Game Design Document: Two Brothers

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Story

A portal from hell opens and demons flood out and abduct humans. Two brothers stayed safe by being stuck in their house during abduction week. The older brother, Joe was confined in his room because his younger brother, Ron was marathoning a new game release and thought that his Joe's wheelchair would be the perfect seat for the week. After finally hearing Joe's cries for help after a week, Ron returns the wheelchair to Joe. Amongst their arguing over who's fault it was that Joe was confined to his room for a week, Ron looks outside and notices that everything is on fire. The two venture outside and experience first-hand the invasion that they had been absent from for a week.

The player plays as Ron, an able-bodied man who goes out to fight the demon horde. Ron has knowledge of how to use a gun, and Joe is incredibly smart and has understanding of engineering of weapons. Joe is able to construct auto-turrets from demon remains. While Joe is out fighting demons, Ron stays home and researches how to put an end to the demon invasion. Ron's workshop is in the garage, and when Joe comes back home, Ron tweaks and upgrades Joe's weaponry for the next battle.

Design Notes

Game Philosophy

For *Two Brothers* we wanted the player to experience battling crazy waves of enemies as well as big bosses. We wanted a good balance of these experiences, so the bosses are evenly spaced out in the game. In between every boss battle, there are levels that are filled with various enemies we created. Fighting off waves can feel very tedious and grindy, so we spent a lot of development time making different enemy types to avoid this. We wanted a lot of the fun in *Two Brothers* to come from fending off hordes of enemies, fighting interesting bosses and utilizing a wide array of weapons.

Game mechanics

The game is in a top-down style and players and enemies have health. The difficulty of the game revolves around enemies overwhelming the player with numbers and certain attribute they have. There are two ways for the player to kill enemies. They can either use a gun and shoot at the enemies, or they can drop down a turret which will work independent of the player. When the player or base health reaches 0, you die and restart at the beginning of that level.

- **Health based damage**
    - Enemies deal damage to player based on their health bar. Each enemy has its own health to damage multiplier, so low health zombies will still deal significant damage.
- **Story, Upgrade, Level format**
    - Most of the game follows this format. First there will be some story, that will give the player a bit of a clue as to what is coming up in the next level(enemy/level type). Then, the player will be brought to the upgrade screen to upgrade/purchase weapons. Afterwards, the level begins.
- **Resources**
    - Enemies drop a random amount of resources on death. These resources are used to construct turrets for the current level. After the level is complete, the resources are converted to loonies. Loonies are used to upgrade and purchase weapons. This incentivises the player to conserve resources and not just construct a tonne of turrets.
- **Path Finding**
    - We imported a pathfinder to deal with enemy movement and chose the BFS pathfinder opposed to more sophisticated pathfinders because of the amount of enemies on our screen. We tested other pathfinders and found that the game would lag when there were many enemies on screen.
    - **Walls**
        - Pathfinding allowed us to have walls in our game. Simply put, the pathfinder divides the screen into square nodes, and when making walls, we set specific nodes to be unwalkable so that the player, enemies and bullets cannot go through them.
- **Level Types**
    - **Waves:** Clear a required amount of waves to complete the level.

    - **Defence:** Clear a required amount of waves to complete the level. Make sure your base survives. Every enemy that reaches the middle decreases the health of the base by one.
    - **Boss:** Defeat the boss to advance.
    - **Collect:** Collect a certain amount of resources to advance.

Guns

The usage of guns is limited to if it's unlocked and its fire rate. Guns do not cost any resource to use during levels. We wanted players to always have something to do, and not have to worry about ammunition.

-  The Pistol is given to the player at the start of the game. It shoots a bullet in the direction of the mouse that deals moderate damage, and can be upgraded to have the bullets pierce through enemies as well as deal more damage. The Pistol has a moderate-high rate of fire.
-  The Mine is an unlockable weapon that is placed on the ground. There is a detection radius as well as a blast radius associated with the Mine. When an enemy is within the detection radius, every enemy in the blast radius takes high damage. It can be upgraded to deal more damage.
-  The Shotgun is an unlockable weapon that shoots five bullets in the direction of the mouse that deal moderate-high damage. It can be upgraded to shoot faster and deal more damage. The Shotgun has a low rate of fire.
-  The Chaingun is an unlockable weapon that shoots a bullet in the direction of the mouse that deals low damage, and can be upgraded to deal more damage and shoot faster. The Chaingun has a high rate of fire.
-  The Grenade is an unlockable weapon that shoots a grenade a certain distance based on how long the mouse is held after the light under the player is green. When it stops moving, it explodes dealing moderate-high damage to all enemies in its blast radius. It explodes prematurely if it hits an enemy or a wall. It can be upgraded to deal more damage.
-  The Webgun is an unlockable weapon that shoots a web a certain distance toward the mouse. When enemies walk over the web, they are slowed

significantly until they walk out of the web. The Webgun deals no damage and can be upgraded to have the webs last longer and have higher rate of fire.

Turrets

The usage of turrets is limited to if it's unlocked and whether or not you have the resources for it.

-  The Small Fry is given to players at the start of the game. It deals moderate-low damage and shoots at nearby enemies. It can be upgraded to pierce through enemies.
-  The Orbulator is an unlockable turret that shoots orbs of energy that orbit in a circle around the turret. The orbs deal moderate damage and can be upgraded to deal more damage.
-  The Red Pepper is an unlockable turret that shoots at nearby enemies dealing low damage. It can be upgraded to shoot faster.
-  The Emissioner is an unlockable turret that shoots at nearby enemies dealing no damage, but permanently slowing enemies. It shoots out a projectile that behaves the same as the grenade, exploding when it stops moving or hitting an enemy. It can be upgraded to shoot faster.

Enemies

Most enemies in the game move based on the pathfinder we implemented. They each have their own speed, healthbar and consequent damage. When an enemy collides with a player they die and deal damage.

 The Shooter walks toward the player and shoots a projectile that deals low damage. A Shooter has low health and walks at a moderate speed.

 The Chaser is the most basic type of enemy and just walks toward the player. It has low health and has moderate speed. They also hatch from the Broodmother's eggs with a lowered health value.

 The Turret Chaser is a variant of the Chaser type, and prioritizes turrets over the player. It has moderate health and moderate speed. When there are no turrets on the screen, it switches its target to the player.

 The Juggernaut walks toward the player at a low speed. It has a high health.

 The Rager walks toward the player at a high speed. It has low health.

 The Broodmother targets a random spot on the screen and walks toward it. When it reaches its destination, it lays an egg and then targets another random spot on the screen. The Broodmother has moderate-high health and moves at a moderate speed.

 The Egg is dropped by the mother. After a short duration, it hatches and a Chaser type comes out. It has low health and no movement.

 The Freezer walks toward the player at a moderate-high speed and has moderate-high health. It deals no damage to the player, and instead slows the player temporarily.

Bosses

The bosses in *Two Brothers* operate by slightly different rules than regular enemies. While the player is in contact with bosses, they will take damage.

 The Juggernaut boss is the first boss in the game and has high health and moderate mobility. It spawns ghoulies that target the player and travel through walls. Throughout the fight, regular Juggernauts will spawn.

 The Broodmothermother is the second boss in the game and has moderate-high health and moderate mobility. It takes behaviour from the Turret Chaser and the regular Broodmother. If there is a turret on the map, it will go destroy it. If there are no turrets, it will look for a random spot on the map and lay an egg that will hatch a Broodmother.

 The Demon King is the final boss in the game. It has many attacks. It barfs, has a orbiting shield, shoots out orbs of evil and during the fight a portal will spawn that spawns enemies. If the player is close to the Demon King, it will barf and poison the player. The Demon King shoots out orbs at a rate of fire dependant on how far away the player is. If the player is very far, it will shoot orbs very quickly. The Demon King has a ring of flames that block bullets.

Graphics

From the very beginning I [Thomas Reese] knew I wanted to make our game's art. Not only would it serve to further my artistic ability (at the end of it all I learned a few new tricks), but more importantly, it also give us greater control over what we could represent in the game visually.

My biggest concern from a graphical standpoint, was that the art assets would not match each other stylistically For example, on the internet there exists free video game art that anyone can use. Everything in the pack you download looks like it'd be from the same game. These are fine to use, but you're obligated to use only that pack of assets. A problem arises when you begin mixing packs. You end up with assets that have been pulled from various artistic genres, and they don't match one another.

This breaks the immersion, which is quite important to a game. It's jarring to see smoothed, cartoony flash assets, with more traditional pixelated/rastered graphics. They usually look different from every aspect (pixelated graphics have sharp edges, flash vectors have smoothed edges, The way they're coloured is totally different, etc).

By not using premade art, we weren't limited to set amount of sprites. We could expand infinitely provided the sprites I created were made with the same principles.

The principles were put in place to prevent the issues I discussed above. In more detail, every single sprite was designed on a 16 by 16 canvas, and was indexed with the same 255 colour values, and was eventually upscaled to multiples of 16 by 16. The only exception to this rule, are the projectiles (bullets, energy orbs, and grenades). Those were designed on 8 by 8 canvases because the amount of detail on them is quite small.

These were not scaled up, however they too use the same 255 colours as everything else does. The sprites were made in Aseprite.

The humanoid sprites in the game were designed with a guideline in mind. I knew early on we couldn't have overly detailed sprites, because we'd be greatly sacrificing our variety. The more time I have to spend on a single sprite, the less time I have for other ones. Also as I was not particularly well versed in the area of spriting, I didn't want to overestimate my abilities. As such, each sprite has a moderate level of detail for a 16 by 16 sprite.

Each humanoid sprite was made almost to these exact specifications:
-Their head was 10 pixels long on the y axis (x axis varied)
-Their torso and legs were 3 pixels long on the y axis (x axis didn't vary too much).

Trivia time: The player sprite in the final game was the very first sprite I made for this game. The subsequent enemy sprites were redesigned based off the original player sprite. In order to save time and many headaches, I decided to recolour the default flesh coloured demon sprite for all of the other humanoid enemy sprites. From demon to demon, there were a few changes to the original flesh coloured demon model, but by and large it stayed the same.

The Broodmothers were pretty fun to make, and aside from the final boss, they're the only enemies that look radically different from the other demons. Because this enemy does something much more different than the standard "run towards the player and explode", I wanted to reciprocate that notion visually. Oddly enough, their design was greatly inspired by the Queen from the Alien franchise, yet it kind of resembles a Hydralisk from the Starcraft franchise (which was also inspired by the Queen from the Alien franchise).

As for the boss, his design stemmed from the notion that he would not move at all. Since the boss is stationary, it allowed me to make something completely different than the standard fare. Rather than being an entity that must move around, this one attaches itself to the ground. So I had to think "Well, what would something like that look like? Obviously it would have no need for legs". I decided it would be best to make a

“terrifying” face, with gnashing teeth, to further convince the player that this thing was really threatening.

The turrets were hard to start, easy to finish. I wanted something that looked mechanical, and made sense. The Red pepper is a machine gun turret, and you can clearly see an ammo box and an ammo belt feeding it. The Orbulator almost looks like a Tesla coil and it has these electrical energy spheres orbiting it.

Each humanoid in the game (player, demons), and the broodmothers, have a 4 frame walk animation for each direction (left, right, up, down). Each leg has to hit the ground in front of the entity, then follow through, then pick itself up and begin again. You can follow each appendage in the animation.

Each death animation is also 4 frames long, however most demons only have 1 death animation that does not change based on the direct they’re facing. I believe only the Chasers and Shooters have side death animations. Time restrictions regrettably cut off further side death animations, and boss death animations.

The boss, the turrets, and the egg sprites only have 2 frame animations. The level of detail I could fit onto the eggs and turrets made anything more than 2 frames redundant. It did not add any significant quality to justify a longer animation loop.

The boss was kept at 2 frames for mostly the same reason. I didn’t think making his mouth open more fluidly added anything.

Conversely, the stalagmites that protrude from the ground during the boss fight absolutely benefitted from the 4 frame animation cycle. As well as the pulsating portals that summon demons from wherever they come from.

It’s important to have detail, but it’s even more important to put the right detail in the right places.

The HUD was inspired by Doom (by id software) HUD's. I liked having all the info at the bottom of the screen instead of all over the place. It's more or less how I envisioned it, but I do wish we picked better fonts for the HUD, something more in style with the rest of the game. It tells the player everything they need to know, and there's no useless information given on it.

The upgrade screen clearly shows what each purchase does. This is pretty much the only appearance of the older brother aside from the cutscenes. It's layout is simple, and very easy to understand.

Again, time dictated that all walls be built from stone. Each wall in the game is a series of boulders. The player can easily tell they cannot walk over them or shoot through them.

The actual wall layout was group contribution. We all liked the idea of the 2 squares with alternating openings. I wanted to have a long wall in the level we introduced the fast demons, so we could let the player know these demons were way faster than usual, but also not let the player feel like he was cheated by introducing a really fast enemy type and not giving him any time to react. With the long walls, the player can surmise how this demon works, and upon their first encounter with it, they have enough time to establish a strategy.

We also wanted to have a level with fire or some kind of damaging material on the ground, and have the juggernaut walk through. This would instantly tell the player that this demon had way more health than the others, and would also inspire a sense of fear because seeing it at full health (and not damaged by fire or waste) would be much more threatening.

The maps were composed by making various tiles in Aseprite(also 16 by 16 and indexed with 255 colours) and then putting all of those tiles together in GIMP.

The actual map background pictures are a desert/dirt landscape, a forest landscape, and a demon landscape. I got worried about having too many greys if we were just in a

city all the time, and I really wanted more colour in the game. I suppose in the context of the story, he's travelling across the land to kill the demon king.

The demon background is littered with skulls and gross biological stuff in order to make the player feel like he's far away from home. Like it's do or die here. Everything in the boss level feels very weighted. You've got the music going, this onslaught of attack from the boss, enemies pouring in from portals, you're stepping over skulls and eggs and it just feels like this is the end game.

Overall, I'm quite happy with the sprites. I do wish I had additional time to make a few more sprites, to make the game feel just a bit more rounded.

Balance

Balancing was one of the final stages in development. Each of us played through the game from beginning to end and gave our input on what needed to be balanced.

Gun Balance

Some obvious, initial problems was that some weapons were far better than others. We made several considerations when dealing with balancing this.

- Checked the damage and fire rate of each gun, and made sure that the damage per second was similar for every gun. While we made sure that the DPS was similar for every gun, some guns are inherently more difficult to use, and we factored that into the damage and fire rate given to guns. The Shotgun, for example has the highest DPS of all the guns because we realize that using it requires the player to be relatively close to enemies, which increases risk of taking damage.
- The Webgun can't be compared to other guns because it deals no damage(only slows) so when balancing it, we just wanted to make sure it was a viable option.
- We realized the Pistol and Chaingun are similar weapons, and to distinguish them throughout the game, we made sure to make it so that Pistol's fire rate could not be upgraded, so that it would never 'feel' like a Chaingun.

Turret Balance

Turrets are extremely valuable in *Two Brothers*. They deal considerable damage and are immune to damage with the exception of a few enemies that will try to destroy them.

- We didn't want to nerf the effectiveness of Turrets, so we did it indirectly, by making the amount of Resources enemies drop lower. This way, Turrets still feel powerful and useful, and the player will still try to protect them from enemies trying to destroy them.

Enemy Balance

Enemies were not too much of a problem during balancing. As the player progresses through the game, to maintain the difficulty of the game, enemies spawn in larger waves. Furthermore, enemies are not all introduced at the same time. Harder enemies appear in later levels. Each level has a list of enemies that can be spawned during the level, and the enemy spawned at any given time is of random type. This is to add variety through playthroughs and prevent the player from knowing which type is coming next.

- Enemies used to deal 100 times their health in damage. This resulted in the player dying in three hits from the Juggernaut. We realized this was undesirable, and changed the health to damage modifier for each enemy. This way, low health enemies are still a threat to players
- Broodmothers used to spawn any enemy, not just a Chaser. This resulted in the player being overwhelmed by many Juggernauts if they were unlucky.
- Ragers used to walk slower than the player. We wanted them to feel like a threat despite their low health, and decided to increase their speed to a value greater than the player's.

Resource Balance

The number of resources enemies drop is very important because that determines how many turrets a player can place and how many upgrades they can purchase. Because many of the levels in the game involve many enemies, we decided to make the enemies drop a low, random amount. This way, players aren't getting enough resources for a turret for killing just one enemy.

Level Balance

There are a few map types in the game, and balancing efforts went into each of them.

- For every level, walls were an issue that had to be addressed. We had to design the walls such that there was always a relatively short ‘path’ that each enemy could take to arrive at the player. If the path was too long, it would result in very bad lag when there were many enemies. We realized this problem when we designed a map where there was only one, long path the enemy could take to the player. Usually, our game only suffers lag when there are 20-30 enemies on the screen, but with this particular map we made, there was visible lag at 2-3 enemies.
- Spawn location of enemies was another balance issue we had. Originally, enemies only spawned from the bottom of the screen. This allowed the player to leave turrets only at the bottom of the screen which was a very dominant strategy at the time. This was quickly fixed.

Kleenex Test

The Kleenex test of the game went very well. We had four of our friends play through the game beginning to end. They had difficulty beating the second and final boss, so we decided to buff the player’s health as well as making the bosses a little bit weaker. We were thrilled to see that the four players bought and upgraded different weapons and were able to beat the game with their choices. Our first play tester gave us the idea for the *Defence* level type.

Bugs

We’ve played the game and noticed some bugs. Here are a list of the known bugs through Kleenex testing and our own playing.

- When using the Grenade, mouse clicks made before the indicator under the player is green are not registered toward the charging of the Grenade throw.
- Bullets don’t collide well with bigger enemies.
- The orbs orbiting the final boss do not disappear upon death.
- The player moves faster when moving in a diagonal direction allowing him to outrun Ragers.
- Some values, like whether the player is slowed or poisoned, are not reset upon restarting a level.
- Sometimes, turrets don’t shoot for an unknown reason.

- Base Health on ‘Defence’ levels flashes different colours and disappears sometimes.
- There is lag on certain maps when enemies update their path or when there are too many enemies on the screen.
- Shooter enemy type is able to damage himself with his own bullets.

Walkthrough/player guide

This is based on the collective opinions of us developers and our playtesters. *Two Brothers* consists of large wave of enemies and big, tanky bosses. To deal with these two major threats in the game, the player should buy one weapon to deal with multiple enemies at one time, and another to deal high concentrated damage to bosses. To deal with many enemies, the player should consider the Pistol’s pierce upgrade, unlocking the Grenade Launcher, or upgrading their Turrets. For boss fights, the Chaingun and Shotgun have very high damage per second, but the Shotgun may be risky as it requires the player to be closer to hit all the bullets.

It’s ill advised to unlock every Gun and Turret in a playthrough as this will leave you with many weak, un-upgraded weapons which you will soon find out, is not very helpful. Pick a handful of Guns and Turrets and focus on upgrading them. If you want to test everything it, it’s better to do so over the course of

Neglecting Gun upgrades and going just for Turrets is a viable strategy as most enemies do not attack Turrets. The risk of following this strategy is that it requires that the player use more of their resources on building Turrets, resulting in fewer loonies to purchase upgrades with.

A good, safe strategy is to have a balance between Gun and Turret upgrades.