

*Gravity* is a 2D puzzle-platform game where the player can use the jetpack, laser gun, and black holes to overcome obstacles and reach the portals at the end of the levels.

My initial idea for the game was to make a fast-paced, side-scrolling 2D platformer similar to *Mario Bros*. I originally wanted the game to force the player to make use of limited resources: the player would have to consciously expend the fuel of the jetpack and the crystals (“ammo”) to shoot the laser or spawn a black hole. I wanted the player to be able to use the responsive and free-flowing jetpack system to be able to dodge enemies’ fire and make difficult jumps from platform to platform. As for the black hole mechanic (i.e., gold\_spike mechanic), I wanted to give the player a means of manipulating their environment and physics to give the player an advantage when combined with a very calculated, precise movement system. Inspiration for a physics-altering black hole idea came largely from games like *Portal* and the new FPS *SplitGate*. I think that mechanics such as the portals in these games lead to players becoming more skilled and using the mechanics in ways that the developers originally intended. Rather than a portal, however, I wanted to implement a mechanic that affected the gravity and other physics which the player could leverage.

Upon the assignment of p2\_goldspike, I set out to implement a small side-scrolling level that would introduce the gameplay mechanics to the player gradually as well as effectively. I also wanted to include a couple of enemies (such as spaceships or aliens) that would move around and fire back at the player, forcing them to use the

jetpack to evade and line up laser shots correctly. However, due to some setbacks, I had to cut enemy mechanics as the deadline approached quickly. I ended up only including a simple dummy enemy that could at least show off the black hole and laser mechanics. I found that implementing the jetpack using a “hold-to-fly” style of control felt better than a tap/single button press control. However, I had to tweak the physics of jumping/flying (i.e., gravity, thrust speed) a lot before it felt natural. Moreover, I was not too sure how I wanted to go about implementing the black hole feature. In the p2\_goldspike, I had the black holes pull floating objects and enemies to its center in an area-of-effect (AOE) form. The black holes would hold the objects at the core and destroy them when the black hole disappeared. The thought was that the player would have to use black holes to hold objects in place, so they could time jumps to traverse the level. However, after playtesting and feedback, it was clear that there were some serious revisions to be made.

Due to setbacks in my personal life, I was unable to have my p2\_goldspike submitted in time for the peer playtesting session. However, I was able to learn a lot from the playtesting session from Prof. Yarger. From first impressions alone, it was quite clear that I needed to rework the jetpack and fuel system. Prof. Yarger noted that forcing the player to have to refuel on platforms was a waste of the player’s valuable time. As so, I decided to allow the player to refuel after simply letting go of the fly button, and I made refueling faster. On a similar note, I realized that the limited resource system I had set up with crystals being used as ammo would also lead to a waste of the player’s time, so I decided to scrap it entirely. Furthermore, Prof. Yarger pointed out that my original

design for the black holes did not seem all that novel, as simple AOE weapons were pretty common in action games. Consequently, I needed to rethink how I wanted to implement this feature and how it would complement level design better. Therefore, during my p2\_gold spring I decided to pivot to a puzzle-style platformer instead of an action-packed side scroller. I reworked the black holes so that the player could invert the direction of gravity after being sucked in by the black hole. I also made it so the player could bend the trajectory of the laser gun by shooting towards the black hole. These two core changes in mechanics laid the groundwork for the level design: players now had to use the inversion mechanic and bend projectiles precisely to reach the end of levels.

Tuning the physics of these two mechanics took a lot of playtesting and adjustments.

As I was much more comfortable with the Unity engine following the p1 and p2 assignments, I found that I could complete new tasks (that would have seemed daunting a few weeks ago) much more easily. Furthermore, I found I was not too attached or focused on one task in particular and was able to pivot off if need be. This was an improvement from the previous projects where I would waste too much time on something that potentially could be dropped. On the other hand, I think I would have benefited from having a slightly more concrete plan for my game to begin p2\_goldspike. However, I also understand that one can waste time creating a plan that gets abandoned for spontaneous new features that come along during the development process. Going forward, I think it would benefit me to sit down and plan out the core ideas of the game before jumping right in. This way, I can also receive feedback at an early stage and pivot before investing too much time into implementation