Building 'Game worlds' : a study for the artist through theories of art & visual perception

Lee, Jolly Yu See

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**Building ‘Game Worlds’: A Study For the Artist Through
Theories of Art & Visual Perception**

by
Lee Yu See Jolly
Supervised by Kenneth Feinstein

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Abstract

Video games are playable journeys that occur through time. A major portion of this journey is experienced through the visuals. These visuals are commonly referred to as “graphics¹”, a term appropriated from computer programming and coding. Such a term is used differently amongst artists and art historians, which results in a conflicting vocabulary to communicate the visual creation process of a world in a video game. Furthermore, academic research revolving around visual art in game studies is often an overlooked topic. This leaves game artists with insufficient means to fully express the weight of the visual creation process within video games. In light of such an oversight, this research will examine the game artist’s process of creating visual game worlds using an amalgamation of three topics, visual composition, visual perception and game design. It corresponds to the close relationship of the artist, game designer and player when it comes to the creation of a cohesive, consistent and convincing visual game world. Guiding this research is a framework consisting of Rudolf Arnheim’s perceptual theories on art and visual compositions, and concepts from notable game theorists, including Mark J. P. Wolf and Jesper Juul. In addition to this framework, a basic world structure combining space, visual entities, time, temporality, forces and motion, is introduced as a fundamental skeleton of a game world. With this skeleton, a set of preconceived standards including video game genres, themes, time periods and visual styles are used to analyse existing visual game world examples. The point of this analysis is to find prominent factors reflecting the visual methods utilised by artists to portray game worlds. It leads into a hypothetical example of how the game artist can use these theories, concepts and standards to create and arrange objects in a simulated environment to convey an overall narrative that enhances the story within the game world. This example is not a definitive model for the entire creation process. Instead, it is a demonstration that reflects the research topics (visual composition, visual perception and game design) within a game world environment. Beyond this research, further development on the discussion of the visual creation process within a game world is needed to refine approaches that are accessible and substantial for game artists.

¹ The word “graphics” refers to the visuals in video games, commonly used by players and video game creators.

Chapter 1: Through the Looking-Glass and Into the Game

Peering into a video game often reveals simulated spaces that serve the purpose of play. The space can be thought of as a void that requires visual entities², which are perceivable and identifiable as independent objects, to form game world environments. For example, simulating a garden-like scene involves an arrangement of visual entities, such as grass, soil, stones, plants, trees and wild life. The arrangement of these various entities is a task performed by a game artist. With that said, the method(s) used during the arrangement process seems enigmatic and personal. This gives reason to examine the fascinating process of individual parts placed together to form a visually perceivable entirety.

This entirety is experienced by a viewer/player through gameplay, which is established by the rules³ of the game's design. A substantial arrangement of these playable entities and environments will form the main body of a visual game world. Hence, a game artist that creates such worlds should incorporate concepts and theories from visual composition (game artist), visual perception (viewer/player) and gameplay (game designer).

A successful blend of these three subjects will allow game artists to create a cohesive (unity among parts), consistent (unity through progression) and convincing (unity of logic) game world that is both visually

² A compilation of visual entities is in chapter 3.3: *Visual entities in game worlds*, page 33.

³ Rules are established to determine the way a particular video game is, can or should be played.

well composed and playable. This leads to the research question: What are the fundamental conditions of a visually cohesive, consistent and convincing game world?

There are numerous theories on visual art, visual perception and game design. Despite that, theories combining these three subjects are few. One example that touched on visual art and game design is *The Medium of the Video Game*, by Mark J. P. Wolf (2003). He described eleven variations of simulated spaces⁴ in game worlds using film theory as a theoretical basis (Wolf 2003, 53-70). These identified spatial structures are conventions that portray the solutions of visual compositions and game design in video games. However, it does not provide an approach that game artists can easily apply into the creation process of visual game worlds.

This paper aims to create a fundamental approach to distinguish the structure of visual game worlds by analysing existing contemporary video games with the application of theories derived from visual art, visual perception and game design. It is important to have such a basis to examine the extensive and complex game worlds that can be found in video games such as, *Fallout 4*⁵ (Bethesda Game Studios 2015) and *Starbound*⁶ (Chucklefish Games 2013). Both these video game examples have multiple areas with a huge variety of objects, surroundings and simulated characters that forms complex environments. This variety of environments provides players with new visuals and content over a substantial period of

⁴ For Wolf's list of simulated spaces in game worlds, refer to chapter 4.2.

⁵ Video example of *Fallout 4*: <https://www.youtube.com/watch?v=0lWNdcbq3EU>

⁶ Video example of *Starbound*: <https://www.youtube.com/watch?v=-O6PUh3reG0>

time. It contributes to a longer gameplay, which gives the impression that the visual game world is extensive.

The available discourses on art in video games are predominately singular in focus. They involve deliberating or declaring video games as an art form. *The Art of Videogames*, by Grant Tavinor (2009), is one such example that explores the philosophical nature of video game as a form of representational art. Questioning this medium is a direction that can be explored in countless ways, but the end result often leads to just classifying video games.

A game artist has more pressing concerns than the classification of the video game medium when it comes to creating a game world. Game artists fabricate game worlds based on their perceptions of the physical world. This is generally done with the incorporation of visual entities into playable surroundings that support game characters. Throughout the playing experience, a player will visually perceive environments in a game world. These environments have to simulate situational responses towards the interactions of a player as an acknowledgement of her/his presence in a fabricated reality. In addition, visual environments commonly surround a player's *representing avatar* (a visual representation of the player in the game world) throughout the whole progression of gameplay and have major influences on the thematic and emotional experience⁷.

⁷ For a further discussion on the variety of visual environments in video games, see section 4.4. It provides a general overview of standard models (theme, time period and visual style) examined in existing video game examples.

Without a keen understanding on how visual perception operates, a game artist is handicapped. This can result in visually chaotic and confusing environments that do not support a player's progression in a game world. A theory where art encounters visual perception becomes essential in conducting this research. This encounter can be found in *Art and Visual Perception*, by Rudolf Arnheim (1974). He used theories of Gestalt psychology⁸ to explain the perceptual experience of viewing art. It is a system that comprises of artistic and perceptual concepts such as, colour, shape and form, which can be applied to most, if not all, art related media. Though, his discussions never included video games in particular, *Art and Visual Perception* (Arnheim 1974) was written before the development of the medium, it still bares relevance to this subject. Hence, it emphasises a gap that this research addresses and investigates. It should also be noted that this investigation is conducted from a visual artist's point of view, which means that the research will emphasise on visual art and the game artist, instead of other fields of research.

Returning to Arnheim, he further developed his perceptual concepts in *The Power of the Center* (1988). It introduced the dynamics of underlying forces that various entities emanate in visual compositions of eastern and western art works. Similar to *Art and Visual Perception* (Arnheim 1974), these concepts did not explore the compositions in game worlds. A counter notion to this matter is in the encompassing nature of Arnheim's theories.

⁸ For more information of Gestalt theory, refer to chapter 3.4.

In his own words, “[i]t seems to be possible to describe a compositional scheme common to works of visual art of whatever time or place” (Arnheim 1988, 1). With this vision, his theories were developed to be adaptable to various art forms.

Applying Arnheim’s theories into an approach to analyse visual game worlds is to fit the simulated environments into general visual compositional guidelines that were formulated with perceptual theories. The study of his theories provides this thesis a vocabulary based on visual perception and art. This adds to the language used in the field of game studies, which predominantly orientates around game play, game design and computer sciences. Any new additions need to be considered alongside the game design language since the visual game world is affected by interaction and play.

As a general note, the topic of game design focuses on play. More specifically, it studies the player’s behaviours and experiences of the gameplay within the game world. The emphasis on players is the link that will connect visual composition and visual perception to gameplay in this research. An example of such theories can be found in *Half-Real*, by Jesper Juul. He conducted a study on game design rules in fictional worlds (2005). It provides this research with valuable information on the occurrences during play between the players and a game world. This will inform on the methods a game artist can employ during the process of creation which is only achievable through the observation of the world around us.

Chapter 2: Dimensions of Worlds

2.1 Lifting the Veil: Splitting Reality from Perception

Figure 1.

The word ‘world’ often brings to mind an image of a circular globe that is whole and complete. This globe may appear similar to figure 1, which is a two-dimensional visual representation of the planet Earth. In actuality, most humans seldom experience the world as a whole, apart from a number of lucky astronauts. Humans visually perceive the world they live in through their immediate environment and some of these visual perceptions are stored as memories.

Over time, the accumulated memories form subjective views of the world, which can be altered by the addition of new(er) visual experiences. These subjective views seem to create a veil over the objective world. Steven Lehar observed that there is an apparent duality of the world, for “it was both the real world, and a perceptual world, and that the two appeared to be somehow superimposed” (2012, *Preface V*). This explanation of the inner workings of visual perception using subjective layering over the

objective world is to accept a constant switching of two states on a singular construction. This results in a confusing state, which implies that every entity existing in the world is visually perceived as both real and unreal at the same moment.

One solution to avoid this complication is to separate the real and the perceptual into two worlds. Lehar proposed a similar solution that regards the real as “an unimaginably immense external world” and the perceptual as “a miniature internal replica” (2012, 8). His main point is that the *external* world is visually perceived and replicated into an *internal* world within the confines of the human mind. In this replicated world resides an immeasurable source of imagination and creativity.

2.2 Emerging Mindscapes (Primary, Secondary & Tertiary)

Figure 2.

The external world is viewed through the eyes, consciously and unconsciously adding to internal mindscapes. These mindscapes can serve as a deep well of inspiration and knowledge that stimulates the creation of

many formations, including constructed worlds⁹. A construction emerges from the inner mind of its creator, projected back into the material world like a spillage and this is achieved through the use of various media. Figure 2 depicts this process that begins from being, to perceiving, to creating; where *2a* is the external world that influences *2b*, the internal world, which fuels the creation of *2c*, a constructed world.

2c contains and displays conceptions of the mind, which relates constructed worlds back to the internal mindscape. This becomes a problem since constructed worlds are visually perceived on the external plane, which also categorises them as external worlds. A reasonable assumption is that constructed worlds are hybrids of the external and internal. This leads to a situation whereby *2a* and *2c* are structurally different, yet are perceived as equal on the external plane. Resolving this conundrum will require a clearer method to define the relationship of these worlds.

This paper proposes a method that distinctly identifies three separate worlds, depicted in figure 2, where *2a* represents the Primary World, *2b* secondary worlds and *2c* tertiary worlds. To elaborate, *2a* represents the world we live in. Therefore, there can only be one in existence and will be termed in this paper as the “Primary World” (Wolf 2012, 380). This term

⁹ It is an artificially built world utilising available media (inclusive of animation, architecture, dance, film, literature, music, painting, photography, theatre, video game), which results in the support of a vast amount of worlds externally. The theme park, Walt Disney World Resort, is one such example of a constructed world in the external world. Also, video game merchandise often feature game world characters and objects in the form of soft toys and figurines.

originated from J. R. R. Tolkien and was utilised by Mark J. P. Wolf in his study of imaginary worlds.

A natural progression is from the primary to the secondary. *2b* illustrates the manifestation of a “secondary world”¹⁰ (Wolf 2012, 14), after the Primary World is visually perceived. Relative to Earth and the current human population, secondary worlds are in abundance; with the presumption that majority of humans can manifest Lehar’s internal worlds in their minds. The interpretation of secondary worlds in this paper diverges slightly from Wolf. He uses the term “imaginary worlds” in place of secondary worlds to represent a fictional and unified whole consisting of all the intended environments and characters, which “could be as large as a universe, or as small as an isolated town” (Wolf 2012, 377). Thus imaginary worlds are created worlds, meaning that they do not reside in the creators mind and instead, is sustained in the Primary World through a medium. Hence, Wolf’s description of secondary worlds relates closer to *2c*.

For consistency, the word “world” will be a constant in depicting the transference from being, to perceiving, to creating. This also satisfies the solution mentioned above, which suggests the splitting of the subjective veil and the objective world into two separate worlds. Therefore, the internal mindscapes of humans, which is *2b*, will be termed as secondary worlds. As was implied with the progression from primary to secondary, anything that falls under *2c* will be considered as tertiary worlds in this paper.

¹⁰ Identical to the origin of the term “Primary World”, secondary worlds came from J. R. R. Tolkien.

These three terms, the Primary World, secondary worlds and tertiary worlds, will be used to form a simplified sequence of relationships amongst worlds. This simplification is to indicate one trajectory of influence, from beginning to end. In fact, there are multiple trajectories, which results in hierarchical systems of influence, represented in figure 3. In a hierarchy, the flow of trajectories begins from the top, or the origin of influence, which in this case is the Primary World. Without the existence of the original, the functioning of subsequent tiers is not possible. Therefore, the formation of these worlds becomes impossible.

With the Primary World on the top tier of figure 3, the hierarchy shows a small slice of how the influence of one world can multiply into many. Each secondary world can stimulate the creation of multiple tertiary worlds and the amount depends largely on the desire of the creator. Apart from that, creators construct a lot more than tertiary worlds. They create inventions to improve the quality of life in the Primary World. An example is a smartphone, which is both useful and entertaining. Comparable to tertiary worlds, inventions stem from the mind of a creator and are constructed on the external plane. These constructions are clearly identified as man-made, as opposed to the natural.

Figure 3.

Visually perceiving man-made constructions, either through a medium or in the material world, introduces man-made percepts¹¹ to secondary worlds. Noticeably, tertiary worlds also contain man-made objects. For example, these objects are found littered throughout the post-apocalyptic world of *Fallout 4*. This further implies that tertiary worlds can influence and have influenced other tertiary worlds. For instance, literary adaptations, such as the novel, *Frankenstein* (Shelley 1994), was adapted countless for film and television. Furthermore, a statue of Frankenstein's monster was erected in Geneva, Switzerland. This statue depicts a tertiary

¹¹ It refers to a person's mental image of the perceived object or group of objects.

world character returning to the Primary World through the artistic medium of sculpture.

With the multitude of trajectories shifting back and forth amongst different worlds, the hierarchical system in figure 3 becomes insufficient. Instead, these trajectories can be said to revolve in an endless loop around the three world types. A web-like structure portrays a clearer image of the complex routes of influence. However, any further elaboration on the influences of worlds will be a discussion involving activities, cultures, economics, politics and societies, which go beyond the objective of this paper. Analysing the visual arrangement of worlds provides a clearer picture on the fundamental elements of creating tertiary worlds.

2.3 Perceiving in Fragments and Gaps

Observing the world through the eyes of a creator extends into creation. To construct a visual world, creators must understand how humans perceive the world they live in; the Primary World. Furthermore, this understanding needs to merge seamlessly with the medium of choice and the creator's vision. The result is a tertiary world that subjects viewers or participants to its mode of delivery.

A tertiary world seems quantifiably lesser than the Primary World, and this can be related to the way humans visually experience their surroundings. Environments of the Primary World are visually perceived in a disjointed sequence over time, resulting in fragments and gaps. Comparably, the land on Earth is fragmented by man-made borders and

oceans. However, these fragments cohere within the spherical boundary, which encases any gaps and completes the Primary World.

The human brain undergoes a similar process of completion. “Many world gaps are filled unconsciously (like the gaps of perceptual psychology), giving the feeling of a fully-rendered complete world with little effort on the part of the audience” (Wolf 2012, 57). This suggests that secondary worlds are conceived as a whole through the unconscious completion in the human mind despite the disjointed perceptions.

If this process of unconscious completion is understood by creators of tertiary worlds, it allows for the purposeful inclusion and insertion of gaps in-between parts. Gaps are a factor that creators can use to form their desired effect on the viewer/participant. For example, *Dragon Age: Inquisition*¹² (Bioware 2014) is a three-dimensional video game with large amounts of simulated environments to explore. This results in a substantial travelling time from one area to another. The time-consuming journey is shortened through a map interface that allows players to select and teleport to where they wish to go. This teleportation system introduces an intentional time gap to players, which removes the length of the journey, but not the virtual event of reaching a different location. Players experience continuity by unconsciously closing the time gap, which allows them to seamlessly resume playing after teleporting to a new zone, much like using a cut as a scene shift in film.

¹² Video example of *Dragon Age: Inquisition*:
<https://www.youtube.com/watch?v=6HZUpnyXuj0>

Figure 4.

The unconscious process of closing gaps can be explained using closure, under Wertheimer's laws of perceptual grouping (Lehar 2012, 46). Closure refers to the completion of a form or shape in spite of the existence of gaps or breaks in-between the enclosing boundary or line. For example, figure 4 is preferably perceived as a circular shape instead of an objective curved line with a gap. This suggests that the human mind has the tendency to favour closure and this supports the unconscious completion of world gaps described by Wolf.

Through the tendency of closure, the arrangement of separated parts and gaps can result in tertiary worlds that are complete. Tertiary worlds appear simplified when compared to the extensive diversity of information offered by the Primary World. Simplification indicates that tertiary worlds are quantifiably lesser as previously mentioned, but does not equate them to be qualitatively inferior. Instead, the information provided by tertiary

worlds is tethered to the Primary World, reflecting the hierarchy of influence in figure 3. For example, the tertiary world of Azeroth in the multiplayer online role-playing game, *World of Warcraft*¹³ (Blizzard Entertainment 2004), simulates objects falling when no resistances keep them in place and its inhabitants walk with their feet firmly planted on the ground. These occurrences in Azeroth portray the simulation of gravity, which is easily assumed to mirror the forces of gravity in the Primary World. Therefore, a player experiencing gravity in Azeroth perceives information of the Primary World in a tertiary world through her/his secondary world.

This hierarchical tether of worlds reflects Mark Wolf's concept of "Primary World defaults" (2012, 24), which refers to the logic of tertiary worlds defaulting to information assumed from the Primary World. These assumptions are made by the viewer/participant without the intentional declaration from a creator. Equally, creators can use and have used "Primary World defaults" to supplement information in tertiary worlds. These supplements allow creators to concentrate on inventing information that differs from the Primary World. This differing information sets the stage for a standard that allows tertiary worlds to convey a sense of visual cohesiveness, which implies that every part included in a tertiary world conforms to the standard preconceived by the creator. A standard includes a set of rules that governs the visually perceptible actions, entities and

¹³ Video example of *World of Warcraft*:
<https://www.youtube.com/watch?v=7IDwYWgFAz4>

events that exist within the tertiary world, which is further discussed in the fourth chapter of this paper.

2.4 A Structure Beneath the World's Surface

The conceived rules need to be applied to something, in this case, a basic world structure. This structure is comparable to a foundational base within a world that holds every part in place, including a creator's set of rules. Without this foundation, all fragments are set adrift and are unable to attain completion; reminiscent of the parts of a tree without its roots.

Rudolf Arnheim described a comparable concept:

The mind proceeds from the comfortable base of persistent, immutable elements. On this base the fanciest structures can be erected as from a set of building blocks. This holds true for creations of the mind as well as for handiwork.

(1992, 193)

A foundational base should then consist of indispensable elements that play a part in every possible world. For the purpose of this paper, the focus is on the optical, which significantly relates the elements of a basic world structure to the laws of physics and are as follows: the existence of space, visual entities that occupy this space, the passing of time, temporality of being, forces and motion. The very essence of a world to behold is to have the space to contain its entirety, be it large or small, complex or simple. Visual entities invert the emptiness of space, countering negative with positive. These entities can be organised into countless arrangements, which explains the variety of tertiary worlds. A creator can approach the

arrangement of these visual entities through the aforementioned preconceived standard.

With the entities in place, perceiving one's surroundings through the passing of time denotes the perception of past, present and future. These three dimensions can be said to occur in a *moment*, where the present is instantaneously perceived as the past that gazes upon the future, a subject explored in the field of psychology and philosophy. In a sense, human beings are bounded to the linear momentum of time and this is an inescapable fact. However, time does not seem to be perceived in a linear fashion. Instead, time appears as fragmented *moments* in memory (Bergson 1929, 25), specifically, in secondary worlds. As tertiary worlds are products of the creator's mind, it can be said to adopt a similarly fragmented quality. Time in these two types of worlds can be reversed, repeated and rearranged. It can go so far as to start, stop and idle at will.

The seizing of time portrays a timelessness that is most evident in tertiary worlds of painting and sculpture. The static nature of these media perpetuates the unchanging. Yet, any perceivable world is still subjected to the perception of humans; the perception that originates from mortal beings with temporary existences. This temporality extends to most living things in the Primary World. Naturally, secondary worlds accept the temporality of Being as an essential condition. However, the memory of the living has the potential to surpass the finitude of mortality, and this is commonly achieved through fame or infamy in recorded history. For example, most people have heard, learnt or read about Helen Keller and

her strength of overcoming her disabilities, Anne Frank and her hardships, Adolf Hitler for starting World War II, and Sir Isaac Newton as the physicist who formulated the universal law of gravitation. It is crucial to note that everyone succumbs to physical death despite her or his continuance in the minds of the living. In turn, these minds that remember also witnesses death's embrace.

Tertiary worlds are affected differently by temporality. Beings of these worlds cannot physically experience fleeting time as they lack a sense of self and have yet to exhibit convincing signs of consciousness. Instead, beings in tertiary worlds portray ephemerality to the viewer/participant with content and materials. Content refers to the theme(s) in artworks and materials are the physical substances used by artists for creation.

As mentioned above, static art forms¹⁴ appear timeless or “outside time” (Arnheim 1974, 373). This implies that the intended content in static artworks is separated from the effects of time. Temporality can be used as a theme in the content of an artwork, but it is, arguably, an unchanging or unchangeable theme. The irony of timeless art pieces is in the materials that decay over time in the Primary World. Art restoration will always be required to the point when a feasible method arises to authentically preserve artworks.

This decay also applies to materials of non-static art forms such as animation and film. However, digitisation negates this conundrum by

¹⁴ Including but, not limited to, architecture, painting, photography and sculpture.

storing data in a format that avoids material deterioration. A newer problem resulting from digital formats occurs when the stored data becomes outdated with the new technologies. This problem is solved by creating an updated version that is made compatible with the improved hardware or software. Otherwise, the existing data is at the risk of becoming obsolete.

A perfect method to immortalise matter in the Primary World remains to be discovered. When achieved, immortality brings an end to the ephemeral. Everything will appear futile due to the inconsequential passing of time. An optimistic speculation is that art and creativity will persist despite the possible yet improbable death of temporality. At present, the temporal nature of the Primary World continues to shape the influx of changes brought about by forces and movement.

There are many physical forces in the Primary World that affect movement such as gravity and friction. When an object falls, it is pulled down by gravity and pushed against by air resistances. These two opposing physical forces create friction. Forces driving the visual perception of a falling object through a sequence of time are perceptual, which is different in comparison to physical forces. Perceptual forces¹⁵ exist and operate in the mind, where the subjective realms of secondary worlds manifest. This suggests that perceptual forces are subjectively perceived and this produces varied experiences.

¹⁵ Perceptual forces are described as the “interplay of directed tensions” (Arnheim 1974, 11), which are psychological in nature (*ibid.*).

Without the ability to perceive perceptual forces, moving objects appear suspended and stationary in time. Perceiving motion allows for the visualisation of changes in a world for it has the “strongest visual appeal to attention” (Arnheim 1974, 372). Other visual transformations taking place through time occur in shape, form, colour, light and space, which extend into the complex factors of balance, dynamics and expression (Arnheim 1974). These factors are potentially observable, but may not be equally memorable in secondary worlds since influences of perceptual forces are different from physical forces. The extent of influences originating from forces, physical or perceptual, depends on the quantity of available matter to act upon. This matter can take the shape of many layouts.

2.5 The Extent of a World’s Layout

In the case of the Primary World, its layout spans across the cosmos, where the Earth makes up a small part of a larger whole. To understand this, humans have to think or visualise outside of themselves, where they can derive thoughts that shift away from a human-centric frame of mind. In contrast, secondary worlds are figmental and do not need to manifest with the same objective layout as the Primary World. A logical postulation is that secondary worlds visualise the Earth with the highest significance in its entire universe. This significance slowly descends as the mental visualisations move away from the Earth and into outer space.

The descent relates to the physical limitation of seeing clearly beyond an optimal distance. To the naked eye, the night sky resembles a simple

dark blanket penetrated by a number of small elliptical light sources. This simplification is explained by gestalt theory's *law of simplicity*¹⁶, whereby “distance weakens the stimulus to such an extent that the perceptual mechanism is left free to impose upon it” (Arnheim 1974, 63). With enough distance, this imposition can reduce and merge details into an amorphous mass that forms the dark blanket of the night.

Figure 5. *Hubble Panoramic View of Orion Nebula Reveals Thousands of Stars* (NASA 2006)

This dark blanket will never reveal such intricacies as seen in figure 5, the Orion Nebula. The National Aeronautics and Space Administration (NASA) captured this stunning image using the Hubble Space Telescope; a powerful piece of technology that transcends human sight. This telescope

¹⁶ “Any stimulus pattern tends to be seen in such a way that the resulting structure is as simple as the given condition permit” (Arnheim 1974, 63).

allows earthbound women and men¹⁷ to glimpse and envision images of the vast universe. Due to such advancements in technology, humans are no longer mentally bound on the ground by gravity. Instead, their minds are in constant expansion, structuring and restructuring the cosmos of secondary worlds.

The mutable nature of secondary worlds invites the development of variations that are conveyed, by the author, into a diverse range of tertiary worlds. This diversity is constructed with individual parts that are arranged into simulated environments. An accumulation of these environments forms a world birth from the mind of its author. This world is then completed by the perception of viewers or participants through the closure of gaps in-between fragments. However, the process from visual parts to visual world is complex and differs amongst various media.

¹⁷ At this point in time, space travel is neither affordable, nor widely available to the general public.

Chapter 3: Tertiary Worlds in Video Games

3.1 'Game Worlds'

Game worlds are a subset of tertiary worlds and are defined by the necessities that determine the video game medium. Video games require a playable journey involving interactions with a simulated world that often express a story or experience. Players immersed in a particular journey perceive a game world as an alternate universe, which consists of elements that are similar to the Primary World, such as the virtual depiction of land and sky. This is the effect of the hierarchy of influence that results in information from the Primary World surfacing in game worlds.

Creating such a world involves design, visuals, sound and code, which is provided by a team of game designers, game artists, sounds designers and programmers. The size and balance of a team vary as each game world differs from the next. This paper assumes that a bare minimum of one from each expertise can work together to produce a playable game world with the allowance of sufficient time.

During the course of production, each member of the team contributes their part to build a desired game world. However, teamwork denotes the presence of certain dependency issues, which originate from the fact that the constructed parts may not fit as well as originally anticipated. An inexperienced team may create inconsistent parts that weaken the portrayal of the entire game world. Therefore, each part should be created with consideration to every other counterpart contributing to the whole.

Figure 6.

Figure 6 illustrates this point, whereby *6a* represents a complete game world through a single circular shape. In actuality, a complete game world does not manifest in such a singular and intact manner. Instead, it is made of various parts and arrangements, contributed by various people. As exemplified in *6b*, *c*, *d*, and *e*, each piece of the circle is seen as a different role in game production. They reflect the many possibilities of constructing a game world. Focusing on *6b*, it is arranged with four jigsaw shaped pieces and each piece is distinct from the next. This reveals that unity is achievable with non-identical parts and is made possible by a consensus of all the adjacent edges within the bounding shape. Directly opposite of *6b* is *6c*, which shows an organisation of identically shaped parts that completes the circle.

Beyond the identical and non-identical, there can be dominant parts that lead or influence the formation of other parts. *6d* displays a formation with a dominant part that is clearly central to the structure of its entirety. The central circular portion leads the corresponding parts to conform to a predictable layout. *6e* also displays a dominant factor, but in a milder fashion. The influence is largely directional, with each part following the

next, compounding to the final shape. Dominant factors impact the overall flow of an arrangement, but do not dictate them as do dominant parts.

Observably, a part contains factors that can result in the domination, submission or uniformity of the corresponding parts. Any person handling these parts should consider the intricate equilibrium of both parts and whole, which will be further expanded on later through Gestalt theory. Losing sight of this equilibrium can cause the largest gaps to form between fragments to such a great extent that even the most imaginative of minds cannot complete.

3.2 Generalising a Game Artist

The visuals of game worlds follow a similar process of creation, which comprises of organising visual entities into a visual game world. Game artists usually handle these organisational tasks by applying concepts of visual art and composition to the medium of video games, using software tools such as, Adobe Photoshop (two-dimensional), Autodesk 3ds Max (three-dimensional) and Unity (Game Engine). This results in an artistic expression of an aesthetic on game worlds. In addition, visual game worlds interact with and respond to players and the way these simulated interactions and responses are visually perceived will shape the overall experience. Thus, game artists must understand how a player's perception influences visual compositions and use that knowledge to construct visual game worlds.

Concepts of visual composition can be at odds with visual perception and these are situations that game artists have to solve or avoid. For example, visual balance¹⁸ is a desirable quality to have in visual compositions, but this may not be suitable for all situations. Certain moments in a game world require the opposite of balance, which is ambiguity (Arnheim 1974, 14). An ambiguous visual composition can enhance an intended misperception, misdirection, and misinterpretation. This leads to the act of exploring and searching for a correct path. The exploration of game worlds require movement through simulated space and time, which indicates that the surroundings are constantly transforming between ambiguity and balance.

Too much ambiguity in a video game will increase the challenge and decrease the willingness to engage the game. Regulating this sort of fluctuating commitment towards challenges in a game world requires game design. Game designers coordinate the entire playing process, inclusive of the intensity of challenges. This process requires a player's sight and perception, which directly links to the formation of visual game worlds. The intertwining relationship of visually perceiving and playing necessitates game artists to be highly aware of a game's design. For example, players encountering diverging paths are given two choices. Depending on how both paths are presented, a preference will emerge. Supposedly, the first path leads into a brightly lit room and the second goes down a gloomy set of

¹⁸ It is the "dynamic state in which the forces constituting a visual configuration compensate for one another" (Arnheim 1988, 225).

stairs, a likely choice is to enter the room. The basis behind this assumption is that the stairs show a route of departure from the current environment and represents the abandoning of an opportunity to discover the contents in the room. Also, a player is less likely to miss out on the room because lights attract visual attention.

Conversely, the game's design may require the opposite, which is to encourage players to pick the path of the gloomy stairs. This can occur due to any number of reasons inclusive of narrative requirements or emotional pacing. At this point, game artists have to create a compatible environment that conforms to this design. This limits possibilities, but invites creativity and problem solving. Returning to the diverging paths of room and stairs, a game artist can divert a player's visual attention by dimming or removing the light sources that would otherwise highlight the room. In addition, the door of the room can be closed, cutting off invitation. There are many other possible visual solutions and it is in these answers that reveal the entwinement of a game's design within the visual creation process.

As a result, creating visual game worlds entails not only concepts of visual composition and visual perception but also game design. It indicates that game artists should approach the creation process with both the perspective of players and game designers in mind. This notion of encompassing the viewer's expectations into the created work is not unheard of. In *The Space of Literature* (1982), Maurice Blanchot noted the intricate relationship of the writer's words seemingly being written by the, "still infinitely future reader" (1982, 199). This relationship is one where

the creator puts her/himself in the place of a future reader during the act of creation. Through the understanding of this relationship of creator(s) and viewer, the created visual game world will be a well-fitted part within the entire game world, reflecting the completed circle of *6a*.

Identifying these essential relations that game artists should consider and utilise during the process of creation is a closer step towards answering this paper's research question of conditions leading to a cohesive, consistent and convincing visual game world. The subsequent step follows with the identification and examination of the various visual entities that simulates the environments of the visual game world.

3.3 Visual Entities in 'Game Worlds'

The entirety is visually perceived only as such when every intended part evokes the notion of the whole. In visual game worlds, these parts are the various visual entities that sustain the player's experience. The nature of a visual entity is anything that is visually perceivable and identifiable as a self-contained existence. Hence, a grain of sand is as much an entity as the desert that it resides in even though the desert is far more complex.

This creates a situation whereby a visual entity can be a singular object, a group of objects or a larger group containing groups of objects. For example, a leaf can be perceived as a whole in itself and subsequently, be connected to a branch. This branch stems from a tree, which is part of a forest that contributes to a brimming ecosystem. Rudolf Arnheim utilised

Karl Duncker's¹⁹ description of “a hierarchic relation of dependence” (1974, 380) to explain the tendency of perceptual connections. It resonates with the method of hierarchical systems of influence discussed in chapter 2.

Keeping Duncker's hierarchy of dependence in mind, the visual entities of a game world can be sorted into various categories and this begins with a *frame*, the window into the game world. This window presents a simulated world beyond its frame, which Hans Belting tells us is only reachable by the player's gaze, but not their physical body (2011, 244). Thus, anything within this frame occurs in the tertiary realm, divided from the Primary World. This divide represents a clear boundary that allows for the distinction of the different worlds. When such boundaries are blurred, it implies the possibility of the internal mind reaching through the tertiary world, into the Primary World, where imagination becomes simulations that mingle with reality. It may seem to be a plot that stepped out of science fiction, yet the potential of virtual reality suggests otherwise.

Presently, most visual game worlds are bounded within a frame, a digital screen, which eliminates the periphery. The opposite of the frame is the frameless view made possible by technologies, such as the Oculus Rift. However, this paper will focus on framed game worlds since it came prior to the frameless view. Returning to the frame, one can think of it as an existence on the precipice of two worlds. Its presence encases the game world, while simultaneously calling to mind the physical world. There can

¹⁹ Karl Duncker was a Gestalt psychologist, who studied under Wolfgang Köhler, one of the founders of Gestalt theory, (Schnall 2011).

be no forgetting of either, but the player has the choice to concentrate on one. This concentration is further amplified by a *representing avatar* that embodies the player's actions and reactions in the visual game world.

In order to simulate a seamless flow of intention from the player to the avatar, the controls²⁰ must feel like an extension of the physical body (Swink 2009, 24). Having a seamless extension allows for the representing avatar to visually take any shape and form; as simple as the rectangular block in *Pong*²¹ (Atari 1972), or as varied as the character creation systems of *Final Fantasy XIV: A Realm Reborn*²² (Square Enix 2013).

Figure 7. Screenshot from *No Man's Sky* (Hello Games 2016)

²⁰ It refers to the buttons, switches, joysticks on an input device that communicates between the machine and the user.

²¹ Game example of *Pong*: <http://www.ponggame.org/>

²² Video example of *Final Fantasy XIV: A Realm Reborn*'s character creation system: <https://www.youtube.com/watch?v=88jGVMGPexQ>

More importantly, the overall visual depiction of the avatar depends on the point of view of the game world, which includes first person, second person and third person views. In a first person view, as depicted in figure 7, the player experiences the game world through the eyes of a representing avatar. This means that the entire visible body is unseen. Occasionally, the avatar's hands enter the field of view through the edges of the frame. The technique of partially including the avatar's hands in the frame simulates the notion of a human-controlled point of view. However, such inclusions within the frame require visual considerations to avoid unnecessary obstructions. A game artist can consider the placement and size of the simulated hands.

Another aspect to take note of in the first-person view point involves the player and movement. While experiencing the visual game world in a first-person mode, players often encounter immediate surrounding threats. These threats require fast-paced movements controlled by the player to avoid and counter efficiently. During these moments, the screen tends to shift very quickly and suddenly, resulting in perceivable motion juddering artefacts. Such artefacts are reduced by the application of motion blurring, which smoothens distinct edges and lines, blending together the entire sequence of the visual gameplay experience. Other viewpoints do display such artefacts but it is particularly evident in the first person point of view due to its resemblance to the way humans visually perceive the environments in the Primary world.

Figure 8. Screenshot from *Siren: Blood Curse* (Sony Interactive Entertainment et al. 2008)

The second person perspective is uncommon since there is little reason to visually experience the representing avatar through another character's viewpoint. An exception is depicted in figure 8, which is a game world that incorporates a second character's perspective into the game's design. The blue coloured cross represents the avatar's point of view and the red coloured cross expresses the gaze of the undead enemy within a split screen. This secondary view can be used by the player to navigate through various pathways, hide from danger and avoid any unwanted attention.

Figure 9. Screenshot from *ABZÛ* (Giant Squid 2016)

In the third person point of view, shown in figure 9, the representing avatar is visible within the frame. However, the avatar is not always portrayed in its entirety. Typical portrayals are either full bodied or half bodied, and can be framed in the side view, over the shoulder view, top-down view or isometrically²³. In addition, the existence of an avatar on the screen is a constant reminder to the player that s/he is in control of another, which suggests a temporary dissociation from one's self to assume a different being.

²³ The isometric view “eliminates any distortion of the depicted shape caused by the perspective. There is no single focal point that would help to concentrate the picture or fixate its orientation” (Nitsche 2008, 99).

Figure 10. Screenshot from *Monument Valley* (Ustwo 2014)

It is no wonder that the adoption of a pre-existing character identity, such as Princess Ida in *Monument Valley*²⁴ (Ustwo 2014) is possible. As shown in figure 10, Princess Ida is monochromatic and minimal in design. She is visually different from humans in the Primary World. This difference is counterbalanced by two visual factors. The first is the perceivable responses of Princess Ida to the player's control through an

²⁴ Video example of *Monument Valley*:
<https://www.youtube.com/watch?v=hlcmGAW0Kg&t=2804s>

input device. The second is the consistency of the surrounding visual style with the design of the representing avatar. This consistency, as seen in the minimalistic environment of figure 10, supports the believability of Princess Ida's simulated existence, fulfilling the fundamental condition for a consistent visual game world.

There are occasions whereby the player assumes more than one avatar in a game world. In *Thomas Was Alone*²⁵ (Bithell et.al 2012), avatars of various colours, shapes and sizes were sequentially introduced as the game progresses. It demonstrates that the notion of a representing avatar can be expanded into multiple characters, resulting in a group of avatars. Surrounding the avatar, be it singular or multiple, are other characters commonly known as ***Non-Player Character (NPC)***. An NPC is controlled by the software programme of the game. They are given various purposes that include advancing a specific narrative thread or supporting the playing experience. Furthermore, NPCs are moving visual entities that can give the impression of a world brimming with life and personality.

This personality originates from the various core states that an NPC is assigned, such as friendly, neutral or hostile. A friendly NPC, as the name suggests, is generally helpful in nature. One such example is the comical Wheatley in *Portal 2*²⁶ (Valve Corporation 2011) that aids the representing avatar through obstacles in the game world. Wheatley changes his core

²⁵ Video example of *Thomas Was Alone*:
<https://www.youtube.com/watch?v=TPo1VRHQFuY>

²⁶ Video example of Wheatley in *Portal 2*:
https://www.youtube.com/watch?v=afHt_1sVQ14&t=754s

state into a hostile character halfway through the game as a narrative twist.

Apart from friendly or hostile, a neutral NPC is neither helpful nor aggressive. Depending on the behaviour of the representing avatar, this neutrality can shift into either a positive or negative reaction, which is slightly different from the core state of a hostile character. At the extreme end of the hostility metre are the enemies of the representing avatar, also known as mobs. Their presence poses obstacles that a player must overcome for the gaming experience to progress. Various obstacles differ in difficulty and are initiated by an array of mobs consisting of minor enemies, major enemies, mini bosses, major bosses and the final boss²⁷. The enemies have weaker attributes of vitality and speed, while the bosses are powerful beings equipped with unique abilities that a player must learn to resolve. A final boss usually appears near the end and should stand as the last obstruction towards the completion of a game. However, not every game world is filled with hostile NPCs.

²⁷ The word “boss” was first used in *Dungeons & Dragons*. Its continued usage is perpetuated by game developers and players (AndreaD et al. 2017).

Figure 11, Screenshot from *Proteus* (Curve Digital et al. 2013)

Certain existing video games do not feature any hostility in its gameplay, such as the game world of *Proteus*²⁸ (Curve Digital et al. 2013), which focuses on exploration and discovery. This results in an emphasis on the experience of the visual environments and friendly NPCs. The visual design of these non-hostile NPCs differ from hostile types. Figure 12 provides some examples of the non-hostile characters in *Proteus*. The player encounters these characters through exploring the game world and they usually simulate shy behaviours, such as dodging or dashing away.

²⁸ Video example of *Proteus*:
<https://www.youtube.com/watch?v=BMQfCMik4F0&t=1416s>

Figure 12, Screenshot from *Proteus* (Curve Digital et al. 2013)

This leads to the notion that the core behaviour of an NPC is a guide for the game artist to use during character design. Friendly characters should look harmless. If communication is required, the NPCs can be designed to look approachable and this is achieved through a human-like façade. A less friendly type can adopt less approachable appearances and the hostile enemies can resemble monstrosities that convey threats and fears of the highest nature. More importantly, the character has to look consistent with the overall visual style and behave convincingly as intended by the creator to maintain a cohesive visual game world.

Capturing these characters in visual game worlds requires a **game world camera**. The camera itself need not be made known to the player, but its movements convey an unmistakable presence within the bounding frame. Certain cameras are fixed, which results in a consistency of frame size. This is evident during the gameplay of *Bit.Trip Runner*²⁹ (Gaijin 2010). Conversely, a dynamic camera provides flexible framing during the playing process. This flexibility enhances specific moments in the game

²⁹ Video example of *Bit.Trip Runner*: <https://www.youtube.com/watch?v=-mPgZWuCrh0>

world by manipulating camera angles, camera movements and shot sizes, which brings to mind the relations that it has to cinematography.

Another prominent aspect of a game world camera is its perceptible shakes. Active gestures such as, running, jumping or fighting are heightened by the reactive trembles of the camera, which are assumedly due to the intensity of the forces generated by those very actions themselves. This is apparent in *Mirror's Edge Catalyst*³⁰ (EA DICE 2016), with the camera at a first person viewpoint reacting accordingly to the avatar's rapid movements. Apart from that, simulated explosions in high adrenaline game worlds such as *Grand Theft Auto V*³¹ (Rockstar Games et al. 2013), also utilises forceful camera shakes to emphasise the outburst of energy, heat, dust and smoke.

A number of visual game worlds have dynamic cameras that can be controlled by the player. This means that the camera is transformed into an interactive entity that becomes part of the playing experience. The freedom to choose the angle, rotation, direction and framing is best suited for three-dimensional environments. One such example is *World of Warcraft*, where the player can decide on how the visual game world is framed. Consequently, the controllable camera attributes to players partial responsibility for the visual composition of their representing avatar and any other visual entities within the surrounding environments.

³⁰ Video example of *Mirror's Edge Catalyst*:
<https://www.youtube.com/watch?v=qjZE7M1CvH0>

³¹ Video example of *Grand Theft Auto V*:
<https://www.youtube.com/watch?v=jDiGwYGNwgk>

Aside from the effects of the player controlled camera, the actual arrangement of *simulated environments* is a task completed by game artists. A basic way for an artist to categorise these environments is to separate the worlds by two or three-dimensions. However, the combination of spatial dimensions and gameplay results in complex examples (Fernández-Vara et al. 2007). For instance, *LittleBigPlanet 2*³² (Media Molecule 2011) has three-dimensional entities that are placed in its game world, but a majority of the game is played in two dimensions due to its design as a side-scrolling puzzle platformer³³. The compounded dimensions then, subject certain rules on the way an artist composes the environments. These rules re-emphasise a previous point about the mindfulness an artist must have towards the game's design during the visual creation process.

As a visual entity, simulated environments are generally complex constructions consisting of groups of objects that occupy a large extent of the bounding frame and beyond. Environments constricted in a single screen (Wolf 2003, 55) such as *Space Invaders*³⁴ (Taito Corporation 1978), are arguably too simplistic to consider as substantial game worlds. After all, the notion of a world brings to mind a rather weighted formation, even when viewed through a digital screen.

³² Video example of *LittleBigPlanet 2*:

<https://www.youtube.com/watch?v=ubDyyWsvn48>

³³ These types of games worlds have an arrangement of platforms that a representing avatar has to navigate through by solving various puzzles as the environment scrolls to the left side of the screen. A contemporary example is the mobile game called *Alto's Adventure* (Snowman 2015).

³⁴ Video example of *Space Invaders*:

<https://www.youtube.com/watch?v=axlx3o0code>

Figure 13.

Figure 13 separates the perceived environment into three distinct layers, the foreground, middle ground and background; a concept frequently applied in visual art. The foreground is usually where the player's representing avatar traverses through and the majority of the interactions of visual entities occur. Directly beyond the foreground is the middle ground that acts as the immediate environment that encases the avatar. Behind the middle ground is the background that portrays visual entities in the far distance such as, the sky. Referring back to Duncker's *hierarchic relation of dependence*, visual entities moving in the foreground appear to depend on the surrounding environment as a "framework" (Arnheim 1974, 394). This dependence allows for all three layers to be visually perceived as a completed whole.

Certain two-dimensional game world environments are depicted with more than three layers. An example is *Castle Crashers*³⁵ (The Behemoth 2008), which allows the player to access several layers by increasing the number of interactive planes. These planes provide the illusion that an avatar can move into the depth of a game world. In three-dimensional environments, visual entities function differently than in two dimensions for the various layers are in a state of flux. When the avatar moves through a simulation of three-dimensional environments, which causes the current foreground to depart through the edges of the bounding frame and the middle ground assumes its new position as the subsequent foreground.

The way to control the interactability of visual entities in such environments is to create invariable objects that cannot be altered by players and this is achieved through code. An artist aids this process by creating visual entities that blend in with the overall landscape. This shifts the visual attention of a player to other objects of interest. In a sense, it can be utilised as a method of leading the eye to its intended point.

An alternate way of directing vision is through ***movement***, which as mentioned earlier is an element in the basic world structure. The forces propelling movement “are not visible in and by themselves; they are embodied only in the action of the objects we see” (Arnheim 1974, 394). Part of this visibility is through the movements of the game world camera, as explained above. Apart from that, moving entities can be separated in

³⁵ Video example of *Castle Crashers*:
<https://www.youtube.com/watch?v=pQHDgByBZrY>

categories, beginning with the application of the laws of physics. These physics simulated movements are implemented by code and has little to do with visual art. The part that involves a game artist is the interaction of the coded movements with the visual entities in the environment. For example, the simulated physical forces that compel the movement of flowing water needs to have a game artist determine its colours, direction and liquid mass. It also needs to fit within the arrangement of the terrain and this requires several back and forth iterations of the game artist and the programmer.

A game artist can also undertake the task of animation within the video game and this contributes to the animated movements in the visual game world. Unlike physics simulated movements, animation brings forth drama, emotion and personality to the characters. It can also tell a story through actions, instead of words. Similarly, lighting can convey narrative information such as the time of day. The day-night cycle³⁶ within a game world results in the movement of light and shadow, which communicates to a player that time is moving forward. Survival video games such as *Minecraft*³⁷ (Mojang et al. 2009), use night time to create dangerous periods that change the tone of gameplay for a player. The darkness literally obstructs one's vision and an artist must ensure that any available lighting creates moments of temporary visual respite.

³⁶ It is the simulation of day to night and light to dark, in a repetitive cycle that depicts the passing of time.

³⁷ Video example of *Minecraft*: <https://www.youtube.com/watch?v=IExwbWczNiY>

Other forms of moving light can be driven by the representing avatar. For instance, within the game world of *Brothers: A Tale of Two Sons*³⁸ (Starbreeze Studios 2013), Naia (the older brother) carries a lit torch through the dark woods, while Naiee (the younger brother) tails along. This light source illuminates the area around the two brothers as they cautiously inch forward in the darkened environment, which labels the torch as a player controlled entity.

Up until now, the types of movement that have been discussed are portrayed as active components in the visual game world. Nonetheless, idle moments during the playing experience are unavoidable, especially when the game world encourages repeated or lengthy gameplay. An idle period occurs when a player stops providing input through her/his controls. This could be a result of the game's design. When this happens, the game world should not be fully static, because a complete freeze of the display usually indicates a problem with the game or device.

The idle moment visually represents a period of rest that provides the illusion of continuing time, where visual composition becomes perceivably apparent. A game artist needs to handle the tensions of mobile and immobile visual entities in the environmental layers with care since a misplaced part can be readily obvious. Using subtle movements to intentionally lead the player's eye is one method to enhance the already existing tensions of static entities.

³⁸ Begin from 20:00 of this video example of *Brothers: A Tale of Two Sons*: <https://www.youtube.com/watch?v=eqp4tuDJdis>

Beyond the idle periods, movements within game worlds can be simulated with altered time such as slow-motion and accelerated motion. They visually enhance active gestures of the representing avatar when used correctly. For example, Jack Joyce from *Quantum Break*³⁹ (Remedy Entertainment 2016) executes a slowed motion punch upon his enemies with extreme emphasis due to the altered timing. These alterations cannot be seen in the Primary World because the human eye perceives visually only at a certain rate. The notion of reality within secondary worlds is modified when people found ways to compensate for this limitation by adding or reducing frames in a sequence and displaying it on a screen. Another alteration of time within the game world is the rewinding of a sequence, which allows a player to virtually travel back in time. This can be seen in *Braid*⁴⁰ (Number None Inc. et al. 2008), where the rewinding movement is visually accompanied with the desaturation of colours. Vibrancy returns when the player ends the rewind and continue progressing through the game world.

A ***particle system*** also contributes to a sense of movement through the use of particle effects that can simulate water, rain, snow, smoke, sparks and fire in a game world. To understand how a particle system works, one has to perceive the image existing in time, where the particle goes through a life cycle; beginning with its visual emergence, expanding to its full

³⁹ Begin from 0:55 of this video example of *Quantum Break*:
<https://www.youtube.com/watch?v=y2F24LRHR-s>

⁴⁰ Begin from 32:32 of this Video example of *Braid*:
<https://www.youtube.com/watch?v=NdUyHili2h0>

extent and ending with an eventual decay. This timed image is then replicated and emitted repeatedly from a fixed point in space to produce clusters of particles, with each subsequent image relating to the prior decayed image(s).

These clusters aid in the portrayal of environmental reactions toward the player's simulated presence and actions within a game world. For instance, a representing avatar treading into a river creates water splashes due to the impact of the footsteps. The splashes can be simulated with timed images that represent water droplets. Besides that, particle effects are also applied to game world characters, both NPCs and the representing avatar. It provides additional visual feedback to the player, allowing for a portrayal of the unreal, the “super power” deriving from the realm of imagination within secondary worlds. This is exemplified in the fast-paced combat sequences in *Infamous Second Son*⁴¹ (Sucker Punch Productions 2014), where abilities resemble streams of light, particles and colours extending from the appendages of various characters.

Understanding the way particle systems function and their limits are needed when creating concept art and visual entities. These limitations are due to the fact that there are a maximum number of particles that a machine can process and display on a digital screen. Exceeding this number causes a drop in a game world's frame rate, agitating and delaying the gameplay experience. This also disrupts the flow of the visual

⁴¹ Video example of *Infamous Second Son*:
https://www.youtube.com/watch?v=Z_HbhcuHODs

experience with screen tearing⁴², distortions and artefacts, affecting the player's experience. Therefore, having an awareness of frame rate constraints allow game artists to contribute towards the maintenance of a suitable frame frequency. A visual exception to this is the prototype game world in *Memory of a Broken Dimension*⁴³ (Hanson-White 2014), where visually perceivable disruptions within the frame are intended by its creator. However, responsiveness during gameplay is still incorporated to reinforce the impression of a functioning game world.

The entirety of this impression is constructed with separated levels, reflecting the fragmented perception of the Primary World as described in the previous chapter. Level and area ***transitions*** are used to visually bridge the gaps between fragments, intensifying connections and supporting the unconscious completion within the mind, the secondary world. Portrayals of transitions should put across a notion of continuity, which leads to changes occurring in simulated space and time. These changes can include progressing and backtracking.

Transitional influences from animation and film are observable in the game world of *Journey*⁴⁴ (Thatgamecompany 2012) as each level advances to the next with a fade to black or white transition. This is coupled with cutscenes that advance the game world narrative before revealing the next

⁴² It is an occurrence whereby more than one frame appears on the screen, resulting in an inconsistent overlap of the game world image.

⁴³ Begin from 1:30 of this video example of *Memory of a Broken Dimension*:
https://www.youtube.com/watch?v=6G_IU5lK1E8&t=182s

⁴⁴ Begin from 6:48 of this video example of *Journey*:
<https://www.youtube.com/watch?v=bkL94nKSd2M>

playable area. Jesper Juul describes cutscenes as “fictional time” (2005, 145), which differs from the time during gameplay. The appearance of a cutscene switches the role of a player into a spectator, who cannot interact or alter the game world. This role eventually reverses again when the cutscene ends.

There are a few different types of cutscenes depicted in game worlds. In-game cutscenes are created by capturing animated sequences in game world environments. This results in a matching visual style and quality between the visual game world and the cutscenes. The *Mass Effect*⁴⁵ trilogy (BioWare et al.) often utilises such scenes to smoothen visual transitions. An alternative is to incorporate a higher visual quality pre-rendered animated clip. Such cutscenes should continue to replicate factors established in its game world, but with an increment in visual details and enhanced lighting.

In the game world of *Mirror’s Edge*⁴⁶ (EA DICE 2008), the visual style and spatial dimensions of cutscenes differs from its simulated environments. This emphasises a contrast between the role of a spectator and a player, as viewing and playing are distinguishable experiences. *Quantum Break*⁴⁷ took the use of cutscenes a step further by implementing lengthy live action clips that vastly complements the gameplay experience.

⁴⁵ Video example of *Mass Effect 3*:

<https://www.youtube.com/watch?v=LPb25ddx97U&t=44s>

⁴⁶ Video example of *Mirror’s Edge*:

<https://www.youtube.com/watch?v=7w0iEK6Eb2o>

⁴⁷ Begin from 8:07 of the video example of *Quantum Break*’s for a cutscene:

https://www.youtube.com/watch?v=k_3MtQDNNts&t=25s

Transitions can also be built into the simulated environments through the use of a door. Conceptually, the act of stepping through a door represents both leaving and arriving, which is a perfect visual metaphor to depict transitional periods. *The Witness*⁴⁸ (Blow et al. 2016) implemented this metaphor and produced a seamlessly flowing visual game world. Similarly, *Mass Effect 2*⁴⁹ (BioWare 2010) employed this transitional metaphor by simulating a closed door that requires a non-specific period of time to open. This door becomes a barrier that offers the video game software a window of time to process the generation of the subsequent area.

The levels in *Flow*⁵⁰ (Thatgamecompany 2006) also applied the door metaphor, but this is achieved without presenting a static entity that opens and closes. Instead, the entrance and exit resembles free floating amoebas that are in constant motion; albeit at a leisurely pace. This compels the player to search for moving doors that do not have a specified location, encouraging the act of exploration.

An elevator can be used instead of a door to function as a level or area transition. This substitution operates on the assumption that most players understand that an elevator requires a period of time to travel along the shaft to reach its destination. Using this assumption, the elevator becomes an enclosed vehicle of illusion that transports the representing avatar from one location to another without taking the player out of the visual game

⁴⁸ Video example of *The Witness*:

<https://www.youtube.com/watch?v=49mseQwFeO0>

⁴⁹ Video example of *Mass Effect 2*: https://www.youtube.com/watch?v=qXf2X1-eSwM&list=PL3d-5REb9KLy-DHk7UeOBSO_UM04w3L_o&index=4

⁵⁰ Game example of *Flow*: <http://intihuatani.usc.edu/cloud/flowing/>

world. *Portal*⁵¹ (Valve Corporation 2007) illustrates this illusion with a cylindrical elevator that brings the avatar to various areas without interrupting the visual flow of gameplay.

Another typical visual transition between levels is a loading screen, which is apparent in numerous video games. It simplistically conveys that time is required to generate simulated entities in the next level. A loading bar is a straightforward method to communicate this requirement, but it can come across as uninventive and boring. Alternatively, diversion tactics can be employed to alleviate a player's possible boredom as extended waiting time can be a rather unpleasant experience.

*The Elder Scrolls V: Skyrim*⁵² (Bethesda Game Studios 2011) included a rotatable three-dimensional visual entity, such as a dragon or stone statue from the game world in its loading screen to give players something to interact with while the next area loads. *Don't Starve*⁵³ (Klei Entertainment 2013) uses humour in the form of alternating short phrases such as, "Inserting trees" and "Wrangling monsters" to poke fun at the loading process in the loading screen. An unusual diversion tactic is seen in the *Assassin's Creed*⁵⁴ series (Ubisoft et al.), whereby an infinite three-dimensional space allows the representing avatar to freely wander and explore during the process of generating the game world.

⁵¹ Begin from 3:19 of the video example of *Portal*:
<https://www.youtube.com/watch?v=zKvPw4Od-mU>

⁵² Video example of *The Elder Scrolls V: Skyrim*:
<https://www.youtube.com/watch?v=fuSEtHURNB8&t=662s>

⁵³ Video example of *Don't Starve*: <https://www.youtube.com/watch?v=pL4snnsZNNk>

⁵⁴ Video example of *Assassin's Creed Syndicate's* loading screen:
<https://www.youtube.com/watch?v=W8k1qO57piA>

Beyond the loading screen, there are other types of screens that can be considered as a part of the *user interface* (UI) in a video game, such as the start screen, game over screen, replay screen and options screen. These screens can be considered as “non-diegetic” visual entities that are distinct from the “diegetic” visual game world (Wolf 2003). However, they still relate to the game world by providing the player with supplementary information or options that the simulated environments themselves cannot efficiently convey.

Apart from *non-diegetic* screens, the visual environment within the frame is commonly coupled with an overlay of interfaces, “often referred to as the head-up display, or HUD” (Jørgensen 2013, 23). Any information portrayed in the HUD should directly affect gameplay due to its proximity to the visual game world. This direct relationship places HUDs in an intermediate state that is neither *diegetic* nor *non-diegetic*. For a game artist, this superimposed layer of interfaces on the environment should be perceived in unison, a sequential gestalt within the bounding frame. Hence, HUDs will be considered as functionally *diegetic* entities in this research.

*The Legend of Zelda: The Wind Waker*⁵⁵ (Nintendo 2002) displays the close relation of the *diegetic* environment and HUD with heart-shaped containers that represent the avatar’s state of health at the top left-hand corner of the screen. These containers have three states, filled, half-filled or empty. Sustaining one attack from hostile NPCs converts a filled heart-

⁵⁵ Video example of *The Legend of Zelda: The Wind Waker*:
<https://www.youtube.com/watch?v=08z9yP0jCEI>

shaped container into half-filled and two attacks will empty it. When all the containers are completely emptied, the player's representing avatar succumbs to a simulated death. This unfortunate situation can be avoided by a player since the avatar's state of health is readily visible during the gameplay. Without the visibility of these containers, it becomes challenging to ascertain the precise health situation of the avatar and a player is left to her/his own deductions.

Kristine Jørgensen described a “naturalistic approach for identifying gameplay-relevant information” (2013, 2), which refers to HUDs that are integrated into game world environments. This approach brings user interfaces into the simulated environment, instead of simple overlays above the visual game world. *Dead Space*⁵⁶ (Visceral Games 2008) incorporated the health status into the back of the representing avatar's engineering RIG suit, which is visually perceptible in the third person viewpoint of the camera. In addition, *diegetic* holographic projections presenting directional, numerical and textual information allows the player to navigate through the horror filled corridors aboard the USG Ishimura space vessel.

Gameplay information can also be conveyed through “metareferences” (op. cit., 124), which occurs when the game world is simulated to react with a sense of self-awareness, such as acknowledging the bounding frame or the existence of a player. At times, the game world camera is referenced when water or blood is used to generate splatters upon the digital screen.

⁵⁶ Video example of *Dead Space*:
<https://www.youtube.com/watch?v=62oXF7c2Fg4&list=PLsefMPn3-5usBnKHns5Nc2Cl7hDYXbgAM&index=4>

These splatters afford the player additional information about the state of the avatar as seen in *Tomb Raider*⁵⁷ (Crystal Dynamics et al. 2013) when the Lara Croft is close to losing her life. Visually, the splatter on the screen acts as a minor obstruction to the player's field of view, which reflects Lara's struggle to stay alive.

The final category of visual entities to be discussed is the uses of *text* in diegetic and non-diegetic spaces of a game world. Text has many functions and they include storytelling, clarification, communication, identity, code and conveying a particular mood. There is even a genre of game that only utilises text. Beginning with storytelling, *Braid*⁵⁸ depicts narrative pieces within a level named "Epilogue" near to the end of the entire gameplay experience. Players can choose to read these pieces to develop a deeper understanding of the story behind this particular game world. Certain narrative pieces are hidden in plain sight and will only reveal themselves when discovered. Intriguingly, the story of *Braid* is not fully explained during gameplay, but there are clues within the pieces of text that allows interpretation.

This method of using textual clues to deliver a tale, linear or non-linear, through a game world is also used in *Layers of Fear*⁵⁹ (Bloober Team 2016),

⁵⁷ Begin from 4:15 of the video example of *Tomb Raider*:

https://www.youtube.com/watch?v=XnU2giosD6E&list=PLC_GisvNDYCCsuSxL9198UZBSUTsUvRUD&index=1

⁵⁸ Video example of *Braid*:

<https://www.youtube.com/watch?v=DTAR8sfwyP0&list=PLIWGc0BIMJSDVLYepUgjult8r6pdUF7lF>

⁵⁹ Video example of *Layers of Fear*:

https://www.youtube.com/watch?v=3BARFQyWq_s

as seen in the documents, letters and newspaper cut-outs scattered around the painter's mansion. Unlike the two-dimensional spaces in *Braid*, the game world of *Layers of Fear* has a three-dimensional spatial construction of visual entities. A game artist can arrange these individual entities into various pathways that lead a player's eye and action. Equally, these arrangements can occlude or hide areas that require further exploration to uncover.

Figure 14, Screenshot from *Dead Space* (Visceral Games 2008)

Certain texts in the diegetic game world can convey a particular mood to the player. This involves the use of words that suggest emotions and thoughts. They do not have to be lengthy since long periods of reading can slow down the gameplay's momentum. Early on in *Dead Space*, a player is faced with wall graffiti that reads as "No God, know fear. Know God, no

fear.” The mere mentioning of, “God”, suggests a religious undertone that is later revealed in the *Dead Space* comic book prequel series (Antony et al. 2008). Furthermore, this phrase implies the sinister thought that was behind the hand that wrote it, which sets the stage for terror inducing encounters with undead hybrids of alien and human monsters. The most unsettling thought being that the physically distorted creatures were once conscious people.

Within this horror filled vessel, graffiti texts are static visual entities located in dimly lit areas. The fact that they are not easily discoverable by the player poses these texts as important and memorable messages. Choosing a typeface is a specific task and it may depend on either the intended mood or visual style of a game world. A game artist must consider these factors in order to create the desired effect. This effect is observable in the naturalistic handwritten text used to depict the graffiti on the USG Ishimura space vessel since a uniform typeface would appear as an illogical and inconsistent choice to simulate something handmade.

Besides the mood that text conveys, its ability to clarify is invaluable for the game world. This clarification can come from instructional texts that give a player hints or tips throughout the gameplay experience. The wall graffiti in *Dead Space* depicted the phrase, “cut off their limbs”, which is the most effective way to incapacitate and destroy the reanimated creatures. Another type of textual clarification is dialogue subtitles. Similar to the overlaid HUDs, they will be considered as diegetic entities in the visual game world. Subtitles commonly appear near the central bottom

area of the frame, which are derived standards taken from film and animation. Alternatively, it can be situated near the top of the frame and is evident in the dialogue intensive game world of *Dragon Age: Inquisition*. For the purpose of practicality, players are usually given the choice to enable or disable subtitling in the options screen.

Beyond clarification, there are video games that dedicate the entire gameplay to text and can be referred to as “text adventures” (Wolf 2003, 53). These types of game worlds are constructed by displaying descriptive texts on the screen, while players use the descriptions to visualise characters, events and locations in the realm of secondary worlds. Navigating through such worlds requires the input of commands, such as “go east” or “run away”. In addition, the inclusion of a limited amount of time to issue commands will create an active interaction between the player and a text-based game world.

Once more common, *text adventures* are now notably rare, but their presence is not completely gone. *Cypher*⁶⁰ (Cabrera Brothers 2012), is a contemporary example of this textually heavy design with the inclusion of minimal visual entities, most of which are motionless or simplistically animated. Undoubtedly, its main focus is still the descriptive texts that occupy more than half of the screen space. *Lifeline*⁶¹ (3 Minute Games 2016), a smartphone text adventure is another example of a contemporary texture adventure game.

⁶⁰ Video example of *Cypher*: <https://www.youtube.com/watch?v=VPdTQj4f4r0>

⁶¹ Video example of *Lifeline*: <https://www.youtube.com/watch?v=6G96MgeDm2Q>

Creating textual environments may appear to be a straightforward task since its visual game world is relatively simple when compared to other types of video games. However, a reduction of entities in the visual surroundings will require an artist to carry out precise selection and depiction, leaving no room for speculation. This is necessary due to the limited amount of visual cues that form the impression of a game world, which will be thwarted by the emergence of a vaguely relevant entity that may cause misdirection.

Text can also be utilised as a mode of communication between players. This is evident in multiplayer online games, where conversations occur through a chat window. *World of Warcraft* situated this window in the bottom left-hand corner of the screen and it is part of the HUD overlaid upon the visual game world. Various text colours are assigned to different channels of chat, which allows the player to distinguish the type of information that s/he is receiving from the online community. Besides conversing with other players, the chat window displays textual updates of the representing avatar's status. This is an automatic feedback triggered by the commands of the code written by game programmers.

The code is a part of the game world that cannot be readily seen, yet its existence is constantly felt throughout the gameplay experience. Code, a text that is made up of letters, numbers and punctuation, communicates with and through a computer to the player(s). It determines and regulates all interaction and visual elements in the game. This unseen text presents logic and infrastructure to the otherwise fragmented entities that have no

way of holding themselves together; including the elements of the basic world structure mentioned in chapter 2. With this infrastructure in place, an artist can begin the process of organising the fragmented parts into a cohesive visual game world.

Another part of the identity of a game world is its title and this is often included with a logo. A title is not strictly a text, but it is created with words and conveys meaning, which gives reason to consider its influence. In a sense, a title is the given name of a video game, forming the identity of its game world. This identity should resonate throughout the entire visual and gameplay experience. For instance, the horror-filled adventure in *Until Dawn*⁶² (Supermassive Games 2015) is titled as such to indicate that the characters must survive until sunrise to escape their terrible fate.

The visual depiction of a game world title usually veers towards the ornate. This is related to the fact that the titles are used as marketing materials to sell the video game and essentially, plain words do not seem to incite the potential buyer's eye. Simpler visual designs are still used to on titles from time to time when the game world itself reflects a comparable visual style, as seen in *Thomas Was Alone*.

Such creative decisions are primarily influenced by game artists, which emphasises the need to comprehend the countless nuances involving in the arrangement of visual entities in game worlds. These nuances are visually perceived by the player, highlighting the importance of the effects of visual

⁶² Video example of *Until Dawn*:
<https://www.youtube.com/watch?v=6G96MgeDm2Q>

perception. As noted in the first chapter, Gestalt theory offers such a perceptual framework. Therefore, the laws and principles of Gestalt theory will be examined for the possible applications within visual game worlds.

3.4 Visualising the ‘Game World’ with Gestalt

Gestalt theory was founded in 1912, by Max Wertheimer (Gordon 2005, 13). He discovered *phi-motion*⁶³, which occurs when movement is perceived without the need of a moving object and this is considered as “a special case of apparent motion” (Wagemans et al. 2012). Wertheimer continued his work with two other psychologists, Wolfgang Köhler and Kurt Koffka, to establish ways in which to study perception.

The origins of Gestalt theory’s name came from Christian von Ehrenfels, who published the paper *Über Gestaltqualitäten* (On the Qualities of Form) (Goldstein 2010). He “pointed out that if each of twelve observers listened to one of the twelve tones of a melody, the sum of their experiences would not correspond to the experience of someone listening to the whole melody” (Arnheim 1974). This particular observation of Ehrenfels established the central principle of Gestalt theory, which states that “the whole is different from the sum of its parts” (Gordon 2005, 18). Therefore, the entirety of a percept will be visually perceived distinctly from its individual parts.

⁶³ For more on Wertheimer’s discovery of phi-movement and the formation of Gestalt theory, see Ian E. Gordon’s *Theories of Visual Perception*, page 13 (2005).

Beyond its origins and founders, Gestalt theory was later applied into visual arts by Rudolf Arnheim in his book *Art and Visual Perception*:

It is generally admitted that the foundations of our present knowledge of visual perception were laid in the laboratories of the gestalt psychologist, and my own development has been shaped by the theoretical and practical work of this school.

(1974, 4)

The rationale behind this application into visual art can be found in the fact that seeing and perceiving are crucial conditions to experience visual art, bringing forth the notion that the unseen art work remains unheard of and in principle, not art.

Consequently, visual art should be gazed upon and as such is the criteria for visual perception to take place. During the process of perceiving, the entire composition exposes the artist's intention upon the viewer. These intentions are received and subsequently affected by an array of subjective factors such as the culture, education, location and personal inclinations of viewers (Arnheim 1974, 6). Regardless of this process, it is still plausible that a well organised arrangement, including visual game worlds, will coexist with or prevail beyond these subjective factors and explicitly express the intent of its creator.

Gestalt theory offers an approach to organise the complexities of visual perception and this begins with its central principle, which states that “the whole is different from the sum of its parts” (Gordon 2005, 18). This means that an arrangement “is so inherently unified that its properties cannot be derived from the individual properties of its parts” (Barry 1997, 42).

Pertaining to video games, this means that the accretion of visual entities is not equivalent to the entirety of the visual game world. Figure 15 depicts this perceptual phenomenon through the juxtaposition of *15a* and *15b*. The visual summation of *15a* is not perceptually equivalent to the whole of *15b* even though both versions consist of identical parts. This difference is further emphasised by the visual emergence of a simplified humanoid face through an intentional arrangement in *15b*. Hence, it is apparent that the compositional decisions significantly shape the whole.

Figure 15. Adapted from *Theories of Visual Perception* (Gordon 2005, 19)

On the subject of organisation, the mind should have an idea of the eventual outcome to facilitate the creation process. Without an objective, parts may appear visually ambiguous and unstructured, as portrayed in *15a*. This remains true even when ambiguity becomes the desired result, for it is still an intentional decision that requires thought. An exception from organising is found in abstract expressionism, which relies upon spontaneity to a certain degree.

Spontaneity as a method is less relevant when it comes to creating game worlds due to the fundamental structure of constructing a game. Essentially, “[g]ames are rule-based” (Juul 2005, 36) and this limits the freedom of creativity. Both the creator and player of the game must adhere to these rules, albeit in different ways. The major difference is in the fact that the creator (game designer) sets the rules that affect the creation process and players interact within the given boundaries of the game.

If the rules are not complied with, the game may become frustrating or unplayable. Take as an example the game, *Ori and the Blind Forest*⁶⁴ (Moon Studios 2015). It is designed as a single player video game. To change this rule will alter both the playing and visual experience. Presuming that two players were to embark on this particular video game together, they would have to share one controller (input device), one representative avatar and one journey. Unless the two players are clairvoyant or appropriately experienced, the fast pace coordination from moving, to jumping, to dodging, to the myriad of attack abilities will seem exceedingly difficult to perform synchronously. The two-minded Ori will have difficulty traversing through its game world fluidly and will require modification to its initial rules to properly embody two players. At this point, abiding by the single player rule seems to be the most effective option to play in the game world of *Ori and the Blind Forest*.

⁶⁴ Video example of Ori and the *Blind Forest*:
<https://www.youtube.com/watch?v=n0jIUSAik2k>

Beyond play, rules also affect the creation process of visual game worlds. Referring back to the basic world structure mentioned in chapter 2, tertiary worlds require visual entities to occupy the empty space and form some semblance of a world. These entities can be thought of as *parts* that combine into a *whole*, a visual game world. As such, the visual game world represents only one part that forms game worlds. However, this paper focuses on the creative process of game artists, which regards visual game worlds as the final whole.

Figure 16.

Applying the central principle of Gestalt theory on visual game worlds assumes that these worlds are more than the sum of their parts. Figure 16 illustrates this principle with a variety of circles, triangles, rectangles and quadrangles. Similar to figure 15, both *16a* and *16b* comprises of identical parts, yet differ in arrangement. When these parts are unintentionally placed, the outcome tends to appear either abstract or random, as illustrated in *16a*. In contrast, *16b* is arranged in a way that depicts a simplified representation of a game world environment that conveys the

sun, sky, floor, mountains and a humanoid character. Observably, the whole of *16b* deviates from the array of shapes and emerges as a visually perceivable environment, which is more than the sum of its parts.

This perceived environment is made possible due to an intentional organisation from the creator's mind, the secondary world, which stems from a human-centric point of view. This view is influenced by the fundamental way that humans experience the Primary World. Some of these fundamentals were mentioned in the basic world structure, such as space, visual objects and gravity. Comparatively, an avian viewpoint is a top-down perspective that conveys a different visual experience with the inclusion of the same fundamental elements. The benefit of viewing from an elevated angle is the removal of eye level obstructions and overlaps. Maps are portrayed in this manner to allow for optimal navigation in unfamiliar terrain.

Returning to Gestalt theory, its laws⁶⁵ of visual perception describe the manner in which perceptual organisation occurs within the whole. The classic gestalt laws discussed here are as follows: simplicity, figure-ground relation, similarity, proximity, good continuation, closure, symmetry, periodicity, common fate, past experience and parallelism. Additionally, newer developments in Gestalt theory, such as generalised common fate, synchrony, common region, element connectedness and uniform connectedness, are also included in this discussion (Wagemans et al. 2012).

⁶⁵ The word "law" is often interchanged with "principle". This paper will treat all perceptual tendencies as *laws* to keep the discussion consistent.

Beginning with the *law of simplicity*, it indicates that there is a tendency of perceiving the simplest structure in any given condition. Arnheim used *simplicity*⁶⁶ to represent the law of *prägnanz* (1974, 467), which translates into, “clear-cut, concise or succinct” (Gordon 2005, 18). The concept of simplicity is comparable to the description of a written summary that comprises of condensed information, making texts easier to read and comprehend. This suggests that the mind has a preference to acquire lucid perceptions in the most efficient way.

“Leveling” and “sharpening” are two concepts that allow for lucid simplification (Arnheim 1974, 66). *Leveling* is the reduction of complexities, favouring balance or symmetry to attain simplicity. Conversely, *sharpening* intensifies complexities, ensuring that the differences are distinctly perceivable. These two tendencies cannot occur concurrently. Instead, one prevails over the other, easing ambiguity into clarity.

Within the environments of a game world, ambiguity is inevitable, but not unmanageable. Visual entities forming the simulated environment should *level* or *sharpen* into the simplest possible arrangement. Perceptual simplification can also be achieved through a discernible *figure-ground relation* (ibid., 227). Most, if not all, visual game worlds are multi-layered, which draws the eyes inward, into the horizon⁶⁷. This is depicted in *10b*, which is layered with the sky, sun, mountains, ground and lastly, the main

⁶⁶ In line with Arnheim’s research, this paper will continue to refer to the law of *prägnanz* with the term *simplicity*.

⁶⁷ The typical horizon that divides the land and sky is not as easily distinguished in indoors or underground environments.

character. However, the relation of figure and ground presents only two layers and cannot fully encompass the multiplicity of these simulated environments. Alternatively, the many layers can be grouped into either figure or ground, depending on their level of interaction with the player. In doing so, a compromise is presented whereby the player and any intractable entities becomes the figure, and everything else is categorised as ground. This compromise is aligned with the figure-ground relationship since, “the surrounded surface tends to be seen as figure, the surrounding, unbounded one as ground” (ibid., 228).

Figure 17.

Beyond figure and ground, visual entities conform to several groupings that perpetuates perceptual organisation. Steven Lehar highlighted a number of Wertheimer’s laws of perceptual grouping, consisting of similarity, proximity, good continuation, closure, symmetry and periodicity (2012, 45). These laws are visually depicted in figure 17. Beginning with, 17a, it presents the *law of similarity*, whereby parts are perceptually connected through similar features. This differentiates the above configuration into groups of circles and groups of squares instead of grouping the parts in vertical configurations. 17b shows that the close

proximity of parts results in perceptual grouping and the opposite can be said for parts that are further away. Hence, the circles visually separate into two distinct groups, overriding the similarity of the size and shape. *17c* displays the **good continuation** of visual elements when they appear to relate in a sequential manner. It simplifies *17c* into a diagonal line and a curved path in place of the alternative of two pointed structures facing each other. The **law of closure** was mentioned in chapter 2. This law can also apply when the organisation contains separated elements and multiple gaps. *17d* portrays this with an organisation of circles and gaps that visually suggests the shape of a square instead of four separate groups of circles. *17e* exemplifies the **law of symmetry** through the balance of both halves on a central vertical axis. This axis can alter depending on the arrangement of visual elements. *17f* demonstrates the **law of periodicity**, where a group of circles is repeated at regular intervals, forming a recurring pattern that prevails from the alternative of perceiving this arrangement as zigzag lines formed by circles.

Apart from the laws emphasised by Lehar, the laws of common fate, parallelism and past experience are yet to be discussed. **Common fate** is observed when motion, direction and speed are present. Hence, visual “[e]lements that move together tend to perceptually group together” (Sekuler et al. 2001). When applied in a visual game world, common fate allows for players to identify the relationship of moving entities. For

example, the various units⁶⁸ in *StarCraft II: Wings of Liberty*⁶⁹ (Blizzard Entertainment 2010) move according to a player's command. If a unit diverges from the progressing direction of a group, it is visibly separated and it can be immediately rectified. This immediacy is crucial in this competitive video game, where one wrong move can lead to defeat.

Another tendency of perceptual grouping is *parallelism*, which associates parts that are aligned side by side in a continuous sequence. This law also applies to parts that are in parallel motion. Any visual entities which are not parallel, even with a minor change in angle, are perceptibly detectable. This can weaken the parallel association and result in the splitting of groups or even, isolation.

Until now, the gestalt laws discussed are said to be “innate” (Wagemans et al. 2012; Gordon 2005) perceptual processes, which have little to do with anything externally learnt or experienced. However, considering that a secondary world (perceptual world) is shaped through the passing of time, events and occurrences, it is impossible to ignore the existence and influence of memory.

⁶⁸ These are armies and workers that a player can create and upgrade to attack or defend from other competing players.

⁶⁹ Video example of *StarCraft II: Wings of Liberty*:
https://www.youtube.com/watch?v=fIMwj3NW_L4

[T]he utilizing of past experience for present action,—recognition, in short,—must take place in two different ways. Sometimes it lies in the action itself, and in the automatic setting in motion of a mechanism adapted to the circumstances; at other times it implies an effort of the mind which seeks in the past, in order to apply them to the present, those representations which are best able to enter into the present situation.

(Bergson et al. 1929, 87)

Observably, memory is not just a remembrance of the past. It is also an active component in the present, shaping the imminent future. This leads to the *law of past experience*, which emphasises on the prominence of familiarity.

I cннаot blveiee таht raednig tihs setnence si pssoilbe!

Figure 18.

Parts that are commonly seen together will perceptibly group together during subsequent exposures. In addition, past experience also operates when the usually associated parts are not in the same order, which is evident in figure 18. The letters of each word rearranged, with the exception of the first and last letter. This creates enough information for the brain to identify the already learnt words and comprehend them as a legible sentence.

Apart from past experience, Wolf's concept of the unconscious completion of the mind is also present here. The brain anchors onto the first and last letter, which follows by the filling in of gaps through the reorganisation of the shuffled letters into readable words. Undeniably,

there are deeper neurological reasons to explain this phenomenon, but that goes beyond the scope of this research.

Newer studies in Gestalt psychology have brought about some notable additions to the laws of grouping. Beginning with tendency of **generalized common fate** (op. cit., 1181), it can be seen as an expansion of the perceptual grouping of common fate. This means that beyond directional movement, common fated grouping extends to the alterations in visual features, most notably from luminance (Sekuler et al. 2001). This particular tendency is related to the grouping of similarity. However, the differing element from similarity grouping is the passing of time, which opens up an array of possible changes within a timed sequence. When changes are visually synchronised, the tendency of **synchrony** (ibid.) occurs. Unlike common fate or generalised common fate, these changes do not need to move in a similar path to portray togetherness.

The next perceptual grouping to be discussed is **common region** (ibid.), which requires visible boundaries. Hence, any visual entities located within a given confine will tend to be perceptibly seen as a group. For instance, farm animals in a fenced off area will visually congregate together and this separates from the free roaming animals outside the fence. This continues to apply when the bounded elements, are visually different.

Element connectedness occurs when parts are joined to one another (ibid.). The connection can be as simple as drawing a line to attach two or more separated parts. This is reminiscent of atoms held together by chemical bonds. Another form of connection is **uniform connectedness**

(UC), which states that the uniformity of features such as, colour, motion and depth, results in an organisation into a single entity (ibid., 1182). However, UC delves into the “initial organization” of an entity and has yet to be either fully acknowledged or disproved (ibid.).

Rudolf Arnheim himself did not go in-depth, if he did at all, into early organisational tendencies that occur before the entity is perceived as it is, part or whole. Following from Arnheim, this paper also does not intend to engage upon the topic of initial organisation. Returning to perceptual organisation, there are other organisational tendencies beyond the laws of perceptual grouping and they are, emergence, reification, multistability, invariance and amodal perception (Lehar 2002).

Figure 19.

Emergence is the identification of an image from seemingly ambiguous shapes. This is portrayed in figure 19, where the sum of all its shapes leads into the emergence of a sheep and lamb roaming across the countryside. Alternate arrangements of these visual elements will depart from the perception of this particular image. This tendency is visible in the stylised

game world of *Proteus*, which depicts explorable landscapes filled with animals, flowers, trees and abandoned architecture. When viewed individually, each visual entity in *Proteus* appears as vague forms and shapes that can only emerge as a complete visual game world when seen together as a whole.

This resonates with Gestalt theory's central principle of the whole being greater than the sum of its parts. **Reification** also has an emergent quality, but it reveals itself in a different manner. Essentially, this is the tendency of perceiving an entity without the existence of any visual stimulus within its bounding form. It is through the suggestive borders of surrounding elements that allow for this phantasm to perceptually reify.

Figure 20.

Visual perception appears to favour a single stable image that conveys certainty. Therefore, when faced with optical illusions, such as 20a, the Necker cube, in figure 20, the tendency of **multistability** becomes apparent. Sustaining the two states of 20a seems to be an impossibility, which causes every part to “shift to a different location in depth” (op. cit.,

51). However, multistability can be altered through the use of symmetry, which is demonstrated in *20b*. A simple rotation of the Necker cube creates visual symmetry. This introduces a certain level of stability into the duo-state optical illusion.

At this point, the tendency to simplify by *leveling* or *sharpening* is at odds with each other, for symmetry and depth are equally prominent in this particular arrangement. Hence, the influence of multistability is weakened, but not entirely removed. *20c* provides an alternative that strengthens the effects of symmetry and this is achieved by occluding the geometric centre of the entire configuration. This removes the perceived depth and can result in a stable symmetrical motif.

Invariance refers to the recognition of objects through their structural features regardless of various circumstances such as, rotation, scale, luminance, deformations and texture (ibid., 52). This is perceivable in origami⁷⁰, where entities can be identified from folded paper versions of the original. As mentioned before, a “gestalt” is an impression of things. Within impressions lie the general proportion, gestures and notable features of the world. A possible postulation is that these generalisations act as the distinguisher for the various possible condition of an object in three-dimensional spaces. Invariance may also be attributed to the recognition of visual elements in the game world despite the various art styles ranging

⁷⁰ This is the traditional Japanese art of folding paper. Many origami creations are inspired by the natural environment.

from the minimal, *Thomas Was Alone*, to the complex, *Beyond: Two Souls*⁷¹ (Quantic Dream 2013).

Amodal Perception is “the perception of spatial structure that is not associated with any particular sensory modality” (op. cit., 55). This implies that the perceived entity can be comprehended beyond what is available to the human senses. For example, a cup will be visually perceived to have a volumetric structure of a cylindrical hollowed body and a curved handle even when the surface in view is only a partial image. This is also tied into the influence of past experience for the cup can only be known as such if a complete image already exists in the mind. Therefore, amodal perception is strengthened by the reinforcement of the learnt object.

Until now, the discussion on Gestalt theory has developed a foundational basis to understand the premise of Rudolf Arnheim’s research on visual perception and visual composition. He did not specifically introduce all the above concepts in *Art and Visual Perception* and *The Power of the Center*, especially the newer perceptual tendencies. However, many of these tendencies appeared within his discussions and are also relevant for the analysis of the visual compositions of game worlds.

⁷¹ Video example of *Beyond: Two Souls*:
<https://www.youtube.com/watch?v=4tYZY5t5drY>

Chapter 4: Preconceived Standards of Creation

Rudolf Arnheim explored many art forms utilising the laws and principles of Gestalt theory. He structured his study with commonly used artistic concepts, such as balance, space, light, colour and movement (1974). In addition to these concepts, Arnheim developed an approach of using the influence of the “center” (1988) to analyse visual compositions. In fact, there are different types of centres that give dynamism to the human perceptual experience. There is the singular centre or the “centric tendency” (Arnheim 1988, 2), which represents a self-centred point. This is followed by the “eccentric tendency” (ibid., 2), referring to the additional external centres that competes with the *centric tendency*. These two concepts form a basic structure for analysing visual compositions.

A centre within a composition is induced through the *centric* and *eccentric* dynamics of the involving visual entities. These dynamics can also be affected by centres with “retinal presence”, (ibid., 14) which is created by “actual stimuli of shape, colour, or movement” (ibid., 228). Also, there are framed centres that are visually divided from any eccentric centres lying beyond its frame, balancing centres that arise from the dynamics of visual elements within an enclosed composition, and geometric centres that occur through the bounding outline of a shape or object (ibid.).

Amongst all the mentioned centres, there is also the perceived centre, which is a point or part that the viewer/player visually perceives at a specific moment. Therefore, the perceived centre is temporal in nature,

changing in time through the dynamics of other interacting centres and the preferences of the perceiver. These changes emphasises on the point that the visual perceptual experience is dynamic, which is a theme that Arnheim incorporated in both *Art and Visual Perception* (1974) and *The Powers of the Center* (1988).

Within these two books, Arnheim's main focus of study is on static works of art, but this is not to say that he did not touch on mobile art forms or, visual compositions in time. For example, he discussed the factors of perceptual movement, inclusive of the hierarchy of entities, motion, speed and direction. Furthermore, he commented that the perceptual experience of compositions in time is brought about by "events" (ibid.), a sequence of inciting moments that reflects upon the topics of time, fragments and memory in chapter 2.

These *events* can be measured by "crescendo or diminuendo, enlargement or constriction" (ibid.), suggesting a visual rhythm that is in constant transformation. The game world also transforms over time through the interaction of the player. More specifically, it is progression or a simulation of it. Within these visual transformations, there needs to be invariable elements that complement change, providing the impression of a consistent world. This is achieved through a standard, set by creators of a game world, guiding the entire visual creation process.

4.1 Genres & Subgenres of ‘Game Worlds’

The topic, invariable elements, refers to the preconceived standards mentioned in chapter 2. These standards are invented by the creators of a game world to provide the (art) direction for the creation and arrangement of visual entities into cohesive, consistent and convincing environments. Inventing, in this case, does not refer purely to the original invention for it can also be elements inspired and adopted from other existing game worlds. These worlds have distinct similarities that can be grouped together, resulting in the formation of various genres.

Video game genres are usually identified by their gameplay and narrative structure, which differs from how genres are understood in literature, film and animation. However, “some video games can be classified in a manner similar to that of films (we might say that *Outlaw* [1978] is a Western, *Space Invaders* [1978] science fiction, and *Combat* [1977] a war game)” (Wolf 2003, 115).

Before diving into the topic of genres in video games, it is pertinent to note that the notion of a genre is rather limiting since it cannot fully convey the complexities in every game world that is classified under its wing. The purpose however, is to impart an impression of what is to be expected. For a player, the consumer that pays for her/his entertainment, this may just be enough to incite a ‘yes’ or ‘no’ decision to engage or retreat from the playable journey. In the case of the creator, a genre provides an established formula that can be repeatedly used, executed with a twist or hybridised.

Mark J. P. Wolf created a list of forty-three genres⁷² that depicts the extensive diversity of games. Not every one of his stated genres applies to video games, such as the “Board Games”, “Card Games”, “Pencil-and-Paper Games” and “Table-Top Games”. Though, every game still has the potential to convey some semblance of a visual game world, be it through images, texts or numbers.

One of the more common genres classified by Wolf is the *Shoot ‘Em Up* or shooter genre, which can be further divided into subgenres including the *First-person shooter* and *Third-person shooter*. These types of subgenres have particular attributes that must be incorporated by the creators in order to fulfil the player’s expectations (Egenfeldt-Nielsen et al. 2013, 46). Such expectations are most likely formed through playing and experiencing other existing video games that are categorised under the same genre. These expectations are expressed through the visual, gameplay and narrative conventions of the subgenre.

*DOOM*⁷³ (id Software 1993) is an iconic example of the *First-person shooter* subgenre that contains attributes, such as the first person point of view in a fast-paced game world that visually appears to be three-

⁷² “Abstract, Adaptation, Adventure, Artificial Life, Board Games, Capturing, Card Games, Catching, Chase, Collecting, Combat, Demo, Diagnostic, Dodging, Driving, Educational, Escape, Fighting, Flying, Gambling, Interactive Movie, Management Simulation, Maze, Obstacle Course, Pencil-and-Paper Games, Pinball, Platform, Programming Games, Puzzle, Quiz, Racing, Role Playing, Rhythm and Dance, Shoot ‘Em Up, Simulation, Sports, Strategy, Table-Top Games, Target, Text Adventure, Training Simulation, and Utility” (Wolf 2003, 117).

⁷³ Video example of *DOOM*: <https://www.youtube.com/watch?v=8mEP4cflrd4>

dimensional⁷⁴. It also features a multitude of hostile NPCs that a player can shoot to kill with an assortment of weaponry. The uniqueness of *DOOM* is found in its science fiction/horror theme; whereby hellish demonic creatures are unleashed on the planet Mars. Any player familiar with *Doom* will naturally expect other *First-person shooter* video games to incorporate similar attributes, gates of hell aside. Presumably, the players' expectations sustain the genre.

One major group of game worlds that Wolf did not include within his extensive list is the *Action* genre. This omission might be caused by the word 'action' itself since any intensive and fast-paced video game can be potentially grouped into this particular genre. It will cause many of Wolf's identified categories to potentially fuse together. For example, the "Combat", "Escape", "Fighting" and "Shoot 'Em Up" (2003,) categories could have easily been subgenres of the *Action* genre.

In the book, *Understanding Video Games*, a system consisting of four broad categories are proposed and they are, "Action Games", "Adventure Games", "Strategy Games" and "Process-oriented Games" (Egenfeldt-Nielsen et al. 2013). This is a simplified system that utilises the "criteria for success" during gameplay to distribute game worlds into the four different genres (ibid., 47).

An issue with these broad genres, in the context of creating visual game worlds, is that they do not convey enough information or conventions that

⁷⁴ In *Doom*, this three-dimensionality is achieved with two-dimensional graphic projections. Hence, it is not fully three-dimensional.

can be used as a guide during the creation process. Matters are not improved by using Wolf's extensive list of genres since the diversity attenuates any established formulas. The clearest direction genres can offer to a game artist is the subgenres themselves, such as a *First-person shooter* video game described above.

Another example of how genre defines the conventions of play, design and narrative is found in the *Real-time strategy* (RTS) subgenre, which originated from the *Strategy* genre. It includes features of "continuous time" (ibid., 49) that results in environmental transformations, resource management, building bases and creating an army of units⁷⁵ to attack and defend the base, as seen in *StarCraft*⁷⁶ (Blizzard Entertainment 1998). Using these features, a game artist can deduce certain problems during creation.

One such problem is the visually identical units in the army clusters owned by multiple players. The similarity of all units' shape, no matter how simple or complex, will cause perceptual confusion when players battle against each other. For the game artist, this is an issue that can be solved visually. According to Arnheim, "shapes are a more reliable means of identification and orientation than colour" (1974, 335). However, when shape is no longer an option for distinction, the use of colours becomes a viable solution. *StarCraft* implemented this solution by providing a player with an identifying colour, for example blue. This produces units that are

⁷⁵ Refer to footnote 68, page 72.

⁷⁶ Video example of *StarCraft*: https://www.youtube.com/watch?v=93A-LpzD6L8&list=PLo6dUe-n7Er-0POryUIWuF0SB28Lso_LG&index=3

accented with blue, which differs from other players. Even with the flurry of similar moving shapes on-screen, players will recognise their armies through the colour.

Creating solutions is in line with the game artist engaging in problem solving to construct the environments, brought up in chapter 3 (page 31). This emphasises the need for visuals to function with the game's design. Part of this design is inferred from an established genre/subgenre with distinctive features that informs the artist. Beyond the generalised guide that genres/subgenres provide, the visual game world requires other factors to set a standard for the creation process. The following standards, spatial dimensions, theme, time period, visual style, and storytelling, will be further discussed using the basic world structure and also various visual entities in the simulated environments.

4.2 Simulated Spatial Dimensions in the Frame

Space, an element of the basic world structure, is also vital to the portrayal of visual game worlds. These simulated spaces are experienced within a frame through the passing of time, breaking up the entirety into visually perceivable pieces. When perceived, this broken spatial sequence is once again completed in a secondary world, the player's mind. In fact, it is impossible for humans to comprehend the totality of a game world by experiencing a single moment, which validates the frame as a limiter, pacing the unfolding of simulated space and time.

Rudolf Arnheim labelled this bounded space as an “enclosure”, which was a term coined by Kevin Lynch (1988, 52). This *enclosure* usually surrounds a space that forms the geometric shape of a horizontal rectangle. The edges of this shape “create by induction a center in the middle of the enclosure” (ibid.). Such a centre is founded in geometry (geometric centre), which can vastly differ from other centres perceived in visual game worlds. It is pertinent to note that the multitude of centres is a result of each identifiable visual entity being bounded by its own enclosure within the frame and inevitably inducing its very own centre.

A way to understand the dynamics of these various centres, mentioned at the beginning of chapter 4, is to use Arnheim’s concepts of, “forces”, which are psychological in nature (1974, 11) and they act like “vectors⁷⁷” displaying “magnitude, direction, and base of attack” (op.cit., 229). A centre exists within each and every visually perceived entity, which forms multiple competing centres radiating their own *vectors*. These competing relationships are then the *eccentric forces* affecting and interacting with the centric system.

Applying these concepts into visual game worlds, the player is a self-centred being that needs to survive challenges and attain goals. Hence, a player represents the centric tendency in simulated environments. Following this, the centric player gazes upon a screen that essentially acts as a frame that defines the boundaries of the game world. Within this

⁷⁷ A simple way to visualise a *vector* is to imagine the trajectory of an arrow, beginning from its point of origin, travelling in a path and ending in its intended position.

frame exists the framed centre; which is also the geometric centre of the frame's geometry.

The player's centre of attention within the frame can be considered as a major focal point. This focal point should represent the entity of the highest importance, which is typically the player's representing avatar, her/his agent of expression in simulated spaces. With such importance, the avatar assumes a dominant role that drives the visual composition, overriding or overlapping with the framed and geometric centre of the screen.

For instance, a game world that is in a first person point of view will feature a centre that overlaps with the framed and geometric centre. There are two reasons for this. Firstly, the representing avatar is not directly in view and does not visually compete with the composition within the screen. Secondly, the first-person view, as depicted in figure 7, consists of a flow of movement that originates from a particular point that expands outwards and beyond the screen, affecting every diegetic visual entity. This point coincides with both the centre of the frame and geometry, which creates this overlying of centres. Such a situation presents a very distinctive system of perceptual forces that creates a highly stable focal point for players.

When a representing avatar is simulated within the frame, it becomes an entity that has *retinal presence* (Arnheim 1988). The movements, colours, shapes and gestures of the avatar provide a certain extent of its presence. However, within a game world, the connection in which the centric player has to her/his representing avatar through interaction and

response creates this compelling visual bond that identifies a visually present avatar as the focal point, emanating centric forces. This also means that the avatar is often the perceived centre throughout the time spent on gameplay.

In terms of spatial relations within the frame, the avatar is generally located in the foreground, or the figure of the *figure-ground relation*. The centric forces of the avatar are affected by other visual entities existing on the same plane. These entities, usually NPCs, emit their own vectors that transmit forces, revealing the eccentric interplay of competing centres. However, the manner in which the centric and eccentric forces interact within the simulated environments is dependent on the space. In turn, it is the very entities themselves that radiates the forces, evoking the player's perception of the depth of a visual game world.

A game artist usually approaches the creation of visual entities with a basic choice of either two or three dimensions⁷⁸. This choice is affected by the intended visual style that is determined during the preproduction stage of the creation process. There are visual game worlds that consist of both two and three-dimensional entities, as seen in *Outland*⁷⁹ (Housemarque 2011), where the avatar and NPCs are three-dimensional and the surrounding environments are constructed with two-dimensional entities. Such hybrids depict the ingenuity of the creative mind, blending entities

⁷⁸ The terms “two dimensions” and “three dimensions” are used to describe the dimensional quality of the individual visual entities created by game artists. They in no way refer to the final appearance of a cohesive visual game world.

⁷⁹ Video example of *Outland*: <https://www.youtube.com/watch?v=Gz4mngkdWJs>

with differing spatial dimensions to bring forth the artistic vision. From this point, ‘compounded dimensions’ will be a term used to refer to anything in a game world that has a blend of more than one type of dimensionality (one, two and three), which includes visual entities, simulated spaces and gameplay.

Apart from the spatial qualities of the entities, the spaces in visual game worlds are portrayed in a variety of structures. Mark J. P. Wolf presented a study of the various spatial structures found in video games, with the focus of finding relations to filmic space as mentioned in chapter 1. Wolf started out with “No visual space; all text-based”, which was discussed earlier in chapter 3, as a textual game world that contains little to no visual imagery. It followed with “One screen, contained”, “One screen, contained, with wraparound”, “Scrolling on one axis”, “Scrolling on two axes”, “Adjacent spaces displayed one at a time”, “Layers of independently moving planes (multiple scrolling backgrounds)”, “Spaces allowing z-axis movement into and out of the frame”, “Multiple, nonadjacent spaces displayed on-screen simultaneously”, “Interactive three-dimensional environment”, and lastly, “Represented or “mapped” spaces” (Wolf 2003, 53-70). In total, he identified eleven types of spatial structures occurring in game worlds and they have been known to appear in various combinations.

Wolf’s explanation of the spatial structures provides a game artist with a basic idea of how the different simulated spaces are interacted with. It also displays the various representations of spatial movement. However, these structures do not clarify gameplay. It ignores the influence of a

player's avatar within the bounding frame. Without acknowledging the representing avatar, visual compositions in simulated spaces lose their focal point, which is a point of reference to inform on the organisation of visual entities. This can cause conflict with the consistency of spatial dimensions in visuals and gameplay. Thus, Wolf's examination of simulated spaces in the video game medium is useful, but insufficient for the purposes of creating visual game worlds.

Another analysis of spaces in game worlds returns to an earlier discussion about compounded dimensions, whereby the spatial dimensions in game worlds differ due to various factors. There are two main factors with compounded dimensions and they will be separated into ***game play space*** and ***visual space***. The gameplay space represents the degree in which a player is allowed to move in the game world and it occurs in one, two, three or compounded dimensions. This is followed by the visual space, which indicates the spatial dimensions of the simulated environment in two, three or compounded dimensions.

In the *Evolution of Spatial Configurations in Videogames*, simulated spaces in game worlds are examined with three concepts, “cardinality⁸⁰ of gameplay”, “cardinality of the game world” and lastly, “discrete” and “continuous” segmentation (Fernández-Vara et al. 2007). Starting with the *cardinality of gameplay*, it points to the gameplay space and the *cardinality of the game world* is in line with the visual space. Following from this, the

⁸⁰ The term “cardinality” refers to “the number of axes that the player can use to move entities around. (X, Y, Z), i.e. side to side, up and down, back and forth” (Fernández-Vara et al. 2007, 160).

discrete and *continuous* segmentation refers to the sequence of spatial presentations on a display screen. A *discrete* method can be described as spaces divided by the borders of the frame, where the progression to each area requires a visual transition to support the switching of spaces, as seen in *Machinarium*⁸¹ (Amanita Design 2009). The *continuous* method refers to uninterrupted simulated spaces and this is observable in *Minecraft*.

These three concepts were combined to produce a list of spatial configurations, so that the visual space is two-dimensional, movement in the gameplay space is one-dimensional (movement is only along one axis) and the spatial presentation allows us to view objects through the discrete segmentation. As an example, in *Worlds in Play* (2007, 159-168), other identified spatial configurations can be found. Continuing from this, the three concepts allow the game artist to recognise the type of spatial dimensions of visuals functioning with gameplay and how this spatial sequence is presented through time.

In spite of this, there are other spatial factors that the game artist needs to consider and they were not examined by Fernández-Vara et al. or Wolf. For instance, the location of the player's avatar determines the way the spaces in a game world are framed and experienced. Without including this information in a specific spatial structure, the game artist cannot ascertain the player's focal point and this greatly hinders visual composition.

⁸¹ Video example of *Machinarium*:
https://www.youtube.com/watch?v=LbNoM_5jKXE

Another issue arises from the use of isometric perspective to create visual game worlds, which is a method of simulating three dimensionality using two-dimensional entities. It is created with *obliqueness*, which “is the most elementary deformation of shape resulting in depth perception” (Arnheim 1974, 264). At times, the isometric perspective is referred to as two and a half dimensions, which is a terminological compromise that only serves to confuse and will not be used in this paper.

Figure 21, Screenshot from *Q*bert* (Gottlieb et al. 1982)

Over the years, isometric game worlds evolved from its two-dimensionality, alongside the advancing technologies, into a spatial structure that can be depicted with two or three-dimensional entities and visual spaces. Examples of these differing isometric environments are

*Q*bert* (Gottlieb et al. 1982), depicted in figure 21, and *Diablo III*⁸² (Blizzard Entertainment 2012). Isometric spaces can also be observed in the compounded game world of *Transistor*⁸³ (Supergiant Games 2014).

With consideration to these variations, the status of isometric spaces seems dimensionally ambiguous. Furthermore, the stating of the spatial dimensions of a visual or gameplay space does not give any indication towards the presence of the isometric space. For a game artist, such clarification of spaces is required not only to effectively create and describe the visual game world, but also to define the parameters and from there, find alternatives to further develop the vocabulary of visual game worlds.

Subsequently, the isometric dimensions should be categorised separately into two-dimensional isometric and three-dimensional isometric. This can be added to the two dimensions, three dimensions and compounded dimensions. The combination of these five classifications of spatial dimensions will serve as a clearer method to categorise the dimensional variations of visual space.

4.3 Solutions for Spatial Dimensions in the Frame

In light of the issues and solutions, this research proposes a collated framework consisting of five factors⁸⁴ to analyse spaces in visual game

⁸² Video example of *Diablo III*:

<https://www.youtube.com/watch?v=OP8rqtOKrwE&list=PLIfdb2Vlbf0TU0Dma9tSRiDCDp7gRYg38&index=2>

⁸³ Video example of *Transistor*: <https://www.youtube.com/watch?v=gRHsdfkYkY>

worlds for the purposes of game artists, and they are as follows: visual space, gameplay space, visual entities, avatar's position and spatial presentation. The first factor is *visual space* and the way to analyse these spaces in game worlds is touched on above. Next, *gameplay space* is defined by the X, Y and Z axes.

One-dimensional gameplay occurs on one axis, either X or Y. This is observable in the smartphone game *Ridiculous Fishing*⁸⁵ (Vlambeer 2013), whereby the fisherman, Billy, casts his line as deep as he can and reels it back up to collect his catch. Two-dimensional gameplay includes movement in both the X and Y axes, which can be experienced in the pixelated world of *Superbrothers: Sword & Sworcery EP*⁸⁶ (Superbrothers et al. 2011). Three-dimensional gameplay extends to all axes, X, Y and Z. This type of gameplay happens in *Silent Hill: Downpour*⁸⁷ (Vatra Games 2012), where a player explores the mysterious environments to solve puzzles and escape the inescapable manifestations of the representing avatar's innermost thoughts and fears.

The next factor is *visual entities* and as discussed earlier, it is usually created in two or three dimensions, or a combination of the two. The entities do not exactly determine the spatial dimensions of the visual game

⁸⁴ These factors are partially constructed with concepts developed in *Evolution of Spatial Configurations in Videogames*, Wolf's analysis of spatial structures in game worlds and theories of Rudolf Arnheim.

⁸⁵ Video example of *Ridiculous Fishing*:

<https://www.youtube.com/watch?v=OskUmv2XAkY&t=56s>

⁸⁶ Video example of *Superbrothers: Sword & Sworcery EP*:

<https://www.youtube.com/watch?v=noxtJhglkUQ>

⁸⁷ Video example of *Silent Hill: Downpour*:

https://www.youtube.com/watch?v=_g5Q2cdFaug

world, but are essential for the depiction of environments in an otherwise empty space. The main purpose of entities is to depict the extent of a game world. It is achieved through environmental layouts that reveal visible pathways, affording the player's actions and movements. In contrast, pathways are visually perceivable due to simulated barriers, such as fencing, walls or a deep body of water. These barriers are limitations that render the open spaces as inviting areas for the avatar to tread on.

With the added factor of time, visual entities move and react within the paths in a visual rhythm that displays the interplay of eccentric forces. When the forces of eccentricity work together, they can become strong visual indicators that lead a player in the direction desired by the game world creator. "It is in the nature of sequences in time that the eccentric principle of vectors moving in a given direction dominates the structure" (Arnheim 1988, 213), controlling the individual forces of centricity originating from each visual entity.

Within the world of *The Elder Scrolls V: Skyrim*, the eccentric forces produced by various entities in the environment can subtly and artfully direct players. This is observable in an early scene that occurs after the representing avatar's escape from a dragon's attack. At that point, the player is encouraged to travel down the mountain, towards Riverwood, a nearby village. This is when the visual entities in the environment begin to lead the player in the direction towards the village; the most obvious being the meandering dirt path down the mountain and the river nearby that flows directly to Riverwood. Along the dirt path, the player will encounter

wild life, such as deer, dogs and foxes, which are mini occurrences that visually reward the player for moving in the right direction.

Applying this naturalistic method of consolidating the forces of eccentricity into a directional unison negates the need to restrict the player's freedom of exploration. It also masks the creator's intension within the simulated environments, resulting in a convincing visual game world. This is not to say that all genres/subgenres of video games should utilise this particular approach.

Simulated environments are also affected by the spatial dimensions of visual entities. An artist can create two or three-dimensional visual entities or combine the various spatial dimensions in a visual composition. The choice of dimension(s) informs the artist in the method of their construction. It also demystifies visual game worlds by laying out the necessary parts that allow for their completion. For example, in the game world of *Fez*⁸⁸ (Polytron Corporation 2012), entities may initially appear as two-dimensional constructions, but this notion is immediately altered by the fact that the structures and platforms rotate three-dimensionally in the visual space.

This is where the idea of 'compounded dimensions' applies, since the term indicates to the game artist that the particular environments are built with entities of more than one type of spatial dimension. Without this identifying term, explaining and understanding the construction might

⁸⁸ Video example of *Fez*: <https://www.youtube.com/watch?v=uZ39jyBdfX0>

become tedious tasks to undertake. Furthermore, this term is especially useful when it comes to avoiding confusion with game worlds that consist purely of either two or three-dimensional visual entities.

Similar to visual space, visual entities are also affected by the spatial dimension, be it two or three-dimensional or isometric. Almost all diegetic entities within an isometric visual space are affected by the oblique angle, apart from the UI. *Bastion*⁸⁹ (Supergiant Games 2011) illustrates this with an overlaid HUD that is translucent in certain areas. This ensures that the simulated environments are not visually obstructed.

Taking the close relationship of visual space and visual entities into account, both of these factors can assume the two-dimensional isometric and three-dimensional isometric classifications. However, visual entities should have an extra category, which is the compounded isometric. This can be used to describe the blend of two and three-dimensional isometric entities in the visual space. *Transistor* is one such game world that achieved its unique visual style through the combination of various dimensional entities.

An ***avatar's position*** (focal point) in a game world is the forth factor in the proposed framework to analyse the spaces in visual game worlds. The position provides a sense of how the environments are framed, which greatly affects a player's visual perception of the simulated spaces. The framing of an avatar can range from full bodied to half bodied to an

⁸⁹ Video example of *Bastion*: <https://www.youtube.com/watch?v=YnuLZavAW1g>

existence that is beyond the frame. A full bodied and half bodied framing will require visual compositions that incorporate the avatar's form in the environment due to their *retinal presence*. Conversely, an avatar that is situated beyond the frame, in the first person point of view, results in an unobstructed experience that closely relates to the way humans visually perceive the Primary World as noted in section 4.2.

These differences affect the scale of visual entities in the environments and by extension, the scale of the spaces that the environments exist in. For example, the avatar in *Hyper Light Drifter*⁹⁰ (Heart Machine 2016) is fully in frame and approximately one tenth of the screen's height. His miniature size causes the surrounding visual entities to scale accordingly to create a consistent game world. In contrast, *Assassin's Creed Rogue*⁹¹ (Ubisoft 2014) presents an avatar that generally takes up more than half of the screen's height, resulting in visual entities that appear larger in scale when compared to those found in the game world of *Hyper Light Drifter*.

In terms of the avatar's position as the dominant point of centrlicity within the interplay of eccentric forces in a visual space, the player's actions become the central force that compels the visually perceived rhythm. Game worlds with a two-dimensional visual and gameplay space have a visual composition that is considerably easier for an artist to create balance, when compared to the three-dimensional options. The rationale

⁹⁰ Video example of *Hyper Light Drifter*:
<https://www.youtube.com/watch?v=WCb84PDRYWc>

⁹¹ Video example of *Assassin's Creed Rogue*:
<https://www.youtube.com/watch?v=TJR1FruXSWM>

behind this is that three-dimensional spaces are visually experienced in multiple angles through a sequence.

Balance in simulated environments does not conform to the usual notion of harmony since the game world is in constant motion, or as Arnheim puts it, “is a flow of transformations, during which its center moves from place to place” (1988, 214). Therefore, the avatar’s location can be used as a consistent centre that the moving entities surround, grounding this *flow of transformations*. In doing so, a visual relationship is formed, whereby the centricity of the player’s representing avatar either opposes or supports the eccentricity of the environment.

Lastly, the fifth factor is the ***spatial presentation*** of progression through the simulated environments in a game world. The *discrete* and *continuous* segmentation of spaces were examined earlier. However, inferring from the variety of game worlds, the presentation of spaces should also have a greater diversity. Referring back to Wolf’s analysis of spatial structures in video games, he brought up three other ways to present simulated spaces. They are the single screen, split screen and wraparound (2003). As mentioned previously, video games with spaces confined to a single screen do not have enough elements in it to be considered as a substantial game world for an in-depth study. Nevertheless, the single screen space is an option that an artist must be aware of in the contexts of spatial presentations and the supposed boundlessness of creative conceptions.

The split screen denotes a divided screen with two or more points of view within the frame. Figure 8 (page 36) depicts an uneven division of the screen's space. This unevenness relates to the fact that it is a single player video game. For multiplayer game worlds, the screen divisions are usually equal, with either a horizontal or vertical partition through the geometric centre, as seen in *Halo: Reach*⁹² (Bungie 2010). In doing so, the frame space will contain two points of centrality and each point encompasses the intentions of its player. The Nintendo DS and 3DS are handheld consoles incorporating two screens that essentially split the spatial presentation of the game world into two sections. It drastically changes the way a player interacts with a visual game world by involving a constant switching of focal points from events occurring in different screens.

The third and last method of spatial presentation to be discussed is the wraparound. "This is a feature of 2D spaces, by which when an entity reaches the limits of the game world, it reappears on the opposite side" (Fernández-Vara et al. 2007, 162). *Pac-man*⁹³ (Namco et al. 1980) is one such example that provides the illusion that the edges of the frame are connected, creating a spatial loop. A wraparound can also be considered as a variation of the single screen spatial presentation (Wolf 2003, 56), which denotes a limited game world. To a game artist, such limits can be a

⁹² Video example of *Halo: Reach*:

https://www.youtube.com/watch?v=_TjCk8jxBgA&index=3&list=PLDfrsfmqhSRb6dNXGF2bfBGJ4dSYg02-i

⁹³ Video example of *Pac-man*: <https://www.youtube.com/watch?v=dScq4P5gn4A>

challenge to creatively and conceptually overcome, especially with the added wraparound feature, removing the need for visual transitions.

A game artist can utilise these five factors to understand the spatial dynamics of playable and simulated worlds, game worlds. It should be noted that the final composition in time, with consideration to the five factors, will perceptually assume a two or three-dimensional appearance regardless of its compounded nature. This is due to the *law of simplicity* that governs depth perception, causing the simulated world to stabilise into its simplest spatial structure (Arnheim 1974, 248). The visual entities within these spaces must present a cohesive arrangement despite the complexities of the spatial dimensions. This coherence is achieved by first establishing a theme, time period and visual style before proceeding into the creation of visual entities.

4.4 The Theme, Time Period & Visual Style

To standardise the process of entity creation, a game artist can utilise several techniques observed from other existing visual game worlds and this begins with a theme. A few examples of game world themes are fantasy, horror and science fiction. In fact, the word “theme” is comparable to the genres of literature and film. However, video games genres mainly indicate the type of gameplay that takes place in a game world as aforementioned. There are exceptions, such as the *Survival Horror* subgenre, which expresses a mixture of gameplay and theme. This may present itself as a complication with genres/subgenres, which is explored in

Video Game Genre, Evolution and Innovation (Arsenault 2009). It is however, a topic of discussion that goes beyond the objective of this paper.

Instead, the focus is on the types of themes and their portrayals as visual game worlds. To do this, one must view game worlds as “fictional worlds” (Juul 2005, 122). A *fictional world* then, is imagined and incomplete (Wolf 2012 and Juul 2005). The incompleteness is conceptually parallel to the fragmented nature of visual perception and memory, which in turn reflects upon the fragmentation of secondary and tertiary worlds. Furthermore, it is logically impossible for creators (artists) to invent and specify the totality of a *fictional world*. Hence, a theme envelops the fragments, giving a commonality that builds a visually consistent game world that eases the player’s mental process of the unconscious completion.

General themes can be observed from the already established genres. This is seen in Dominic Arsenault’s exploration of video game genres, which identified certain categories, such as horror, cyberpunk/dark science fiction, detective/mystery and adventure (2009). Similar themes can also be observed from Wolf’s discussion of genres. However, these categories are insufficient to express the wide thematic range of visual game worlds.

In *Building Imaginary Worlds*, Wolf examined the history of fictional worlds⁹⁴ (2012). The fundamental elements used to construct this type of worlds are characters, objects and locations, which can be observed in various classical narratives. Fiction begins with the *other* world, a place

⁹⁴ Wolf termed these worlds as “imaginary worlds”, but it is conceptually similar to Juul’s fictional worlds. Therefore, both terms will be used interchangeably in this research.

where fantastical *myth and legends* are born; gods, demons and the afterlife. In the *God of War*⁹⁵ series (SIE Santa Monica Studios), Greek deities were depicted as divine beings, with abilities beyond mere mortals. As a twist, the game world creators pit the fury of a single Spartan man against these gods.

Other worlds are created to fill in the gaps of the unknown. This is evident through the dichotomy of good and evil, found in Greek and Roman mythology, the Chinese tian tang (heaven) and diyu (hell) or Christianity's concept of heaven and hell. An interpretation of *The Divine Comedy* (Alighieri & Ciardi 2003) is seen in *Dante's Inferno*⁹⁶ (Electronic Arts 2010), where Dante is characterised as a crusader that delves into the other world, the depths of hell to rescue the soul of his deceased fiancée, Beatrice. This journey brought him into different levels, each one symbolising a particular sin.

Departing from the other world, gaps of the unknown gradually ceases and is replaced by gathered proofs and facts as humans walk the Earth, scale mountains, cross desserts, sail the seas, dive into the depths of the oceans, take to the skies and commence space travel. This ushers in the notion of the *adventure*, resulting in the discovery of faraway places, strange beings and creatures. The adventurer in the eccentric game world is represented by the player's representing avatar.

⁹⁵ Video example of *God of War III*:
<https://www.youtube.com/watch?v=neil8QXUp0I>

⁹⁶ Video example of *Dante's Inferno*:
<https://www.youtube.com/watch?v=yH9yNpPi41c>

*The Legend of Zelda: A Link Between Worlds*⁹⁷ (Nintendo Entertainment Analysis & Development et al. 2013) features this adventuring avatar that travels to new and different environments, solving puzzles and defeating hostile NPCs and bosses in dungeons. The overarching element of the adventure game world is the narrative, delivered to the player in segments throughout “play time” (Juul 2005). In a sense, the story itself is a part of the forces of eccentricity in a game world, negotiating with the avatar’s dominance within the visual game world.

Moving on from the adventure and returning to society, to utopic and dystopic worlds. *Utopia* embodies perfection, while *dystopia* represents the opposite, the flawed (Wolf 2012). These game worlds differ from the adventure in terms of the impact of the presence of a sizable population. It switches the uncharted lands and spaces into established civilisations, with “social and political structures, government, religion, education, customs, and routines of daily life” (ibid., 88). Utopias can transition into dystopias and this is portrayed in *BioShock*⁹⁸ (Irrational Games et al. 2007), an idealistic underwater city housing the greatest minds including artists, scientists, engineers and thinkers. Inevitably, everything fell into chaos and disarray, largely due to ungoverned human experimentations and biological modifications.

⁹⁷ Video example of *The Legend of Zelda: A Link Between Worlds*:
https://www.youtube.com/watch?v=Td9O0TJCPUY&index=2&list=PLA-m5rcd0REcdTZGv9Lw1QGW-pPb68S_Z

⁹⁸ Video example of *Bioshock*:
<https://www.youtube.com/watch?v=tMwBSahQHR8&t=26s>

In general, the surroundings of a utopia/dystopia should be visually different from the environments discovered during an adventure. Utopic game worlds are modified cityscapes, made to perfection. Then again, perfection is a subjective view dependent upon the mind that conceived it. Similarly, a dystopia reflects a man-made world, but one that lies in shambles. In contrast to this, an adventure leads to lands of the unknown, places untouched by people and civilisations. For example, *Tomb Raider*⁹⁹ (Core Design et al. 1996) brings players into jungles and tombs that were long forgotten.

Another theme that relates to civilisation is ***Science Fiction***. The main notion behind this theme is the infinite outer space that can possibly sustain (intelligent) life apart from human beings. This may also be driven by people's propensity to desire extra-terrestrial contact. Therefore, this desire gazes into the future, with imaginations of aliens, starships, self-aware robots/androids, space travel, time travel, the apocalypse, post-apocalypse, steampunk and cyberpunk.

Many visual game worlds also display the influence of science fiction, beginning with *Spacewar!*¹⁰⁰ (Russel et al. 1962), which is the earliest space themed video game. A more contemporary alien related game world is *Alien: Isolation*¹⁰¹ (Creative Assembly 2014) and it is based on the *Alien* film franchise. This game world is actually a hybrid of the science fiction

⁹⁹ Video example of *Tomb Raider*: https://www.youtube.com/watch?v=LCO8R_qZ-cA

¹⁰⁰ Video example of *Spacewar!*: <https://www.youtube.com/watch?v=Rmnb4Hktv7U>

¹⁰¹ Video example of *Alien: Isolation*: https://www.youtube.com/watch?v=Vdzz_cPTsqo

and horror themes, resulting in a terrifying, outer space related visual and gameplay experience.

Mass Effect (Bioware et al. 2007) is a game world that is set in the distant future, where space travel has progressed due to the discovery of advance alien technologies. One of the distinct events in *Mass Effect* is when the artificial intelligence named, the geth, became sentient, causing a devastating war between the creators and the creations. Such a game world requires visualisations that function for the purposes of situations occurring in the future.

Game artists must predict these inventions not only for humans, but also for a variety of alien life forms. A common priority is to create beings portraying intelligence and separating them from alien beasts. Perceptually, any characters reflecting the bodily proportion of humans will naturally come across as self-conscious existences, as presented in the variety of humanoid-looking alien races in the world of *Mass Effect*.

Apart from the influences of science fiction, ***fantasy*** is another prevalent theme in many visual game worlds. It does not require scientific facts to explain its fantastical nature. Instead fantasy is defined by the unreality of magic and folklore, shaped by the creator's secondary world, into a variety of visuals in simulated spaces. These varieties include medieval fantasy, high fantasy, low fantasy, dark fantasy, urban fantasy, fairy tales, the supernatural and paranormal.

The world of *The Elder Scrolls* series contains medieval fantasy races, such as the orcs, elves, kahjiits (feline humanoid) and argonian (reptilian

humanoid). These races have their places of origin, histories and abilities that must correspond to their visage. Furthermore, the appearances should be perceivably distinct to ensure that the races are visually identifiable and to avoid ambiguous situations.

A game artist can use Primary World defaults to construct these characters. For instance, the reptile-like argonians are based on lizards, in terms of facial features, colouration, textures and bone structures. Additionally, there are known conventions, such as the defining characteristic of elves, the pointed tip ears, which an artist must be aware of in order to create faithful representations.

Another visual requirement in fantasy themed game worlds is the depiction of magic, which is different from magic tricks and illusions in reality. Wizards, witches, necromancers and warlocks summon these supernatural forces that supposedly break the laws of physics. A general method of portrayal is to combine light beams and sparks into a focused area within the gestures of its summoner. Magic is also derived from the elements of nature inclusive of fire, water, air and earth. This can be utilised by an artist to visualise the malleable forces.

*Year Walk*¹⁰² (Simogo 2013) is a hybrid of fantasy and horror, fusing Swedish folklore and mystery into a visually harrowing journey. Introducing the **horror** theme into any game world should involve a particular atmosphere and mood. It is a play on one's fear, brought about

¹⁰² Video example of *Year Walk*: <https://www.youtube.com/watch?v=VIU55JvbYu4>

by the threatening, dangerous and unknown. Being alone in the dark can trigger such fears, motivating the reactions of hiding and fleeing. This can be enhanced with actual threats, such as the psychotic inmates in *Outlast*¹⁰³ (Red Barrels Studios 2013) running rampant in a psychiatric hospital.

A game artist can utilise lighting in game world environments to provide the appropriate atmosphere to suit the creator's intention. For example, *P.T.*¹⁰⁴ (7780s Studio 2014) features the same cycle of corridors rooms and stairs, reminiscent of a never ending nightmare. The lighting is varied in every cycle, creating layers of familiarity that is atmospherically different. The swinging lights and flickering blubs put every scene in a state of flux, resulting in the uncertainty of each moment, inducing visual disturbances to the player.

Within these unsettling surroundings, interior or exterior, monster and creature designs play a huge role in enforcing a feeling of an imminent threat. *The Last of Us*¹⁰⁵ (Naughty Dog 2013) portray mutated humans that are mind controlled by cordyceps fungus and any encounter is a dangerous one. These mutants visually resemble sickly humans with patches of fungus blooming across the skin and out of any bodily orifice. Coupled with unnatural physical movements, these monsters are beings to be feared and avoided at all cost.

¹⁰³ Video example of *Outlast*: <https://www.youtube.com/watch?v=3FUjPMjwpp4>

¹⁰⁴ Video example of *P.T.*: <https://www.youtube.com/watch?v=SFCjCxaDAVI>

¹⁰⁵ Video example of *The Last of Us*:
<https://www.youtube.com/watch?v=A9sCkkow7UQ>

Besides the horror theme, video games also include *mystery*. This turns detective work into gameplay in the visual game world. A player will likely be spending time inspecting the simulated environments for clues. For example, *The Vanishing of Ethan Carter*¹⁰⁶ (The Astronauts 2014) allows the avatar to openly explore the world in search of Ethan, a missing child. An array of objects found in various locations builds an impression of Ethan and the events that led to his disappearance. Overlaid text is heavily used within the environments to describe the thought process of the avatar during detective work and puzzle solving.

*Everybody's Gone to the Rapture*¹⁰⁷ (The Chinese Room et al. 2016) has a similar concept of using the arrangement of visual entities in the environments to provide clues to the mystery of vanished town folks. These types of game worlds seldom incorporate hostile NPCs that the player has to confront and defeat. Instead, the focus is on the way the visual entities in the world forms a story through the interactions of the player. A particular weather can also add to the surrounding atmosphere as a foggy scenario visually differs from a sunny day.

Apart from these environmentally focused worlds, the mystery theme can also include threatening NPCs, as seen in *Alan Wake*¹⁰⁸ (Remedy Entertainment 2010). A variety of shadowed forms attacks the player's representing avatar in dark areas and can be repelled with light.

¹⁰⁶ Video example of *The Vanishing of Ethan Carter*:

https://www.youtube.com/watch?v=fVjaabZ_Zo8&t=2172s

¹⁰⁷ Video example of *Everybody's Gone to the Rapture*:

https://www.youtube.com/watch?v=2vifO3_gjiM

¹⁰⁸ Video example of *Alan Wake*: <https://www.youtube.com/watch?v=HuszPyxBi8U>

Discovering objects within the environment for clues to the mystery is an optional part of gameplay. It does however, enhance the narrative and the completion of the gameplay experience.

A different theme that is shrouded in mystery is *espionage*. The usual gameplay consists of the player's avatar stalking in dark corners to launch swift attacks or assassinations. This reverses the role of a hero to that of an antihero, from one standing visibly tall, into a character that sneaks and hides. Creating recognisable silhouettes become an indispensable factor in visual design since portions of the playing experience revolves around shaded areas.

Figure 22. Screenshot from *CounterSpy* (Dynamighty 2014)

In figure 22, the representing avatar is visually depicted as a darkened silhouette taking down hostile NPCs and completing missions. This simplified character design complements the eccentricity of the coloured interiors and NPCs, bringing visual focus to the avatar's centre. In terms of

animation, the avatar should execute swift gestures that emphasise evasion, instead of attack. Much of the action can also happen from afar so that the representing avatar remains incognito.

In the game world of *Hitman: Absolution*¹⁰⁹ (Io-Interactive 2012), Agent 47, the representing avatar, is seen in a third person point of view. The agent's actions must only be made by necessity for any wrong move results in detection and possible death. This means that an animator must ensure subtle animations to match the atmosphere and the player's controls. In addition, the avatar is donned in black, forming a strong silhouette that blends in with the shadows.

The *Assassin's Creed* series also portrays a stealthy avatar, traversing the terrain in various time periods, such as the Third Crusade and the Renaissance. Utilising set periods in history is a tool for game artists to determine consistency in the visual game world. Conversely, mixing entities from different points in time creates a break in continuity, which is to be avoided at all costs. Otherwise, the illusion of a completed game world will be adversely affected.

An exception to the restriction of visual entities to a particular time period is the introduction of time travel, a branch from the science fiction theme. When time becomes non-linear, objects in a simulated existence is expected to organise or reorganise accordingly. However, even when time is shuffled, there needs to be a sense of visual logic that follows its disarray.

¹⁰⁹ Video example of *Hitman: Absolution*
https://www.youtube.com/watch?v=iWtl8MZo1Yo&list=PLC_GisvNDYCCDf6w3Zm9p6h-V6Zt9Cxlz&index=5

An artist must arrange visual entities in spaces with regards to the transformations that can occur due to time travel.

Apart from the exception of time travel, time periods are also defined by major events, revolutions, wars, plagues, natural and man-made disasters. For instance, the French Revolution denotes a historical event and a time period. All these events leave marks upon the people and the landscape they affect. For example, the two atomic bombs that were released upon Hiroshima and Nagasaki, during World War II, greatly affected the lands with fatalities and radiation. A parallel can be drawn to the desolate situation of *Metro: Last Light*¹¹⁰ (4A Games 2013), whereby a missile attack caused a post-apocalyptic game world.

Knowing about these historical events is crucial for a game artist to represent different points in time. They must know about the fashion, architecture, people, behaviour, culture, issues, or as it is better known, the Primary World defaults. These are the things that can define a time period in a tertiary world. With that said, the visual environments, characters and creatures must correspond to the narrative and gameplay to depict a cohesive game world. Resultantly, there needs to be room for negotiation between faithful representations and invention.

Inventing within limitations, such as the timeframe of the Victorian era, sets a particular image of a world to light. Steampunk is one such branch of the science fiction theme that occurs around this era. Beyond the

¹¹⁰ Video example of *Metro: Last Light*:

<https://www.youtube.com/watch?v=oi1rZdXCPyA&index=2&list=PL9MoLfABC7y616b6AqYmej19EQ3eC2oRJ>

long dresses, the suits and hats, the opulence and depravity, an alternate path is taken in another world. It is one that continued the use of steam power, resulting in an advancement of technologies that resembles machinations of iron and brass.

Figure 23, Screenshot from *BioShock Infinite* (Irrational Games et al. 2013)

*BioShock Infinite*¹¹¹ (Irrational Games et al. 2013) portrayed a steampunk inspired game world on a floating city. A dystopia disguised by its utopic façade named, Columbia. This place is of a time that occurred directly after the Victorian era, which explains the technology and weaponry. Weapons are a major part of the gameplay in *BioShock Infinite* and they create intense combats between the player and hostile NPCs. Such combats occur in three-dimensional visual spaces, simulating the way humans visually perceive the Primary World. However, the combination of

¹¹¹ Video example of *BioShock Infinite*:
https://www.youtube.com/watch?v=elvGT8_ZiWo

the various spatial dimensionalities of visual space, visual entities and gameplay result in a wide variety of visual game worlds.

This leads to the next topic of discussion, which are the visual styles of game worlds. A game artist can create a style using inspirations from any theme, time period and worlds, the Primary, secondary or tertiary. The existing game worlds visually range from the minimal to the complex. Beginning with a simple square, it is the shape of a pixel that builds into an entity. *Pixelated* or *eight-bit* visuals create distinctively recognisable worlds in early video games. This is observable in the arcade game, *Donkey Kong*¹¹² (Nintendo 1981), whereby the player's representing avatar jumps over barrels and ascend upwards to save the princess.

As the hardware technology advances, these real-time sequences become more refined, smooth and detailed. With this, game worlds begin to simulate the visual complexities perceived in the Primary World. A contemporary example is *Mirror's Edge Catalyst*, which portrays a highly detailed cityscape. The entities within this game world represent parts that are organised, by a game artist, into perceivably *realistic* environments. The word "realistic", in this case, refers to visual entities that closely resemble objects that are found in the material world.

These entities do not have to be identical copies of their counterparts found in the Primary World. Instead, there need only be a conveyance of enough visual information for players to visualise the intended object(s).

¹¹² Video example of *Donkey Kong*:
<https://www.youtube.com/watch?v=Pp2aMs38ERY>

Hence, the simulation of a tree can contain a lower amount of leaves than an actual tree. This is crucial to optimise the visual creation process since a numerical reduction logically demands lesser production time. It is also conceptually comparable with gestalt theory's *law of simplicity*, whereby the simplest structures can perceptually portray the intended image.

The realistic visual style does not require the simulation of historically accurate events and narratives. This is seen in *The Witcher 3: Wild Hunt*¹¹³ (CD Projekt RED 2015), which is a world based on fantasy. The detailed environments encompass invented lore and creatures, such as the supernatural wraiths, cave trolls and the formidable griffins. Thus, this particular style can be combined with any theme and time period.

Currently, a game artist has the choice of depicting visual game worlds with either a high amount or low amount of detail. In between these extremities are a myriad of visual styles that can be identified into various groups. The concept of the ***abstract***, a term derived from visual art, in game worlds refers to visual entities that are non-representational. This can be observed in figure 24, whereby hostile NPCs take the form of geometric shapes that converge towards the representing avatar.

¹¹³ Video example of *The Witcher 3: Wild Hunt*:
<https://www.youtube.com/watch?v=xUcFjRzuDP0>

Figure 24. Screenshot from *Geometry Wars: Retro Evolved 2*¹¹⁴ (Bizarre Creations 2008)

The avatar itself is a white coloured pentagonal shape with one of its edges removed, resulting in a claw-like pattern. These geometric shapes appear to be visually simple, but the gameplay is designed as a “bullet hell”, a subgenre of the Shooter genre, which features a barrage of bullets and hostile NPCs that overwhelms the frame’s space. This suggests that an abstract visual style does not necessarily result in a simplistic game world when gameplay and genres are involved.

This barrage of abstract visual entities can be separated and identified through the *law of similarity* as mentioned in chapter 3. The hostile NPCs visually differ in colour and shape from the representing avatar, helping the player to attack and avoid simultaneously in the game world

¹¹⁴ Video example of *Geometry Wars: Retro Evolved 2*:
<https://www.youtube.com/watch?v=pLFeQl2RY1I&t=109s>

environment. This is enhanced through the *law of common fate*, which is displayed through the similar animation of the hostiles heading towards the avatar, the centre of the forces of centricity.

The laws of Gestalt theory are best used to explain the possibility of building an abstract world. However, the non-representational aspect of the abstract style appears to be conceptually at odds with the function of visual entities within a game world. These entities are used to define the boundaries of simulated spaces by fulfilling its purpose, be it as a background, an NPC, or UI. The avatar can be depicted in any visual style, as simple as a pixel or as complex as the human form, without compromising or altering its purpose. In this sense, a visually abstract entity can never be fully non-representational for it has to represent its intended function in a game world to a player.

This brings to mind Arnheim's comment that the visually simple percept/entity, when coupled with a complex meaning, becomes more than what its simplicity suggests (1974, 62). Consequently, the visual style can be abstract in nature, but the gameplay does not need to conform to the stylisation's standard. On the contrary, the chosen style has to negotiate with the gameplay and the players' expectations of the genre, theme and time period.

The abstract visual style can be *minimal*, which differs from the seizure inducing "bullet hell" seen in the *Geometry Wars* series. A minimal visual game world consists of entities reduced to the barest extent and should only display what is necessary to convey a convincing game world.

Equally, a game artist needs to ensure that the gameplay sequence is experienced in a perceivably balanced visual composition. *Stack*¹¹⁵ (Ketchapp 2016) is a smartphone game that uses descending quadrangular blocks to build a tower. The resultant structure efficiently conveys the player's gameplay progression through the game world. Removing any of its visual elements, be it colour, shape or form, will alter the delicate balance of the minimal visual style and gameplay.

The two dimension game world of *Passage*¹¹⁶ (Rohrer 2007) features a hybrid of minimal visual style and pixelated entities as shown in figure 25. The gameplay intended by the designer is a “generalizable experience of mortality” (Maizels & Jagoda 2016). This experience is presented in a strip, where the player's representing avatar begins from the left-hand corner, progresses to the middle and ends at the right-hand side. Within this journey from left to right, the representing avatar's hair colour changes to grey and it indicates the process of aging, the path to “mortality”.

Figure 25. Screenshot from *Passage* (Rohrer 2007)

Colour changes are also used in the background to indicate various phases of the gameplay sequence. These phases corresponds to a visual

¹¹⁵ Video example of *Stack*: <https://www.youtube.com/watch?v=fDAOtiiGBFY>

¹¹⁶ Video example of *Passage*: <https://www.youtube.com/watch?v=n3o0HFXPfc0>

rhythm, the “crescendo or diminuendo” (Arnheim 1988, 213) of an experience in time. It is illustrated in figure 25, whereby the pale blue background fades into a black and white pattern as the avatar progresses onward. This progression, however linear, becomes sectioned by the perceivable colour transformations, which is reminiscent of the ground in Gestalt theory’s figure-ground relationship (ibid., 228).

The figure is represented by the entities that are surrounded, inclusive of the representing avatar, the avatar’s partner (NPC), barriers and treasure chests. By utilising different colours and shapes, these entities become visually distinct when compared to the ground. For example, the rectangular red walls, shown in figure 25, complements the black and white checked background.

Apart from the two dimensions, the minimal visual style has been incorporated into three-dimensional game worlds. The low details of three-dimensional visual entities can be considered as the *low poly* visual style. Such entities are constructed with a minimum amount of triangles or quadrangles, which can take the form of any object the game artist wishes to mould them into. In early three-dimensional video games, low polygonal creations are essential to optimise the processing of the real-time gameplay sequences. At present, low poly has evolved into a visual style of its own for it can be used by choice and is not necessity.

Figure 26. Screenshot from *Red Amazon*¹¹⁷ (Boogaart 2015)

The game world in figure 26 is depicted in a three-dimensional low poly visual style. Smoothened curves are intentionally replaced by hard edges, forming angular outlines of each visual entity. This is a reduction of the perceivable world, producing minimal suggestions of a known object or scene. For example, the grass perceived in the Primary World consists of a multitude of green coloured blades that are situated relatively close to the ground. *Red Amazon* simplified the portrayal of grass through the use of a single tone of green across the landscape to suggest this notion. A transition of grassland to road is accomplished by the change in colour of the flooring.

Simplifying a game world to its minimum also involves the removal or reduction of lighting, which results in the lack of reflections, refractions

¹¹⁷ Game example for *Red Amazon*: <http://gamejolt.com/games/red-amazon/87009>

and the casting of shadows. A piece of stone lying on the grass, in figure 26, seems two-dimensional in appearance due to the lack of lighting information. However, the incorporation of a three-dimensional game world camera allows the player to walk around this stone, experiencing it in three dimensions. This builds a three-dimensional understanding of the stone within the player's secondary world without the need to simulate any lighting information beyond a flat colour.

Moving away from the minimal, visual styles in game worlds are also influenced by an assortment of *artistic media*. A pencil sketch style is used in *The Bridge*¹¹⁸ (The Quantum Astrophysicists Guild 2013), brushes and paint is depicted in *Braid* and the comic art style is applied into *The Wolf Among Us*¹¹⁹ (Telltale Games 2013). The styles inspired from the various artistic media represent the presence of visual art and the artist within game worlds.

Another influence originating from visual art is the visual style of cartoons. A cartoon is created through animation, which is an art form that comprises of many types of visual styles. Beginning with *Cuphead*¹²⁰ (MDHR Studio 2016), it is a video game inspired by the cartoons of the 1930s. The line art acts as the *enclosure* to each colour segment, dividing and defining the entities in motion. The similar design of the eyes on

¹¹⁸ Video example of *The Bridge*: <https://www.youtube.com/watch?v=p9kp6IhhDqo>

¹¹⁹ Video example of *The Wolf Among Us*: <https://www.youtube.com/watch?v=D6-9v2W3Jdc&list=PLWLXHWuO4hgZNpPWR7aszOvgKKmReNYH2&index=3>

¹²⁰ Video example of *Cuphead*: <https://www.youtube.com/watch?v=cMt27Jk36K8>

various characters within this particular game world characterises this cartoon-like visual style.

A prominent Asian cartoon visual style that also has distinctive eye designs on the characters is Anime. It originated from Japan and is featured in most Japanese video games. This visual style can be observed in *The Legend of Zelda: Twilight Princess*¹²¹ (Nintendo EAD 2006), whereby the representing avatar and other NPCs' eyes are enlarged and excessively tapered at the ends. Furthermore, the facial features and body proportions are simplified, which appear unrealistic when they are compared to the face and physique of people in the Primary World.

Besides cartoons, the film aesthetic has been known to influence the visual styles in game worlds. This can be perceived in the monochromatic environments of *Limbo*¹²² (Playdead 2010), which are reminiscent of films created in the *Noir* style. The specific use of lighting forms a strong contrast between light and shadow. This often results in the simplification of the characters and objects, rendering them as silhouettes.

Limbo applied this silhouette concept into the visual entities, including the representing avatar, NPCs, environmental objects and structures. This simplification requires recognisable silhouettes since the conveyance of visual information is reduced to the edges of the blacken forms. To distinguish the player's avatar from other environmental forms, two white

¹²¹ Video examples of *The Legend of Zelda: Twilight Princess*:
<https://www.youtube.com/watch?v=7H-Z9tkOKoQ>

¹²² Video examples of *Limbo*: <https://www.youtube.com/watch?v=9RWGZBZhr1g>

circles are incorporated onto the avatar's face, representing his eyes and allowing a certain degree of expression.

An alternate way to utilise the ***silhouette*** visual style is presented in the *Patapon*¹²³ series (SIE Japan Studio & Pyramid), whereby the contrast in the environments is determined by a variety of colour tonalities in the foreground, middle ground and background. The foreground entities are kept as black silhouettes with colour accents. They overlap the lighter coloured tones of the middle and background. It creates the illusion of depth as through the perceptual tendency of *simplicity*, this is the simplest perceivable structure of the two-dimensional environments.

In a more general sense, all existing visual game worlds have a visual style. Some of which coincides with the above mentioned styles. However, similar to the discussion on video game genres, an identified style cannot fully represent every visual game world that is categorised within it. The point of having an awareness of visual styles is for a game artist to use them as a preconceived standard to guide the game world creation process. It can also encourage the creation of hybrids by combining elements from known visual styles.

Choosing a particular visual style can also convey a mood and by extension, information that builds a narrative of the simulated world. This narrative can and should be in line with the intended story that unfolds through gameplay. Yet, it should notably be distinguished as a different

¹²³ Video example of *Patapon 3*:
<https://www.youtube.com/watch?v=cGTgSlvdy04&t=713s>

factor that enhances the experience of a game world. Such a narrative is formed through recognising the visual entities as objects holding information that can be inferred upon by players.

Chapter 5: Building the ‘Game World’

5.1 The Power of Objects

An object that fits within an ordinary circumstance in the Primary World can be easily overlooked. This circumstance can be altered, leaving the object as an entity that is recognisably out of place. For example, a simple chair located within a café is a perceivably logical composition. This same chair, when found in the middle of an empty room, creates an unusual scene that breaks away from normality. Adding a noose directly above this chair shifts the unusual scene into a sinister one by having two objects that portrays complementing ideas. In a way, this can be seen as a coupling of meaning, which creates a consistent message that a game artist intends to convey.

This example also portrays the different roles that an object and object combinations can adopt when organised with intention. These roles can be inferred from the understanding of things found in the Primary World (defaults), which can be generalised as common knowledge. This is assuming that the people who are seeing and perceiving the visual entities in a game world are informed of nature, civilisation and its inventions.

Constructing a visual game world with reference to the Primary World defaults will create environments that go beyond the visual balance of a composition. It produces a convincing narrative that is built upon by what humans/players already know. There is a certain degree of flexibility to the impression of a known object. To illustrate, the presence of a weapon, on

one hand, can be associated with danger and violence. On the other hand, it becomes a form of protection when it is used against hostilities. Similar to the chair example above, the perceived circumstance determines the nature of the object(s) in a simulated environment.

This perceived circumstance can be established with the concepts derived from Arnheim's discussion of *shape* and *form*. The shape can be thought of as the external edges that outline an object and the form refers to the internal content revealed by perceiving the object (Arnheim, 1974). This content of form can include Primary World defaults, but it also consists of other elements, such as the effects of spatial orientation, viewable angles, overlaps, distance, location and lighting conditions.

For instance, the outline of a ball is circular in shape, no matter the angle from which it is viewed in. This circle shape denotes the properties of rolling and spinning. However, the shape does not inform on the primary function of the ball, which is for playing, be it as a toy or in a sport.

The form of the ball, if containing the recognisable pentagonal pattern of black and white, suggests that this is a football. Switching the appearance of the ball into a slightly larger size that displays a rainbow of colours will change its form into a beach ball. This ability to identify the type of ball is partly due to associations derived from the Primary World defaults. Additionally, a beach ball that is held near to one's face has a different form to a ball that is positioned far away in the distance, slightly peeking out from the base of a palm tree. One major difference between these two situations is that a held object denotes ownership, while a distant

object that is overlapped by other environmental entities suggests a forgotten item. This brings to mind the care that is required of object placements. A cohesive world can be cast into disarray when the contents contradict the situation, unless contradiction is the desired intention.

In terms of visual composition, game artists must be aware of how the balancing centre and meaning of objects interact within the established space. This is due to the fact that both factors affect the perceived experience of players during gameplay. Regardless of the various possible spatial dimensions, as discussed in section 4.3, both factors still apply within the visual compositions of game worlds and should be considered by the game artist during the visual creation process. Hence, the meanings that objects represent and convey can be considered as part of the eccentric forces acting within the composition, affecting and influencing the centrality of a player and her/his representing avatar.

5.2 Creating a Cohesive, Consistent & Convincing Environment by the Game Artist

This section will focus on concluding with the elements mentioned throughout this paper by consolidating on the process of creating a single scene in one environment. This example will serve as a hypothetical demonstration of the creation process of a game artist. It should be noted that there are many visual possibilities that can occur during the construction of game worlds and this will result in the formation of exceptions within any approach and structure.

A game artist begins the creation process through the use of the basic world structure mentioned in chapter 2, space, entities to fill the space, time, temporality, forces and movement. These factors form a skeleton that fulfils the basic criteria needed to create a visual game world. Beginning with space, the spatial dimensions of a game world should be determined before any visual entities can be created and positioned within it. For this example, a two-dimensional isometric visual space is chosen since this is a distinctive method that has been used countless in the portrayal of game world environments.

An isometric world is usually constructed with oblique angled square tiles. This obliqueness may be visually perceived as the shape of a diamond. However, the visual perception of an isometric cube is structurally simpler than the tendency to visualise a diamond shape. This is gestalt theory's *law of simplicity* at work and it results in the perceptual "square-ness" of the oblique tiles.

The square tiles are placed alongside each other, forming a sizable planar space that is enough to simulate an environment. The actual amount of tiles is relative to the game's design. At this point, specifying a video game genre will aid in the clarification of the type of gameplay a player will experience. This allows the artist to anticipate what is required within the environments.

For this example, the Puzzle Adventure, a subgenre of the Adventure genre, will be used to represent the overall playing mechanics in the hypothetical isometric visual game world. In terms of the Adventure genre,

it indicates a narrative driven world that requires a player to investigate within the *gameplay space*, mentioned in the section 4.2 (page 90). The puzzle element of this subgenre gives emphasis to the problem/puzzle-solving aspect of the gameplay.

The combination of these two elements informs an artist of the need to accentuate certain environmental entities to conform to the puzzle designs that a player will encounter while experiencing the video game. An example of an existing isometric game world of the Puzzle Adventure subgenre is *Monument Valley*. The difference with this hypothetical example, beyond that fact that this is a purely conjectural model, is that the environments in *Monument Valley* are created in a three-dimensional visual space. In spite of this, the game world camera does not portray three-dimensional movements, which results in the tendency to perceive the simulated environments as a two-dimensional construct.

With an established subgenre, an artist can begin to envision visual entities that can fit into the gameplay space. These entities will have to conform to the intended layout design and this is usually provided by a game designer. Essentially, a game artist does not formulate the puzzles and pathways. Instead, an artist converts the gameplay space into a visual space using the given layout(s).

A layout of a scene should inform on the intended course of events within a localised area. It also presents a certain tone of the space, creating a portion that fits in the entire visual rhythm of a game world. For instance, the localised tone of a scene can convey danger, which can include

fast paced events, resulting in a perceived urgency. Conversely, a scene can express the notion of safety, inviting a visual respite that opens up the environment to possible exploration.

Aside from a localised tone, the entire visual rhythm should consist of an overarching atmosphere that generalises the overall mood. This mood can be a consequence of the game world's story, such as an aspiring tale or a quest for revenge. The narrative itself may specify a certain theme and time period. For example, in *Red Dead Redemption* (Rockstar San Diego 2010), the narrative is set during the American Frontier, with cowboys and outlaws. The leading character/representing avatar, named John Marston, came from an outlaw background, but later gave that up to settle down and start a family. This initial portion of the story provides an image of a game world that exists during a fixed time period, which is between late 19th century and early 20th century. Anything outside of this time frame contradicts with the setting of the story. As for the theme of *Red Dead Redemption*, its narrative states that John Marston travels around the Wild West to capture his old team of outlaws, which establishes an adventure related theme.

Figure 27.

Within the hypothetical scene of a two-dimensional isometric Puzzle Adventure, a story can be obtained from the writer and is woven into the layout design by a game designer. A visualisation of an isometric layout is depicted in figure 27, where it includes puzzle elements (blue, red & yellow circle) that can be solved to open the entrance (oblique rectangle). With this, the game artist can proceed to conceptualise the general proportions in a visual composition. Since the positions of objects are established within the layout, this leaves the artist with other elements, such as scale, shape, form, colour and texture to create a balanced composition.

The visual design of the entrance can adopt any *shape* or *form*, such as a rectangular wooden door, a metal gate or even a sealed off elliptic portal that leads to a parallel dimension. The point is that the artist can create the appearance of the entrance and the type of visual entities that represents the puzzle. The appearances have to be visually consistent,

which is attainable with the choice of a theme and time period to guide the creation process.

A Puzzle Adventure genre can be portrayed with any time period and theme. However, a chosen time period poses certain priorities on a theme and the same can be said contrariwise. For example, a specific time period, such as World War I, coupled with the adventure theme will tie the theme to the early 20th century time frame. For an inverse example, the science fiction theme is usually related to the futuristic, which sets the period of time to be somewhere in the future. Regardless of which comes first, one will influence the other.

For this isometric example, a Medieval Fantasy themed game world will set the time period in the middle ages. This subjects the puzzle and entrance within the layout design to a particular time frame and this directs the artist's concepts and creations. The placement of an automatic sliding door will not fit within this scene since the architecture is constructed with materials and technologies that are available at that time. Equally, the puzzle elements should be constructed with similar materials. This will allow the player to effortlessly draw a relationship between the entrance and the puzzle. Such a tendency refers to the *law of similarity*, whereby the same colours and textures of the materials create a recognisable connection amongst visual entities.

At this point, the game artist must decide on the spatial dimension of the visual entities in order to find suitable methods to create them. This usually depends on the creators' preferences and expertise. For this two-

dimensional isometric scene, a logical accompaniment would be to include two-dimensional visual entities. These entities should come together to form a cohesive whole, which is achieved through the selection of a suitable visual style.

The notion of a “suitable visual style” is subjective in nature and this decision is made by the creators. A chosen style has to merge with the spatial dimensions of the visual space and entities. Isometric game worlds have been portrayed in many visual styles, including the pixelated, realistic and exaggeration. Though, referring to the minimal style used in figure 27, this hypothetical example will follow suit.

Each square tile in this Medieval Fantasy and minimal isometric example is used as a form of measurement. Any visual entity that occupies a single tile can be approximately associated to the general proportion. The height however, cannot be verified by the tiles themselves. This is when the height of the screen can be used to estimate the scale of the visual entities within the entire composition.

As stated in chapter 4, the representing avatar’s scale affects all the other entities within the environments. Therefore, the avatar’s size can be utilised by a game artist to guide the proportions of the visual composition in time. This supports the concept that the avatar emits the forces of centricity, which is the focal point within the frame space. With this focal point, the arrangement of visual entities in the layout design has a visual anchor. Consequently, this anchor can also be thought of as the “center of

attention” (Arnheim 1988, 22), which allows for the perception of the distribution of visual weight¹²⁴ within the composition (ibid.).

Assuming that the representing avatar conveys a high amount of visual weight due to its relation to the centric player and also being the *centre of attention*, it should be created with a distinctive silhouette, colour, texture, shape and other qualities as compared to entities in the surrounding environment. Conversely, if the situation calls for an entity other than the avatar to be the *centre of attention*, the perceived centre of the moment, it has to possess an eccentric centre that can override the centricity of the representing avatar.

One method to achieve this is to elevate an object or NPC. In the case of this hypothetical example, it can refer to the entrance in figure 27 since the door acts as a visual goal that the avatar must attain by opening it through solving the puzzle. The purpose of elevating the door is related to Arnheim’s concept of visual weight, which denotes that “the higher an object is in pictorial space, the heavier it looks” (ibid.). This shift in visual weight through raising the height of the door is made possible through the existence of the visual anchor, the representing avatar (ibid.). A way to visually portray this is to introduce stairs, which are in line with the Medieval Fantasy theme.

Apart from the entrance, the other predetermined visual entities are near to the walls in the layout. The game artist can choose to create visual

¹²⁴ “Visually, weight is the dynamic power inherent in an object by virtue of its conspicuousness, size, shape, location, etc.” (Arnheim 1988, 229)

contrast or harmony. A strong enough contrast will emphasise the entities, resulting in the surrounding eccentric forces to overpower the avatar's centrality. Conversely, the presence of visual harmony amongst the entities will blend objects together, subduing the eccentricity of the environments.

The last topic of discussion for this hypothetical example returns to the influence of objects, the narrative that is conveyed through the summation of information from a scene. This scene is experienced through time, which requires the memory of what came before, long term and short term, to perceive the present as a whole. The perception of this present should simultaneously form a prediction of the immediate future, guiding the player's actions.

The process of building a visual environment from a layout design is affected by the *law of past experience*. What is known and committed to memory will impact the entirety of the scene. Hence, there is a difference between a sharpened sword and a lit candle stand within a medieval time period. The game artist has to use the *common knowledge* of the masses to create a convincing scene. It should be noted that this knowledge is prone to the subjectivity of the players since every secondary world is formed by the perceptions of individuals, creating a myriad of experiences within the Primary, secondary and tertiary worlds.

Since this is a fundamental look into the creation of a cohesive, consistent and convincing game world, all elements discussed in this example is aimed at providing a basic structure to examine the visual creation process. There are other factors to study in-depth to further

clarify specific design decisions in visual composition, especially since the perception of a visual game world is affected by subjectivity. However, going in detail is the next step to take after establishing a fundamental method.

The aim of this paper is to do exactly that, which is to develop a structure to demystify the visual game world creation process. This is done by examining the realm of perception and classifying the various worlds or notion of worlds into the Primary, secondary and tertiary world. These three distinctions allow for the clarification of what a game world is as compared to other worlds.

As a tertiary world, the game world is a construction from secondary worlds and therefore, fragmented. This fragmentation relates to the fact that game worlds are created using separated visual entities. Without a strong foundation, there is nothing for the entities to latch on. For this reason, a basic world structure consisting of space, visual entities, time, temporality, forces and motion is introduced to provide a broad model that can sustain other concepts.

Since it is a paper written for the game artist, the focus steered into the categorisation of visual entities, which is one of the factors mentioned in the basic world structure. These categories segmented the wide variety of possible entities into nine define types comprising of the frame, NPCs, representing avatar, game world camera, simulated environments, particle system, transitions, user interface and text. Contemporary video games were used to exemplify the types.

The next step was to discuss on the laws of Gestalt theory, which will cover the fundamental perceptual qualities that affect visual perception. This will act as a basis to proceed into Rudolf Arnheim's concepts that were also derived from Gestalt psychology. His concepts on the different "centres" were used within the analysis of the preconceived standards consisting of genres, space, theme, time period and visual style. The purpose of this standard is to offer the game artist a (art) direction through the examination of existing video games.

This direction leads into the last chapter, which touches on the meaning of objects and how it is involved in visual composition, affecting the perceptual experience of the visual game world. To bring everything together in the end, a hypothetical example of creating a visual scene in a game world is included to demonstrate how Arnheim's theories and Gestalt theory can be applied alongside with the basic world structure and preconceived standards. The research question of "what are the fundamental conditions of a visually cohesive, consistent and convincing game world?" is investigated and answered with the method as stated above. However, there are extensions that can be made to enhance these fundamental concepts. The way to achieve this is through the continuation of exploring other hybrids of hypothetical examples to cover different possibilities of applying the various theories of art, game design and perception discussed in this paper. In doing so, it will create a collection of visual game world structures that extensively document and describe the visual creation process.

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Appendix 1

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