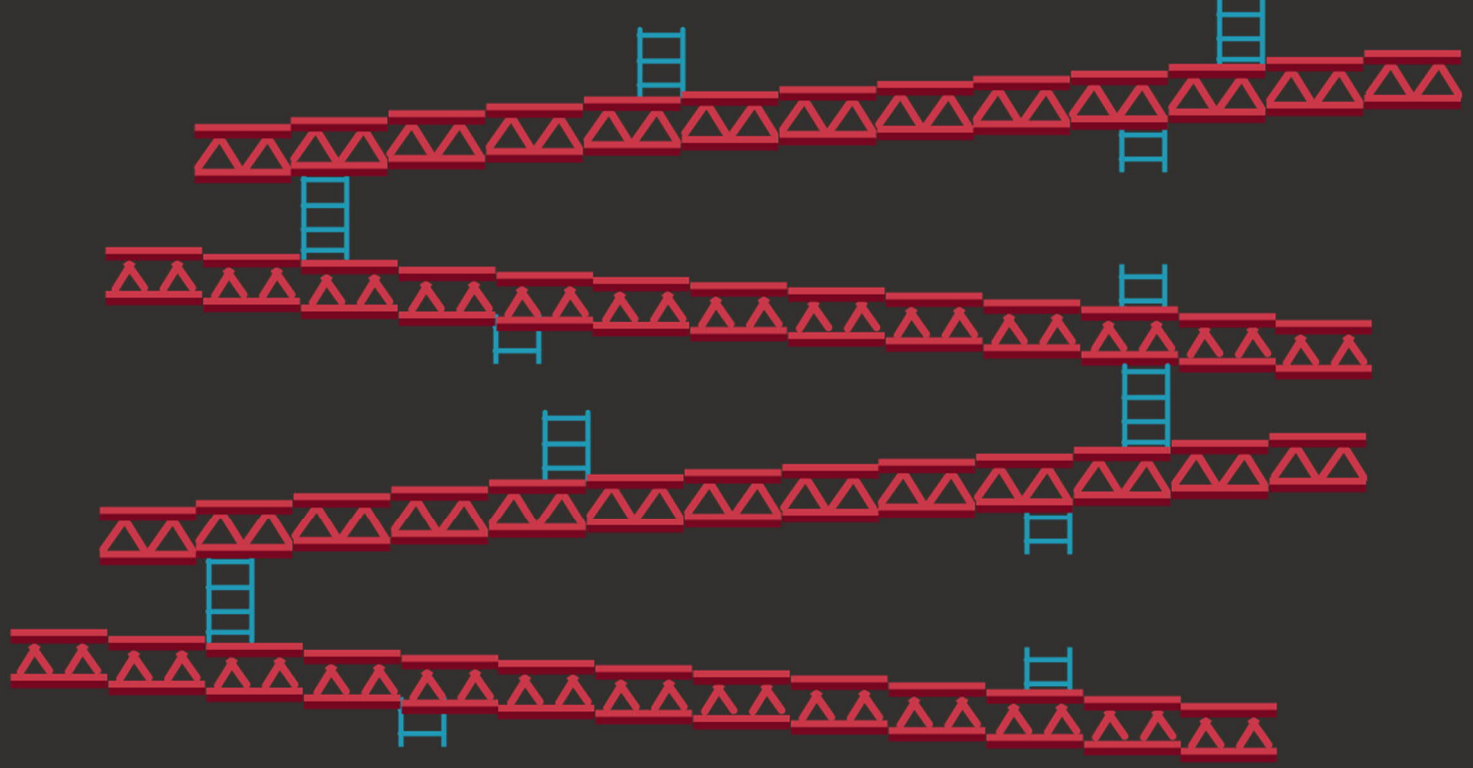

Creating Immersive 2D World Visuals for Platform Games – Post-Mortem: Skytails

Eveliina Aalto

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“Although an image is clearly visible to the eye, it takes the mind to develop it into a rich, tangible brilliance, into an outstanding painting.”

— Jeanne Dobie, *Making color sing*

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Abstract

Game visuals are a crucial part of the game aesthetics – art evokes emotions, gives information, and creates immersion. Creating visual assets for a game is a complex subject that can be approached in multiple ways. However, the visual choices made in games have many common qualities that can be observed and analyzed. This thesis aims to identify the benefits of applying art theory principles in two-dimensional platform games' visuals and its impacts on the player's aesthetic experience.

The first chapter of the study introduces a brief history of platform games, screen spaces, and the method of parallax scrolling. Platform games, commonly known as platformers, refer to action games where the player advances by climbing and jumping between platforms. In 1981, the first platform arcade game, Donkey Kong, was introduced. Since then, the genre has expanded to various sub-genres and more complex graphics with the advances in the hardware.

The second chapter demonstrates the core principles of art theory regarding color, composition, and shape language. Color use is discussed in terms of color harmony and color associations. The compositional aspects are examined in different ways to direct the observer's eye and create visual balance. After this literary research, art theory learnings are applied in a case study of existing platform games. The games discussed in this thesis are chosen by their popularity, representation of a particular decade, or prominent visual style.

The visual aspects of the games are evaluated in terms of clarity, coherency, and emotional impact. Clarity is defined by how easily the player can navigate the game world, how different parallax levels are separated from each other, and how other interactive elements are presented. Coherency refers to the overall consistency of the art style. Immersion and emotional impact of the platform games' visuals are discussed in terms of human response to specific compositions, colors, and shapes.

The creation of game graphics for a video game project, Skytails, is a reflective empirical part of this thesis. Skytails is a physically interactive platform game created for trampoline facilities. This thesis will go through the work progress from the initial sketches to the final product.

The literary research and game analysis helped the author gain more insight into critically evaluating her work and offer ways to improve Skytails visual design. The analysis was able to showcase examples of how art theory aspects can be seen in existing platform games and give example suggestions for its use. The work process of Skytails offers insight into aspects of iterative work in game production and challenges of game art creation.

A follow-up research on the subject could be done with futher examination of game visuals and literary research on human perception and response to visual cues.

Keywords platform games, platformers, art theory, game art, parallax

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Työn nimi Immersiivisten 2D pelimaailmojen grafiikan luominen tasohyppelypeleihin – esimerkkitapaus Skytails

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Abstrakti

Pelien grafiikka on tärkeä osa pelin estetiikkaa - taide herättää tunteita, antaa informaatiota sekä luo immersiota. Peligrafiikan luominen on monitahoinen aihe, jota voidaan lähestyä monesta eri kulmasta. Peligrafiikassa eri pelien välillä voidaan kuitenkin nähdä paljon yhtäläisiä ominaisuuksia joita voidaan tarkastella ja analysoida. Tämä opinnäytetyö pyrkii identifioimaan taideteorian soveltamisen hyödyt kaksiulotteisten tasohyppelypelien grafiikassa, ja sen vaikutukset pelaajan esteettiseen kokemukseen.

Opinnäytetyön ensimmäinen kappale esittelee tasohyppelypelien historian pääpiirteet ja parallax grafiikan käytön. Tasohyppelypelit ovat toimintapelejä, joissa pelaaja etenee kiipeämällä ja hyppimällä tasojen välillä. Ensimmäinen tasohyppelypeli Donkey Kong julkaistiin vuonna 1981. Nykypäivänä tasohyppely genre on laajentunut moniin eri alagenreihin ja niiden grafiikka on monipuolistunut tekniikan kehityksen kautta.

Toinen kappale esittelee taideteorian pääpiirteet, värin, komposition ja muotokielen avulla. Väriä tarkastellaan väriharmonian ja väriassosiaatioiden kautta. Komposition merkitystä tutkitaan katseen kuljettamisen ja visuaalisen tasapainon kautta. Tämän kirjallisen tutkimuksen pohjalta tutkitaan, kuinka näitä periaatteita on lähestytty 2D tasohyppelypelien grafiikassa. Analysoitavat pelit ovat valittu joko tunnettavuuden, tietyn aikakauden, tai vahvan ominaisen tyylin perusteella.

Pelien grafiikkaa arvioidaan niiden selkeyden, yhteneväisyyden ja tunnevaikutuksen perusteella. Selkeys määritellään sen mukaan, kuinka helposti pelaaja pystyy navigoimaan pelimaailmassa, kuinka eri parallax-tasot on erotettu toisistaan ja miten muut interaktiiviset elementit on esitetty. Yhteneväisyys viittaa pelin kokonaisvaltaisen tyylin johdonmukaisuuteen. Pelin immersiota ja vaikutusta tunteisiin tutkitaan ihmisen reaktioista tiettyihin kompositioihin, väreihin ja muotokieliin.

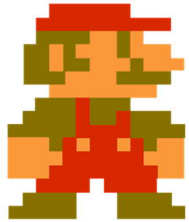
Peligraafikan luominen Skytails-peliin toimii opinnäytetyön empiisenä tutkimuksen osana. Skytails on fyysisesti interaktiivinen tasohyppelypeli trampoliinille. Opinnäytetyö käy läpi työprosessin luonnoksista aina valmiiseen tuotteeseen asti.

Kirjallisen tutkimuksen avulla tekijä pystyi arvioimaan työtään kriittisesti ja ehdottaa tapoja parantaa Skytailsin visuaalista ilmettä. Analyysi onnistui antamaan esimerkkejä taideteorian käytöstä tasohyppelypeleissä ja antaa ehdotuksia sen käytölle. Työprojektin kuvaus tarjoaa näkökulman iteratiivisesta työskentelystä peliproduktiossa ja haasteista peligrafiikan luomisessa.

Tutkimusta aiheesta voitaisiin laajentaa jatkamalla peligrafiikan tutkimusta taideteorialähtöisesti ja tutustumalla syvemmin psykologiseen tutkimukseen ihmisen havaintokyvystä ja reaktiosta visuaalisiin vihjeisiin.

Keywords tasohyppelypeli, peligrafiikka, taideteoria, parallax

Contents



1. Introduction

Game visuals are a crucial part of game aesthetics – art evokes **emotions**, gives **information**, and creates **immersion**. If you think about your favorite game, how does it make you feel? Do you easily know where you should go or whether the item you are observing is interactable or not? Creating visual assets for a game is a complex subject that can be approached in multiple ways. In this thesis, I wish to analyze and understand how two-dimensional worlds for platform games are designed and created from the artist's perspective. Moreover, how can we use the learnings from basic art theory and human perception to better understand and control the different functions the game visuals have and our work's aesthetic impact?

When I joined **Valo Motion,** a game development and hardware manufacturing company in 2017, I was hired to design and create visuals and animations for two games using two-dimensional (2D) graphics. This thesis will examine one specific project, Skytails, a physically interactive platform game designed for trampoline parks. Currently, I work as a game graphic designer in a mobile game company.

1.1 Methods and research questions

This thesis aims to *identify the benefits of applying art theory principles in two-dimensional platform games' art creation and its impacts on the player's aesthetic experience*. The first chapter of this study introduces a brief history of platform games' graphics and the method of parallax scrolling. Then, **literary research** is conducted to understand the critical elements of art theory regarding color, composition, and shape language. The learnings are then applied in a **case study** of existing platform games to understand their visual choices and their impact on the game's visual clarity, coherency, and emotional impact.

This thesis uses **qualitative research** methods. The games analyzed are chosen by the criteria of being either critically-acclaimed and well-known, representing a particular decade in the history of platform games, or having a prominent visual approach. Game visuals are analyzed by either playing or observing gameplay videos by a secondary source. Finally, the creation of game graphics for a video game project is used as a reflective empirical part of this thesis. The results of the project are evaluated with the help of the case study.

Some previous studies exist in connecting art theory with game art design. The closest relevant study to this research is written by an author and artist-game designer **Chris Solarski**, in his books *Interactive Stories and Video Game Art: A Storytelling Framework For Game Design* and *Drawing Basics and Video Game Art*. He offers a framework for game designers and artists to analyze and create more immersive game visuals using shape language and dynamic composition. Examples in Solarski's work mainly consist of three-dimensional graphics and narrative possibilities of visuals in games. While in close relation, this thesis strictly concentrates on 2D platform games, stresses color usage, and emphasizes the personal understanding of art theory before applying it to game analysis.

This thesis does not take a stance in the debate of art games and games as an art form in the philosophical sense. This study's approach is predominantly practical. While the visuals are discussed with game design, it is done primarily in terms of aesthetic impact and clarity.

2. A brief history of game visuals in platform games

Platform games, also commonly known as **platformers**, refer to action games where the player advances by climbing and jumping between platforms. The first trailblazer platform game was an arcade game **Donkey Kong**, published by Nintendo in 1981. It used a game space consisting of a single screen, where the level was laid out in full for the player (Wolf, 1997). Like the very first video games, such as a space combat game **Spacewar!** (1962) created by *Steve Russel* and table-tennis **Pong** (Atari, 1971), the game used an entirely black background with minimalistic and color-restricted game objects and characters (Therrien, 2007).

Figure 1 Original Donkey Kong (Nintendo, 1981)

Along with Donkey Kong, one of the most well-known platform games is the **Super Mario Bros.** franchise, which was launched initially on the Nintendo Entertainment System (NES) in 1985 (Boutros, 2006). Instead of staying in one screen space the whole level, the player could advance horizontally in the game world. It did not take long for game spaces to spread out into more complex screens, such as adjacent and scrolling levels, vastly increasing the player's participation in the games' navigation. The player's ability to control what is seen on-screen separates games from other mediums such as film and animation. Sometimes there is no off-screen whatsoever, which results in objects immediately appearing from the other side after disappearing from the first. (Wolf, 2010). Examples of this kind of 'wraparound' world can be seen in games like **Asteroids** (Atari, 1979) and **TowerFall Ascension** (Matt Makes Games, 2013).

Many platform games are side-scrollers. In scrolling levels, graphics move along with the player, gradually revealing more of the game world. In addition to the horizontal scrolling of Super Mario Bros., the levels' vertical movement became familiar with titles such as **Metroid** (Nintendo, 1985) and **Kirby's Adventure** (HAL Laboratory, 1993), where the player could climb up and down the levels. **Bionic Commando** (Capcom, 1988) offered further freedom with simultaneous horizontal and vertical movement in the game world with a grappling gun (Thomas, 2012). Pixels increased with advances in the hardware and allowed more complex pictorial representations of the game worlds, and the solid background colors changed into richer equivalents.

Metroid and Castlevania franchises made a significant impact on the platformer genre. Specifically, **Super Metroid** (Nintendo, 1994) and **Castlevania: Symphony of the Night** (Konami, 1997) are two games of the 90s that derived a **Metroidvania** genre, a term used to describe platform

games with similar mechanics today. In their interconnected maps of the game-world, the players could freely explore and experience the story while looking for secrets and power-ups to advance in the game. (Nutt, 2015)

One of the first three-dimensional platform games was **Jumping Flash!** (Exact, 1995) for Playstation. The game uses a first-person view of the camera to follow the player character on their journey through the levels. Quickly after Jumping Flash, Nintendo published their 3D version of their Super Mario Bros. franchise called **Super Mario 64** (Nintendo, 1996). Instead of a first-person view, the player observers the player character outside of the character's body in third-person (Boutros, 2006). Some games are a mix of 2D and 3D; **Klonoa: Door to Phantomile** (Namco, 1997) uses 3D rendered graphics, but the player stays on a 2D plane. The world rotates while the camera view stays on the side perspective. This type of visuals is referred to as **2.5D**. (Wikipedia, 2020a)

Figure 2 Jumping Flash (Exact, 1995)

Figure 3 Klonoa: Door to Phantomile (Namco, 1997)

For 2D side-scrolling platformers, **parallax scrolling** became an essential method to create depth. Parallax means the usage of multiple layers of graphics moving simultaneously at different speeds. It fakes the feeling of depth to a level that otherwise would seem flat. Objects near the camera tend to move faster, while the furthest away appears to slow down. (Wolf, 1997) Parallax was first created for the film **The Adventures of Prince Achmed** in 1926 by *Lotte Reiniger*, with the early version of a multiplane camera (Kizirian, 2008). The multiplane camera was used later by *Walt Disney* in the 30s and popularized in 1937 within the creation of **Snow White and the Seven Dwarves** (Disney, 1957). The first game that was said to introduce this technique was **Moon Patrol**, by *Irem* in 1982. Moon Patrol has three background layers that move simultaneously. The player follows the ground plane at the front while the other two layers scroll behind them. (Stahl, 2013) Current parallax graphics in games use additional effects such as blur and animated layers for greater immersion. An extra foreground layer is often placed in front of the player level to increase depth even further.

While technology's current power and resources allow us to make our games much more realistic and offer bigger and bigger worlds for players to navigate through three-dimensional space, 2D games are still played and created. Author *Steven Poole* argues in his book **Trigger Happy** (2007),

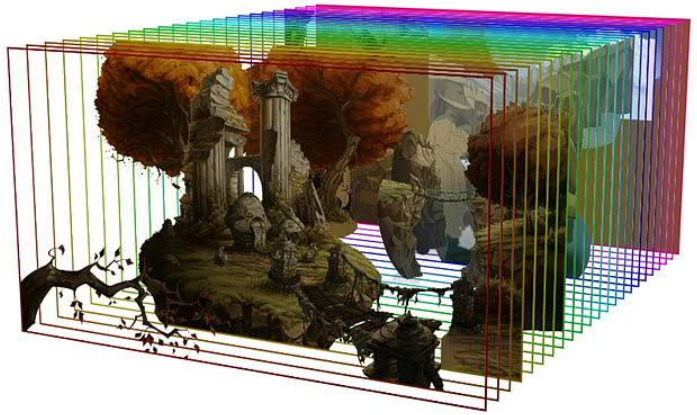


Figure 4 Example of parallax layers in The Whispered World (Daedalic Entertainment, 2009)

about the relevance of the term 'platformer' in the current age. As the games have become much more complex and are mixed with various other gameplay mechanics such as exploration, puzzles, and combat, the 'platformer' is often not precise enough to describe the game as a whole (Poole, 2007). For more specific distinction, different sub-genres have emerged under the platformer category. This thesis emphasizes two-dimensional side-scrolling games with platforming elements on the assets (platforms) and gameplay (jumping action).

VOCABULARY

Hue: Name of the color
Saturation: Intensity of the color
Value: The amount of lightness or darkness in the color
Shade: Hue created by adding black
Tint: Hue created by adding white
Tone: Hue created by adding grey

(Holtzschue, 1995)

3. Art theory

3.1. Color

Just like any other art form such as film and comics, games use color for these primary reasons: to **identify**, to **guide,** and to **set a mood**. (Tulleken, 2015). We also have given meanings to different colors, in biological and cultural terms. Colors evoke different emotions in us, and it has a significant role in setting the atmosphere in any scene that is designed. Colors are also symboling different things in different cultures, and it is good to be aware of how different people read them.

One of the core principles of color theory is a **color wheel**. The scientist *Isaac Newton* first created it in 1666 with the study of the **color spectrum**.

The original one consisted of the colors **Red**, **Yellow**, and **Blue** (**RYB**), and it concentrated on the physical appearance of a color. Later, the psychological effects were included in the system, mainly by the poet *Johann Wolfgang von Goethe* in 1810. (Wikipedia, 2020b) The color wheel differs depending on the color theorist and usage, but they all produce similar results. The current color theory mainly focuses on the physiological and neurological aspects of the eye and seeing (Pesch, 2018). The basic color wheel consists of three **primary colors**. Mixing two of the primary colors produces a **secondary color,** and mixing a primary with a secondary gives us a **tertiary color,** eventually giving us a spectrum of colors gradually changing into another (Itten, 1970).

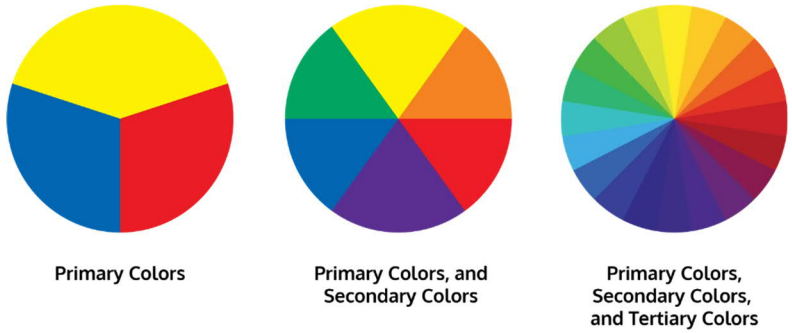


Figure 5 Examples of color wheels (Factory Inks, 2019)

Relevant for the digital working environment, the known color systems are **RGB** and **CMYK**, used for different purposes. RGB is an additive color system, where colors act as sources of light, and by mixing them, different hues are created. This system is commonly seen on the computer screen and other digital devices. CMYK is used mainly in the printing process. It is a subtractive color system, where mixing color pigments makes the color gradually getting darker by absorbing light. The traditional paint mixing is also subtractive. (Pesch, 2018) This thesis will concentrate on the RGB color wheel used in digital painting programs today.

3.1.1 Color harmonies

The main three color harmonies consist of monochromatic, analogous, and complementary colors. The **monochromatic** palette only contains shades from one hue, while **analogous** consists of three adjacent hues on the color wheel. **Complementary** color refers to the **opposite** hues on the color wheel. Triadic and tetradic color palettes are created by picking the three or four colors furthest away from each other. Split-complimentary is made by choosing two of the neighboring shades of the complementary color.

Figure 6 Different color harmonies, from left to right: monochromatic, analogous, and complementary (Moving.com, 2020)

While different color harmony templates are useful, there are no definitive rules in color combinations in reality. Color harmony means **appealing** color combinations. As there can be many reasons for something being appealing to someone, it can be more beneficial to look into color harmony in terms of its **goals**. Was the designer able to deliver a wanted message? Is the scene soothing, aggressive, or perhaps disturbing? The eye naturally looks for balancing components, trying to reach equilibrium. Examples of creating a harmonious palette can be found in even intervals of colors and a balancing ratio of complementary colors. A common way to use complementary colors is to have a major and a minor hue for creating a balanced, rather than competing, color setting. (Holtzschue, 1995)

Figure 7 Complementary color examples in action movie posters (Smith, 2020)

3.1.2 Color temperature and associations

Colors can be divided into warm and cool hues. Warm colors include **red**, **orange**, and **yellow**, whereas cool colors refer to **blue**, **green**, and **purple**. Warm colors appear closer, while more cool colors seem more receding. In nature, we can notice lower saturation and cooler tones near the horizon than the objects closer to us. The difference is caused by dust and water particles in the atmosphere, affecting the skylight's scattering. It is called an **aerial perspective**. (Dobie, 1986) Skylight is perceived as whiter and

cooler than artificial lights (except in sunrise and sunset), which often appear yellowish and warm. In sunlight, shadows appear more unsaturated than in neutral lighting. (Yot, 2019)

Artists often accentuate the **color contrast** by creating cool shadows to warmly lighted subjects and vice versa, making a pleasant complementary color scheme (Yot, 2019). Colors can also be divided into cooler and warmer variants depending on their placement on the color wheel and the primary they are leaning more to. For example, red with a blue undertone appears cooler than one with a yellow undertone (figure 8). Surrounding colors can also make a color's temperature change in relation to them. (Dobie, 1986) **Local color** refers to the characteristic color of an object which is unaltered by intense lighting conditions. (Yot, 2019). The size of a colored area has less impact than the qualities of the color itself. Warm and saturated colors pop out from cool or muted tones, and lighter area overpowers dark. (Holtzschue, 1995)

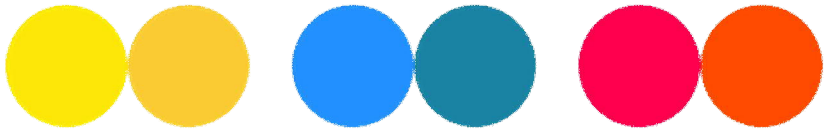


Figure 8 Cooler and warmer color variants

Colors can symbolize different things and evoke a variety of emotions. While some of them are universal, meanings can differ depending on the culture and the context where the color is used. Cooler tones are generally calmer, while warmer hues such as red have more intensity. **Red** is associated with fire, which can symbolize things such as passion and anger. The color red's intensity is further increased when it has light-reflecting property, causing it to easily catch our gaze and, therefore, be used in warnings and emergencies (Holtzschue, 1995). **Yellow**, associated with the sun, is often described as a happy and energizing color. Like red, its intensity makes it a hue often used in notifications and warnings that need our attention. **Orange** lies somewhere in between the two, being more aggressive than yellow but less than red. While often associated with sadness, the color **blue**'s calming effect is also used in professional contexts to give an impression of trust and stability. The color **green** is often used to represent nature and longevity. **Purple**, alongside association with creativity, depicts royalness or luxury because of its history of being an expensive dye. (Adams, 2016).

While **white** and **black** are referred to as "neutral colors," they create the most dramatic impact together, with the most contrast in their values. Black can represent power and elegance, and in western cultures, it is associated with death. White, on the other hand, is often seen as a symbol

of purity and innocence. Grey and brown are neutral and muted colors, and their appearance varies from the cool or warm undertones. (Adams, 2016) An overall color palette consisting of only hues from a cool or a warm spectrum is often used to emphasize a particular mood (Yot, 2019).

3.1.2 Accessibility and color swapping

In game design, like in any visual design, it is also good to consider **accessibility**. It is a good practice to think of solutions to make the game possible for people with color-blindness. This problem is often tackled by not using color as the only identification for an object. For example, in match-three games, where the basic idea is to connect the same-colored objects, it is common to differentiate the shape and icon on the different matchable items instead of only using colors. An extra mode is added in some games to allow a player to access a color-blind-friendly version. The most common form of color-blindness is red-green blindness, where the person has difficulty differentiating these two colors from each other (Wong, 2011).

Color swap - or **palette swapping**, is common in games. Color swapping means only changing the color of a graphic sprite while keeping the asset otherwise the same. The method made it easy to create **variation** and distinction between objects. Color swapping is seen, for example, in collectibles and enemies. In early games, it was particularly useful for machine restrictions. The color can also be used to differentiate the **difficulty** level. In the original **Legend of Zelda** (Nintendo, 1986), the red enemies were easier than the blue ones, and **Castlevania: Bloodlines**' (Konami, 1994) final boss changes its colors during the fight (figure 9 & 10). Different players in multiplayer games are also often assigned to different colors to quickly **identify** who is who. The asset's color can be tinted in code, requiring the original to be grayscale. Current shaders can also change colors dynamically, creating more control over the color swapping. (Tulleken, 2015)

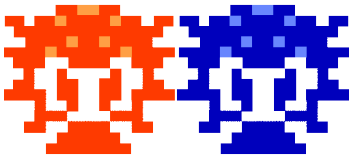


Figure 9 The Legend of Zelda's (Nintendo, 1986) two color variants of the enemy

Figure 10 The boss's color changes during the battle in Castlevania: Bloodlines (Konami, 1994)

3.2 Composition

Simply put, composition means the arrangement of the elements on a picture. It is not a coincidence that some visuals are more pleasing to the eye than others. The human eye can naturally evaluate the **balance** of the image's composition without consciously knowing about art theory. (Poore, 1967) However, it can be challenging to put into words why something feels off and what can be changed to make the work have the desired effect without the knowledge. That said, there are no definitive rules in art, and they are not something to be followed blindly - the observations come from the real world and our knowledge of **forms** and **light** we see around us. Understanding these principles makes it easier to create more believable visuals and break them when needed (Mateu-Mestre, 2010). In many 3D games, the graphics are aimed to look as realistic as possible to show the power of the current hardware. Trying to learn how to achieve photographic accuracy will not be the goal in the upcoming analysis. Moreover, it will concentrate on the notion of how the different methods of image-making affect the outcome of the game's visual style and its clarity and usability for the player.

3.2.1 Creating focus

In a biological sense, humans' **field of view** is wider horizontally than vertically - and only sharp from the middle. Therefore looking at a horizontal image takes less effort and is faster to observe than a portrait one. Naturally, more complex images take more time to read than simplified ones. From an artists' perspective, this means being aware of the image's different subjects and their visual hierarchy. **The focal point**, or points, are the parts of the image that catches the eye first. It can be created in multiple ways. The order that our eye goes through the image can be altered with contrast, placement, size of the elements, and converging lines. **Framing** in visual arts means a compositional method to draw attention to a specific part of the image. (Mateu-Mestre, 2010)

Rhythm in images describes the distances and intensities of the objects in relation to each other. If the items are evenly distributed with the same distances from each other, it looks more artificial than more varied placement, which results in a more natural feel. (Pesch, 2018)

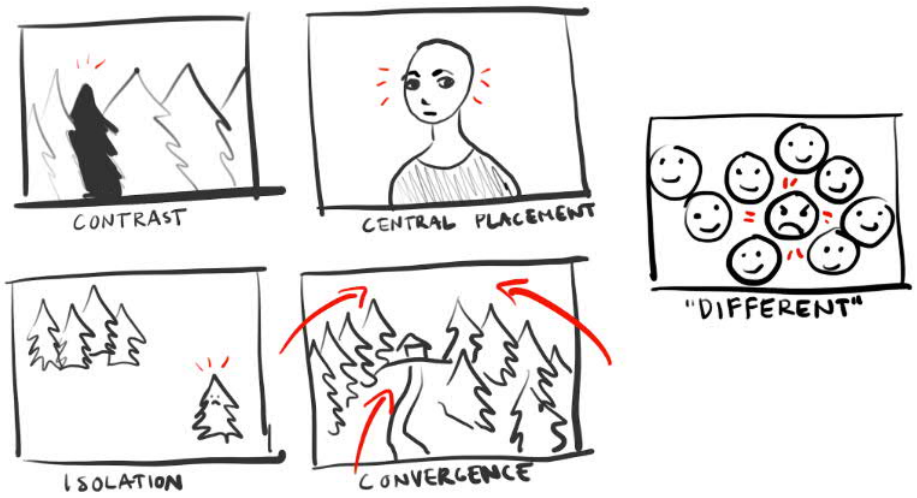


Figure 11 Examples of creating a focus in an image.

To understand composition, we have to look into the ways images are read. The main subject of the picture is the one we take the longest time to look at. The eye can wander around it but will always go back to it. The clearest example of this is traditional portraits - because of our evolutionary biological need to find our mom's gaze when we are born, human faces naturally catch our interest (Pesch, 2018). Most commonly, images are read from left to right, which leads to different outcomes depending on the subject's position.

For this reason, things on the right seem heavier than on the left. The diagonal line from bottom-left to top-right seems to ascend while top-left to bottom-right to descend. (Arnheim, 1954) However, this is not always the case. Japanese writing system works both horizontally and vertically, and in the latter case, the text is read from right to left. It also applies to Japanese art, which can have a different impact on the western observer.

Figure 12 The Great Wave of Kanagawa (Katsushika Hokusai, c. 1830)

A famous example of this is *Hokusai*'s woodblock print, **The Great Wave of Kanagawa** (figure 12). For Japanese, the Fuji Mountain is the main subject of the image, sitting on the right side of the frame - while in

westerners' eyes, it appears to be the wave positioned on the left side. (Pesch, 2018)

Leonardo da Vinci's **Mona Lisa** is a clear example of using multiple ways to create a focal point. In Mona Lisa, the viewer's gaze is guided through the face, the chest, and finally to the main subject's hands. These are the lightest parts of the image, which is the most straightforward way to create focus. Dark clothing and background are working as a frame for those parts. (Pesch, 2018)

Additionally, the main subject's face is also positioned right into one-third of the image. This method is called the **rule of the third**s, where the canvas is divided into nine parts, three horizontally and three vertically - and the focal point is positioned on one of the intersections of these imaginary lines, or like in this case, in the top center lane (figure 13). Placing the object off-center is said to create a more natural and dynamic feel to the scene than a perfectly centered subject (Mateu-Mestre, 2010). Bottom placement makes an object seem lighter than one placed on the upper part of the frame (Arnheim, 1954).

One simple reason for framing the image right is to keep the observer's gaze in it - therefore, the image's edges are essential. If an object is too tightly to the edge of the frame, it allows the gaze to escape from it, unlike a more centralized composition that directs the eye inside the frame. (Poore, 1967)

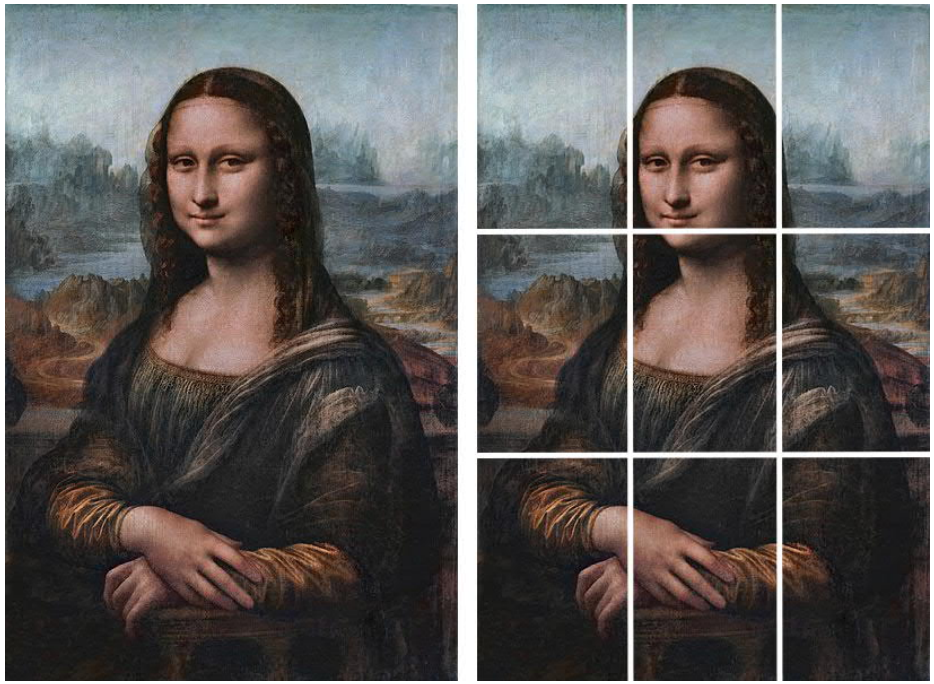


Figure 13 Mona Lisa (Leonardo Da Vinci) and an added rule-of-thirds grid

Traditionally, nearby objects are defined with more contrast and saturation in them than ones further away. The further the layer is, the lighter and fewer details it seems to have. Light sources have a significant effect on

this, as the size of it determines the sharpness and the number of shadows we see. As mentioned in the previous chapter, the **aerial perspective** results in the cooler tones on the horizon, giving bluish tones to far-away objects. (Aaseng, 2016)

Figure 14 Aerial perspective seen in the mountains on the back.

In 2D-spaces, the illusion of depth is created with perspective. **Linear perspective**, a mathematical approach devised by Filippo Brunelleschi, is used to create believable compositions in two-dimensional space. It consists of parallel lines, the horizon line, and vanishing points, where the object's size decrease in distance. (Britannica, 2014) In addition to that, **foreshortening** is used to reach an even more realistic sense of space (Blumberg, 2020). In two-dimensional space, objects can have endless variations created by direction and orientation, distances from each other, and placement on the whole. In three-dimensional space, objects can extend in any direction creating even more possibilities. (Arnheim, 1954).

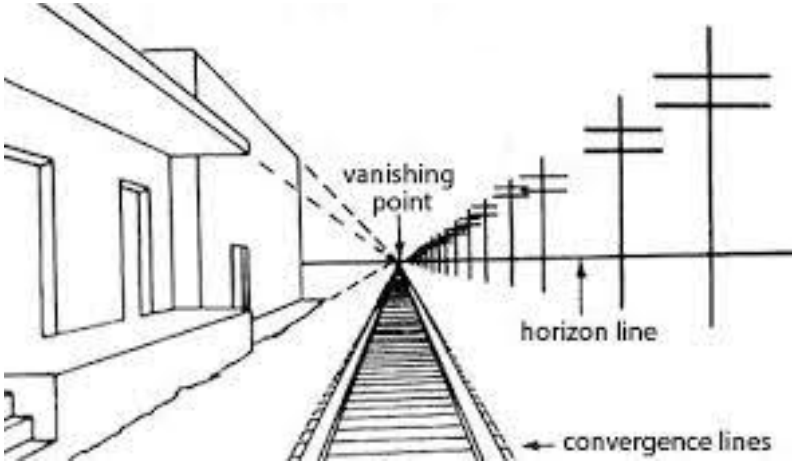


Figure 15 Linear perspective (Bernard, 2016).

Not all art use this calculated approach to perspective but uses more abstract methods to present its subjects. A well-known example of this is early Egyptian art, where the humans are drawn their head in profile and

torso from the front. Primitive people and children are known to draw in a similar manner, where the image is built upon the memorized features and known attributes of the subject rather than drawn from life. (Britannica, 2014)

Figure 16 Egyptian art "Tutankhamun embraces Osiris" (Witts, 2013)

3.2.2 Shape language

Every object has a shape. The way we perceive shapes is affected by our ability to **generalize** objects. Our previous observations of the object or similar objects affect how we categorize and recognize new shapes. Our perception also relies on the surrounding elements of the shape. Shapes are created by boundaries. (Arnheim, 1954) Lined borders, the difference in color, and usage of different values and texture can define various shapes from each other. Adding a third dimension to the object, it becomes a form with perceived depth. (Esaak, 2019)

Different shapes give us information about the object and its' usability and evoke different emotional responses. Shapes can be divided into **organic**, **geometric**, and **abstract** shapes. Organic shapes refer to the asymmetric shapes seen in nature, like trees and clouds, while geometric means the human-made, often mechanical shapes like triangles and squares. Abstract shapes are representational ones, which simplify known and recognizable subject matters. (Al-Ali, 2019)

Shape language is often discussed in terms of general character design, but it also works as a framework in objects and environments. Three basic shapes used in these studies are circle, square, and triangle. A circle is seen

as youthful, unthreatening, and positive. Square represents stability and neutrality, while triangles' sharp edges indicate danger and caution or tension. It has a background on basic human instincts - we often perceive round things cute or harmless like babies, while finding straight and concrete structures safe. Spikes and other sharp lines make us more cautious. (Solarski, 2017) Shape-language can also help the player to figure out affordances in the area. Affordances are the object's cues about their usability. What can I interact with, and how? The more visually realistic the game is more expectations of the affordances the players usually have. If a particular object is usable and other is not, it is essential to pay attention to how they visually differ, so the rules feel consistent. (Schatz, 2017)

Sometimes, bringing shapes from different shape spectrums can create disharmony and a feel of threat, while similar shapes create a more peaceful feel. Human characters are often a combination of these shapes, and depending on the style and amount of realism, the cues can be more or less evident. Body language and gestures give clues about the character's personality, but they often need to be exaggerated in the game context for readability. Lines of movement and other animations of the character are also part of their shape-language. (Solarski, 2017)

4. Using art theory in analyzing visuals in platform games

Most of the fundamental theories discussed earlier can be applied in games – how we direct the player and create immersion and atmosphere. When compared to other art forms, the difference is the player and their movement. In animation and film, the character's action is set for us in the best possible way to deliver the desired message. How games differ from this is the unpredictability. We can try to guide the player and make assumptions about their movements, but in the end, the experience will still be unique for every player. It is particularly true in three-dimensional games, where depending on the camera model, the player observes the surrounding world from numerous different angles.

In the following chapter, I examine existing platform games and different ways the designers have approached in-game graphics in three viewpoints–clarity, coherency, and immersion/emotional impact. **Clarity** is defined by how easily the player can navigate and understand the visual world in the game. **Coherency** refers to the overall consistency of the art style. Finally, **immersion and emotional impact** are discussed in terms of the game world's believability and how well the game keeps the player immersed with visual choices. The viewpoints on clarity and coherency are chosen by their relevance to composition, color, and shape language and the ability to analyze these qualities as objectively as possible. Immersion and emotional impact are more subjective experiences, depending on the individual player. As the designer's initial goal can often be unknown, the visual choices are discussed in generalized terms of humans' biological and cultural responses to composition, color, and shapes.

Games chosen for the analysis are mostly from the 80s-90s, for their significance on the platform game genre. Their limited graphical input made them more straightforward to take apart and examine with less visual noise. After understanding early methods of creating depth and immersion in a 2D game, it is then applied to analyze more recent graphics with additional visual effects and detail. Overall, 18 different games are discussed: twelve from the 80s-90s, and six from the 2010s. The absence of the early 2000s is due to most platform games of that era being in 3D. A list of the games in chronological order can be found at the end of chapter 8.

4.1 Composition and clarity

In 2D platformers, clarity consists of various things. First, we can observe how the player is separated from the background elements and how easy it is to navigate. Secondly, are the affordances of the objects clear, and do they work consistently throughout the game? And lastly, how is the screen size and framing affecting the visual hierarchy?
Limitation in the hardware forced artists to adopt an oversimplified approach in platform games back in the 80s. In the early games, the backgrounds consisted of one solid color, which would either change depending on the level or stay the same throughout the game. Any assets set on the front of them would automatically pop out - in good and in bad. In the original **Donkey Kong**, the background was black, and other elements consisted mostly of intense reds and blues.

A typical platformer environment would consist of the repeating ground blocks, platforms to jump onto, and additional background props like vegetation and mountains. There are different ways the games have separated these assets from each other. The most crucial focus for the player is the character they are controlling (Tulleken, 2015). In cartoonish visual styles, as seen in the early Nintendo titles, creating an eye-catching character is often approached using intense colors such as bright red in the character's appearance. **Mario's** red overalls, **Sonic's** red shoes, and monkeys wearing red accessories in **Donkey Kong Country** (Rare, 1994) are all using this method. Even in a thematically entirely different game, Castlevania: Symphony of the Night (Konami, 1997), the playable character Alucard has red in his cape. However, the dark environment makes it possible to use a much more subtle and muted red while still making the character stand out from its surroundings.

Sometimes the playable characters and enemies are separated from the static background objects with a black outline or vice versa. In the colorful **Rayman** (Ubisoft, 1995), the main character has a black stroke behind him, acting as a shadow. In **Kirby's Adventure** (HAL Laboratory, 1993), the blocks and other background items have colored outlines, which creates a softer overall feel compared to all-black. Kirby's graphics use rim light, which is often used in platforms to mimic depth. The rim light is an intense highlight on the edge of the object, usually cast by backlighting (Yot, 2019). A darker stroke on the ground and platforms can be interpreted as a shadow, which further increases a feeling of form with minimum graphical input. Sometimes, shadows are also used to indicate the player's position in the game world. In the second adaptation of **Teenage Mutant Ninja Turtles** (Konami, 1989), a cast shadow follows the player's movements (figure 17).

In the first **Super Mario Bros**. (Nintendo, 1985), the inanimate objects and background elements use a black outline, while the player character and enemies are represented without one. The characters' movement helps to separate them from the game world, but otherwise appear flat and less focal (figure 17).

Figure 17 Top: Mario (Nintendo, 1985) without outlines and colored outlines in Kirby (HAL Laboratory, 1993). Bottom: Rayman's (Ubisoft, 1995) black shadow and cast shadows in Teenage Mutant Ninja Turtles (Konami, 1989).

Donkey Kong Country's graphics are fully pre-rendered in 3D, and therefore do not use any outlines. The shadows' strength is highest on the background layers, while the characters' and enemies' shadows stay close to their main hue. The highest color contrast can be found on the characters' red clothing, ensuring their visibility in most locations. Parallax layers in Donkey Kong Country are noticeable, and along with the 3D-modeled graphics, they create a feeling of depth to the world. While the characters cannot move in z-axes, a wide ground gives an illusion of dimension. Like in many other small resolution games, the horizontal camera view is quite limited, which results in trial-and-error gameplay as it is harder for the player to anticipate the upcoming obstacles. The elements would also compositionally benefit from a larger screen area, as the shapes would stay more readable. Awkward cuts on the structures occasionally create an imbalance in the scene's composition (figure 18).

Figure 18 The overall shape of the pillars and the structure of the building gets cut off in Donkey Kong Country (Rare, 1994).

The blockbuster game **Sonic the Hedgehog** (Sega, 1991) for Sega Genesis is known for its highly vivid and colorful graphics. The saturated environment supports Sonic's energetic character and creates a cartoonish feel. However, the even saturation and contrast between the horizon and the front occasionally affect the composition's clarity. On a grayscale image, equal saturation can be seen in the jungle level's values (figure 20).

Another reason for the loss of visual focus is the background objects that use the same amount of details as the front ones. A similar occurrence can be seen in Rayman's music world, where the decorative instruments on the back intervene with the front layer. On the contrary, the trap spikes seem to be less vocal even though they are vital to the player to notice (figure 19).

Figure 19 The background instruments blend in with the objects in front in Rayman (Ubisoft, 1995)

Figure 20 Grayscale values of the first level of Sonic the Hedgehog (Sega, 1991)

In darker environments, such as in **Castlevania: Symphony of the Night**, the same methods apply in differentiating the background and front layer from each other. The player character, enemies, items, and platforms are lighter and more saturated than the background layers. While dynamic lighting did not exist, the assets themselves had to be light enough for readability. Decorative lights, like candles and lamps, are often used to add the illusion of light sources to a level. In newer games, such as **Hollow Knight** (Team Cherry, 2017), the player character themselves act as a light source, illuminating their pathway on the go. In Super Metroid, highly illuminated ground and the character's bright suit read well from otherwise dark backgrounds.

The darkness of the scene can also be part of the added difficulty of the gameplay. In Donkey Kong Country's factory level, energy shortages make the screen go black every couple of seconds, and the player has to wait before advancing to the next platform.

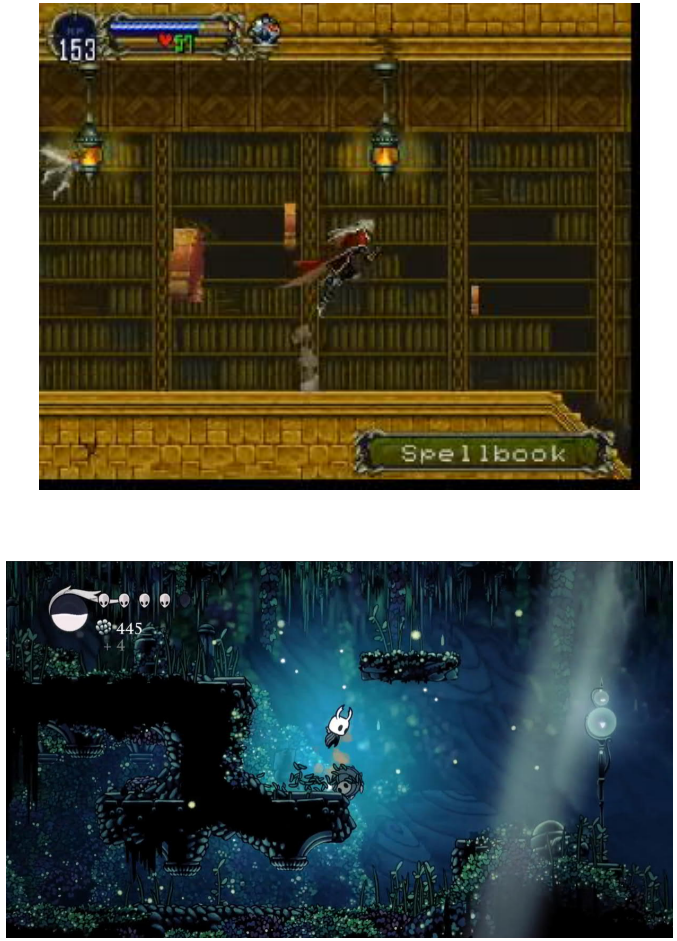


Figure 21 Lights hanging from the ceiling in Castlevania: Symphony of The Night (Konami, 1997), and multiple light particles surrounding the player in Hollow Knight (Team Cherry, 2017)

The color palette of **Castle of Illusion Starring Mickey Mouse** (Sega, 1990) mostly consists of muted hues, leaving the most saturated colors to Mickey and enemy characters. In the opening scene, painted style is created with non-repetitive use of pixel graphics. The colors appear more analogous at the forest level, and the platforms do not particularly stand out. On the library level, the platforms create transparent cast shadows, which positively impact the clarity and the world's feeling of depth (figure 23). Different objects are identified with varying textures to imply materials, such as wood, glass, and vegetation.

Another Disney game from the same era is **The Lion King** (Westwood Studios, 1994). The Lion King's graphic style is very colorful and saturated, faithful to the original Disney animation. The levels follow through the locations from the movie, including the same characters and music. Platforms are generally readable, and rich foliage adds much detail to the levels. On some levels, large solidly colored areas are used between the player and the background. While making the layers more apparent, their flat appearance feels inconsistent compared to other elements. On the first level, the harsh contrast between the sky and the rock formation draws the eye to the rock's cracks. With more detail and rim light, the stones could

Figure 22 A starting scene of Castle of Illusion Featuring Mickey Mouse (Sega, 1990)

Figure 23 Forest and library level of Castle of Illusion Featuring Mickey Mouse (Sega, 1990)

appear in a softer relation to the rest of the graphics. The platforms are lit by distinctive softer light, which makes them easier to recognize. Some enemies use similar colors than their background, which makes them occasionally more challenging to see. Green lizard on the grass and grey hyenas on the rocks gets lost in their surroundings (figure 24). However, it can also be a conscious choice to add challenge to the game.

Figure 24 The Lion King (*Westwood Studios, 1994)* and camouflaging enemies

In **Limbo** (Playdead Studios, 2010), the player needs to navigate and solve their way through the world of black silhouettes created by a strong backlight. Background elements are separated from the player with blur effects. The blur is most evident in the forest on the back and the grass on the front layer. Controlled blurriness also creates dimension to the silhouettes, which would quickly feel flat otherwise. Shape language's importance is amplified on a greyscale palette, and the objects need to have a very understandable shape as no other detail is available for the player.

Figure 25 The sharp silhouettes stand out on the blurred and lighter background in Limbo (Playdead Studios, 2010).

From other modern platformers, **Cuphead** (Studio MDHR, 2017) has a distinctive approach in its visual style, inspiring heavily from the 1930s cartoons. The backgrounds are painted traditionally in watercolors, and character animations are lively and humorous. Digitally colored characters and game objects stand out from the hand-painted environment but subtly enough to fit together. Characters' outlines and more saturated colors also

help to differentiate them from the background. Parallax is created with multiple layers, following the aerial perspective (figure 26).

Figure 26 Cuphead (Studio MDHR, 2017) has clear parallax levels.

On the first boss battle, Cuphead fights against giant vegetables on a crop field. The further background layer has a tree with a tire swing containing a small idle animation. The tree and the bird feeder with sunflowers work as a framing object - it creates balance with the giant monster on the screen's right side. It also borrows the same yellow color from the enemy. It creates framing for the scene, directing the eye to the center of the image. More depth is achieved with a dark and blurred fence on the very front of the screen on the left corner. The player's gaze is directed between the player character and the enemy boss, with a compliance of the background objects. If the left element is removed, clarity is lost (figure 27). Without the tree, the gaze is dominantly on the right side and makes the scene less dynamic (figure 27).

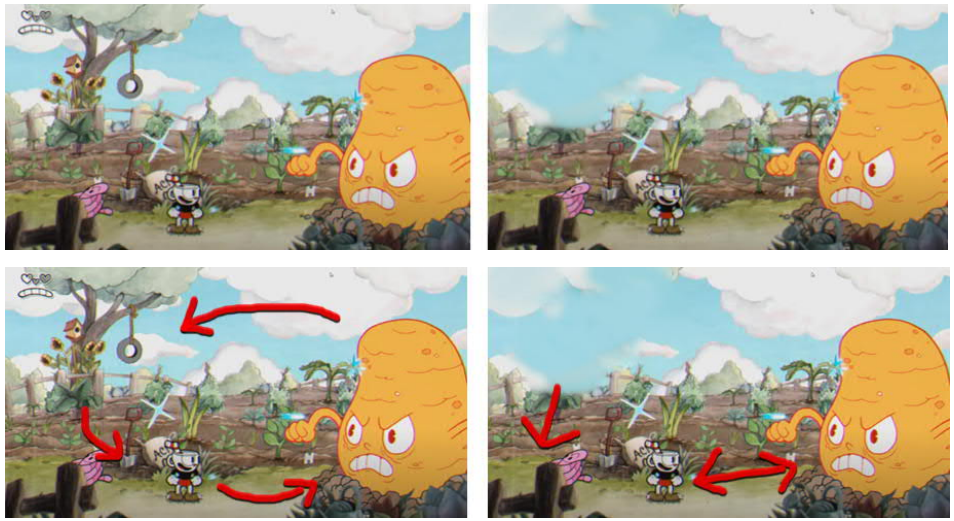


Figure 27 When the tree on the left is removed, the composition and the direction of the eye suffers.

Another example of framing in boss fights can be seen in Castlevania: Symphony of the Night. Two large pillars and the steps receding into the vanishing point direct the gaze to the center of the image. Pillars have more details compared to the throne, which emphasizes their closer distance to the player. The main subjects are the player character and the enemy, and they stand out well from the dark background (figure 28).

Figure 28 Castlevania: Symphony of the Night (Konami, 1997)

Ori and the Blind Forest (Moon Studios, 2015) is one of the most critically acclaimed platformers of the current age. In Ori and The Blind Forest, the player is followed through the expanding forest of rich colors, effects, and lights. A feel of depth to the 2D graphics is created with the help of bloom and blur effects. The platforms stand out from the rest of the visuals with strong yet softly edged highlights. Dark and blurred masses are used in the foreground layer, and occasionally the player can notice small animations in it. Like in the visually similar game, Hollow Knight, the game uses colors near each other on the color wheel, which gradually changes into different shades. Gradual change keeps the overall color palette coherent, avoiding drastic changes in the visuals. Occasional complementary colors are introduced in effects and enemies, and light and detail are used to direct the player through the darkness.

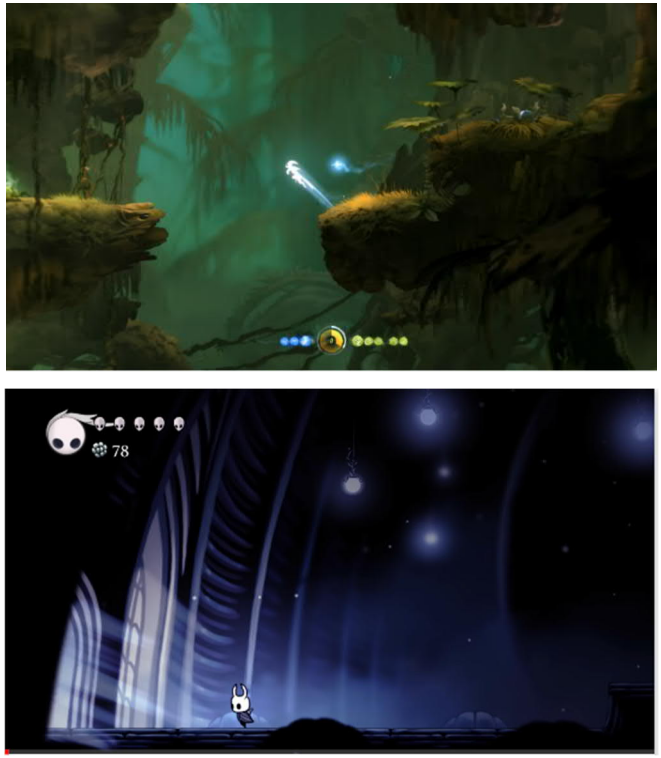


Figure 29 Ori and the Blind Forest (Moon Studios, 2015) & Hollow Knight (Team Cherry, 2017)

An example of unclear visual hierarchy and difficulty in readability can be found in **Jim Power: The Lost Dimension in 3-D** (Loriciel, 1993). The game's parallax layers move rapidly in opposing directions, creating a distracting visual effect. Additionally, the even amount of contrast and detail between the layers further complicates the environment's read. The player character does not stand out from the environment, and an exact focal point is missing. A similar occurrence can be seen in Sonic the Hedgehogs' bonus levels, where the player character gets lost in its surroundings. Intense red, green, and yellow compete with each other in the visual hierarchy, and constant movement of the screen makes focusing difficult.

In conclusion, the compositional rules' explained in the previous chapter can be applied to the core of keeping the game visuals readable for players. While the **character's movement** naturally catches our focus, overlooking the aspects of the visual hierarchy can cause unwanted results. An equal amount of contrast, detail, and saturation affect the environment's readability, and by ignoring the **aerial perspective**, the space appears flat. The visuals should always support the goals of the game and level design, and unnecessary visual confusion should be avoided.

Figure 30 Jim Power: The Lost Dimension in 3-D (Loriciel, 1993) and Sonic the Hedgehog (Sega, 1991)

The following examples of separating the player character and enemies from their environment were found: **outline**, different painting **technique** (traditional vs. digital), **color contrast** (high contrast value), **highlight** (illumination or intense color), and **shadow** (in character or environment). Parallax layers are differentiated from each other by **aerial perspective**, movement **speed**, and amount of **detail**. Objects on the front should have more contrast and saturation than those near the horizon, and the primary focus should be on the interactable instead of decorative elements. Framing elements, such as converging lines and shadow mass, direct the player's gaze, and highlight important objectives.

4.2 Atmosphere and immersion

Immersiveness in games refers to the level of **engagement** and presence the player feels during their play. Game designers aim to find a way to create a **flow state**, where the player is only focused on the task at hand and forget their surroundings. Usually, this comes down to finding a perfect balance between difficulty and the player's skills – if the game is too easy, it causes boredom, while too challenging gameplay causes anxiety. (Csikszentmihalyi, 1990; Schell, 2008) While mostly relating to game design, it is relevant to pay attention to the visuals' role in the equation. Poorly designed visuals can cause unwanted challenges for the player. Unclear navigation and inability to read the scenes and understand the world's rules can make the playing experience unpleasant and break the immersion. However, immersion can also be analyzed in terms of believability and richness of the game world and the player's connection to it (Madigan, 2010). The atmosphere and emotions the games evoke in us are a big part of feeling connected to the game and its world. The upcoming examples will explore how color theory, shape language, and visual effects can affect the game's emotional impact and overall mood.

A world of **Never Alone** (Upper One Games, 2010) uses a similar method in creating their visual identity as Limbo. The overall color palette consists of cool and muted hues, which makes a strong emotional impact as any change in the world is amplified in the muted canvas. In Never Alone, a snowstorm and far-reaching glazier emphasizes the solitariness of the main character. The character's black hair can be easily distinguished from the otherwise cool tones.

In both Never Alone and Limbo, the usage of a **vignette** creates a pressing feeling of the world closing in. Vignette is a term used in photography to describe the darkened and blurred borders of the image caused by a camera lens (Wikipedia, 2020d). A common way to create feelings of fear and uneasiness is to restrict the player's **field of view** with things like fog and darkness (King & Krzywinska, 2006). In Limbo, the gloomy atmosphere is created with a dark and ominous background. Uncertainty is created with a high blur, where the shapes are hard to identify clearly. Black and white create the most dramatic impact, having the most contrast compared to other combinations (Holtzschue, 1995). As a test, a blue tint was added to the screenshot of Limbo. The mood gets an immediate shift to a calmer one (figure 31). In Never Alone, we can see a similar occurrence when the vignette is removed. The mood of the scene goes from pressing to more dreamlike (figure 32).

Figure 31 The original screenshot of Limbo (Playdead Studios, 2010) and tinted test version

Figure 32 The original screenshot and removed vignette test in Never Alone (Upper One Games, 2010)

In **Super Metroid**, a hostile and alien-like atmosphere is achieved with unnatural and ominous color choices and textures. A glowing animation on the terrain accentuates the abnormality - the orange substance flickers and boils in the lava area and creates a bouncing light to the platforms nearby (figure 33). A sci-fi world gives much space for freedom of expression regarding the environment and enemy design. Built-structures, combined with organic material, create variation in the game world. In the starting scene of Super Metroid, the main character Samus escapes an exploding spaceship - as to further emphasize the pressing feeling, the screen tilts a little when Samus is climbing her way out (figure 34).

Figure 33 Lava area in Super Metroid (Nintendo, 1994)

Figure 34 The camera tilt in Super Metroid. (Nintendo, 1994)

In Castlevania: Symphony of the Night, the backgrounds are highly detailed. Dark and gloomy gothic castles are part of the visual identity of all Castlevania games. Empty corridors are usually signs of either an upcoming boss battle, a new area, or a discoverable item. A moment of anticipation is also created by muting the music just before the boss battle and playing again once the fight begins. Rooms with a saving point or a friendly character do not have music either, emphasizing a peaceful resting place. The absence of audio, as well as its presence, can offer a heightened emotional experience for the player (Solarski, 2017).

In most boss fights in the genre, the play area gets restricted. The player cannot return to the previous scene, and they will have to defeat the enemy to proceed and gather the rewards. Restricted space creates a feeling of urgency and a more claustrophobic experience. The atmosphere is often increased with extra animations and specific music. In Castlevania: Symphony of the Night and Super Metroid, some bosses exceed the screen's size or move out of sight, making them even more menacing (figure 35).

Figure 35 Big boss fights in Super Metroid (Nintendo, 1994) and Castlevania: Symphony of the Night (Konami, 1997)

In Hollow Knight, the game world contains much foliage and moving vegetation. The grass on the ground moves and can be cut into small particles by the player. When the player jumps on the platforms, a little dust cloud is seen from the impact. All these little animated details increase the interactivity with the game world and increase the feeling of immersion. The overall palette of the game is dark, every scene including much black. It is used on the foreground and platforms and the vignette. Darkness sets the game's mood to be grimmer than more light and casual environments. Dark edges also restrict the player's view and create tension for what is coming ahead.

Usage of complementary colors create harmonious color schemes and also helps to create a contrast to essential objectives. When using complementary colors, it is essential to remember to find the right ratio. If both of the colors are used in the same amount, their power is lost. Rich and saturated colors only pop out if there is a less saturated environment to pop out from and direct the viewer's eye (Dobie, 1986)

Hollow Knight and Ori and the Blind Forest's analogous color palettes create a feeling of a continuous world, which helps create immersion. The shape language in Ori and the Blind Forest is mostly organic, and the glowing and blurring effects combined with the softly painted graphics create a magical atmosphere. A lot of the added tension comes from the combination of a seemingly serene forest environment with illuminated explosive effects caused by the enemies and the player's actions. A similar effect is achieved in Hollow Knight. Hollow Knight's shape language is more abstract due to the black outlines and more unnatural vegetation.

Both games use sharp spikey elements to increase the cautiousness or guide the player's gaze (figure 38).

Figure 36 Colors near each other on the color wheel create a harmonious feel in Hollow Knight (Team Cherry, 2017).

Figure 37 Complementary colors direct the eye with contrast in Ori and The Blind Forest (Moon Studios, 2015).

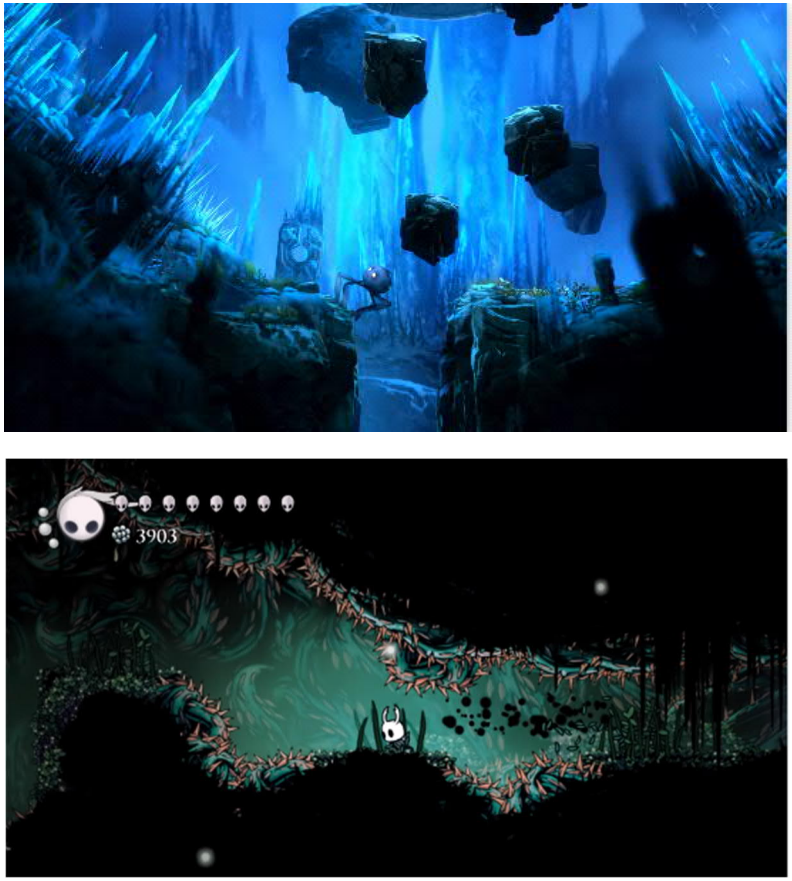


Figure 38 Top: Dramatic icicle formations direct the gaze to the pathway up on Ori and the Blind Forest (Moon Studios, 2015). Down: Spikey plants in Hollow Knight (Team Cherry, 2017) to be avoided.

A more joyful and peaceful scenery can be seen in **Kirby Star Allies** (HAL Laboratory, 2018). The absence of the black color creates a very vibrant and safe atmosphere. While the dark corners and vignettes obscured the player's vision in the previous examples, everything on-screen is visible to the player in Kirby Star Allies. Shape language is round for the most part, and even seemingly sharp-edged levels have relatively soft corners and other elements. While color palettes vary between levels, a coherent overall style is achieved with a consistent saturation level and range of colors.

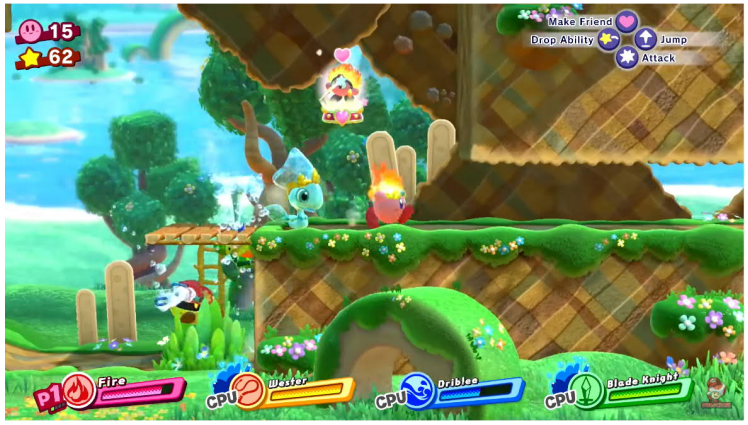


Figure 39 Daylight and sunset in Kirby Star Allies (HAL Laboratory, 2018)

Some games emphasize the effects of nature by playing with weather. Rain and falling snow are often used to create even more immersive game scenes. However, it quickly adds noise to the screen, so it is often used as an exception rather than a continuous state. Underwater levels are also a common way to introduce new gameplay and variation to the visuals. Water is often indicated with bubbles, distortion, and blue hue on top of the player character.

Figure 40 Raining effect on Cuphead.

Figure 41 A waterfall in Castle of Illusion Starring Mickey Mouse (Sega, 1990).

In conclusion, many different techniques are used to create a particular atmosphere or emotional impact on the game world. Following aspects were found during the analysis:

The color scheme has a high impact on the overall mood of the scene. The **temperature, saturation, value,** and **contras**t of the colors have an impact on the whole. Vibrant and saturated colors, combined with round shape language, often creates an energetic and joyful atmosphere, while dark colors and sharp shapes create more suspense and uncertainty. Muted and analogous color palettes create space for more intense colors to pop out, while an evenly saturated palette has a less dramatic effect. Different visual effects are used for additional immersion, such as animated background objects, attacks' visual feedback, camera movement, and weather elements. The size of the enemies and environmental elements can also be used for heightened emotional impact.

5. Skytails Post-Mortem

The following chapter will go through the process of creating visuals for a **physically interactive 2D platform game, Skytails**. The game project was done before the literary and case study research, which allows me to look at the overall process with a fresh perspective. After describing the working progress, I will evaluate the art created in terms of previous learnings of this thesis.

Skytails is a physically interactive game created for **trampoline** facilities. Player advances in the game by jumping through platforms while observing themselves on the screen. The player's goal is to reach as far as possible in the game world and collect points by their speed and collectibles on the way. The game has three difficulty levels, and it will end when the player has used all their extra lives by missing a platform and

falling down the screen. Skytails initial goal was to create a fun game experience for a trampoline jumper and add a virtual dimension for trampoline exercise.

As the game requires specific hardware and a relatively big trampoline, the primary audience is sports halls with trampolines. It was also a reason for making the game quick and easy to hop on to. The player competes with other players from the highest score evaluated from the completion percentage and the number of extra points collected. The game contains three different levels, the forest, the cliffs, and the clouds. The initial plan was to have an Adventure-mode with set metrics and an Endless-mode with procedurally generated elements.

5.1 References and concept art

I joined **Valo Motion** in September 2017 and started working with *Lauri Lehtonen*, my former classmate from Aalto University, to create a new series of games for the company's new product development for trampolines. My primary job was to create art for different game ideas and define the new games' art style. The game had a playable prototype with placeholder graphics in place when I started working on the project. The first task was to start creating concepts and mood boards to figure out what kind of feel and style would be ideal for our purpose. Mood boards are collages of visual ideas (Endrissat;Islam;& Noppeney, 2016).

Concept art is a powerful tool in the game design process, and not only seen in the finished product's art book (which can often be done just for marketing purposes). Concepts and doodles are utilized straight from the beginning - and the middle of the process - to spark ideas and verify their functionality. It is often easier to present one's thoughts with an image more vividly to other people than only with words and text. Game designer *Jesse Schell* (2008) writes, "Sometimes, an inspiring piece of concept art can provide the uniting vision of the experience a game is trying to achieve." (p. 349). Well-crafted concept art can also create

excitement, not only for the game's audience but for people working on the game (Schell, 2008).

Closely tied to concept work and planning visual direction for the project is the use of **references**. Deliberate and smart use of references is essential in developing artistic skills and achieving more realistic depictions of the surrounding world. Using references in this context does not point to copying existing work one to one or modifying copyrighted material. Moreover, it is about developing one's perception and expanding the inner visual library.

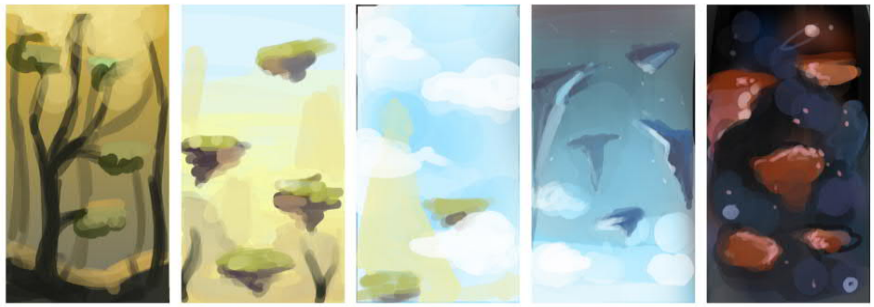


Figure 42 First concepts and references

Humans have learned to categorize things easily to save our brains' capacity for only the crucial information in front of us. Also known in psychological terms as schema, it affects our perception of things and causes preconceived remarks of the subject matter. (Mateu-Mestre, 2010) In classical live drawing, we often draw what we think we see, but not what is actually in front of us. In a book for artists, **Drawing On The Right Side of the Brain**, the art teacher and writer Betty Edwards explains this phenomenon by exploring methods to improve perception, directly contributing to the drawing skills. (Edwards, 2012) While we all have our visual imagination, it does not always produce the most accurate nor the most suitable graphics for the project in hand. When looking for references, it might be a good idea to look outside the medium used. For example, only looking at other games can cause the creator to overlook more original approaches and insights from real-life sources or other mediums (Schell, 2008). References can also be broken apart for different purposes. Separate mood boards for colors, subject matter, and techniques can help avoid copying existing work and spark more unique ideas.

For Skytails, I created sheets of images I found interesting, appealing, and close to the feeling I wanted to achieve in the art style. The first concepts were done quickly to get a basic idea of the style on paper. Once done, the concepts were shown to the other team members, and discussion was held

to decide if they were close enough to be used as guidelines for the upcoming work. I looked for separate references for the color palette and made quick tests to try out the atmosphere's possible combinations.

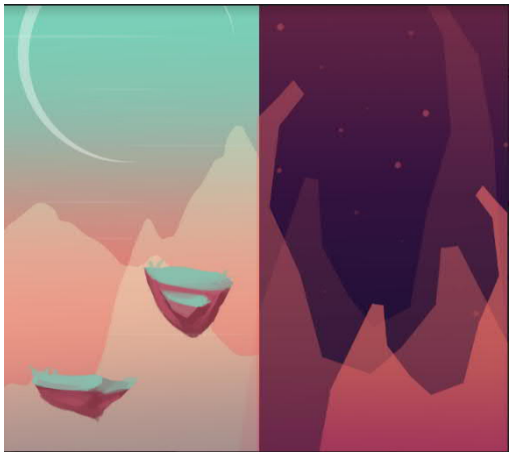


Figure 43 Color tests

A test with red and blue pastel hues created a serene and dreamlike atmosphere (figure 43). However, it was not in line with the energetic action of trampoline jumping and was therefore discarded. More natural hues from the previous sketches felt more appealing and created a starting point for creating the first assets.

5.2 Asset creation and iterative work

The daily work of game art creation is mostly about iteration. The asset goes into the game engine, in this case, **Unity**, and via testing, we see how it works in the actual game. More often than not, the first creation needs adjustments before reaching its final state. Usually, the earlier the asset can be seen in the game setting, the better. It allows us to spot problems that might get overlooked on the painting progress, especially when the asset is being worked on separately without other assets' support. Moving parts and the player interaction can shed light on possible design flaws.

The team found a consensus on the idea of a fantasy world advancing through the ground level to the sky, and I started creating the first assets to the **forest level**. However, the first set of assets were too detached from the original concept, with much more saturation and cartoonish shapes (figure 44). A more painterly visual style was preferred, and a couple of iterations were needed before the final design.

To reach a more painterly feel, I did more testing with the tree platforms. A more surreal and dreamlike color palette (figure 45) did not meet the desired effect, and I had to take a step back to rethink the design. A round

shape of the platforms was noticed as problematic on a playtest. Round shape's boundaries were not clear enough for the player to indicate how close to the center they would need to land without falling. Rounded corners also made a floating effect when the player was on the edge of the platform. A more realistic set of colors and a flatter surface of the platforms were created to achieve a more simplified design. While trying out the design for the tree on the first level, we also quickly noticed that for it to feel natural, the branches needed to appear from the screen's sides instead of an endless tree trunk growing from the center of the screen. The separate branches were easier to control and vary.

The game's feeling of depth was increased with multiple parallax layers. The first level's furthest background layer consisted of a forest area, a mountain, and the moon. Blur effect was added manually in Photoshop to the assets for them to appear far away. However, Photoshop's blur filters quickly made the assets look smudgy. A challenge with blur is to ensure that it creates a feeling of distance instead of just making the asset's quality look poor and low resolution. When painting far-away objects, like the mountain, it is vital to be aware of the amount and size of the detail. If the number of details does not vary, it can affect the game world's readability, depth and make the scene look monotonic.

Figure 44 First versions of the assets

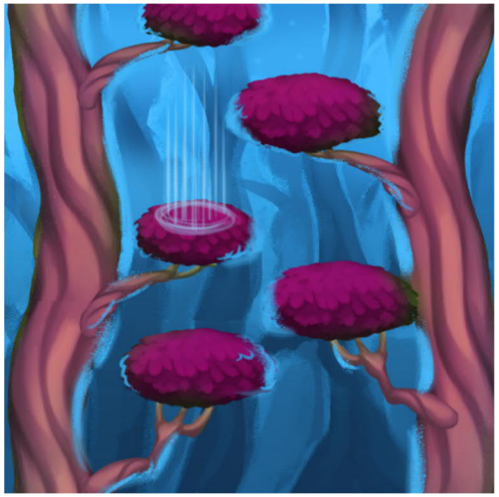


Figure 45 A more experimental color palette and roundly shaped platforms were tested.

Figure 46 Decorative vegetation

Figure 47 First level's parallax layers without the three branches

The rest of the background layers consisted of the vegetation on the side of the screen. Saturation, contrast, and detail of the assets varied depending on their distance from the camera. The area closest to the player consisted of tree trunks, branches, and different sized platforms. The platforms were separated from the branches with making them more bright and saturated. Lianas were added for extra detail.

Breakable platforms were added for increased difficulty. They were indicated by brownish color and holes on the leaves. They would break after the player stomps on them, which would force the player to get to the next branch in one jump. To avoid situations where the player would end up blocked by a broken platform, they grow back after a little while. In the regular branches, the player can stand or jump as long as they want to catch their breath or prepare for a longer jump. Bouncing animation and falling leaves were added to the platforms to increase the player's interactive experience when they jump on them. The name Skytails refers to the beaver-like critter that helps the player fly back to the spot they left off when falling. The team wanted to have a cute animal character as a sidekick, helping the player in tight spots. (figure 48).

Figure 48 Sketches of the flying beaver

Figure 49 Broken tree branch and the collectibles

Glowing mushrooms and gold nuggets act as collectible items, which would generate more points for the player when hit. Occasional doughnuts add additional difficulty by making the player slower for a few jumps. The first version of the collectibles consisted of different fruits and berries.

When entering the next area, **the cliffs**, the sun rises, and the background's lightness gradually changes into daylight. The second area consists of floating cliffs and stones. The difficulty is created by moving and falling platforms. A new animal character is also introduced as a new feature—the goat charges when the player lands next to it and pushes them off the cliff. If the player manages to land on top of it, the goat gives a jumping boost. The original asset was too light, and details were too unnoticeable, and rework to make it less flat and noticeable was needed (figure 52).

Figure 50 Initial plan of the cliff-level built on Photoshop

Small stone platforms that would lower their position on each jump were also added to the level to create further variation. The small stones' initial design was too unclear for the player, creating a resemblance to a snake-

kind form. They were changed to more simple ones to acquire more clarity (figure 51).

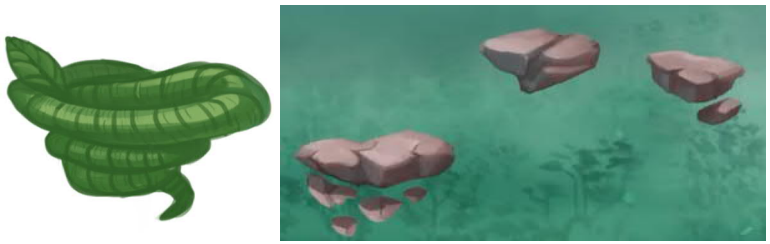


Figure 51 Unclear green platform changed into small stone platforms.

Figure 52 The early and the latest version of the goat

The same mountain background from the forest level is used on the cliff level, with a recolor to match daylight. Side decorations consisted of similar but larger floating cliffs. They were made to have significantly less saturation and contrast than the platforms to separate them from each other. Two different collectibles were introduced by replacing the mushroom and the gold nugget to stay consistent with the earlier level. A reddish flower and purple amethyst were chosen for their readability with the green background. Floating far-away cliffs were added for an additional parallax layer. A waterfall asset was tested but left out due to the animation's complexity and the amount of effort it would have required. As the only game artist on the team, some ideas had to be postponed to future updates to meet the deadlines.

On the third and final level, **the clouds**, a candylike-sky was created for an apparent change of scenery. The mountain background was replaced with a purple sky and yellow-pink clouds. Side decorations consisted of candies and windmills. Platforms were also clouds, which created a challenge to make them stand out from the other assets. The cooler and whiter tone was created in contrast to the warm background yellow. Storm clouds were sending off flashes of lightning, which would freeze the player for the moment when hit. An additional filter was added on top of the player to indicate an electric shock. Blue lapis lazuli stones worked as the collectible, and giant marshmallows give the player a boosted jump.

Figure 53 The clouds level without the platforms

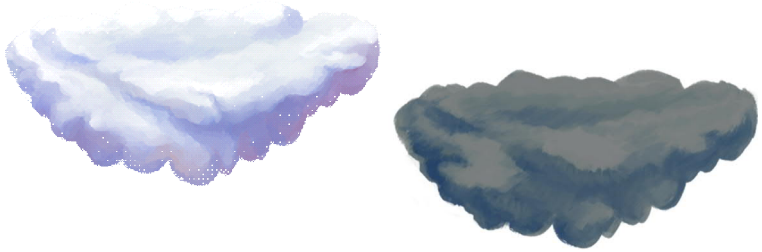


Figure 54 Cloud platforms

One of the challenges that needed to be tackled during the process was procedurally generated assets. Procedural generation in games means that the game engine creates the content with the given algorithms instead of human-generated content (Wikipedia, 2020e). Often these two are combined, like in Skytails. The platforms and their placement were partly randomly generated within the game engine. The assets would appear at specified distances from each other to ensure the playability of the level.

For the art, randomization meant unpredictable placements of the assets. However, it was possible to create templates for the background assets determining which elements would always come together and at what speed. After all, there was much room to control the visuals' appearance. The only obstacle that could not be controlled was that the same assets would be running multiple times, as creating a never-ending level would not be possible. The thing that had to be tackled was to decide which order these elements would repeat and how fast—more assets, less repetitive feel. Many assets were also easy to manipulate slightly to lessen the workload but still make a variation for the game world. By differing the size and the saturation of the elements, it was easy to change them to close-up or far-away positions.

5.3 Results

As the case study of existing games and literary research was done after creating this project, multiple things were overlooked during the development process. References have helped to overcome some of the downfalls, but art was mainly created with intuition over study. In the upcoming chapter, I will critically look into the visual outcomes of Skytails, with the help of examples from successful platform games and animation films.

The biggest issue on the visuals of Skytails is the rushed design. With a bit more time, graphics could have been thought out more thoroughly to support each other with more consistent style decisions. The style of Skytails is not exceptionally inharmonic or incoherent per se but lacks potential depth and proper framing. Some of the assets could have used more iteration and references to create more realistic shapes. Even when depicting fantasy, we compare things to their counterparts in the real world.

The visually most coherent level of the game is the forest level. The night scene's cool palette combined with the complementary yellow color, makes the mood harmonious and emphasizes a magical feel. When compared to a night scene from **Ori and the Blind Forest**, we can notice a clear difference in contrast and saturation. Skytails looks much more muted in comparison. The background branches are almost in the same contrast as the mountains on the back, which affect the level's clarity. In a night scene from Disney's **Jungle Book**, we can notice a similarly toned down color palette. However, instead of a monochromatic effect Skytails has, the objects keep some of their local colors, creating an appealing variation of blues, with green and purple hints (figure 55). The front layers are significantly darker in both examples, emphasizing the feeling of depth. Platforms in the forest level could have rim lights cast by the moon on the back, and the vegetation's overall colors would be more lively with a slight variation on the hues.

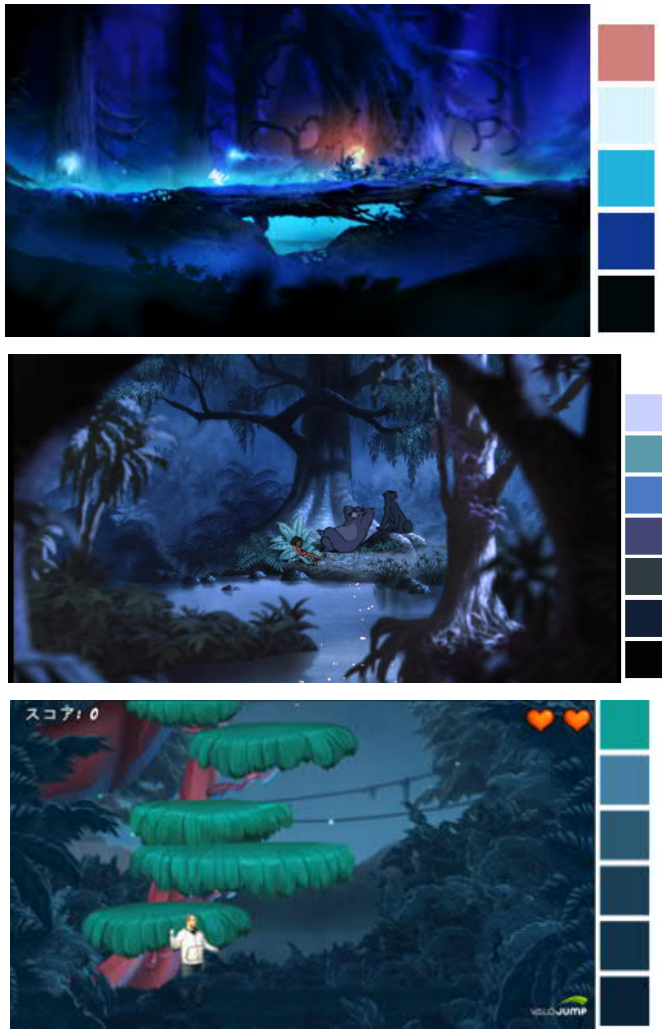


Figure 55 Nightly forest scene in Ori and the Blind Forest (Moon Studios, 2015), Disney's Jungle Book (Disney, 1967) and Skytails (Valo Motion, 2017)

On the cliff-level, colors become even more unsaturated. The amount of white on the bottom takes a lot of the overall palette. The decorative cliffs on the sides have less saturation than the trees at the bottom, which creates an inconsistency to the aerial perspective. However, the foreground layer with colorful flowers is significantly darker and creates a framing effect on the level.

In **Rayman**, the colors are more vibrant, and the amount of detail is much higher. The grass is darker behind the character, which helps separate it from the rest of the background. Animation film **Howl's Moving Castle** by *Studio Ghibli* uses vibrant green, blue, and magenta on a meadow scenery. It shows that saturated colors do not necessarily make the scene unrealistic or cartoony. Both of the examples use a complementary color pair of hot pink and light green together. Skytails have magenta on the collectible gems and purple on the side decoration. However, the rest of the palette uses hues with cool undertones, and together with the fog, creates an impression of chill weather. The atmosphere was not intentional and did not support the fantasy theme. The amount of unsaturation makes the furthest background layer look distant – but the lack of layers in between or a more gradual change in hue makes the gamespace look empty (figure 56).

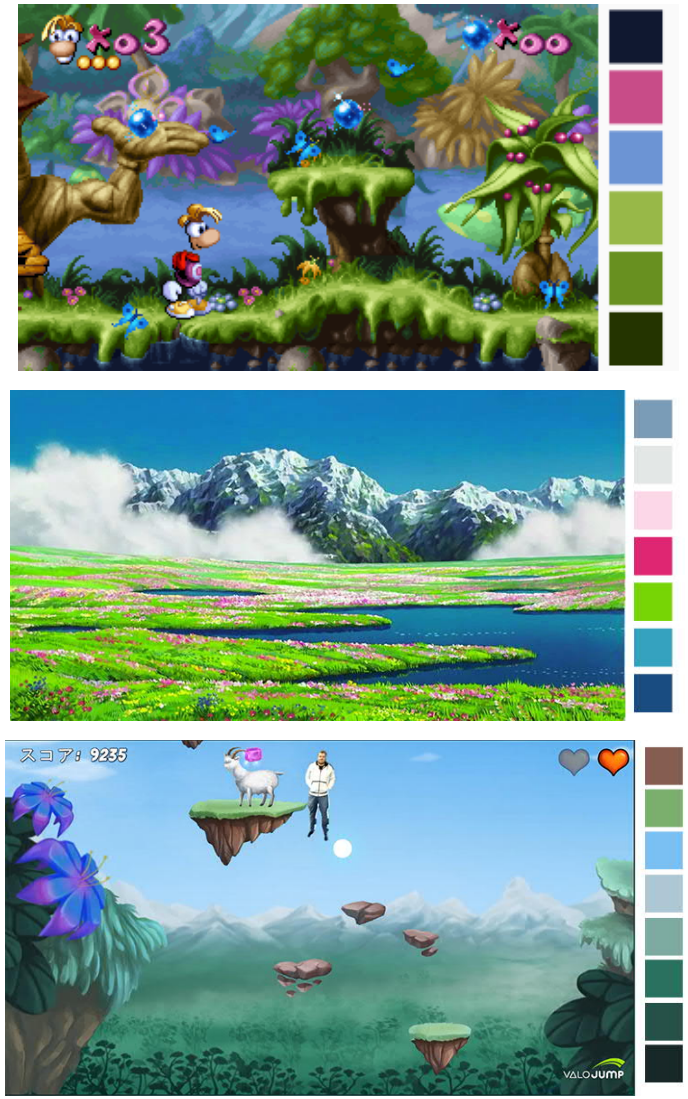


Figure 56 Rayman (Ubisoft, 1995), Howl's Moving Castle (Studio Ghibli, 2004), and Skytails (Valo Motion, 2017)

In the last level, the clouds' color palette consists mostly of purple and yellow. The level suffers from the same problem as the cliffs – colors include many grey undertones, creating muddy colors. **The Lion King** can be observed for a more playful and saturated feel. In the screenshot (figure 57), even though the background is highly saturated, its brightness and lesser contrast keep it from intervening with the front plane.

As an example of a slightly more realistic and muted palette, the animation film **Your Name** by *CoMix Wave Films* has highly detailed painted skies. A lens flare is used for the extra atmospheric effect of a sunrise/sunset.
The horizon level in Skytails is relatively high, and the continuous layer of clouds creates a contradiction with the perspective. For a more believable setting, the background clouds would be divided into sections accordingly to their distance to the camera. To further avoid a large monotonous layer, the clouds could have gaps in between, where the purple sky or sunlight could occasionally show through.

One problem that had to be tackled differently in Skytails compared to traditional platformers was the unpredictability of the character's looks. As Skytails uses the player's real-time video, we cannot anticipate the player's choice of clothes, and ensuring their distinction from the background becomes particularly tricky. One way to have more control

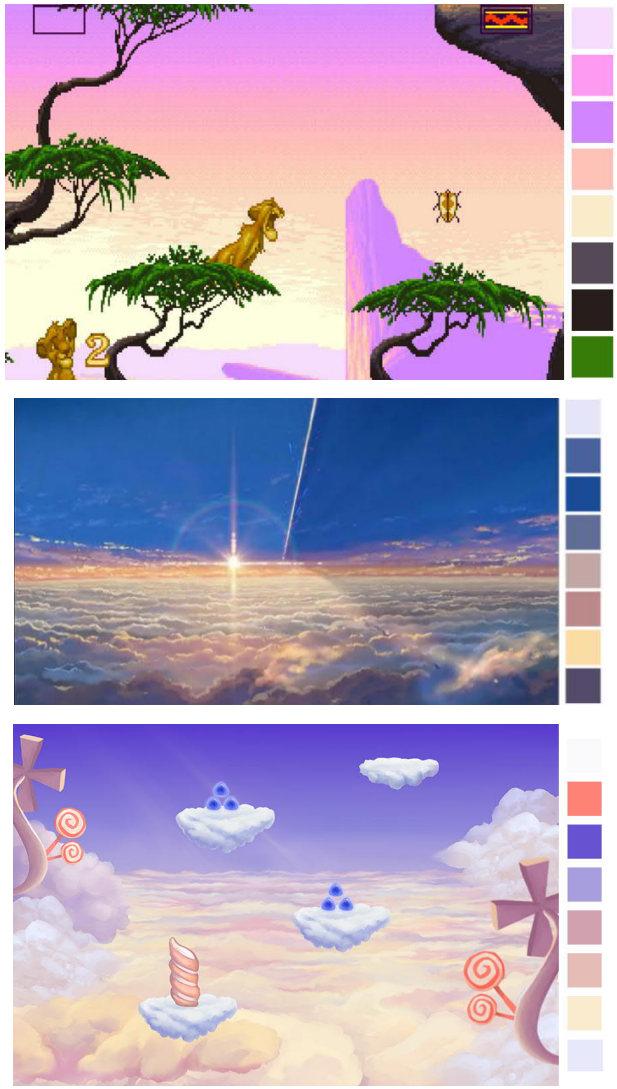


Figure 57 The Lion King (Westwood Studios, 1994), Your Name (CoMix Wave Films, 2016), Skytails (Valo Motion, 2017)

over it is to have an option to change the brightness and contrast of the video feedback. The video is not as polished as a hand-made asset – some noise and unclarities were unavoidable. A player avatar could be used to experiment with the change in the player experience in the future.

In conclusion, the readability of Skytails is relatively clear. The game had multiple playtests by the team members and guests, which helped identify design problems. Collectibles were clear for the players and avoidable obstacles for the most part. Some features had to be tried out before their intent was clear (like the goat), which creates a deliberate challenge for the player. Fantasy-themed world and animals were found appealing to the kids.

For improvements, I would suggest the following iterations:
The backgrounds could have **less monochromatic** colors and more contrast to increase the feeling-of-depth of the game world. **More assets** could be used between the player and the background to have more immersion and variation. **Dynamic lights** and **animations** could create a more realistic atmosphere and help keep the world more consistent. Overall, the game's visuals' strength and uniqueness could be **explored further** with more bold and confident design tests.

6. Conclusions

This thesis aimed to identify the benefits of applying art theory in two-dimensional platform games' art creation and its impacts on the player's aesthetic experience. Literary research was done to recognize and understand the critical elements of art theory, which were then applied in a case study of existing platform games. Finally, these learnings were implemented to analyze and reflect on a 2D platform game's creative process.

Literary research recognized and discussed three main aspects of art theory: color, composition, and shape language. Color theory was narrowed down to the basics of color harmony, the appearance of colors, and color associations. Compositional aspects included ways to direct the viewer's eye, create focus, and achieve visual balance. Shape language was briefly discussed in terms of the categorization of shapes and emotional impact.

The case study of existing platform games was able to identify common characteristics of their visuals in terms of art theory. Outline, color contrast, material, and highlight and shadow were found to be the most dominant ways to create clear visual hierarchy and separation of interactive and decorative elements in a game world. Prominent techniques used in the examined games included the use of aerial perspective and parallax layers.

The game world's emotional impact and immersive qualities were found more complicated to evaluate because of the subjectivity of the player experience. However, some plausible discoveries were made in terms of the game's overall aesthetic style and methods to increase specific emotional effects. A significant factor in creating atmosphere and emotional impact in platform games was the usage of different color harmonies. Temperature, saturation, value, and contrast of the colors convey different aesthetic settings for the game world. The size and shape of elements were found to impact the mood of the game, as well as the usage of special effects and camera techniques.

The creation process of Skytails was able to disclose some of the aspects of iterative work of game production and showcase the challenges of game art creation in this particular project. Learnings of the literary research and its application on the case study helped me to gain more insight and confidence to critically evaluate my work on Skytails and offer ways to improve the game's visual design.

The analysis showed that many of the methods from the traditional art theory and other mediums such as animation were visible in platform games' visual design. The work was able to demonstrate that a deeper understanding of human perception and its application in games can help the visual designer make more conscious and deliberate design choices to improve the games' visual clarity and emotional impact. This research's core audience is game visual creators and designers who wish to make more conscious design choices instead of purely intuitive work. Rather than offering definitive rules, this thesis's learnings can be seen as guidelines for helping the designer identify possible inconsistencies between their visual design and aesthetic goals in terms of art theory. Usage of references is encouraged to find new ways to represent different elements and fight existing artistic bias.

Further narrowing of the thesis subject could have provided more focused and in-depth results. However, the study was able to identify and apply art theory aspects relevant to game visuals and give examples and suggestions

for its use in existing platform games. Follow-up research on the subject could be done by further examining game visuals and more in-depth literary research on psychological aspects of human perception and response to visual cues.

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Cover image and Super Mario art recreation on the Conclusions page by Author

Games list:

Donkey Kong (Nintendo, 1981)

Super Mario Bros. (Nintendo, 1985)

Teenage Mutant Ninja Turtles (Konami, 1989)

Castle of Illusion Starring Mickey Mouse (Sega, 1990)

Sonic the Hedgehog (Sega, 1991)

Kirby's Adventure (HAL Laboratory, 1993)

Jim Power: The Lost Dimension in 3-D (Loriciel, 1993)

The Lion King (Westwood Studios, 1994)

Donkey Kong Country (Rare, 1994)

Super Metroid (Nintendo, 1994)

Rayman (Ubisoft, 1995)

Castlevania: Symphony of the Night (Konami, 1997)

Limbo (Playdead, 2010)

Never Alone (Upper One Games, 2014)

Ori and the Blind Forest (Moon Studios, 2015)

Hollow Knight (Team Cherry, 2017)

Cuphead (Studio MDHR, 2017)

Kirby Star Allies (HAL Laboratory, 2018)