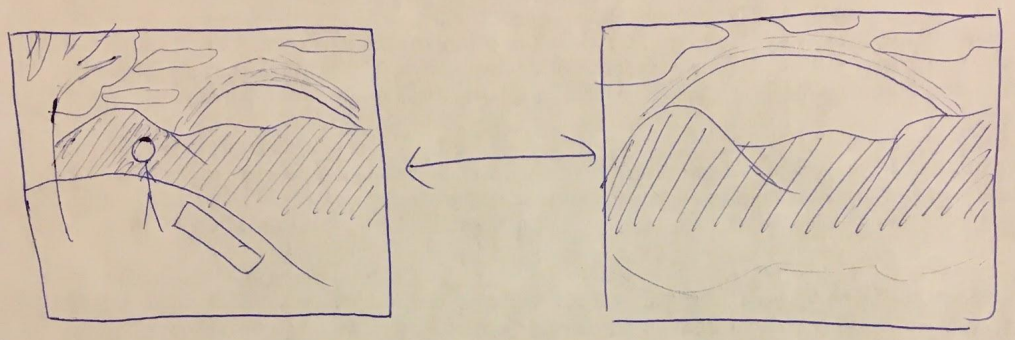
- Meditation audio: https://www.youtube.com/watch?v=op1Nh16Htfc

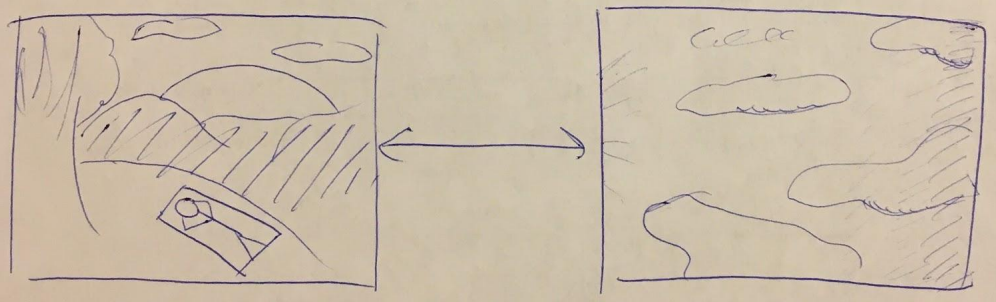
Cloud watching at Sunset

→ Sunset so that colors are not as jarring, also warm colors

3rd person

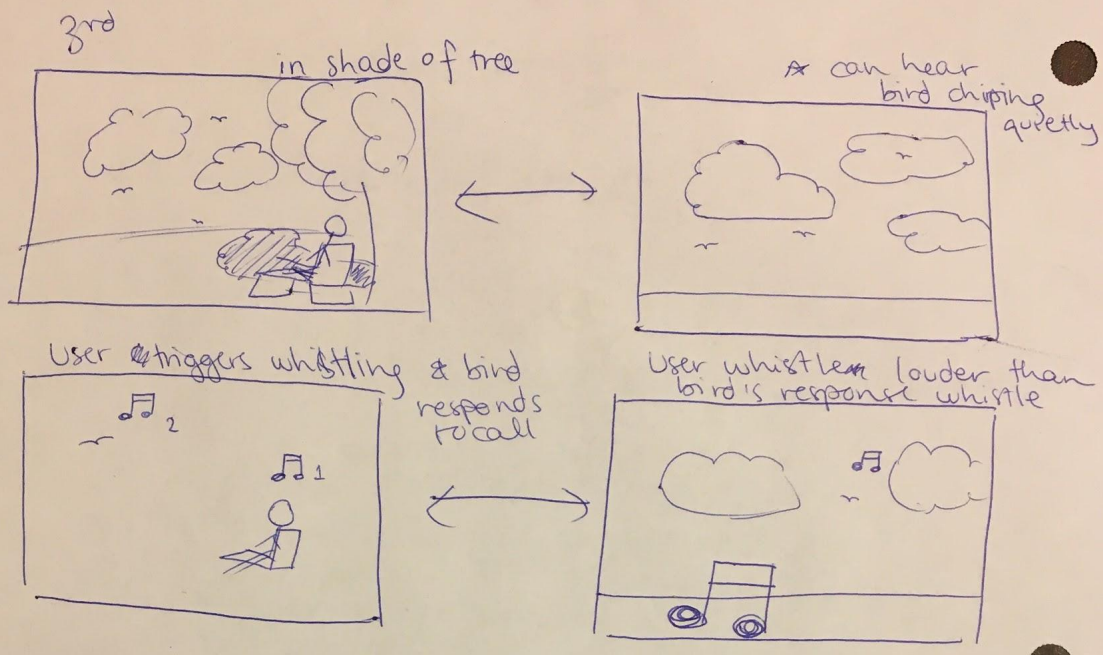
1st person



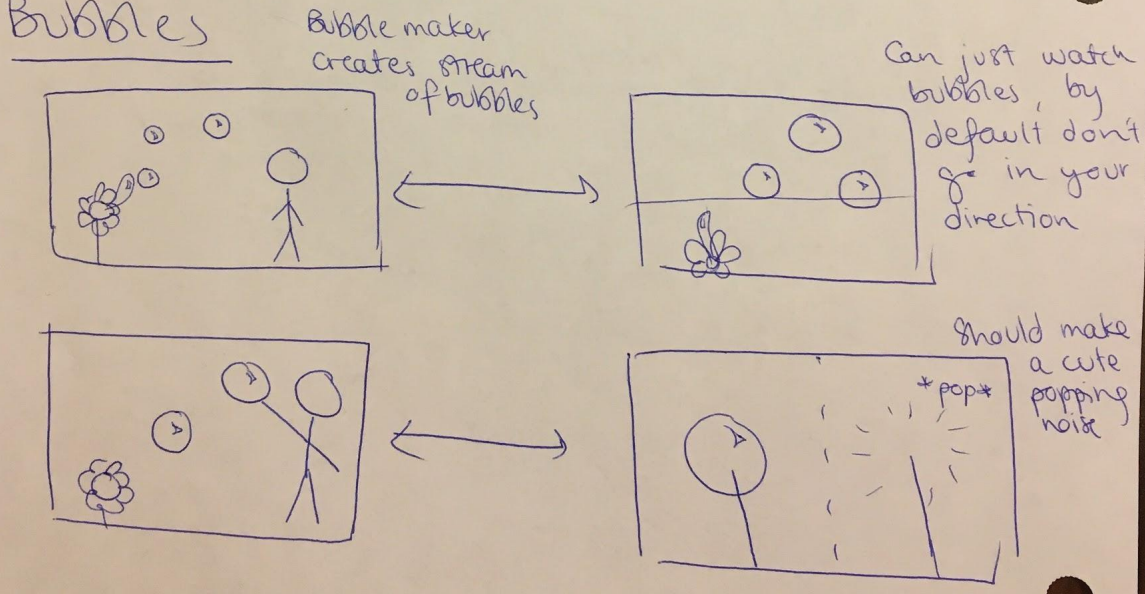


→ Can't really think of a good interactive component for this one...

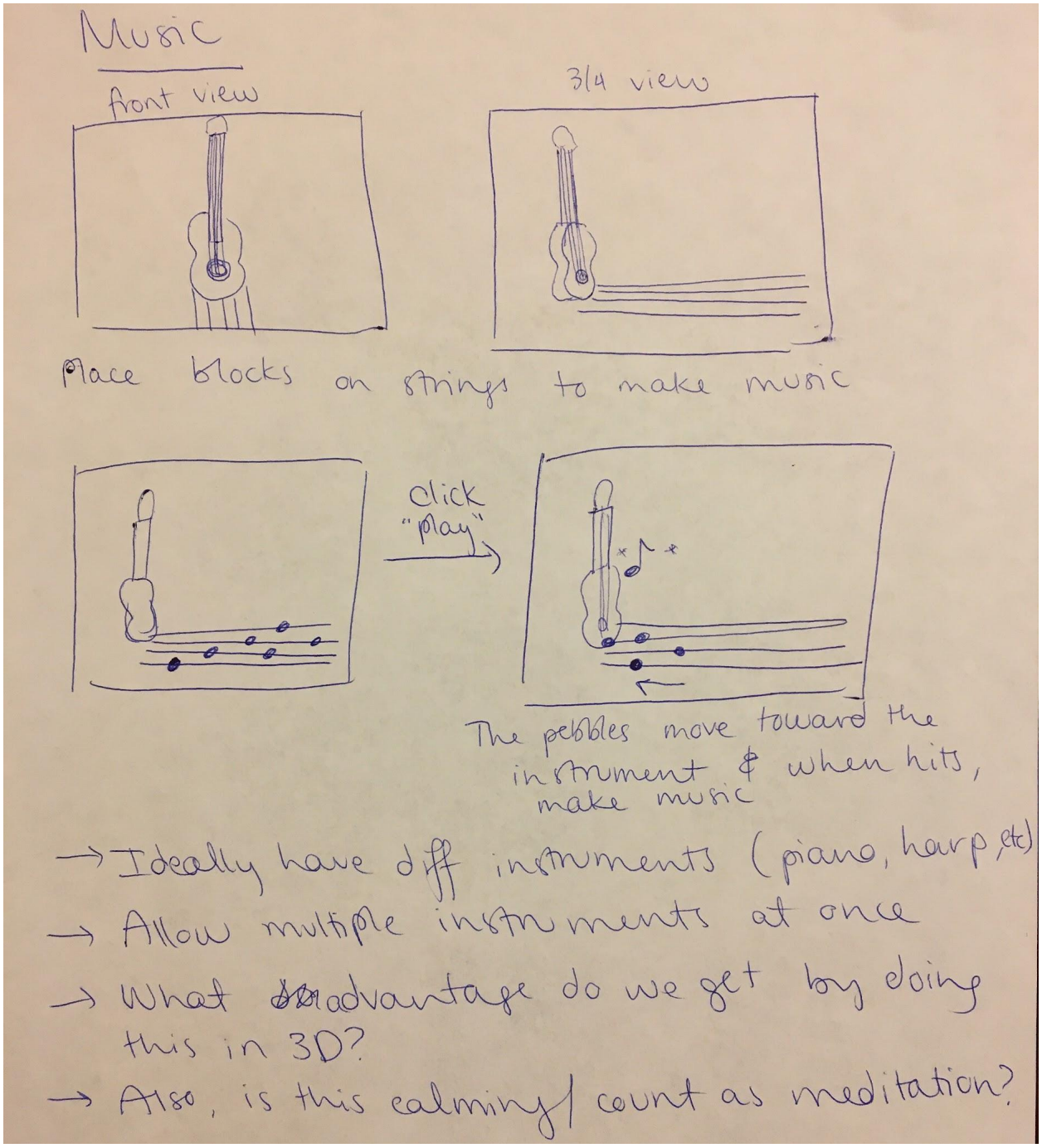
Cloud/ bird watching



Bubbles

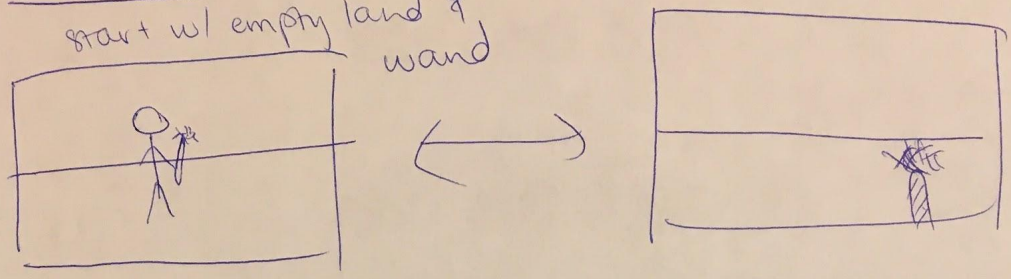


Creative Building Exercise

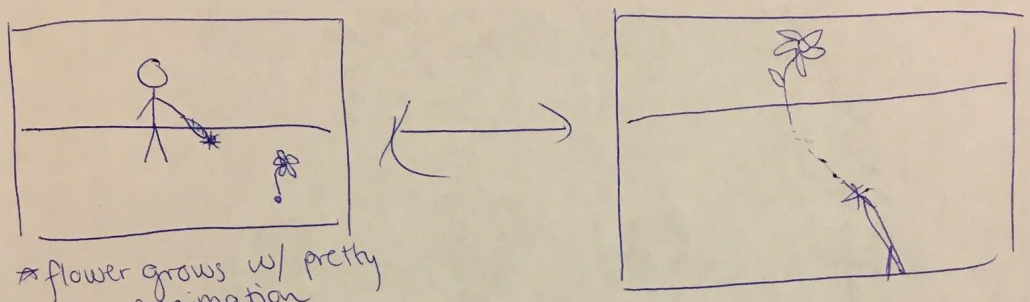


Planting Flowers

start w/ empty land & wand



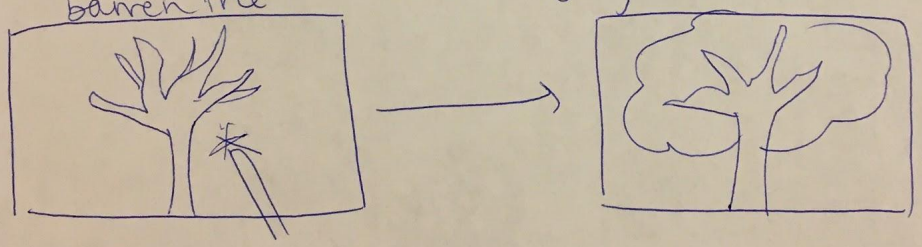
Pt w/ wand (raycast)



* flower grows w/ pretty animation

✡ Step further - Springify World

barren tree



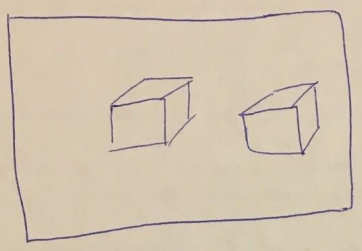
leaves & blossoms grow

→ sort of like coloring but instead of choosing / applying colors, you make the world bloom

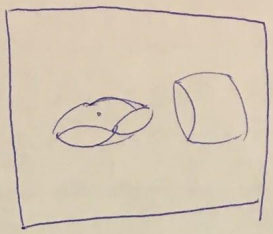
"Legos" / Building with Blocks

☆ Block Types

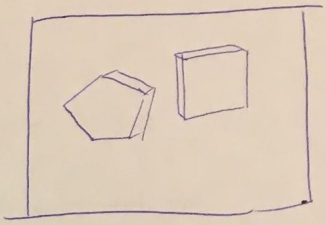
Just cubes



Pillows



Regular polygons

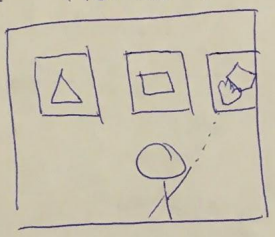


☆ Select / generate blocks

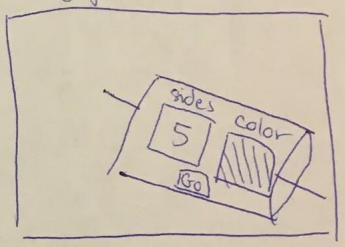
Existing pile + ~~raycast~~ HOMER

→ Good for homogenous items

Posters + HOMER

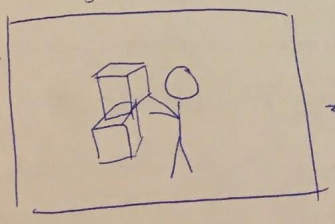


Button + settings trigger

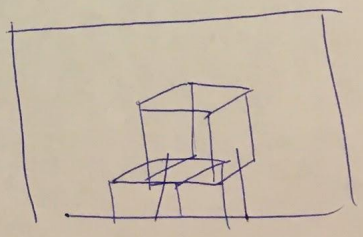


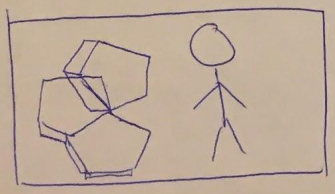
☆ Building

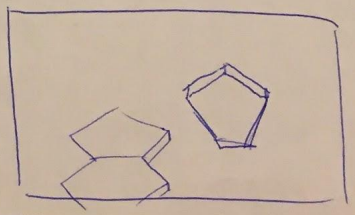
3rd



1st







Both vertical & horizontal placement

Conclusions
We ended up liking the stargazing idea or the bubbles idea. Since stargazing had more research for reducing anxiety behind it, we proceeded with that idea. However, we noticed after doing more research that stargazing meditation experts strongly recommend not interacting with your environment, and merely appreciating it. Thus, we decided to focus on appealing more to the senses, using auditory, tactile, and olfactory stimuli.

- Auditory: crickets in the default setting, meditation guidance that the user can optionally prompt
- Tactile: Pillow and mat that aligns with our virtual experience, as well as fanning the user as they stargaze to simulate the gentle breeze (which is visually noticeable by the swaying grass)
- Olfactory: Essential oils for herbal scents to simulate being in a grassy field

Other Design Choices

Headset: The use case dictates that we expect the users to be able to use our program at any time during their day. Thus, it should be presented in a format that is easy for users to get to and use. Many of the possible interactions (such as a cave system) would not fulfill this requirement. Thus, we went with an Oculus HMD. The headset is fairly small and easy to transport. It is a bit larger than the phone, but it has advantages over the phone because it can support more interaction. This interaction is important especially for the Trataka meditation, and should be included in a manner that is smooth to the user.

Controller Interaction: To interact with most of our system, we decided to use controller input. The first reason for that is that this type of interaction is more common for Oculus applications. Thus, the interaction we use should be familiar to users with Oculus devices. The R/L touch (AKA grip button) is common for interacting with objects. Furthermore, pressing buttons can be relaxing.

Menu Box Touch: From the main menu, users can select which of the three scenes they wish to enter. We decided to implement this by creating a very simple touch interaction. Users can simply touch the color box that corresponds to the scene they wish to enter to perform that action. This was chosen because it makes it very easy to enter a scene.

Manual lighter and mallet grabbing: We decided to make the mallet in the gong waterfall scene and the lighter in the Trataka scene manipulatable with basic pinch select interaction. This is because moving your hand to an object and pinching it is mostly similar to the real world interaction of moving your hand to an object and grabbing it.

Button Stargazing: To interact with the stargazing scene (start and stop guided meditation to return to crickets) you pressed various buttons on the Oculus controller. This is because in our research we found that stargazing meditation should focus on observing the body and no interaction. If hands were in the scene this would run counter to this paradigm. Thus, we made the button interaction so the user could focus more on just observing the stars.

Various Return to Main Menu: To return to the main menu, we implemented a variety of techniques. This was to ensure that the strategy felt like it fit within the environment. For the Trataka candle scene, you snuffed out the candle. This feels like a natural end to the scene. In the waterfall scene, you select the back arrow. This fits in the scene well, because it is the same interaction for the mallet. Finally, to return from the stargazing you press a button. This is consistent with the other button interactions in the scene.

Aspects to Learn

In order to create this project, the biggest barrier was working with Oculus libraries and hardware. We had to learn how to use the Oculus hardware to track actual hands, provide pinch grab interaction, ray cast interaction, and head tracking to look around the scene. Once we have that all completed in Unity, we will also have to figure out how to interact with the oculus hardware to upload our Unity project and get it to run.

User Experience

During finals, many students at school are feeling anxious about exams. So, we decided to ask folks we knew who might be feeling anxious at the moment to demo the project and let us know if it helped.

Trial

We had 2 users from our target audience test the experience. These two users were given an Oculus Quest with our calming application opened. The users were given basic instruction on how to use the Oculus Quest to interact with our environment. After navigating through the experience until they experienced all they wanted, users were asked to fill out a response form.They gave the responses found here.

Reflection

Our VR experience had mixed reviews. While both users reported feeling less stressed after using the VR, only one user said that they would want to use this application if they were stressed. However, the person who would not use the application again reported that they did not have much familiarity with any VR application. Going forward we might want to only test the application on users who are familiar with the Oculus so they are more familiar with the interaction. Overall, it seems that our meditation app achieved its goal of reducing the user's stress, though with varying levels of success, and if we were to try to improve our app in the future, we should try to ensure that the experience is as accessible to new VR users as possible.