

A Game and Design Document by **Team WiDaNeKa**

Dalia Luque (dk13@williams.edu): Sound, game design

Kar Yern Chin (kc10@williams.edu): Coding

Ned Lauber (ell1@williams.edu): Managing, game design

Winnie Ma (wm3@williams.edu): Graphics

Proposal

Title: Hikari Yami

Names: Dalia, Kar Yern, Ned, Winnie

Genre: Fantasy Side Scroller Shooter

Platform: Computer

Market: Online flash game

Setting: Lands of Hikari Yami

Plays like: Ikaruga, R-Type

Summary:

It is a co-op shooter consisting of five levels. Two players control two spirits called Kami. One is black while the other is white. They have to defeat enemies that have black and white colours. The Kami can destroy enemies of the opposite colour and vice versa. There are two bosses in the last two levels.

Mechanics: Cooperation, Polarity

Reference Art: Monument Valley, Badland

Related Games: Ikaruga, R-Type, Touhou

Schedule

Wednesday, March 18th

- Level Completion Capability (Kar Yern)
- Decide on player and enemy types (Mythical creatures, forest creatures, bugs, spooky creatures) (Winnie)

Thursday, March 19th

- Design outline of 5+ levels (Ned, Dalia)
- Add alien HP, bullet types, color types (Kar Yern)
- Concept art (Winnie)
- Go to TA hours, discuss bullet movements, more level design and advice (Dalia)

Friday, March 20th

- 3+ unique levels (Group)

Sunday, March 22nd

- Instruction screen: 1920 x 1290 PNG file (Ned)
- Simple looped background: 2879 x 1278 PNG file (no more than 30 minutes) (Winnie)

Week of Monday, March 23rd

- Playthrough two full games w/ one teammate per day (Ned)

Monday, March 23rd

- Group Skype Meeting at 1pm EST
- TONIGHT: Ned makes playable game w/ several levels (Ned)
- Sends questions to Kar Yern

Tuesday, March 24th

- Kar Yern spend no more than 60 minutes helping Ned (Kar Yern)

Wednesday, March 25th

- Group Skype Meeting at 1pm EST
- Code any remaining levels (Ned, Kar Yern)
- Player graphics: Black and white Flying Pegasi, 1026 x 1040 PNG File (Winnie)
- Bullet graphics: black and white circles and triangles, 220 x 207 PNG File
- 3 enemy graphics: black and white Ghost, Jagged creature, Tentacle monster, Phoenix,

Friday, March 27th

- Group Skype Meeting at 1pm EST

Saturday, March 28th

- Finalized set of all graphics (Winnie)

1026 x 1040 PNG Black Player Image - Round Flying Creature White Player Image - Round Flying Creature 345 X 345 PNG Black Enemy 1 - Evil sprites White Enemy 1 - Evil sprites 300 x 313 PNG Black Enemy 2 - Tall ghost White Enemy 2 - Tall ghost 364 x 349 PNG Black Enemy 3 - Circle spirit White Enemy 3 - Circle spirit 600 x 566 PNG Boss 1 - Phoenix 1586 x 1574 PNG Boss 2 - Octopus 200 x 207 PNG Black Player Bullet - Glowly black circle White Player Bullet - Glowly white circle	359 x 296 PNG Black Enemy Bullet - Glowly black triangle White Enemy Bullet - Glowly white triangle 1920 x 1290 PNG Win Screen! Start Screen Instructions Screen 5 x Level Transition Screens 5758 x 1278 PNG Background 1 - Floating Islands Background 2 - Mountains Background 3 - Cave Boss 1 Background - Green Jungle Final Boss Background - Purple Jungle
---	--

Sunday, March 29th

- Playtest game daily (if possible) with new people (Group)

Monday, March 30th

- Group Skype Meeting at 1pm EST

Tuesday, March 31st

- 3rd enemy graphic done - Black and White Circle Spirit (Winnie)

- Graphics done

Wednesday, April 1st

- Group Skype Meeting at 1pm EST

Thursday, April 2nd

- Final Music Soundtrack (Dalia)
 - Theme Song: 489107_Fields-of-Glory.mp3
 - Boss 1 Song: 551325_Combat-Theory.mp3
 - Boss 2 Song: 565391_COHA---Contraship.mp3
 - Victory Song: 617390_Victory.mp3

Friday, April 3rd

- Group Skype Meeting at 1pm EST
- Upload all the graphics and the music to the code (Kar Yern and Winnie)

Sunday, April 5th

- Updated some graphics and music based on playtesting comments
- Game completed

Tuesday, April 7th

- Practice presentation (Group)

Wednesday, April 8th

- PROJECT DUE AT 10PM

Thursday, April 9th

- PRESENTATION AT 1PM

Analysis

Strengths

The core mechanic of Hikari Yami is the duality of and interaction between the white and black characters and projectiles. The two players each control a different character, one black and one white, that can only shoot projectiles matching their color. Additionally, enemies follow the same aspect, shooting bullets of their own color. The key mechanic underlying all of this is that players and enemies absorb bullets that match their color but will be hit by bullets of the opposite color. This mechanic is applied in numerous ways in order to force the two players to

cooperate and coordinate. Players are constantly forced to choose between hiding behind their partner in order to protect themselves from bullets and entering a danger zone in which they can destroy enemies.

Although the game as a whole is progressive and linear in nature, individual levels have emergent gameplay qualities to them. In general, enemies are either generated randomly or they move and shoot based on the exact location of the players. This gives players some control over how to beat each level. Depending on how experienced they are and who their partners are, players may opt for a more defensive, conservative strategy or opt to play more aggressively. Players may opt to mostly play as separate entities, only coordinating when forced to, or they may opt to work together and coordinate every movement.

Even though players have the option to focus less on the teamwork element of the game, the design of each level forces players to at least coordinate with their teammates. Each level presents a new type of enemy, whether that enemy moves differently, shoots differently, or does something completely unique, and players cannot simply follow the same formula for each level. For example, in Level 3, The Cave, the enemies follow the players around. Two players may play through Level 1 and 2 fairly independently, occasionally working together but generally using their dexterity to allow them to navigate each level independently for the most part. In the Cave, however, the enemies follow each player around, and if the players do not work together and communicate with each other, they will end up killing their teammate or having to restart the level multiple times.

The focus of the game is on the gameplay itself, but the art, graphics, theme, and music help to enhance player experience. Although the game is not intended to have a strong theme or narrative, having a bit of story helps to make the experience more enjoyable. As players progress through the game, they are able to enjoy beautiful backgrounds with soft, harmonious color tones. A new background for each level provides a subtle reward for beating a level. However, the background does not distract from the gameplay itself.

The visual language of the game also enhances player experience. The use of shape and silhouette creates contrast between the allies and the enemies. While the player graphics are organic and curvy and their simple shapes convey friendliness, the enemy and boss graphics are mechanical and angular and their relatively complex shapes make them seem more aggressive. Black and white silhouettes are a key feature of the graphics. The characters, represented by

recognizable and distinct silhouettes that carry much of the shape information, are able to remain simple yet contrast with the more complex and colorful background. In addition, the ambient shadows around the characters lift the foreground, while the use of black and white for foreground characters isolates it from the background.

In addition, the underlying code is based on wave-generating and level-generating functions that not only allow old levels to be adjusted and new levels to be added with relative ease but also create interesting, often challenging and beautiful bullet patterns.

Weaknesses

It is very difficult to balance a bullet hell style game because the challenge depends heavily on a given player's skill level. Our goal was to make a difficult game, but one that was beatable by most teenagers and young adults given enough time, practice, and a basic familiarity with video games. However, this means that some players are able to beat the game easily and others with incredible difficulty. For some players, the game might be incredibly frustrating, but it was decided that it was more important to provide a challenge for the average player than to allow absolutely everyone to beat the game.

Given more time, it would have been possible to add varying difficulty levels to the game, but this would have required vast amounts of additional playtesting time with new playtesters to ensure that the easier and harder versions of each level were of consistent difficulty and that they satisfied less-skilled and more skilled-players, respectively.

Since our game is aimed to be played by fairly casual gamers online, it would have been very beneficial to include a single player mode in our game. A single player mode would have allowed players to play without needing to find a friend, or to practice before attempting to play the game with a friend. However, since this would not satisfy the core mechanic of our game, it would have taken considerable time and effort to make a satisfying single player experience and would have taken something away from the unique two player aspect of this game.

Playtests

We measured playtest results in a number of ways. Initially, we just had playtesters play through the game and give their thoughts on the game. As we began playtesting specific levels, our initial level designs were often either outright impossible to beat or incredibly easy to beat.

We used intuition along with qualitative feedback from players to quickly adjust the level to a more appropriate difficulty level.

In order to refine our game further, we played through each level several times, recording a number of measurements in order to ensure that our game was beatable. We recorded information such as the number of attempts each level took and the length of time it took to beat the level. See the attached playtest data for more information.

Key Changes

Side-scrolling

One of the first major changes we made to our game was changing it from an overhead perspective to a side-scrolling perspective. We did this primarily for artistic reasons. We felt that we were limited in terms of graphical options if we were forced to adhere to a top-down view. Switching to a sidescroller allowed us to implement unique silhouettes for players and enemies in addition to a wider range of backgrounds.

Gateway-based

Initially, we had many ideas for levels. Some of these levels involved killing specific enemies, others revolved around surviving until a certain number of enemies had passed, but we ultimately decided to change all of our levels into entirely gateway-based levels. That is, the players have to defeat every enemy in order to pass the level. We felt that this fit the theme of our game better (of the kami eliminating evil spirits) and made more intuitive sense for players.

Five unique levels

One of our near-complete versions of the game included ten levels. However, many of these levels were very similar, or required repetitive tactics in order to beat. We wanted each level to be a well balanced level that the players had to figure out. We didn't want players to be able to use the same strategy on any two levels. In order to solve this, we selected five of our ten levels that were all distinct from one another and focused on balancing and refining these levels. This also allowed the game to be completed in a shorter amount of time.

Balancing

Players get satisfaction out of figuring out the underlying pattern of each level and determining how to beat it. If the game is too easy to figure out, the players will quickly get

bored and lose interest; If the game is too difficult to figure out, they will get frustrated and stop playing. We decided to balance the game for people of approximately our skill level by doing repetitive playtests as we have players with varied experience of this genre. We also playtested each level with one player in order to ensure that each level was near impossible to beat without a teammate. Since one of our goals was communication, we looked for players to talk to each other about strategies during play.

Change Log

Started with two-player Bullet Hell game

- We started with a single level bullet hell style game that we changed by adding a second player to Kar Yern's video game warmup. This was the first playable draft for our game.

Added white/black duality mechanic

- We added the black/white duality mechanic, and changed the graphics to black and white circles for the players and squares for the enemies to better analyze the gameplay. This simplified version enabled us to test the core mechanics.

Changed game to a side scroller

- In order to fit the graphic and art style we wanted, we changed the game to a side scroller with a bird's eye view. This allowed us to implement clear silhouettes and desirable backgrounds.

Scaled back number of bullets fired by enemies

- In order to put less emphasis on the mechanics of moving the players and more emphasis on the teamwork and thinking elements of the game, we drastically decreased the number of bullets enemies fired in order to make the game both easier and decrease the pace of the game.

Added multiple levels

- We added multiple levels to the game, each with various patterns and things to figured out. We had at least ten levels, but many were very similar to one another.

Added bosses

- We added two bosses to the game to force a new kind of teamwork and cooperation.

Changed levels from survival based to gateway based

- Initially, many of our levels were simply about surviving waves of enemies. In some levels, you had to a certain number of enemies, and in others you simply had to survive a certain number. We changed it so that all of our levels were based on killing the enemies rather than simply surviving.

Added seekers, straight waves of enemies

- We added more unique levels in order to encourage teamwork, adaptation, and add more "puzzles" to be solved. These levels included enemies that followed the players, a large horde of enemies that moved in a fixed formation, and enemies that changed colors.

Cut down to five unique levels

- Although we had ten fairly unique levels in the game, we decided it would be better to focus on making five very good and very unique levels. We limited ourselves to five levels, one basic intro level, one level where the enemies switched colors, one level where the enemies followed the players, one boss level where the boss fired huge arrays of bullets, and one boss that split the players up on either side of it.

One life only

- Having multiple lives ran into some difficulties with restarting levels. We also felt that it was more elegant to have only one life but to allow players to restart at the same level they left off at. This allowed us to make the game more difficult without increasing the frustration. This also allowed experienced players to try to play through the game with as few lives lost as possible.

Decreased size of player hitboxes

- In our playtests, it proved very frustrating for players to get hit and killed when a bullet barely scraped them. We solved this problem by decreasing the size of player hitboxes so that bullets could skim past players without hurting them.

Added multiple waves within each level

- In order to add more bulk to the gameplay for experienced players to navigate through, we added multiple waves within each level.

Added god mode

- In order to allow players to get to any level of the game with relative ease, and to just have some relaxing fun, we added a hidden “god mode” to the game toggled by pressing “7” on the keyboard. This allowed players to see every level without being able to die.

Code Changelog

Instructions: Every time you update the code in any way (even very minor changes), replace the current `game.js` with your updated `game.js` and type in here exactly the changes you made. This is important because if two people work on the game at once we need a way to merge the files.

3/22/2015

Created a wave and level algorithm.

These will handle the creation of enemies and transition between levels.

Created the base algorithm for movement and bullet patterns.

3/23/2015 Kar Yern

Added Boss 1 and Boss 2:

- They are available by calling `wave.waveType 4` and `5`.
- They each have their own movement and bullet patterns.
- Boss 1 spawns another Boss 1 of another color when it dies.

Added also a special scenario where ships are split to the sides and have to shoot in opposite directions during Boss 2 Phase.

3/25/2015 Kar Yern

Incorporated Ned's level (Level 1) and code into the code:

Now there are two levels so far in the game.

The first level has 6 waves, including boss 1 at the end.

The second level has 2 waves, including boss 2 at the end.

Code in new code folder.

3/26/2015 Kar Yern

Fixed a bug which prevents the game from winning.

Fixed colors of Boss 2 and fighters

3/29/2015 Kar Yern

Added the lives systems

Players now share lives; both die when one is hit by an enemy

Created the new bullet and movement Patterns: homing, sync, flipped

Fixed some bugs regarding Boss 2.

Optimized some code (added Ned's overlaps function and created a `applyGrad` function to reduce repeated code)

Added the win and lose screens

Adjusted hitboxes

Generated 17 waves for 2 levels.

4/1/2015 Winnie

Added in the player graphics, player torpedo, enemy torpedo, enemy1, boss1, and boss2 graphics
Resized graphics to appropriate dimensions

4/2/2015 Kar Yern

Removed the lives systems. Players die immediately as soon as they are hit. Players still share lives.

Optimized code and removed old clutter

Added a restart level option.

4/6/2015

Turned the two levels into five levels.

Players are now hurt by each other's bullets.

Tweaked the starting position of players when the game or level restarts.

Fixed a bug where players' bullets remain when a level ends.

Changed the way score works: Score now starts at 10000 points and players lose 100 points for each level restart (from deaths).

Incorporated all of the final graphics: backgrounds, win screen, lose screen, level transition screens, instructions, enemies

Changed boss1 graphics to a more optimized version to reduce slight delay when it spawns.

The background moves and loops

Made tweaks to enemies:

- enemies in level 1 are fewer. Number of enemies spawned each wavecount is reduced from 10 to 5
- homing enemies are slower and have lower hp: (10 --> 5 for first wave, 10 --> 3 for second wave)
- boss1 in black form has more hp. (20-->40)
- boss1 in white form has more hp. (10-->15)
- boss2 has less hp (150 -->80)
- boss2 now has a spiral attack when below 40 hp.
- boss2 flips colors when 10 damage has been dealt.

Enemies in levels 2 and 3 now have more randomized starting position.

4/7/2015

Optimized background loop with new extended background images:

- Added two background images that form a specific sequence of movement.
- The background now does not have an awkward jump when the background movement resets.

Incorporated all the soundtracks.

Fixed a soundtrack bug where the previous song continues playing when the game is restarted.
Optimized code by removing outdated parts.
Adjusted the arrangement of code to reduce slight delays of the game at the end of levels.
Added a pause at the end of each level.

4/8/2015

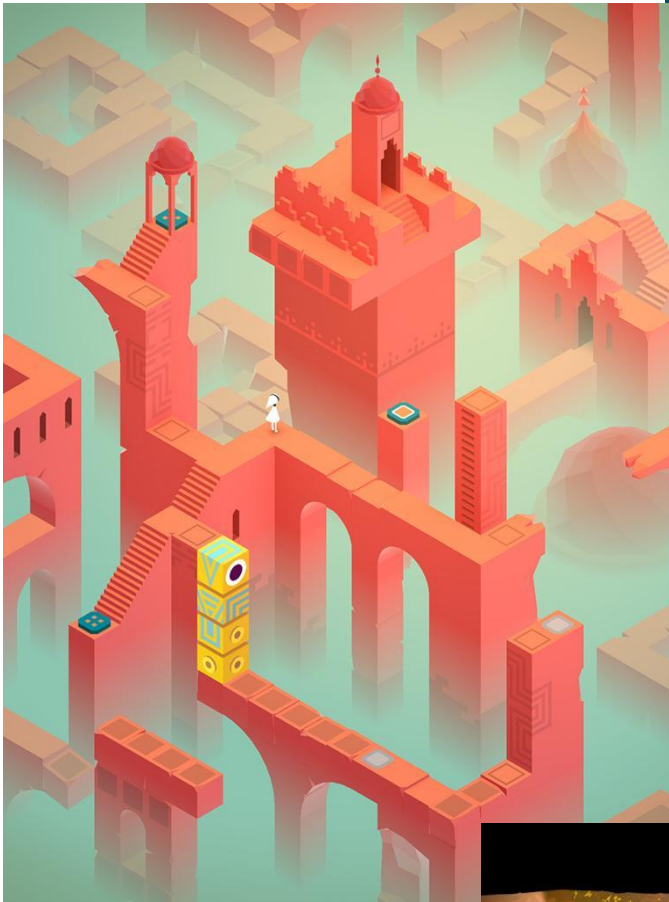
Renamed, rearranged optimized and annotated code.
Added pauses between the end of the levels and the next transition screens
Optimized images by decreasing the file size of the graphics

Concept and Reference Art

General Inspiration

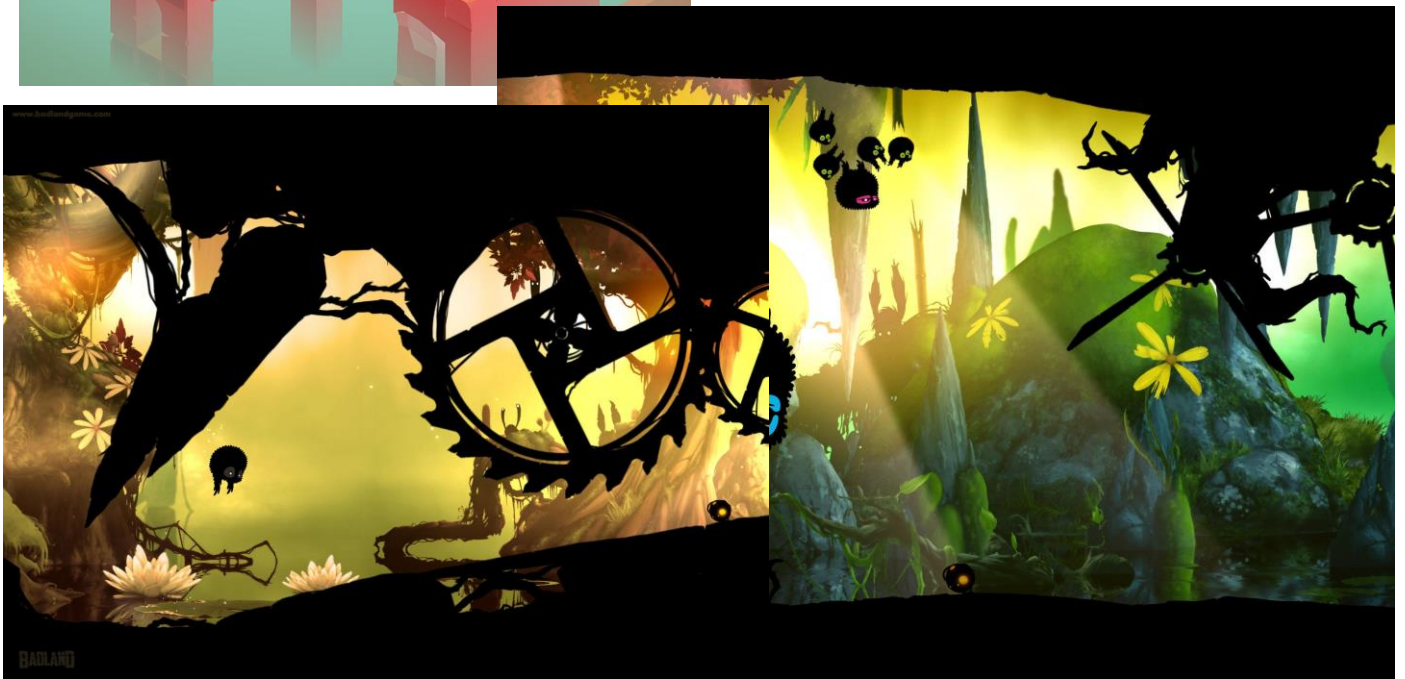
Monument Valley

http://cdn3.vox-cdn.com/uploads/chorus_image/image/30281307/monumentvalley_gdc_650.0_cinema_640.0.png



Badland

<http://www.badlandgame.com/wp-content/uploads/2013/01/mp-2.jpg>



Boss Enemy



[https://a3-
images.myspacecdn.com/images01/44/cde4aa991b232a020fa4995d757a0d3e/300x300.jpg](https://a3-images.myspacecdn.com/images01/44/cde4aa991b232a020fa4995d757a0d3e/300x300.jpg)
Mountain Background



<https://s-media-cache-ak0.pinimg.com/736x/cc/1e/b2/cc1eb248759dab4ea9dc2ef753a5a5e1.jpg>

Acknowledgments and Bibliography

Suzuki, *Ikaruga*, videogame for Arcade, Dreamcast, GameCube, Xbox Live Arcade, Android, Windows, Treasure, 2001

Roszak, *Bullet Heaven*, flash videogame, Matt Roszak, 2011

Frogmind, *Badland*, videogame for Android, BlackBerry 10, iOS, Linux, Microsoft Windows, OS X, PlayStation 3, PlayStation 4, PlayStation Vita, Wii U, Windows Phone 8, Xbox One, Frogmind, 2013

Wong, *Monument Valley*, videogame for iOS, Android, Ustwo, 2014

COH:A-Contraship, Nicksmall94, 2014, newgrounds.com, 8 Apr 2015

Combat Theory, Vahnson, 2013, newgrounds.com, 8 Apr 2015

Fields of Glory, Eternal Games, 2012, newgrounds.com, 8 Apr 2015

Victory, LawnReality, 2015, newgrounds.com, 8 Apr 2015

Playtest Document

Write down any notes and observations you have from playtesting here

Players	Level	Total lives lost on level	Total time spent on level	Avg time spent per level attempt	Time of successful level completion	Comments
Dalia and Winnie	Level 1: The Sky	100	1 hr	1 min	2 minutes	Too difficult. Need to decrease speed of bullets or decrease number of waves.
Kar Yern and Winnie	Level 2: The Mountain	13	10 mins	1 min	2 mins	Abit too predictable. Should randomize enemy colors and positions
Kar Yern and Winnie	Level 3: The Cave	27	30 mins	1 min	N/A	Too difficult. Enemies have high hp. They're also very

						fast.
Kar Yern and Dalia	Level 3: The Cave	22	30 mins	1 min	2.5 mins	Too difficult. Enemies have high hp. They're also very fast.
Kar Yern and Dalia	Level 4:The Jungle	4	5 minutes	40 sec	40 sec	Boss 1 has low hp. Spamming bullets early in the game can defeat it very quickly.
Kar Yern and Dalia	Level 5: The Abyss	5	5 mins	1 mins	1.2 mins	Pattern can be predictable.
Dalia and Winnie	Level 1: The Sky	4	10 min	2 min	5 min	

Detailed Comments

4/1/2015 Winnie

Played with brother

Took a while to figure out what was happening at first. Need players' controls in the instructions, as well as what color each person is trying to hit and trying to dodge.

Bullet formations are so awesome!!

Is there any way we could make losing a life a little more obvious? We found it hard to keep track of how many lives we were at when we were focused on playing the game.

I think some kind of transition between levels would help.

I don't know how important this is, but the levels are pretty difficult until you recognize the patterns, and then the game isn't as replayable anymore. Thoughts?

4/2/2015 Ned and Maggie

Played with sister

Difficult time playing game

4/3/2015 Dalia (20mins)

Played with brother

The players can overlap the enemies which is kind of strange

The last level is really slow. I don't know if its just my computer.

The music takes a lot of time to loop back to the beginning.

My brother did not find it particularly interesting but that might have been the number of lives we had (100 lives).

The game is really difficult unless there are lots of lives available.

On the last level the black player shoots backward but it is still facing the same direction which we should probably fix so that black player is facing the enemy.

Brother: It was a cool game but it need to be harder. It lags because there are too many bullets on the screen and too much is happening. More rewards/ incentives to play the game. Unexpected rewards that increase gameplay. Maybe like when you kill the enemy that is halfway through the game your lives get refilled or doubled.

4/5/2015 Ned, Brittany, Spencer

- Playtested Level 1, found it to be very difficult
- Brittany acknowledged her own lack of experience with game
- Spencer was very challenged by it but able to beat it

4/6/2015 Dalia, Winnie, Kar Yern (2 hours)

- Did a whole playthrough
- Level 1 was very tough. The number of enemies and bullets in the area is high. Took an hour to beat it.
- Level 2 is a little bit predictable as enemies respawn in the same position and colors. These aspects should be randomized.
- Level 3 has the same concerns as level 2. In addition, enemies have very high hp. This makes attempting to kill these enemies frustrating. It should be reduced.
- Boss 1 has low hp. This allows spamming bullets at the beginning of the game to defeat the boss pretty easily.
- Boss 2 has a predictable pattern. Maybe adding another bullet pattern to it would increase its complexity.
- With the new one-life system and friendly-fire, game becomes very challenging as players need to restart levels if they get hit by even a single bullet.
- However, due to the difficulty, this game becomes fulfilling once levels are completed.
- Randomization of enemies' positions and colours in levels 2 and 3 could enhance replayability of the game.
- Coordination and communication become important in this game.
- Bug: Found that player's bullets remain on screen even if levels are completed.

4/7/2015 Ned, Kar Yern (45 minutes)

- Did a whole playthrough
- Found that Level 5 was incredibly frustrating and unsatisfying
- Other levels seemed good