

# Embodiment for the Difference: A VR Experience of Bipolar Disorder

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## ABSTRACT

The objective of this project is to simulate the symptoms of bipolar disorder through a virtual reality application. We aim to provide an experience of how people live with bipolar disorder, which is characterized by drastic mood changes, during their daily lives. For our bipolar disorder simulation, we narrowed down the emotions to two stages—a manic or overjoyed state and a depressive state. Various factors—such as gameplay speed, interactions of varied difficulty, and computer graphics and sound effects—are employed during the simulation to dictate the emotion experienced by the user.

**Index Terms:** Human-centered computing—Human computer interaction (HCI)—Interaction paradigms—Virtual Reality

## 1 INTRODUCTION

Bipolar disorder is a mental disorder that causes extreme mood swings [1]. Although currently bipolar disorder is categorized into four types 1) bipolar I disorder, 2) bipolar II disorder, 3) cyclothymic disorder, and 4) other types. All types have some symptoms in common. They all involve clear changes in mood, energy, and activity levels. Bipolar disorder brings with it two main phases—the “manic phase” and the “depressive phase.” The alternations between manic and depressive phases are called “episodes.” Each episode can last from several weeks to months, or even years. Previous studies [2] have also shown that the depressive episodes can affect the patient’s cognitive abilities, leading to cognitive impairment and a significant difficulty in performing daily routine actions. According to the U.S. Department of Health and Human Services’ National Institute of Mental Health,<sup>1</sup> people living through a manic or depressive episode may experience the feelings or behaviors listed in Table 1.

Bipolar disorder is a lifelong illness, but the symptoms can be controlled through medications and psychotherapy. The medications usually help to stabilize the mood swings by affecting the chemical balance in the brain, while the psychotherapy is able to provide support, education, and guidance to people with the condition. It is also important that the families and friends of people with bipolar disorder learn more about the illness, be prepared to perform the required actions in an emergency, and be able to provide emotional support on a daily basis.

We didn’t find any academic research focusing on bipolar simulation. But there are some games and animations about it. *Manic VR*<sup>2</sup> is one of the bipolar simulation virtual reality (VR) animations published in 2018 by EyeSteelFilm and directed by Kalina Bertin. *Manic VR* allows users to explore the experiences of the director’s

siblings, who live with bipolar disorder. The author used animation and first-person audio recordings to simulate mania, psychosis, and depression phases from the patients’ perspective. *Manic VR* adopts a mainly narrative approach and includes few interactions. The interactive element of the controllers arrives at very specific times to assist with the storytelling. Controllers will pulse when users transit from the hypomania to mania phases to simulate a feeling of being “jumpy” or “wired.” One shortcoming of *Manic VR* is this lack of interaction. The efficiency of *Manic VR* can be improved by developing a more interactive and immersive simulation.

## 2 IMPLEMENTATION OF THE SIMULATION

### 2.1 Technical Details

We developed the Bipolar Simulation Game using the Unity3D game engine, version 2019.2.17. We chose Unity3D especially, due to its flexibility in developing complex human-computer interaction techniques and its compatibility with major mainstream VR devices. The goal of the simulation game is to let users immerse themselves in an outdoor environment and get the feeling of bipolar symptoms by wearing the HTC VIVE™ headset and performing tasks using the VIVE controllers. Thus, we aimed toward increasing empathy for and awareness of the mental disorder that users would find hard to access in the real environment.

### 2.2 Virtual Reality Scenes

Our simulation comprises four major scenes—namely, campfire scene, wood-collecting scene, cliff scene, and dark room scene. Each of these scenes has been designed specifically to induce an emotional curve inside the user that starts at a normal state of emotional intensity, heightens each time a successful “task” is completed in the successive levels, and drops when the second act of the simulation starts.

#### 2.2.1 Campfire Scene

The starting scene of the simulation puts the user in a camping site. The site has been developed in such a way as to evoke the feeling of a closed environment, deep in a forest. The terrain envelops the site so that there exists only one opening for the user to move toward (which acts as an entry point to the next scene). This stage (as well as the wood-collecting scene) employs concepts of environmental way-points. The advantage here is that there is minimal application of user interface elements to distract the user. Two major events occur in this scene. First, the user receives the objective of the entire simulation through the assignment of a non-playable character (NPC). The second event is the deployment of a trigger zone at the entrance of the path to transition the user to the next scene, wood collecting.

#### 2.2.2 Wood-Collecting Scene

The purpose of this scene is to simulate the highs of the bipolar symptoms like over-excitement and extreme irritability. In this scene, the user needs to collect wooden sticks for the campfire. The scene starts with the user looking at a clearing where he/she executes the tasks to fulfill the objective (relayed to them in the campfire scene). The users bend and use the controllers to pick up the sticks from the ground. This signifies a point where the user would feel elated, a

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<sup>1</sup><https://www.nimh.nih.gov/health/topics/bipolar-disorder/index.shtml>

<sup>2</sup><http://www.eyesteelfilm.com/web-projects/manic-vr/>

Table 1: The feelings and behaviours that the manic and depressive episodes of bipolar disorder may bring.

Manic	Depressive
Feel very “up,” “high,” or elated. Have a lot of energy. Have increased activity levels. Feel “jumpy” or “wired.” Have trouble sleeping. Become more active than usual. Talk really fast about a lot of different things. Be agitated, irritable, or “touchy.” Feel like their thoughts are going very fast. Think they can do a lot of things at once. Do risky things, like spend a lot of money or have reckless sex.	Feel very sad, down, empty, or hopeless. Have very little energy. Have decreased activity levels. Have trouble sleeping, they may sleep too little or too much. Feel like they can’t enjoy anything. Feel worried and empty. Have trouble concentrating. Forget things a lot. Eat too much or too little. Feel tired or “slowed down.” Think about death or suicide.

state that would gradually heighten via the saturation of the colors to signify a “manic phase.” At this point, another event occurs, called a “flashback.” During flashback, the screen fills up with a collage of multiple videos to signify happy memories of the past to further bolster the state of elation (see Figure 1).



Figure 1: Screenshot of the video collage shown to users to bolster the happy emotions.

### 2.2.3 Cliff Scene

Once the user dives into this scene (see Figure 2), a prescribed event occurs. Specifically, the event takes control of the user’s virtual presence and then simulates this virtual presence falling from the cliff, into the water. By defining the trajectory of the motion and by prescribing the falling speed, we were able to induce the sensation of a free fall. Then, once the user lands in the water, the screen fades to black, which acts as a transition to the next scene.

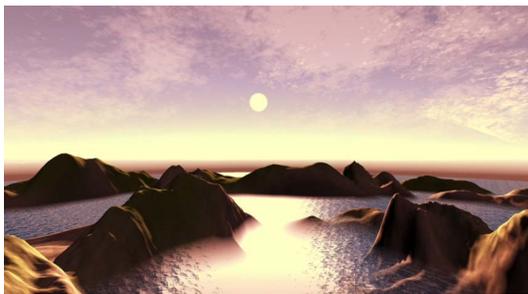


Figure 2: The cliff scene in which the free fall is simulated.

### 2.2.4 Dark Room Scene

This dark room scene stands for the depressed state of a person suffering from bipolar disorder. As an interaction event, the user needs to control his/her breath. To do so, the user is asked to gradually press a button on the controller. After a certain number of button presses, a virtual “exit” is instantiated. However, for a certain duration, as the user approaches the door, it gradually becomes

smaller until it disappears. This stage is meant to frustrate the user to make him/her experience the depressed state of mind. Then the user is supposed to “breathe in and out” (i.e., press the buttons) to calm down in order for the door to reappear. Thus, this part of the simulation provides a simple solution for the user to try to control his/her calmness and find a way out of this state. Once the final door appears, and the user goes through it, he/she returns to the campfire scene.

## 2.3 Effects

### 2.3.1 Saturation Shader

In order to simulate the excitement that a person with bipolar disorder would experience during the manic phase, a shader was applied to enhance the saturation of everything the user sees in the scene. The shader is applied to the camera and accesses the rendered image directly. By doing so, it can simplify the computation, as if it is processing a single image. The magnitude of enhancement in the color saturation increases along with the emotional change we convey during the manic phase.

### 2.3.2 Sound Effects

We included numerous sound effects to better replicate the manic and depressed mental status of a bipolar disorder patient, including heart beats, human breathing, and environmental sounds. Sound can be considered to be an essential element of our project. This is because it provides a more immersive experience and enhances the user’s sense of presence.

## 3 CONCLUSION

Our goal is to provide to the users of the developed bipolar disorder simulation an experience of unexpected mood swings that people with bipolar disorder are facing in their everyday life. By informing the public about the situation that people with bipolar disorder experience in their everyday life, we believe it is possible to raise empathy and encourage people to support those with such a disorder. In conclusion, we believe that the developed simulation of bipolar disorder also serves as an important inspiration that could help developers and designers to create virtual reality experiences for simulating a range of other mental health conditions, thus improving understanding, acceptance, and support for people living with these challenges.

## REFERENCES

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