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Artwork for a Casual Sports Game

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Artwork for a Casual Sports Game

A Major Qualifying Project Report
submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the
Degree of Bachelor of Science

by
Mary Yovina

Professor Robert W. Lindeman, Major Advisor

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Abstract

This project was concerned with the creation of art assets for a casual sports game for a Japanese game system. The artwork was required to comply with the art style and specifications as decided by the project team at Jupiter, a Kyoto-based game company, and their client company, as well as fit the restrictions imposed by the capability of the game system itself. The project was divided into three segments: a training period, a time spent completing assets for the sports game, and the analysis portion in which the paper was written.

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1 Introduction

1.1 Project Overview

I worked with a project team at Jupiter, a Kyoto-based game company, to produce artwork for a casual sports game for a Japanese game system. Unlike most MQPs for IMGD students, I did not have input in either the game's development or the artistic direction; the game was directed by the requirements given by the client company and the project team at Jupiter. Once I joined the project, my job was limited to completing assets as they were assigned to me. Therefore, my project goals were a bit narrower than student-led projects.

The objective of this project was to create artwork which complied with the limitations of the chosen art style as well as the restrictions created by the capability of the game system. The boundaries for the art style were such that the ambiance and design would be appropriate for the Japanese casual gamer demographic. The game system also presented restrictions on the specifications for the images, such as the available color palette and image dimensions, due to simpler technology than that found in current generation consoles. I will discuss each of these limitations in more detail in section 1.4.

The project was split into three distinct phases: training, work for the company project, and analysis. During the training period, which took place over about three months, I completed personal projects which taught me skills I would need to work on the company project, and allowed me to learn how to use new programs. The period in which I created art assets for the company project spanned about one month, and involved working on character design, animations, logos, and icons. The final portion of the project took about two weeks, and during this time I wrote the paper and analyzed my work for this project.

1.2 Goals

My goals over the course of this project were mostly personal ones due to having no influence on the game's art direction or gameplay. I essentially had three goals: to create art which did not look out of place in the game, to improve my artistic range, and to become proficient in

Illustrator. My first objective was both personal and related to the problem statement of the project. As someone who has little experience with Japanese art styles, it was a challenge but a necessity to create art that fit in with the rest of the art in the game. This goal is connected with my second, though not the limit of what I wanted to improve. I hoped to develop in style as well as approach, learning techniques to produce drawings of pixel art, cartoon-style art, and vector art. The third goal is pretty straightforward; I felt Illustrator is a valuable tool I should have an understanding of, not only for the purpose of the MQP, although it was also necessary to work with the program for that reason.

1.3 Project Background: The Game System

The game system is built for casual games with a focus on sports and other physical activities. Similar to, but a predecessor of, Nintendo's Wii, the system's target demographic is the family, appealing to non-gamers and those interested in bringing physical fitness and gaming together. These games include a specialized controller, such as a golf club or a mat, to make playing these games intuitive. Earlier games were programmed into the game system itself, meaning consumers would buy an entire system that can only play tennis. The latest games now come packaged with the cartridge, controller, and other peripherals if necessary, and are played via a separate console. However, the console only functions to connect the game cartridge to a television, and the cartridge itself contains the technology to run the game.¹

1.4 Limitations

The most prevalent limitation on my work for this project was the level of capability of the game system. The technology in the games is several generations behind the latest consoles for two reasons: the cartridges contain all of the hardware for their respective games, and each game must be reasonably inexpensive to make and reasonably priced when sold. In conjunction, those requirements result in limited storage space and much lower graphics capability than the latest consoles, which in turn has a significant impact on how art assets are created. The system

¹ From game system's official website, accessed October 1, 2009. This information has been removed due to restrictions.

is unable to use 3D graphics that haven't been rendered as 2D images, so most art assets for the games are created with Photoshop and Illustrator. Additionally, there are restrictions on the size of the color palette—for individual images and the whole game—meaning colors need to be chosen carefully and reused from other images whenever possible.

The other limitation, which I found to be more difficult to work through, was the art style. The game was designed for a Japanese audience of casual gamers of all ages, which is a demographic I have no experience drawing for. For this game and others like it, the style is generally bright, calm, happy, cute, and mixes semi-realistic elements with cartoon ones. What I found to be a challenge for me was that the features which bring objects away from realism and into abstraction or cartoon differ between Japanese and American styles. The differences in the way each culture draws characters are significantly easier to see than how terrain or objects are styled differently, but grasping how to do either well was hard for me. Adjusting my drawing style to at least be similar to this look I was inexperienced with was a daily struggle.

1.5 Artistic Tools and Workflow

All of the artwork for the sports game was created with Adobe's Photoshop and Illustrator, in-house software specifically for creating images for this game system called OPTPiX, and IBmpA, a program in which images are prepared to be interlaced. The only exceptions were the character designs, which only went through Photoshop and Illustrator. Right away a distinct workflow emerged for creating art assets, which came about due to the strengths and specializations of each program. The programs I used were ordered as follows:

Photoshop → Illustrator → Photoshop → OPTPiX → IBmpA

1.5.1 Step 1: Photoshop

Photoshop was utilized first for the sketch and design step. At this stage, the main objectives were to generate and solidify an idea, and try to accurately depict the form. Depending upon the drawing, I might have planned out some of its finer features, but much was likely to change about the sketches during this stage, so details were not always included.

One of Photoshop's strengths is having tools that allow freehand drawing, which is important for sketching. Because of how fluid ideas are at this point, things like body type, proportions, hair, expression, and pose have to be felt out and tweaked in a way that feels natural. Photoshop has the brush and eraser tools to do this which respond to pen pressure and act like their real-life equivalents, but Illustrator does not. Photoshop is also particularly useful for drawing and checking animations because of an animation editor window. Unfortunately, Photoshop is not very good at making crisp drawings that can be altered easily, so once the drawings are ready to be cleaned up, they have to go to Illustrator.

1.5.2 Step 2: Illustrator

Although drawing is restricted to paths in Illustrator, it's no longer necessary to draw freehand, and the second step actually benefits from that feature of Illustrator. Because Illustrator uses vectors, shapes can be manipulated without quality loss, which allows the drawing to be changed easily. The process in Illustrator mostly involved tracing the original sketch and finalizing it; changes at this time were usually minor. Also, if the drawing was an animation, the frames were stacked vertically, in order. Once complete, the image was stretched vertically to 200% to prepare the drawing to be interlaced later.

1.5.3 Step 3: Return to Photoshop

From there, the image was briefly brought back into Photoshop to be converted from Illustrator's file format (.ai) to a bitmap. The game system, and therefore OPTPiX, the program created specifically to make artwork for the system, is only compatible with bitmaps. However, Illustrator doesn't have the option to save as a bitmap, so I had to open the file in Photoshop to do so. I also needed to change the resolution to 72 pixels per inch, and check that the mode was set to RGB. No editing was done in this step.

1.5.4 Step 4: OPTPiX

I then opened the image in OPTPiX. When the image is first opened, it has no color palette. Even though I have been selective with my colors in Illustrator, the color palette has to be reduced because Photoshop actually fills all 256 color slots despite the number of colors actually

used. Additionally, there were always pixels of blended colors as a result of when vector graphics from Illustrator were converted to an arrangement of colored pixels in Photoshop. I first reduced the color palette to within a few colors of the specified number, and then manually reduced that number by combining similar colors and removing unnecessary or unused ones. After removing some of the blended colors, like ones mixing the background color with the outline color, the form sometimes also needed correction. I always then ended my editing by rechecking the animation with this program.

Before I sent the image to IBmpA, though, I made sure that the color palette adhered to a few guidelines. The first color had to be the color that would be set to alpha, which is to say it would be set as “invisible.” Also, the palette once again had to be increased to 256 colors with essentially blank data, and an unused color needed to be in the final color slot. This was done because of the problem I touched on briefly at the beginning of this section, where Photoshop will fill all 256 color slots if they are empty. If Photoshop reads that there is a color in the final slot, that problem will not occur.

1.5.5 Step 5: IBmpA

IBmpA is a program which handles creating interlaced images. Interlaced images are created by taking an image stretched to 200% vertically, and separating it into its even and odd rows of pixels to form two images (even lines and odd lines). The two resulting images are similar to one another and normally proportioned. When displayed on a TV screen, the two versions of the same image will alternate rapidly, such that they blend to the human eye.

In the case of IBmpA, after putting the file from OPTPiX into a designated folder, I ran that file through the program, specifying the height dimension of the final image—or of one frame in the case of an animation. Because the image has been vertically stretched to 200%, the indicated height would be half that, or half the size of one frame. The result is a stack of images. If the initial image was a list of vertically stretched images 1, 2, 3, 4..., then running the image through the program would produce another list of correctly proportioned images 1, 1, 2, 2, 3, 3, 4, 4.... As long as the image displays well on a TV screen, the asset is finished.

2 Training Phase

Initially, I went through a three month training period where I learned techniques for drawing that would prepare me for working on the company project. During this time, I needed to learn how to use several programs and improve my drawing skill, as well as learn how to adhere to the restrictions that I would need to follow when making art for the game system. All of the work done during this stage was in preparation for my work later for the sports game.

2.1 Pixel Art

The first type of art I needed to learn how to make was pixel art, which is a drawing that is created by drawing and putting detail in at the pixel level. Most of the work I did with pixel art was very small, and even backgrounds were not even as large as 300 square pixels. In order to complete this art, I needed to become accustomed to working with such limitations that would be the expected of me during the creation of assets for the sports game. I also needed to learn how to use the program OPTPiX, a program that becomes an integral part of my workflow for the company project. This portion of my training was the groundwork for everything I would do later.

2.1.1 Limited Color Palette and Limited Space

The two restrictions that have the most impact on creating pixel art, particularly for this game system, are the problems of only having a small amount of space and a few colors to express an object. Limited space really only has one resulting challenge, and that is how to represent a thing or character in such a way that it is detailed and accurate, but not cluttered. Style also factors into the use of space, because the thing being represented may have certain features exaggerated to depict what's being drawn in a way that is more visible. In addition to the size constraints, having a small selection of colors places importance on being able to use color in a way that is expressive and not wasteful. Having smooth gradients is desired, but because the image is small, if the slight change in tone is not seen when viewed at normal size, a color slot is being wasted. Shading is also pretty delicate in terms of how to create smooth transitions between colors.

I began practicing how to work with these restrictions, my first try shown in Figure 1, by first completing a few static objects with common color palette sizes: 4, 8, and 16. At this time, I made some mistakes, like accidentally adding an additional color and having instead a palette of 9. One of the purposes of the exercises was to learn how to use color and shade depending upon how many colors I'm limited to. As a result, I began to be able to space colored pixels in ways I related to the drawing technique stippling, and got a better grasp of how to blend even very different colors. However, this initial exercise didn't prepare me for the difficulties of working in a small space because I was making small objects to begin with, and so the dimensions of the image were not very limiting.



Figure 1 Frog head using 5, 9, and 17 colors.

2.1.2 Characters and Animation

From there, I jumped quickly into full characters and animations (Figure 2), which I had a very hard time with. Although before I didn't really notice the boundaries of the small image space, I felt almost claustrophobic when trying to draw an entire person in a 48 pixel box. I could not work out proportions, and my already shaky knowledge of how to shade with a limited color palette did not hold up. I worked unsuccessfully for a long while before deciding I needed to take a step back and learn how other games represented the human figure in such a confined workspace.



Figure 2 First attempt to make and animate a character, displayed horizontally for space purposes.

I took some time out of completing my own art to study a lot of Nintendo DS games and Playstation 2 games that used sprites, and try to produce characters with these sprites as guides. I found the sprite sheets from *Kingdom Hearts: Chain of Memories* and *Disgaea* to be the most

helpful for their attention to detail, form, proportion, and shading. When I began again, I started by reproducing the proportions of one of the sprites online, as shown in Figure 3. While it was a step forward, the character design was weak and the proportions were no more than a copy of Sora from *Chain of Memories*. I decided that I would work much quicker and do better work if I were using existing characters—Rinoa and Cloud from the *Final Fantasy* series (Figure 4). That way, I could work on detail right away and keep myself from copying the features of the reference sprites when I needed to fill in gaps in design.

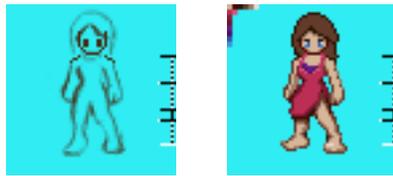


Figure 3 Initial proportions test and character sketch.



Figure 4 Rinoa and Cloud sprites.

I felt that there was good improvement to my sprites after drawing Rinoa and Cloud, but was hesitant to move on. I began drawing Riku from *Kingdom Hearts II*, but before I was finished, I was asked to make a jumping animation from the sprite, which can be seen in Figure 5. I had some trouble creating the right amount of movement for the limbs, sword, clothing, and hair; I tended to choose subtlety or a lack of movement to be safe, but doing so instead made the action look stiff and unnatural. I slowly corrected or improved these problems in my drawings, and eventually ended with a significantly better animation than the first one I made.



Figure 5 Riku looping jump animation, displayed horizontally for space purposes.

By that time, I had improved my use of the color palette and my shading, learned how to utilize the small workspace I was allotted, and learned how to create smoother and more detailed animations. All of these things were necessary skills to have before beginning my work on the company game. However, I needed to improve my speed, because in order to meet deadlines for the project, I had to work much faster than I had been. To do that, I was given an exercise

where I had only an hour or two to complete each drawing, the results of which are shown in Figure 6.

I was given a list of objects to draw, each with required image dimensions and color palette size. Once the time was up, I was allowed to go back over some of them to do more work for another short time. Although not all of them came out well, I was most satisfied with how the flower and car came out, and was also a little surprised that I was able to work so quickly to finish them. In the end, pushing myself to work faster on these pieces helped me to complete my work for the company project faster as well.



Figure 6 Results of the speed exercise.

2.1.3 Backgrounds and Palette Animations

The next step in my training was to learn how to make backgrounds and how to animate the color palette. My background was to fit with my very first animated character walking, so I needed to draw it at the same angle. The angle of the background became a bit of a problem because of the numerous mistakes with my character, and was only made worse by my inexperience with backgrounds. However, as was the hope of the exercise, I managed to correct or improve the drawing's problems over time.

Once the background was complete, I was then asked to make a palette animation, shown in Figure 7. Palette animations are when one or more colors in the palette are substituted for other colors, but what is drawn in the image remains unchanged. This type of animation takes up much less space than one where the images change, because two color palettes are stored rather than two pictures and two sets of color palette data. To create this animation, I created two different images first, the second one having its yellow lighting replaced by blue lighting. Once the second image was complete, I copied the 16 color palette and put it into the third row on the color palette of the first image. The colors on the second palette had to correspond with the

colors on the first, and the replaced colors also needed to be in the same number slot as their originals. Once the two palettes were correctly arranged on the first image, the animation was finished.

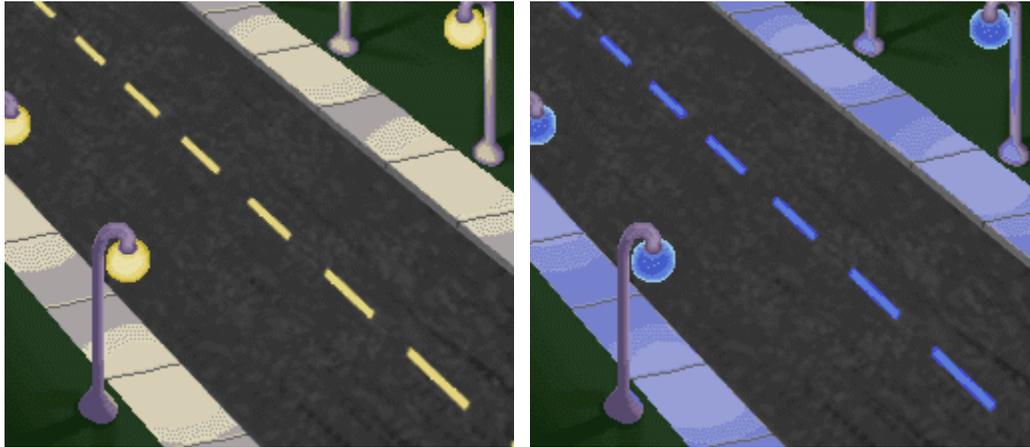


Figure 7 Background animation before color change and after.

Although in the end I didn't need to make either backgrounds or palette animations for the sports game, this assignment was still useful practice. As for improvements that were directly related to the goals of the overall project, this task helped me to be able to work with a small color palette despite drawing a relatively large picture. Previous to this drawing, I was trying to make small but detailed drawings; a background was much larger and required a more spread-out distribution of color across many objects.

2.2 Using Illustrator

Illustrator is the program I used most often to create artwork for the sports game, but I had never used it prior to this project. Learning how to use this program was especially difficult because I could not read the Japanese menus very well, if at all; although I could struggle through the task when the words were written in hiragana or katakana, I was entirely lost if they were in kanji. I had to learn how to use the program by memorizing features and sequences of actions as I had been told them, and writing several pages of notes that included translations, how to achieve effects or do certain actions, and shortcuts. Despite the frustration of initial difficulties,

Illustrator was incredibly important to creating assets. Particularly due to the language barrier and the complexity of the program, each of the exercises which I completed in Illustrator was invaluable practice in understanding how to use the program.

2.2.1 Logos

The first thing I practiced in Illustrator was designing and making text-only logos with a simple shine animation. My first logo, “Makin’ the Best of It,” as seen in Figure 8, was a very unsuccessful attempt. Although I managed to draw the text with the pen tool, I didn’t know how to create any of the effects I needed, such as an outline or the shine. In order to create the appearance of an outline, I had duplicated and enlarged the text behind the first layer, as a result needing to make time-consuming alterations. Also, I could only manage to alter the opacity of the text, which worked poorly to say the least, because instead of a shine, the result was disappearing segments of text. I even managed to create bouncing text when I animated the logo because I did not align each frame properly.

Eventually, after watching numerous tutorial videos, taking notes, and experimenting, I went back over my design and began to fix it. The end result was an improvement, but the image was still not done well. Although I didn’t learn how to move a semi-transparent shine layer over the text until the next logo, I came up with a clunky fix of putting identically sized white text behind my logo, which at least prevented the text from fading into the background color. I also learned a couple ways to have Illustrator create outlines for me, and I nearly corrected the moving text problem.

Before moving on, I wanted to practice more, and to use what I then knew about how Illustrator worked. I made a WPI logo, shown in Figure 9, which was a much more concise animation, and successfully used the better means of creating an outline and shine that I became aware of during the creation of the other logo. Although I still had only a very shaky understanding of how to work with Illustrator, and although I was frustrated by my slow progression, I was at least taking a step toward getting better with the program. This was also the first assignment in which I worked through the series of programs that I would be using for the sports game project, so these logos were additionally helpful for familiarizing me with the art pipeline.



Figure 8 First logo attempt.



Figure 9 Second logo attempt.

2.2.2 Running Girl Animation

After the logos, the next step was to move into creating characters in Illustrator. I began with a character sketch that was drawn by Yosuke Ookubo, and my task was to first trace it in Illustrator, then create an animation of that character running, which can be seen in Figure 10. Once I was finished tracing, I drew the running animation in Photoshop and brought the frames into Illustrator.

This portion of the assignment was incredibly difficult for me because of my inexperience with Illustrator and because the art style was one I was unused to. I spent a very long time correcting the character's features and the strange ways I tried to piece together shapes, in addition to problems with movement. With the help of some of my coworkers, I slowly made progress by making corrections as I was given tips.



Figure 10 Girl running animation, shown horizontally and split into two rows for space purposes.

This project greatly improved my ability to use Illustrator. At the start, I had no idea how to put together a character in the program, and I was clumsily using Illustrator's tools. By the end, I had a much better idea of how to use Illustrator and how to build a character correctly. Overall, this assignment was the most helpful to learning how to use Illustrator simply because of time and practice, which I very much needed.

2.2.3 Running Girl Background

After the running animation was complete, I next needed to create a background. Like the previous background I made, it needed to fit appropriately with the perspective of the animation. This drawing was not only practice with Illustrator, but also, like the previous drawings in Illustrator, included using the programs Photoshop, Illustrator, (Photoshop,) and OPTPiX, in that order, as they would be used in my work for the company project.

I began in Photoshop with perspective lines (Figure 11), using a two point perspective, and matching the angle of the character. I then sketched out the buildings and street. By the time I brought the drawing to Illustrator (Figure 12), I didn't need to do very much but trace, which finally did not seem like an impossible task. I was also able to do some work with shading and gradients, which I couldn't do before, even though what I did was still very simple. I also was able to work much faster; I completed the background in a little over a week, while the animation for the girl took about two.



Figure 11 Sketch of background with perspective lines.



Figure 12 Background from Illustrator.



Figure 13 Completed background.

Once the image went to OPTPiX (Figure 13), I needed to add in more detail, particularly for the trees and for the roof of the blue house. After reducing the colors, I was able to add in the detail by once again working on the pixel level with the pencil tool. I ended up being pretty happy with the result because I felt like I had a much better grasp of Illustrator and a good idea of how to make detailed images by strategically placing colored pixels.

2.3 Original Game

For my final practice project, I needed to design and draw a prototype for a game on the game system I would make art assets for during my MQP. Once I had a game idea, I began by writing up a basic game plan (Appendix A.) which detailed things like gameplay and the objects that appear in the game. My initial plan was to have a game with a dark, silhouetted background and illuminated objects, but the purpose of this exercise was that I work on creating detailed drawings, so I changed my background to meet the objectives of the project. Instead of my original plan, I made a sparsely lit carnival scene and retained my brightly lit objects. I hoped that, because of the visibility problems this would cause my objects, I could create an image long enough to have a large dark sky and a smaller carnival portion, allowing the light objects to be viewed easily in most of the screen, and not appear at all where the carnival was. Unfortunately, the maximum image dimensions for the game system did not allow that, so I concentrated instead on simply making a detailed background, even if there were visibility

problems for the objects.

I began first by making the background, which is shown in Figure 14. The drawing was concept art rather than a finalized piece, so it was drawn and completed in Photoshop. Because the reason for this project was to create a detailed drawing, I paid a lot of attention to perspective, texture, lighting, and detail, especially in the Merry-Go-Round. At times, it was hard to keep adding detail because of how much time it took to reach completion, but the actual drawing was not too difficult because of the experience I'd gained over my time as an intern, working to improve my art. My next step was to create the game objects, seen in Figure 15, which I created in Illustrator. By that time, I was familiar with the program and was able to do a lot more work with effects to create more interesting designs. Finally, I combined the background and the game objects in a mockup of the game screen, which is displayed in Figure 16, and created a proposal document (Appendix B.) in which I pitched my idea.



Figure 14 Completed game background.

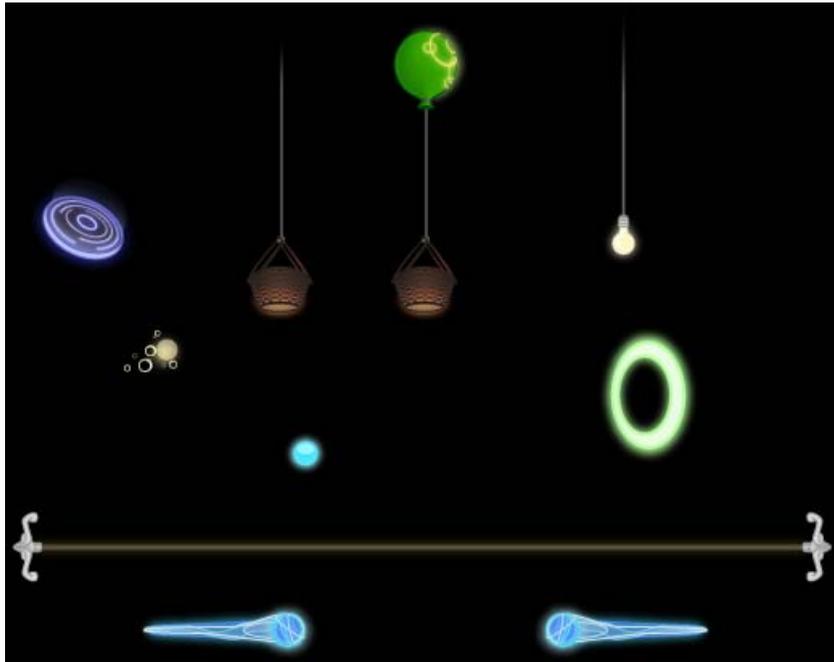


Figure 15 All game objects.



Figure 16 Game screen mockup.

3 Casual Sports Game Project

3.1 Character Design

My first task for the game was to draw two characters in a cartoon art style of my choosing. The first character—whom I will refer to as the “first character” due to restrictions preventing me from mentioning him by name—was to be based on an existing person, and the other playable character was to be an original character, drawn in the same style as the first character. The purpose of this task was to create style and character options to add to a document of main character designs. This document comprises several artists’ designs, and will be sent to the client company for them to choose the style and characters that Jupiter ultimately uses for the game.

The task was broken down into three stages. First, I was asked to draw the first character in many different styles, aiming only to amass a large number of styles, even though they might not work for the game. Presumably, I had the freedom to create in any style so that I could focus on representing the character well and exploring different looks. Then, I was to finalize the best sketch of the first character in Illustrator. Finally, I would design and finalize an original character in the style of the completed first character.

My process began with research. Because the first character was drawn from an existing person, I needed to gather pictures, video, and information about this person in order to design the character with features that made him recognizable as the real-life version. Although pictures and video were helpful references, the most valuable information came from my coworkers. They were able to tell me about physical and personality characteristics that were important in depicting this person. I found this information much better to begin with because I was getting an artist’s perspective; what defined this person in my mind was narrowed down to characteristics that were important to portray. One thing in particular that I would not have been able to interpret through online content only, but that I was told was important, was that I be sure to emphasize his smile. Information such as that helped me to begin my sketches, and helped me revise the best one later on.

At this time, I also needed to research art styles. Although I was told to draw in any style, I preferred to try to find a style that would be well-received. I searched through comic book, webcomic, and newspaper comic styles, but it was difficult to find a style that I thought would work for the game. Most styles I looked at were too Western, and inflexible when it came to blending features. However, I knew I would have a difficult time drawing in a Japanese style, because I have very little experience with it.

For a long time, I had no luck with my searches, and I was disappointed in my drawings. I knew I was getting into a slump because I was trying too hard to get the character's appearance right. To break out of it, I decided to draw at the opposite end of the spectrum and make something awful that looked like a cross between a Lego character and a Muppet. Although the character still looked completely wrong, and expectedly so, I was able to move into a less literal state of mind. At that point, I also restricted my search to webcomics and anime, and had much better luck. The two tended to blend better together than other comic styles, and allowed me to work in a style I was at least semi-comfortable in. My next and final drawing, Stage A in Figure 17, became the sketch that I would bring into Illustrator.

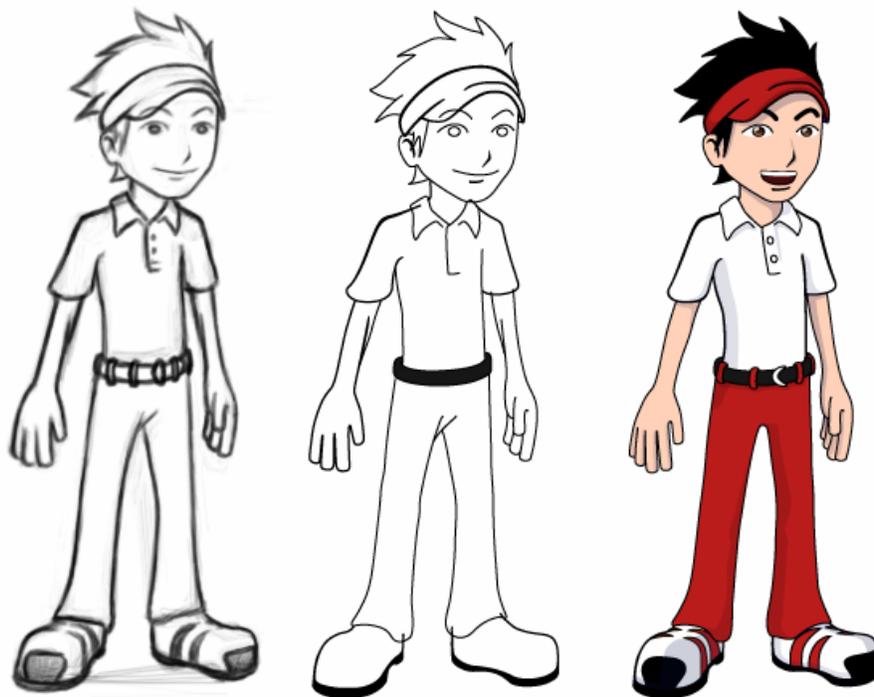


Figure 17 Stages A, B, and C of character development.

I began by tracing over the original drawing with no fill color, which is Stage B in Figure 17. At that time, I was given tips to improve the drawing before I moved on to giving the drawing color and shading. The position of the head over the body and the bend of the chest made the character look like he was slouching, but I needed the first character to look heroic, with his chest out and standing straight. Also, although I had made most of my previous designs include the important smile, this one did not; I needed to include it. The other tips were to correct the number of fingers, because although it's common in American cartoons to give humanoid characters four fingers, it was seen as strange; and to remove unnecessary lines, such as the ones at the elbows and on the pants. The final image is shown as Stage C in Figure 17.

Once I finalized the image, I began another original character in the same style. I decided to draw a robot character, because I had been given the freedom of drawing anything, and I thought that designing a robot would allow me to be more creative than designing a living thing. Yet, even as I was finishing up my sketch, I had no idea what it should look like. My robot character ended up going through a notable redesign.

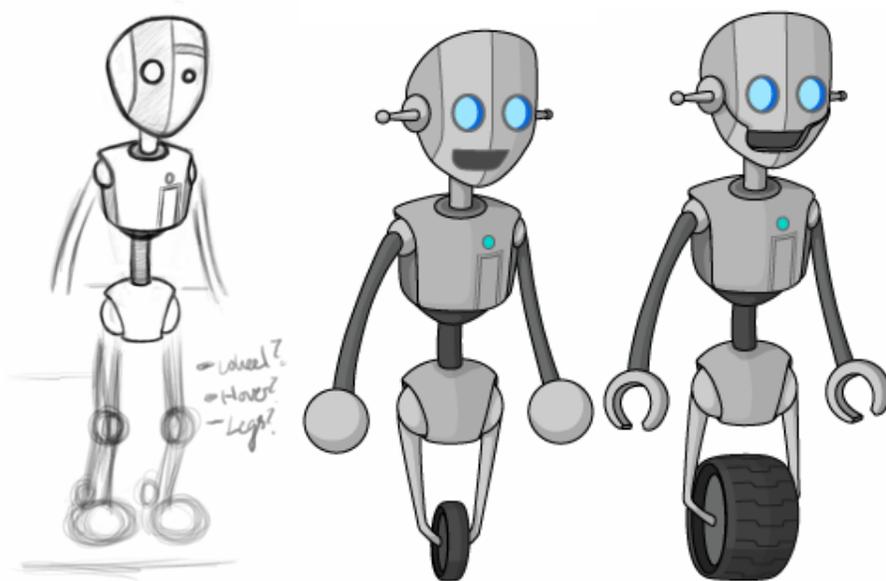


Figure 18 Stages A, B, and C of Robot development.

My original sketch (Stage A, Figure 18) had no direction. Although I began with some ideas for the torso and head, such as some markings and the shape, I was not very satisfied with the facial expression, and I drew a blank when designing the limbs. I added basic legs as placeholders and never sketched the hands. I knew that I did not want a walking robot, and I knew that I wanted it to be cuter, but I was not accomplishing either. After a relatively short and uninspired time in Photoshop, I decided to stop because I felt that the sketch, overall, lacked personality. I did not want to abandon the character, though, because I felt that I had the beginnings of a cohesive, interesting design in spite of what was actually drawn. Hoping to bring that out, and believing that Illustrator would yield better results, I opened the drawing in that program even though I was only bringing in a half-completed sketch.

I traced the drawing where it was complete, and tweaked the lines where I wanted to make adjustments. I went about this and filled in missing parts with a kind of stream of consciousness method, as though I were sketching. At the same time, I looked at a previous game on the same game system in which there was a robot character for direction. I changed the eyes to be large and lit up, added more facial features, and gave it a wheel and some arms. The robot now appeared friendly and cute (Stage B, Figure 18).

Final modifications to the design, shown in Stage C of Figure 18, were pretty minimal compared to the first changes. I was asked to make the head boxier and add a visibly separate, hinged jaw to look more classically robotic. I also had designed the hands to be spherical, but they needed to be capable of grasping. In order to solve that problem in such a way that was reminiscent of old robots, I changed them into “robot claws.” The final adjustment was the wheel, which needed to be bigger and wider. Because of the added space, I was able to include treads and more shading. Once these changes were made, the designs were complete.

3.2 Stage Number Logos

My next assignment was to make each of the stage numbers (1—18) that would appear in the corner of the screen to indicate which level the player was on (Figure 19). The requirements I needed to satisfy were that the text needed to appear three-dimensional, and the final image had to have a color palette of 4 colors, including the color set to alpha. I also needed to use the

colors of the example logos I had been given in a mockup of the game screen.

This process was much different from the approach to character design because there were significantly more limitations and far fewer design decisions for me to make. There was no need to start with Photoshop, because I was not sketching the design. Instead, I began in Illustrator, using an existing font chosen for these logos. I typed each number from 0 to 9 individually into a text box, beginning with number 1, and then converted that text to an outline. With the text as an outline, I was able to work more easily with the shape of the number and its outline.

Once I gave the number slightly more rounded edges and it was complete as a two-dimensional object, I duplicated the number and offset it behind the first. To create a more realistic 3-D effect, I needed to make it appear as though the bottom number was attached to the top one, not just that one was overlaid on the other. To do this, I chose an anchor point on the bottom number, near the end of the top number that needed to appear joined, and dragged it over. An anchor point is a point on the line that forms the shape of the number, which bends the line. I continued moving anchor points and adjusting the bend of the lines until the number appeared 3-D.

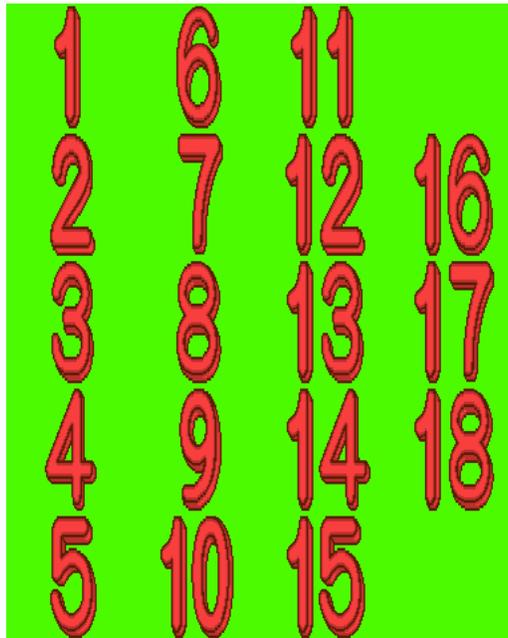


Figure 19 Vertically stretched number logos, split into several columns for space purposes.

After I completed numbers 1 through 9 and the 0 for number 10, I made numbers 10 through 18 by reusing previously made numbers. I then stacked them and stretched the entire group to 200%, as is necessary so the file can later be interlaced. As mentioned in the Artistic Tools section, I had to next bring the file into Photoshop to save as a bitmap, and then send that bitmap to OPTPiX, where the image is given a palette.

As the program often reduced colors in ways that were undesirable, I reduced the palette to 7 and then manually brought the palette down to 4 colors, setting my 1st color to be the color used as alpha. At this point, I checked to make sure that the numbers' shapes were correct, and that they weren't jagged or looked incomplete. Once the image seemed fine, I ran the logos through IBmpA, then handed them over to be put onto the game screen on a TV to be checked again.

Unfortunately, it was discovered only then that the logos were too big and needed to be made smaller. While I had made them correctly, the size specifications I was given were wrong. I needed to go back to my Illustrator file and reduce the size of the numbers, but I did not need to be the one to redo the rest.

3.3 Animated Directional Icon

For this task, I was required to make an icon which indicated direction, using a color palette of 8, which is shown in Figure 20. Again, this icon was modeled after an existing design, so I needed to reproduce it as well as include those colors. Beyond that, however, I had to create a 3 frame animation for each of the cardinal and ordinal directions, totaling 24 images.

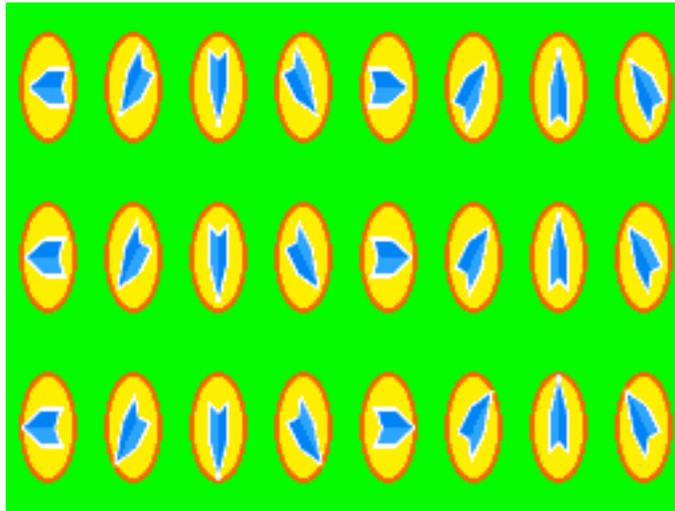


Figure 20 Vertically stretched directional icons, split into several columns for space purposes.

The process started again in Illustrator because the shapes were simple, and sketching was not necessary. This drawing and animation went quickly in this phase, because the design, colors, and animation were already known. It was not at all difficult to reproduce the icon's components, or work from the description of what the animation should be.

The way I approached the animation was to work in such a way that the movement would be consistent in all directions. I took advantage of Illustrator's ability to rotate objects without quality loss and its ability to position those objects by simply typing numbers into the x and y coordinates. I first made the complete animation for the arrow pointing left. Keeping all of these layers on, and selecting the full animation, I duplicated them and flipped them, nudging the layers until they were in the correctly mirrored positions of the left-pointing arrows. This way, because I moved the three layers, or "frames," of animated arrows as a group, they always animated consistently. I repeated this process for the up and down directions as well. Then, to make the ordinal directions' arrows, I duplicated the layers from each of the cardinal directions, and specified that they point at a 45 degree angle to the two arrows on either side. These arrows needed a little more adjustment to move correctly within the icon, but with the cardinal direction arrows as guides and the ability to specify coordinates, it still went quickly.

Once finished with the drawing, the whole image is stretched vertically to 200%, converted to a Bitmap, and brought again into OPTPiX. For some reason, there were problems with this

image in terms of color when the palette was reduced. Segments of the icon were assigned the background color, even though the colors they should have been not only appeared in the palette, but also in the icons themselves. It was impossible to solve the problem by changing specifications, so I had to draw in the changes myself. Although time consuming, it was eventually corrected and there were no problems as a result. After one more check of the animation, the image again went to IBmpA and was complete.

3.4 Animated Flag Icon and Corresponding Static Flag

This task required me to make two images that represented the same in-game object. One image was the small, 8 by 16 pixel flag which can be seen on the ground (Figure 22), and the other was an icon which indicates where the flag is (Figure 21). There was already a static version of the icon made which I needed to make mine look like, but I also needed to animate the icon by making a 4 frame animation of the flag blowing in the wind. These objects also had the additional restriction that their color palette must include the 4 colors from the stage number logos I made earlier. The two flag assets also needed to share the same 8 color palette, with the exception of the color blue that only appeared in the logo.

I chose to make the icon first because it was larger and more detailed, and much easier to scale down later to become the small flag. I began in Photoshop by making a rough sketch and checking the animation. I also looked online at some videos of flags to check if the movement looked reasonably accurate. At the same time, however, I compared the movement to cartoon examples, because the art style of the flag in the game is not realistic. There was a noticeable difference in the movement patterns and shapes, but I opted to choose a more exaggerated style of movement to, hopefully, fit the rest of the game's art style better.

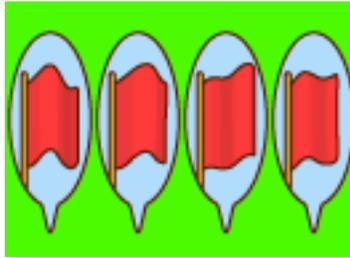


Figure 21 Vertically stretched flag icons, displayed horizontally for space purposes.

Once the animation looked smooth, I brought the file into Illustrator and traced the shapes I drew, fixing the form when necessary. One thing that needed a lot of alteration at this stage was shading. Photoshop allowed me to have a large amount of variation with shade, but that could not be retained. Because of the limited number of colors available (8), I could not keep all of the colors used for shading, or use gradients. I also, stylistically, could not keep the more complicated shading because the cartoon style went more sensibly with more defined shading. These changes led to some problems with the animation, because the movement looked awkward without the right shading. The worst problem was the way the animation jumped when the flag reached the end of the animation and looped. To fix these problems, I experimented with the darkness of each of the shadow colors on the flag, and changed the position and shape of these sections of shadow. After each trial, I brought the animation to OPTPiX to preview the animation and check for awkward movement.

Once the image was stretched and brought to OPTPiX, I took a short time to create the static image of the flag from one of the frames of the icon's animation. In Illustrator, I resized the image to fit the required dimensions, and lengthened the flagpole now that the object was fully visible. That flag was also brought into OPTPiX via Photoshop.

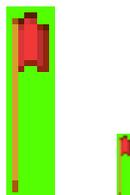


Figure 22 Vertically stretched flag at 300% and full size, respectively.

Because I needed to reuse colors from the stage number logos' color palette, I had to open the logos' file before reducing the color palette of the flag files. I began first with the flag icon. In the specifications for reducing the colors of the icon, I indicated that I wanted to take the first 4 colors from the palette of the logo file. When the color palette was reduced, I was disappointed with the way the icon looked.

Because some of the colors brought over from the stage numbers' palette were darker and were a different shade of red, the shadows in the flag didn't quite look right. Unfortunately, I couldn't do very much to improve the colors because they had to match the colors of the text, and I could not add more red to an already full color palette. I spent some time making adjustments which did improve the picture, however, I still prefer the look of the Illustrator file to that of the final image.

I then moved on to the static object file. In reducing its color palette, I specified that I wanted to take the full 256 color palette from the icon file. The flag icon and the flag object now had identical color palettes. The flag only needed to be fixed slightly to make the blocks of color distinct and correct where some pixels were assigned the wrong color, and then both images were run through IBmpA.

3.5 Level Mockup of American Level for Design Doc.

My next assignment was much different than everything else I did for this project. I was asked to make a mockup for an American level. I had to do very little drawing to make this picture, and instead had to do more editing of photographs. I needed to create a level that included an American landmark so that one could later be created based on the design.

After choosing Mount Rushmore as the landmark, I looked online for pictures of it as well as the playing field and sky. It was a little harder to find a good quality image of the ground, because I needed one that had a specific perspective and also did not look out of place next to Mt. Rushmore. Once I had collected my images, I worked in Photoshop to get rid of the pieces of each image that weren't needed.

I created a layer mask for each of the images, and chose the option “Reveal All.” What I did on these layers was paint in black, white, and grey to paint the value of how visible, or opaque, that part of the image was. Black gave that part of the image 0% opacity, white gave it 100% opacity, and shades of grey were values in between. It’s much easier to edit on the layer mask than on the image itself because the image does not really get erased or changed this way. I edited out the sky above the playing field image, as well as everything around Mt. Rushmore that could be seen above the trees in the ground photo. When each image was edited as needed, they were fit together so that they were all visible behind the user interface and the other objects on the screen.

The last thing I needed to do was draw the playing field that would appear on the screen to show the player the level’s layout. I also made this in Photoshop, although I regretted not making it with Illustrator when Photoshop began to have strange problems. I created each section by drawing a path and filling it. For some reason I never was able to figure out, Photoshop would fill everything outside of the path. When it was a selection instead of the path, the same happened. However, after selecting the inverse and filling it with color, even though the desired section was filled, the outlines were jagged. I decided to just give up and draw over the jagged outlines to smooth out the roughness, because I had no more ideas, and could not read the Japanese menus to find a solution. Everything after that point was drawn in with the brush. Despite the strange problem, I completed the screen mockup when that was finished.

3.6 Hit Ball Effect

For this task, I needed to create three animations, of five frames each, for hitting the ball in the left, straight, and right directions, all of which are presented in Figure 23. Each image also needed to have a palette of 4 colors, preferably warm colors. Before beginning, I was shown a static image as an example to base my drawings off of, and given an explanation of how the effect should move throughout the animation.

This was the most challenging assignment for me because, except for one quickly made animation of an explosion, I haven’t drawn any kind of special effects before. Even after seeing the example, I had no idea what to do. The sketches I made seemed to look far more like

explosions and fire than hitting a ball, but I couldn't figure out what hitting a ball should look like. I spent a long time looking at the example drawing, and at my notes, and even at images online. I sketched over and over again in Photoshop, only to erase most of what I drew by the end of the day.

Finally, I sat and picked apart the elements of the example drawing to figure out what made the image work as an effect for hitting a ball. I looked at the shapes that constituted the effect, how they fit together, the shape of the overall effect, and the feel that the effect had. I noted that there were a lot of straight, sharp lines and very few curves, although the overall shape of the effect was curved. I also noted that the original design gave the feeling of excitement without the negative connotations of danger or damage that an explosion has, and decided that at least some of the reason for that was color choice. Although I needed to use warm colors in my design, I wanted to stay away from red or the red-orange-yellow combination that signified fire and explosions, in order to achieve the same effect as the original design.

I redesigned my drawing, taking into account these traits. In the end, however, I still found that there was something that prevented the drawing from looking the way I wanted it to. I asked for tips to make the drawing better, and found that most of the problem was in how the pieces of the effect fit together. They were too evenly distributed and moved too neatly together, which was unnatural for a burst of any kind. They also didn't spread out and get smaller before dissipating. Thankfully, these were specific corrections that I understood how to fix, so I made the changes and brought the drawing into Illustrator.

In Illustrator, I focused on making further changes to the shapes I'd drawn to improve the look. Although I wanted to decide on the colors I would be using, I knew it would be easier to make changes and design the gradient in OPTPiX. The reason is because Illustrator has to use shapes, meaning each color in the gradient would have to be made either from a duplicated and adjusted version of the overall shape of the effect, or drawn in and edited. That method is very inconvenient and time consuming compared to how to create the same effect in OPTPiX, which involves only drawing in each color with a pencil tool and filling with the paint bucket tool.

Also in Illustrator, I created the effects for hitting the ball to the right and left, using the drawing of the effect for hitting the ball straight. All of the components were already made, so I only

needed to adjust the angle of the hit and some of the details, rearranging the pieces and dragging the outlines so that the effect made a clear angle. Both of these effects took much less time than the first drawing.

Once in OPTPiX, I started with the effect for hitting the ball straight. Reducing the color palette was trivial for this image because I only used two colors in Illustrator: the effect and the background were one solid color each. After removing a couple unwanted colors that blended the background and effect colors, I separated the effect into three sections of color. Then, I focused on changing the colors. I tried first to see how blue, a cool color, would look in the image, because I wanted to make it clear that this effect was not an explosion. Although it was clearly neither fire nor an explosion, it didn't have the power that it needed. I then experimented with shades of orange, red, and yellow, and eventually found that a shade of orange and gradually whiter oranges seemed to work pretty well.

I then opened the other two effects and gave them the color palette of the first. I had to redraw the gradient in each of the drawings to be like the first, since I could not reproduce them otherwise, but the process didn't take very much time. Finally, all of the drawings were run through IBmpA, the resulting right direction effect image shown in Figure 24.

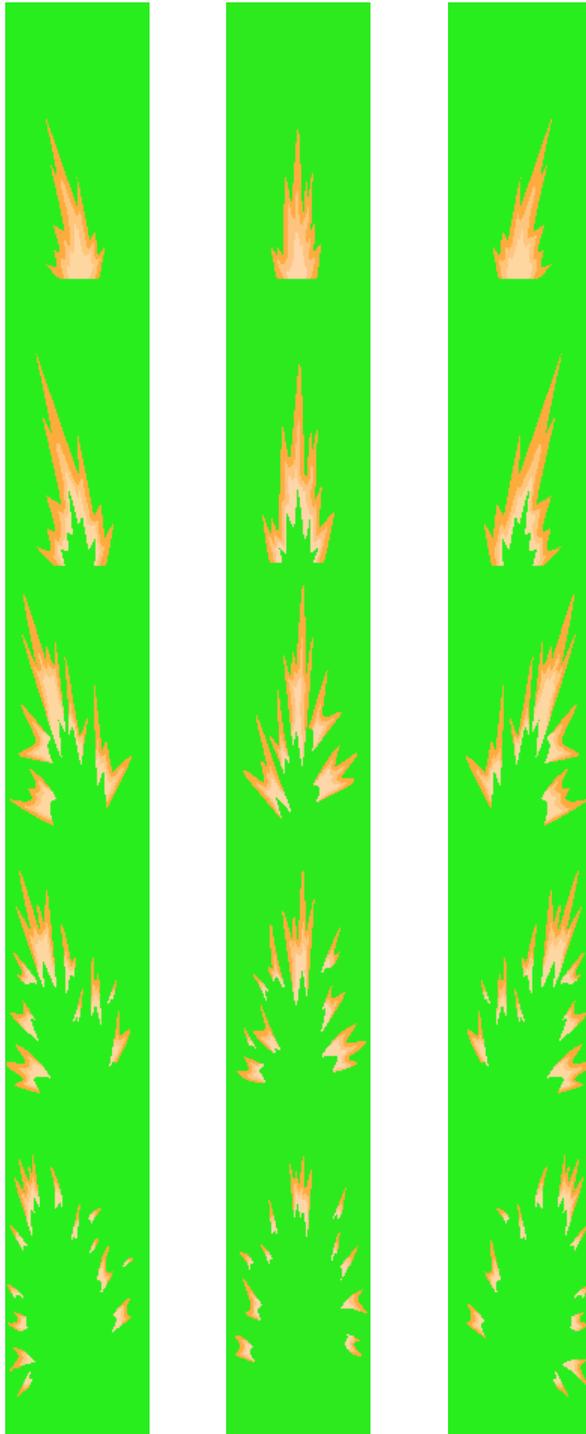


Figure 23 Hit ball left, straight, and right effects.



Figure 24 Hit right effect after IBmpA.

4 Conclusion/Postmortem

4.1 What Worked

The most successful part of this project, I think, was meeting my personal goals. I feel that the training period helped me greatly to improve my art, as did my work on the sports game. When I look over the differences in the art I created at the beginning of learning a style or program and the art I made after some experience and help from others at the office, I see a significant change for the better. I see this especially in my pixel art, when I look at the first character animation I made and compare it to my Riku jumping animation. After hard work and determination, I believe I have succeeded in increasing my attention to detail, my shading, my form, my use of perspective, and my range of styles in my artwork.

I also met my goal of learning how to use Illustrator well. When I first opened the program, I had no idea how to make anything at all. I doodled aimlessly, just trying to grasp how to use the tools. Although I struggled to learn how to draw with Illustrator, I know that I do now have an understanding of the program. I believe that I will have a better grasp of it once I use the English version, but I know that I can work in the program now, even in Japanese, with little hindrance. I think that the game objects I drew for my original game as well as the character designs are proof that I understand far more about Illustrator than I started with.

My last goal, to have art that fit with the art style of the company's game, I am hesitant to consider a success. I think that I may have succeeded with some of my work, such as the logos and icons, but I highly doubt that everything I made was done as the team wanted it, or that I reproduced the art style well for each asset. I am going to say that I was at least able to partially meet this objective, but I don't think that my work can completely fit in with that of my experienced coworkers.

4.2 What Didn't Work

I think the biggest problems with this project were communication and planning, which mainly occurred at the start of the project. Because this was a new project, there was a lot of uncertainty in how to organize the project and what I should be doing at any time. Although this was entirely understandable, it was a bit frustrating to go through portions of the project not knowing what I was going to be doing. Other IMGD projects emphasize a planning phase, so because I did not have this, I felt lost and uncertain of the results. I had trouble especially at the start of my individual projects because I didn't know what the plan was, and I didn't know that I was not starting right away to do work for the company project.

The other difficulty was communication, which was also an understandable problem. Because of language differences, directions, explanations, and tips were not always clear. There were also times I hoped for more feedback, but didn't get very much. In addition, I had difficulty asking questions and explaining myself well.

4.3 What Could Have Been Done Differently

I think that there should have been more preparation before arriving at Jupiter. I should have spent some time learning how to use Illustrator so that I could have spent my time during the project improving upon a base knowledge rather than starting from nothing. By having no prior experience with Illustrator, I lost a lot of time trying to understand the tools rather than focusing on style and technique, and I may have even been able to start the company project earlier had I not needed to fumble with the program for so long. If I had the chance, I would have also taken Japanese classes, because I would have had a significantly easier time communicating and understanding the programs' menus.

The other thing I wish I had done while training was ask more questions. I tried to avoid doing this, actually, because I felt that other people were doing more important work than I was doing. However, I should have gotten more help so that I could work faster and do better quality work earlier in the process.

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Appendix A. Lightball Game Plan

Title: Lightball

Object of the Game: Complete the objective for the level (collect X # of points, hit X of some object, keep ball in play for X amount of time, complete a sequence, break through a barrier, etc.) while not allowing the ball to fall to the bottom of the screen.

Demographic: For casual gamers of all ages. The game tries to be gender-neutral. Although the game is for the family, it's most likely more appealing to female casual gamers (probably especially women around 40, 50), and children younger than teenagers.

Platform & Controller: (Removed due to restrictions.)

CONTROLS:

- Each hand/glove controls a paddle on the screen. Paddles allowed to move left and right the full width of the screen, but are limited to how far up they are allowed to move.
- How hard the player hits the ball determines its momentum.
 - Just putting the paddle underneath as the ball falls onto it gives the ball the bounce one would expect of just springing back against gel; the ball's previous momentum is decreased, but it stays in play. Good for when the ball is getting out of control.
 - Moving one's hand/arm to connect with the ball adds momentum. The more sharply this occurs, the faster the ball will go, but it's probably not a good idea to hit it so hard it becomes out of control (unless the ball is expendable, or there is a barrier to prevent the ball from hitting the ground).
- The player has the ability to tilt the paddles by tilting his/her hands, and hit the ball at an angle. This adds more control for the player, but also adds difficulty and the need to concentrate on how one's hands are positioned.
- Player can cup hands together and catch the ball
 - There are limitations to this—if the player can just catch the ball all the time, it would be hard to lose, and hard to find a reason to use the paddles.

- ✧ Making cup does not catch balls going really fast. The ball will break the weak bond between the paddles and rocket through.
- ✧ Once ball is caught, it has to be tossed back up into the air like when beginning the game. The ball resumes going very slowly. It won't be able to reach very high up the screen.

GAME OBJECTS:

(Objects fade in like a light glowing on, and when hit, the light turns off)

- BOUNCERS: Disks of light rings, bounce the ball.
- LIGHT ORBS: Collectable orbs, do not interact with the ball's path.
- LIGHT BULBS: Hanging bulbs that pop when hit. Do not change the ball's path.
- LIGHT RINGS: Get ball through the middle to get points.
- "BASKETS": Get ball into one to get points. Look like they have lights in them.

Two types.

- Type 1: Easy to land in, worth fewer points. Drop down suspended on wires like light bulbs.
- Type 2: Hard to land in, worth more points. Go by on balloons. If balloon is popped, basket is lost. Balloon still gives player points.

POWERUPS:

- MULTIBALL: Ball splits into three balls. Only losing the final ball counts as a loss.
- BARRIER: Extends over the bottom area of the screen to prevent the ball from falling through. It remains for a limited time, or until struck by a falling ball, whichever happens first.

(NOTE) Screen split similar to image "Desert night sky at Yulara.jpg" in my reference folder. Ground area in image is where paddles are allowed.

Gameplay Scenario:

- Title Screen
 - New Game
 - ✧ (Screen) Are you left-handed or right-handed? Please squeeze hand to respond.
- Game Screen

- “Get 2000 Points” appears in center of screen, then moves offscreen.
- Begins by making tossing up motion with hand.
- Hits ball into bouncer, collects orbs for points as ball moves higher up on screen.
- Gameplay continues with objects being hit, new objects coming on screen.
- The ball continues for awhile without needing to hit with the paddles; 10 Chain appears on the screen next to the score.
- Ball falls and is not saved.
- In the section where the balls left are on the screen, the 1st of the 2 remaining is now lit to show it’s in play. Shows 1st to be greyed out, 2nd lit, 3rd white.
- Begins again by tossing the ball in the air, hitting it.
- Gets MULTIBALL powerup.
- Continues to accumulate points. All balls eventually fall.
- Player plays through final ball and loses.
- High Score Screen
 - There’s a keyboard under empty field to enter name
 - Move hands and grab to select keys

Why is this Game Good?:

- Good replay value. With varied objectives and skill-based challenges, the player is not going to see the same thing over and over again if s/he decides to play the game more than once.
- Simple fun. The concept is simple, the gameplay is simple, but there’s appeal in similar games with simple tasks, planning, and coordination. For example, Peggle. Games that are repetitive and simple, yet keep the player’s attention, have a kind of instinctual fun quality.
- Interactivity through movement. Moving the body to affect something virtual is, in a way that controllers aren’t, satisfying.
- Wide appeal. Although the game will most likely have a demographic that the game appeals to more, particularly the casual gamer, the design is intended to be fun for anyone. The style was purposely designed to avoid being cute, which is generally off-putting to American males.

Appendix B. Proposal Document for Original Game

After designing my original game, I needed to create a proposal document. The following images are the three pages I made to pitch my game idea.

「Lightball」

Proposal Document

...a combination of Pinball and Breakout you play with your hands.

Game System	Uses gloves with two mirrors on each (fingertips and palms) to refract infrared light to a sensor on or near the TV screen.
Demographic	Casual gamers of all ages. Most likely more appealing to female casual gamers, (especially women around 40, 50), and pre-teens.
Genre	Casual action
Art Style	2D
Number of Players	1

Score points!
Complete a sequence!

Each level has a different goal to keep the player interested.

-Collection -Survival -Targets -Sequence -Points

Control the paddles intuitively with your hands to win!

The background image shows a vibrant carnival at night with a Ferris wheel, a carousel, and various colorful lights and structures.

- Lightball Gameplay -

With the [redacted] your hands become the paddles



- Each hand controls a paddle on the screen
- Player begins "serve" by tossing the ball into the air
- Player has the ability to tilt the paddles to any degree that the hand can be rotated, and hit the ball at an angle
- How hard the player hits the ball determines its momentum
- Player can cup hands together and catch the ball, but if the ball is moving too fast it will break through
- Paddles can move left and right the full width of the screen, but are limited in how far up they are allowed to move

Moving the body to affect something virtual feels satisfying and fun

Varied objectives and skill-based challenges create good replay value

There's fun in simple tasks involving planning and coordination

What makes Lightball a good game?

The result is hopefully a design with wide appeal, despite being a casual game

- Game Objects -

BOUNCERS:

Bounce the ball



LIGHT ORBS:

Collectable orbs



LIGHT BULBS:

Hanging bulbs that pop when hit
(Do not change the ball's path)



LIGHT RINGS:

Get ball through the middle to get points



BASKETS:

Get ball into one to get points

Type 1: Suspended from wires, easier to land in than Type 2, so worth fewer points
Type 2: Float by on balloons, which can be popped (for some points), but basket is lost



Make Use of Powerups!

Powerups can get players more points and keep them in the game. For example:

MULTIBALL: Ball splits into three balls

BARRIER: Extends over the bottom of the screen to prevent the ball from falling through, and remains for a limited time, or until struck by a falling ball (whichever happens first)