CHALMERS
UNIVERSITY OF TECHNOLOGY | UNIVERSITY OF GOTHENBURG

Player Environmental Awareness: Rules of Thumb for Environmental Storytelling in Role-Playing Games

Exploring Diverse Game Aspects to Support Environmental Storytelling

Master's Thesis in Computer Science and Engineering

SAMIR AOUN
CHI HONG CHAO

Department of Computer Science and Engineering
CHALMERS UNIVERSITY OF TECHNOLOGY
UNIVERSITY OF GOTHENBURG
Gothenburg, Sweden 2022

Master's thesis 2022

Player Environmental Awareness: Rules of Thumb for Environmental Storytelling in Role-Playing Games

Exploring Diverse Game Aspects to Support Environmental Storytelling

SAMIR AOUN
CHI HONG CHAO

UNIVERSITY OF GOTHENBURG

CHALMERS
UNIVERSITY OF TECHNOLOGY

Department of Computer Science and Engineering
Chalmers University of Technology
University of Gothenburg
Gothenburg, Sweden 2022

Player Environmental Awareness: Rules of Thumb for Environmental Storytelling in Role-Playing Games
Exploring Diverse Game Aspects to Support Environmental Storytelling
SAMIR AOUN
CHI HONG CHAO

© SAMIR AOUN & CHI HONG CHAO, 2022.

Supervisor: Staffan Björk, Department of Computer Science and Engineering
Examiner: Mikael Wiberg, Department of Computer Science and Engineering

Master's Thesis 2022
Department of Computer Science and Engineering
Chalmers University of Technology and University of Gothenburg
SE-412 96 Gothenburg
Telephone +46 31 772 1000

Cover: Our retention rate of the knowledge we have obtained throughout this thesis.

Typeset in LaTeX
Gothenburg, Sweden 2022

Player Environmental Awareness: Rules of Thumb for Environmental Storytelling in Role-Playing Games
Exploring Diverse Game Aspects to Support Environmental Storytelling
SAMIR AOUN & CHI HONG CHAO
Department of Computer Science and Engineering
Chalmers University of Technology and University of Gothenburg

Abstract

Environmental Storytelling is ”Staging player-space with environmental properties that can be interpreted as a meaningful whole, furthering the narrative of the game”. While many techniques present methods to guide players within levels or immerse the player, few are specifically targeted towards environmental storytelling and how players can be attracted to environmental storytelling.

This project set out to explore and investigate different aspects and techniques to draw players towards environmental storytelling, establishing an assumption that players who were more conscious of their surroundings would notice more environmental storytelling elements. This was done by doing literature research on the topic of environmental storytelling, doing light play of off-the-shelf games and conducting interviews and soft evaluation sessions with practitioners in the field. Using a grounded theory approach, observations were created from the data gathered which were then open coded, conceptualised and categorised.

After categorising, we diverged from our grounded theory approach and created 110 Rules of Thumb based on the 46 concepts and 15 categories identified during our open coding phase, which aim to be practical. Soft evaluation was done on the Rules of Thumb to obtain the opinions of the practitioners, who are also potential users. The main feedback indicated that they agreed on the general content, but emphasized increasing the number of supporting references and visual examples.

More research should be done on the Rules of Thumb to increase validity and generalisability, and more visual examples containing different media should be included to allow for greater practicality of the results. A summative evaluation with practitioners with a range of different cultures, studio sizes, and genre proficiencies would be interesting.

Keywords: Environmental Storytelling, Rules of Thumb, Guidelines, Environmental Awareness, Game Design, RPGs, Open World Games, Level Design.

Acknowledgements

We want to give our heartfelt thanks to the practitioners that agreed to conduct the interviews with us, the information gained in our meeting where very helpful to both us and the project. We would like to give a bigger thanks to the practitioner who took the time to comment on the entire document that was sent.

We want to thank Staffan Björk for being a great supervisor and for dealing with our shenanigans on a weekly basis, you made this thesis more tolerable. Pain.

We thank our keyboards for enduring the rage of our fiery fists on a daily basis and our coffee machines for providing us the energy to go on.

We would to express our gratitude to the untold amounts of memes that have fueled our constant dwindling motivation. If only we were Vergil from the Devil May Cry series, perhaps we may have been more motivated.

Nigel thanks Sam's spare laptop when his beloved gaming laptop did not exit the electronic equivalent of the ICU alive. He would also like to apologize to the reader for reading through this thesis.

We want to apologize to our body and mind for the pain suffered through the thesis. Pain.[1]

Samir Aoun & Chi Hong Chao, Gothenburg, June 2022

[1]Source: https://www.youtube.com/watch?v=MJbE3uWN9vE

Contents

1 Introduction **1**
1.1 Research Question . . . 2

2 Theory **2**
2.1 Environmental Storytelling . . . 2
2.2 Staging and Mise-en-Scene . . . 3
2.2.1 Classic Composition Techniques . . . 4
2.2.2 Eye-catchers . . . 4
2.2.3 Spatial Cinematography . . . 5
2.3 Signposting . . . 7
2.4 Nudging Theory . . . 7
2.5 Player Behaviour Types . . . 10
2.5.1 GNS Theory . . . 10
2.5.2 Bartle Taxonomy of Player Types . . . 10
2.5.3 Five-Factor Model of Personality . . . 11
2.5.4 The Five Domains of Play . . . 11
2.6 Game Design Patterns . . . 13
2.7 Mechanics . . . 14
2.7.1 MDA Framework . . . 14
2.7.2 Exploratory Mechanics . . . 14
2.8 Sound Design Patterns . . . 14
2.9 The Hook Model . . . 15
2.9.1 (Pull My Devil) Trigger . . . 15
2.9.2 Action . . . 15
2.9.3 Variable Reward . . . 15
2.9.4 Investment . . . 16

3 Background **17**
3.1 Tomb Raider Franchise . . . 17
3.2 Bioshock 1 . . . 17
3.3 Fallout 3 . . . 18
3.4 Deus Ex: Mankind Divided . . . 18

4 Methodology **19**
4.1 Wicked Problems . . . 19
4.2 Design and Analysis Processes . . . 19
4.2.1 Iterative Design . . . 20
4.2.2 Playcentric Design Process . . . 20
4.2.3 Research Through Design . . . 20
4.2.4 Fallman's Model . . . 21
4.2.5 Grounded Theory . . . 21
4.3 Methods . . . 22
4.3.1 Formal Analysis . . . 22
4.3.2 Literature Review . . . 23
4.3.3 Data Gathering Through Play . . . 23
4.3.4 Stimulated Recall . . . 23
4.3.5 Observation . . . 25
4.3.6 Interviews . . . 25
4.4 Prototyping . . . 26
4.4.1 Trade-offs and Types of Prototyping . . . 26
4.4.2 Using Prototyping . . . 27

5 Planning **27**
5.1 Desired Sub Goals . . . 27
5.2 Prestudy . . . 28
5.2.1 Literature Review . . . 28
5.3 Research . . . 29
5.3.1 Literature Review . . . 29
5.3.2 Off-the-Shelf Game Scenarios . . . 29
5.3.3 Practitioner Interviews . . . 29
5.3.4 Stimulated Recall . . . 30
5.4 Soft Evaluation . . . 30
5.5 Updated Time Plan . . . 30

5.6 Ethics . . . 30
5.6.1 Methodology . . . 31
5.7 Misuse of Results . . . 32

6 Process **33**
6.1 Prestudy . . . 33
6.1.1 Literature Review . . . 33
6.1.2 Uncertainties . . . 33
6.1.3 Changes in Planning . . . 33
6.2 Game Analysis . . . 33
6.2.1 Problems Encountered . . . 35
6.3 Interview . . . 36
6.3.1 Preparation Phase . . . 36
6.3.2 Designing The Interview . . . 36
6.3.3 The Interview . . . 38
6.4 Analysing The Data - Open Coding . . . 38
6.4.1 Issues . . . 38
6.4.2 Time-plan Change . . . 39
6.5 First Phase - Rough Guidelines . . . 39
6.6 Second Phase - Conceptualisation and Categorisation . . . 42
6.6.1 Issues . . . 42
6.6.2 Time-plan Change . . . 42
6.7 Third Phase - Rules of Thumb . . . 43
6.7.1 Issues . . . 43
6.7.2 Time-plan Change . . . 44
6.8 Fourth Phase - Soft Evaluation . . . 45
6.8.1 Preparation . . . 45
6.8.2 Soft Evaluation Design . . . 45
6.8.3 During the Soft Evaluation Interview . . . 46
6.8.4 Refining the Rules of Thumb . . . 46
6.8.5 Issues . . . 47

7 Results **48**
7.1 Eye Catchers . . . 49
7.2 Spatial Composition . . . 59
7.3 Environment Art . . . 65
7.4 Navigation . . . 70
7.5 Player Behaviour . . . 78
7.6 Player Subconsciousness . . . 82
7.7 Storytelling . . . 86
7.8 Player-Game Interaction . . . 93
7.9 Characters . . . 97
7.10 Accomplishment . . . 99
7.11 Human-Computer Interaction . . . 102
7.12 Game Mode . . . 104
7.13 Accessibility . . . 105
7.14 Production . . . 107
7.15 Audio . . . 109

8 Discussion **113**
8.1 Methodology Discussion . . . 113
8.2 Results Discussion . . . 113
8.2.1 Time Constraints . . . 114
8.2.2 Obtained Knowledge . . . 115
8.2.3 Presentation of Results . . . 115
8.2.4 Soft Evaluation Feedback . . . 115
8.3 Generalizability and Validity . . . 116
8.4 Ethics . . . 117
8.5 Future Work . . . 117

9 Conclusion **118**

Appendix A The 3 Triggers of Nudging **127**

Appendix B Interview Guide **129**

Appendix C Interview Consent Forms **133**

Appendix D Grounded Theory Diagram **137**

Appendix E Grounded Theory Codeset **139**

Appendix F Observations of Bioshock 1 **143**

Appendix G Observation of Fallout New Vegas **156**

Appendix H Observations of The Industry Practitioners' Focus Group Interview Part 1 **158**

Appendix I Observation of The Industry Practitioners' Focus Group Interview Part 2 **161**

Appendix J Observations of the industry practitioner's individual interview **165**

Appendix K Raw Data Points for Bioshock: Remastered **168**

Appendix L Raw Datapoints for Fallout: New Vegas **192**

1 Introduction

Video games often utilize the environment as a means to tell stories in a multitude of ways, increasing player immersion. Rather than providing passive exposition to the player, narrative elements can be embedded into the video game environment, called environmental storytelling. Environmental storytelling invites players to interpret narrative events based on the environment, resulting in an interactive narrative. Environmental storytelling often heavily contributes to the "atmosphere" and player engagement.

Environmental storytelling often goes hand in hand with exploration, as players need to have the freedom to actively look at and interpret their surrounding environment from an incomplete overview of the entire game world.

One such genre that conventionally has these characteristics are Role-playing games (RPGs), often with open worlds allowing players to investigate their surroundings. Environmental storytelling in RPGs not only further the narrative, it can encourage exploration as players are increasingly invested into the game - the world speaks for itself.

Our initial research has shown that there are many techniques which draw the player's attention. While many existing techniques present methods to guide the player within the level or create compelling embedded narratives in the game environment, few are targeted towards environmental storytelling. Furthermore, most environmental storytelling techniques focus on the visual aspect, but not much in other domains, such as sound or mechanics.

Furthermore, while there are techniques which discuss how narratives can be embedded into the environment, we have found little in manipulating the degree of interpretation players have if these environmental setups are noticed. Which means, players may not be interested in the environment even if they notice environmental storytelling aspects.

Techniques that are used to catch the player's attention cannot be directed at the environmental props forcibly - environmental setups still need to be discovered by the player themselves to allow for personal interpretations. As such, players still need to not only be encouraged to explore the environment themselves, but also be interested in the environmental setups too. We believe that players who are more conscious of their surroundings are more inclined to notice environmental storytelling setups. Manipulating the degree of this player awareness, which we define as ***"Player Environmental Awareness"*** (PEA), would be crucial to whether it aids or hurts player exploration and narrative engagement.

Thus, different methods and techniques may be used to impact exploratory behaviour. More intrusive methods include in-game mechanics that highlight areas of interest, or level designs which funnel the player into looking at the environmental setup. Subtle methods involve using light and environmental composition techniques [87] to lure the player's attention towards the environmental setup. The degree of influence of each method on PEA is unclear.

Providing key considerations for game designers who want to manipulate the player's environmental awareness can provide designers with a frame of reference when designing environmental setups. Practical suggestions for improving players' environmental awareness can improve prototyping work, provide points of discussion for designers aiming for certain game aesthetics, and spark discussion during level design. Moreover, it can help designers vary the discoverability of different environmental setups in an intentional manner.

1.1 Research Question

Our goal was to investigate aspects that support PEA, which may also affect exploratory behavior. Furthermore, diverse players have varied decision-making behaviors and enjoy differently paced games. As such, our Research Question is:

"What should be considered when designing for supporting Player Environmental Awareness?"

We set out to answer this by a set of guidelines but throughout the project it shifted to be answered by a set Rules of Thumb for game designers. To develop these guidelines, we be analyzed commercial RPGs, as well as interviewed practitioners to create a collection of techniques and concepts.

2 Theory

2.1 Environmental Storytelling

Environmental storytelling in games is a concept widely credited to Don Carson[23], drawing parallels between 3D interactive games and amusement parks, arguing that both create virtual worlds that spatially entertain people. As such, Carson encourages game designers to study the techniques of environmental storytelling used when designing amusement park attractions, which embed story elements into the physical space throughout the attraction.

Carson further elaborates on practical environmental storytelling guidelines for digital games. Some guidelines include using the audience's own experiences to manipulate their expectations, following a set of thematic and design rules, establishing player identity, creating cause and effect, and using contrasting elements to create create stories within the environment.

Jenkins[67] builds on this concept of environmental storytelling, arguing that game designers act as narrative architects rather than storytellers, since they design worlds and spaces to tell that story for the player to interpret. Moreover, Jenkins introduces spatial narrative categories for environmental storytelling:

- Evoked narratives paint broad strokes of the world, bringing out certain emotions and increasing immersion through its landscape and the environmental details surrounding the player. Jenkins discusses that evocative spaces do not tell self-contained stories, but rather use the player's previous experiences and knowledge to create an immersive "atmosphere".

- Embedded narrative discusses the distinction between the story, called "fabula", and the plot, called "syuzhet". Embedded narrative describes the narrative elements within the staged area of the game world, which can be spatial, such as how props are positioned together, but since the player may not see the pieces in chronological order, the mental construction of the events are done by the player. As such, the story created by the staged area is argued to have less temporal structure, but is read like a body of information. Jenkins compares this to a "detective story", where the detective looks at the clues to determine what previously happened in chronological order.

- Emergent narratives rely on how the player interprets the environmental aspects in regards to the story. This narrative type is not anticipated by the designer, and instead comes from how the player interprets the interactions created in game. Jenkins uses the Sims as an example, where the story arises from the player seeing how the different characters handle situations.

- Enacted Narratives involve character interactions and modifications to the world. Often the player is a character as well, and contributes to the narrative.

Industry leaders have looked into using environmental storytelling to heighten immersion. Worsh & Smith[100] provides a framework for using environmental storytelling to invite players to infer "What Happened", describing how the player interpretation builds investment. Defining Environmental Storytelling as "Staging player-space with environmental properties that can be interpreted as a meaningful whole, furthering the narrative of the game", Worsh & Smith emphasize the idea of the player "pulling" the narrative, allowing players to discover the narrative at their own pace. Furthermore, Worsh & Smith propose practical techniques to create strong storytelling moments:

- Establishing a Chain of Events, creating a cause and effect sequence. The way set dressing elements connect can create chains of events.

- Ensuring game events engages the player, adding subtext and associations to create setups which have individual significance and relate to a larger picture.

- Echo the world at large, where environmental storytelling events reflect the game's themes, and vice versa.

- Avoiding disconnects between the player's possible actions and pre-scripted setups. Showing something the player cannot do in a setup can be jarring.

Worsh & Smith also present the concept of Systemic/Dynamic Environmental Storytelling, where the player drives the history of the level. This concept is similar to the Jenkin's emergent narrative, where the actions of the player leave traces of their actions behind.

Similarly, Maurer[75] discusses balancing detail in exploration setups, rewarding exploration, and linking side narratives together in order to let players "connect the dots".

Using guidelines taken from both Carson and Jenkins alongside analyses of a range of games, Bevensee[17] presents several core aspects that can be used when designing for environmental storytelling: Objects and Scenery, Analogies and Metaphors, Terrain and Landscape, Textual Elements, and Mise en Scene. Furthermore, Bevensee discusses how evoked and embedded storytelling setups lead to emergent narratives, as players actively interpret the environment in different ways, resulting in drastically distinct stories.

Objects and Scenery is heavily based on the concept of embedded narratives, which is part of the mise en scene. However, this aspect focuses on the aspect of the embedded narratives within the objects themselves, which can create cause-effect interpretations. Analogies are often used to imply deeper meanings within the narrative, allowing for a more efficient method of conveying a theme. Terrain and Landscape is based on evoked narratives, which, combined with effective staging and objects, can convey geographical information to indicate deeper narrative ideas. Textual elements should be used sparingly to support the main story, as too much will result in exposition, preventing players from freely interpreting the environmental setup. Finally, the mise en scene encapsulates the relation of the environment and the camera - the staging of the scene. In essence, the mise en scene is the combination of the other aspects working together to form a complete whole.

2.2 Staging and Mise-en-Scene

Environmental Storytelling is heavily reliant on the spatial composition of the game space. As such, creating embedded storytelling is related to staging in theatres and mise-en-scene in films. Jenkins

suggests that game designers sculpt space and design worlds for the player to interpret. As such, in games, the mise-en-scene can be understood as the way information is shaped and placed within the game environment for the player to interpret, generating new meaning. The original concept of mise-en-scene originated from theatrical plays and adopted by films, discussed by Bordwell and Thompson[19].

Carson discusses the importance of color, lighting and texture to convey central themes within the game. Furthermore, he emphasizes the idea of "theatrical magic" to create illusions of depth and drama in order to optimize performance. Carson also suggests to reduce clutter, using detailed elements to create signposts to lead the player from one space to another. Lighting is particularly important - Carson stresses the importance of smart lighting and composition, suggesting to compose other textures and props as supporting players to highlight important "cause and effect" elements. This suggestion is particularly relevant to PEA, as controlling where to draw the player's eye would most likely raise awareness within that area.

Contrast is another tool that Carson presents. Emphasizing the need to create variety in spaces using spatial, thematic, and visual contrast, Carson highlights the use of asymmetry to create a believable world.

2.2.1 Classic Composition Techniques

Level design in games heavily use composition techniques to direct the player's attention and manipulate player behaviour. As such, much of this section utilizes techniques taken from level and environmental design in games.

Piaskiewicz[87] explains how many classic composition techniques taken from photography and painting can be applied to level design. Composition can be applied in three areas: Environment, Environmental Elements, and Visual Feedback and Navigation. The environment composition consists of the big picture, often seen from a few directions. On the other hand, environmental elements are smaller details that are part of the environment, which can be seen from arbitrary angles. Finally, visual feedback and navigation consists of player wayfinding, or catching the player's attention.

Many composition basics are presented Piaskiewicz, such as creating a sense of harmony using layers, taking into consideration dominant subjects and Staffage, an optional layer with living elements. Sight Angles are important when considering a sense of scale or depth, and creating observation spots such as chokepoints or funnels to guide players.

Element Positioning in composition is important when achieving a desired emotion or effect. Symmetric compositions feel synthetic and man-made, whilst asymmetric compositions feel natural and organic. Visual balance is important when guiding player attention, encompassing techniques such as contrast, shapes, color intensity, size, texture, and detail.

2.2.2 Eye-catchers

Eye-catchers are techniques which emphasize the dominant subject of the composition. In games, these techniques are essential when catching the player's attention:

- A contrast of detail density. Details can be textures, elements, or symbols, among others.
- Leading lines can guide the player's eye. A distinction is made between horizontal and vertical lines, as both evoke different emotions and effects. Curved lines create a sense of beauty of nature, while angled lines are more aggressive and dynamic.

- Color is effective in the game's visual language. Intense colors and contrasts can easily catch player attention.
- Similarly, lighting can be used to great effect. As with color, the intensity, color, and contrast can emphasize elements or guide players.
- The scale of elements can attract attention. Specifically, larger objects will garner more attention as they stand out from the scenery. Contrast applies here too, however. A tinier object could also be interesting for the player.
- Moving elements can be signifiers or navigation.

2.2.3 Spatial Cinematography

Bellard[11] presents the concept of spatial cinematography, referring to methods in which developers can use the environment to direct player movement and attention. Bellard discusses different techniques of controlling the 2D screen, camera movement, and the player's perception of time.

2D Screen Proposing classic composition techniques as a means to enhance readability of the environment, Bellard advises to use the rule of thirds when placing the weight of the composition to maintain readability, similar to other types of media. Combined with choke points and through routes, good visual weight placement can help draw the player's eye.

Bellard also discusses the aim of "composing 3D for 2D", designing the environment to be in proportion to the rule of thirds for the player's camera, which is moving through the environment.

Movement Controlling movement is particularly problematic. The camera and player is tightly linked - the camera is attached to the player, and therefore developers need to try to influence where the player looks and goes in order to control the camera. Where the player looks and goes is termed Saliency and Affordance respectively.

Bellard debunks various classical concepts which do not work well or function differently in level design. These concepts are:

- Leading lines are not directional, and viewers of a composition are not visually following the lines in a singular direction. Rather, the viewer's eye are flickering past the lines, and getting caught "like a fish in the net". As such, without a directional aspect to it, players would not physically follow them. However, Bellard notes that leading lines are still useful in catching the player's attention and understanding the structure of a 2D image.
- Lighting functions differently in terms of visual attention in 3D video games. Specifically, players do not automatically walk towards the light, but can provide more spatial information to the player.
- Weenies, landmarks which lead the player, have two aspects: they function as a landmark and contain mystery. Weenies require mystery in order to lead the player towards it, as players want to learn and discover information.

Saliency has two categories: bottom up and top down. Bottom up saliency is similar to the eye-catchers described by Piaskiewicz, involving the use of contrast. Top down saliency involves things which are meaningful to the player, which can be context-dependent or permanent. Examples of permanent top-down saliency are humans and human faces, or items associated with personal safety and survival. Context dependent top-down saliency can be task or goal based. While the final player saliency is a combination of top down and bottom up saliency, the mode the player

is in affects the weight, or importance, of one type over the other. Bellard argues that top down saliency is often more important in games since players are usually in a task or goal oriented mode, compared to other types of media.

Affordances are actions an object allows [84]. Oftentimes, there can be misperceived affordances in video games as affordances of real world objects are not copied over. To communicate in-game affordances, signifiers, or signals that players need to learn, can be used instead. Such signals can be through the use of strong colors, signs or symbols, amongst others. Other than object affordances, as described above, there are other types of affordances:

- Surface affordances are places people will walk towards, similar to object affordances. Surface affordances are distinct such that they are much more navigation-based - people are attracted to walkable surfaces. While people tend to be more attracted to larger surfaces, this is often not the case due to other objects in the scene.

- Complex affordances take context into account, in combination with surface affordances. For example, players in video games have learned to look for alleyways and side paths since there are often gameplay rewards which can be found.

- Spatial affordances involve the architectural concept of Prospect and Refuge (P&R), which is the view and safety of a space respectively. Spaces that have a wider and better view have strong prospect, while spaces that feel safer have strong refuge. There is primary and secondary P&R. While primary P&R is the current view and safety, secondary P&R are spaces which the player can see that can afford a higher P&R than the current location. People gravitate towards spaces which have strong P&R, and as such the environment can shape the way players move in a space. If players have strong primary P&R and cannot see secondary P&R spaces, they are less prone to move much, or will move more cautiously. Spaces with many potential secondary P&R will encourage player movement.

A sense of mystery is important when attracting players. In terms of affordances, a mystery affords more information, and humans in general like learning information. Using eye-catchers such as extra detail and contrasting shapes can create a stronger sense of mystery. This can be combined with secondary P&R to attract players towards a direction or location.

Wayfinding elements structure a player's understanding of a space. There are five types:

- Landmarks - Objects which stand out.
- Districts - Areas with distinct properties and "flavors".
- Linear Elements - Affords movement, such as paths, rivers, and roads.
- Edges - Linear elements which prevent movement.
- Nodes - Moments of decision or choice.

These elements are context dependent on the player's current mode of transport. It is important to note that wayfinding elements do not directly lead the player, but provide a mental map of a space, and as such affect how players navigate.

Time While films control time through edits and cuts, the camera in games are often controlled by the player, without the ability to edit and cut. However, space is experienced over time. As such, the layout of a space can be set up over time. Through the use of architectural repetition, a desired rhythm can be achieved. The density of a space will affect the intensity of time. It should be noted that intensity needs to be modulated over time to maintain its effectiveness.

2.3 Signposting

Vredenberg[117] defines signposting as "all the artefacts in a game that are based on visual aesthetics that fill a game space with content with the purpose of supporting player navigation, orientation, and progression through the space and narrative". As such, signposting is placed in the mise-en-scene. Major components of signposting were focused on: Lighting, Signs, Decals, and Objects.

Vredenberg analyzes the techniques, effects, and role of signposting in environmental storytelling, identifying three types of navigational signposting:

- Directional signposting directly point the player from point A to B. These generally contain little embedded narrative, and has the weakest narrative relation.
- Orientational signposting points players towards alternate routes or spaces, which include shortcuts and hidden areas. These signs stimulate player exploration, leading players to areas with spatial stories. Orientational signposts may contain embedded information, such as danger signs.
- Contextual signposting emphasizes conveying narrative information rather than supporting player navigation and exploration. These signs can work by either visibly point to embedded narrative information which are in direct proximity of the player, or contain the embedded information itself. One example is a spot light beside a dead body holding a treasure map.

Vredenberg uses semiotics to analyze how signposts can be embed narrative, discussing the work of Salen and Zimmerman's[105] semiotics in game design and Fernandez-Vara's indexical storytelling[41]. Signposts can embed narrative in three ways:

- Icons, which imitate ideas.
- Indexes, which are physically connected with a sign.
- Symbols, which are associated with a specific meaning through usage.

Through these characteristics, Vredenberg concludes that signposting fulfills three main roles:

- Supports and affords player navigation through the game space. As this can lead to more narrative information, signposting can indirectly support narrative progression.
- Contain embedded narrative information using symbolic and indexical signs. These pieces of narrative information are often small and do not progress the main plot.
- Contributes to a more immersive narrative and spatial experience for the player, as a result of the aforementioned functions.

2.4 Nudging Theory

The *Nudge Theory* is a concept developed by two professors, Richard H. Thaler and Cass R. Sunstein, that talks about altering people's behaviour in a predictable way by using subtle changes in the "*choice architecture*" [106], the process of influencing a person's decision by deliberately framing the available options. An example of this instance is presenting a person buying snacks online with a more healthy alternative when the snack is chosen, that will give the buyer a moment to rethink their decision and hopefully changing it. So why does this work? We human own two mode of thinking, the automatic and the reflective [102][70], with the automatic being the dominant mode which is estimated to be used for 95% of our daily decisions [9]. We human are more inclined to reduce effort as often as possible, and for that reason we rely mostly on our automatic mind,

and in the case of unavailable, or hard to access information, we apply *heuristics*, mental shortcuts, to substitute that information for a piece of readily available information that yields accurate judgments [96]. That said, *heuristics* leaves us vulnerable and more susceptible to *cognitive biases*, a systematic error in thinking that occurs when people are processing and interpreting information in the world around them and affects the decisions and judgments that they make. A *choice architect* can then exploit that cognitive bias by nudging the user and manipulating their choices into a more predictable outcome.

These nudges can be divided into 6 categories:

1. **Facilitate:** Nudges that exploit (or combat) a person's status-quo bias, i.e., it is easier to let things be as they are, than put effort to change their status. Examples of such nudges are opt-out policies.

2. **Confront:** Makes the end-user reflect an extra time before committing to their action. ex. reminding users to be careful when posting photos of children.

3. **Deceive:** Not the most ethical to use, but could be used for good. Changes user's perception of the options. ex. placing a rotten apple next to a bruised apple will raise the value of the bruised apple.

4. **Social Influence:** Social influence nudges take advantage of people's desire to conform and comply with what is believed to be expected from them.

5. **Fear:** Takes advantage of people's fear of physical losses, or fear of missing out. ex. making resources scarce, increasing its chances to be purchased.

6. **Reinforce:** Reinforces behaviours by trying to be more present in the users' minds. ex. "just-in time" prompts, reminds the user to continue or start on the ideal behaviour.

According to BJ Fogg, "For a target behaviour to happen, a person must have sufficient motivation, sufficient ability, and an effective trigger. All three factors must be present at the same instant for the behaviour to occur" [42]. To increase the chances of their existence Fogg identifies 3 types of triggers, *sparks, facilitators and signals.*

- **Motivation:** Sufficient motivation
  - To increase motivation **Sparks** can be used: **Sparks** are used when the players have the ability to perform a task but lack the motivation.
- **Ability:** Sufficient ability to execute the behaviour
  - To aid with the lack of ability **Facilitators** can be used: **Facilitators** aim to simplify the tasks and are suitable when the player has the motivation but lacks the ability to execute it.
- **Trigger:** An effective Trigger to initiate the behaviour
  - To aid the user to initiate a target behaviour **Signals** can be used: **Signals** are used when the player has the motivation and the ability to execute the task but there is a discrepancy between the player's actions and intentions

Caraban *et al.* later took these triggers and mapped them to the 23 types of nudges that they identified [22] defining the types of nudges that can be used in each situation, check the appendix A.

When do nudging fail?
Even though effective nudging is not always guaranteed to work. According to Caraban *et al.* 66% of the 74 nudges that were studied had significant effect on the target behaviour or attitudes. They also found no relation between the exact nudging mechanism and its effectiveness, rather its effectiveness relied on its implementation in a given context [22]. Caraban *et al.* later went on and identified and discussed 6 different categories for the reason of the nudges failure [22].

1. **Lack of educational effects:** One possible risk in using nudging, and especially techniques that tap onto the automatic mind, is their lack of any educational effects [73], so its hard to know if the effect of the nudge persists after its removed since nudges to not provide any information that people can use to reflect on their behaviours and learn the consequences of their choices.

2. **Nudging effect not sustained over time:** The effects of nudges diminishes or all together dissipates with time. Caraban *et al.* showed in 52 studies that that the effects of nudges even though promising, we have limited understanding of their long-term effects in a technological context and that area needs to be researched further.

3. **Unexpected effects and backfiring:** Nudges can backfire and produce unexpected behaviour due to compensating behaviours (e.g., printing more when double-sided due to carrying less weight, increasing calorie intake along with physical activity due to a licensing effect), unexpected interpretations (e.g., showing the average household energy consumption has led individuals to consume more when they notice that they are below average).

4. **Intrusiveness and reactance:** Nudges that focuses on creating friction runs the risk of reactance as they interfered with the user's freedom.

5. **Timing and strength of nudges:** Fine-tuning the timing and the strength of the nudges is of the greatest importance (e.g., The opportune moment for showing warning pictures on the danger of smoking was more effective, not when the individual was smoking, but much earlier.)

6. **Strong preferences and established habits:** Nudges work best under uncertainty when an individual do not have a strong preference for particular choices.

2.5 Player Behaviour Types

Player behaviour is the results of complex reflective and impulsive process that is susceptible to vary with time, place, situation, and context and is influenced by a series of factors like personality traits, beliefs, and cultural aspects [80]. Player behaviour is considered the way that the players acts and conduct themselves within the game [26], understanding how player acts will allows us to predict what actions the players will make or what games motivates them to play.

A few studies have investigated player behaviours in digital games. Schoenau-Fog[58] explored triggers for player engagement, and found that "experiencing the story" and "exploration" were ranked 1st and 4th respectively as activities which triggered engagement.

2.5.1 GNS Theory

On October 2001, Ron Edwards wrote an article about a theory with the attempt to create a unified theory of how role-playing games work known as the **GNS Theory** [32] which is inspired by **The Threefold Model** [93]. The GNS theory maps a player on a triangular model, figure 1, with **Gamism**, **Simulationism**, and **Narrativism** on each end.

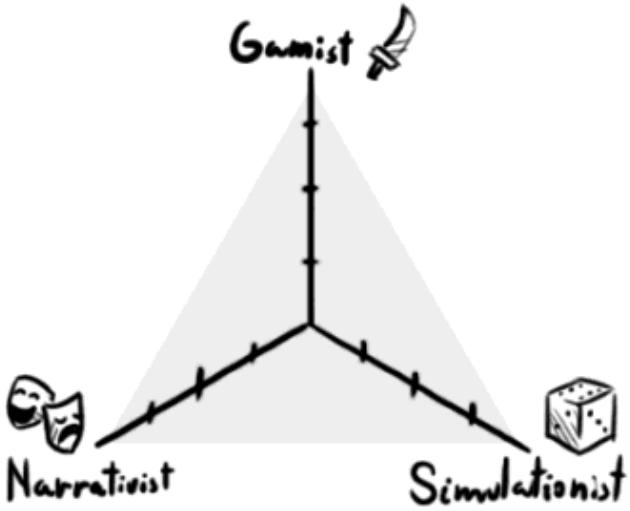


Figure 1: The GNS Theory Model

By knowing where the player falls on the GNS scale, we can then figure out what types of games that fit their liking and how their playstyle is going to be.

2.5.2 Bartle Taxonomy of Player Types

Similarly to the GNS theory, Richard Bartle wrote a paper in 1996 on the taxonomy of player types known as the **Bartle's Taxonomy** [10], which is a chart of classification of video game players, see figure 2. On the opposite end of the vertical axis we have **Acting** and **Interacting**, and on the opposite ends of the horizontal axis we have **Players** and **World** dividing the chart into 4 player types **Killers**, **Achievers**, **Socialisers**, and **Explorers**. This taxonomy chart allowed game designers to more deeply understand player motivation and psychology which in turn was used to design games to fit as many types of players as possible.

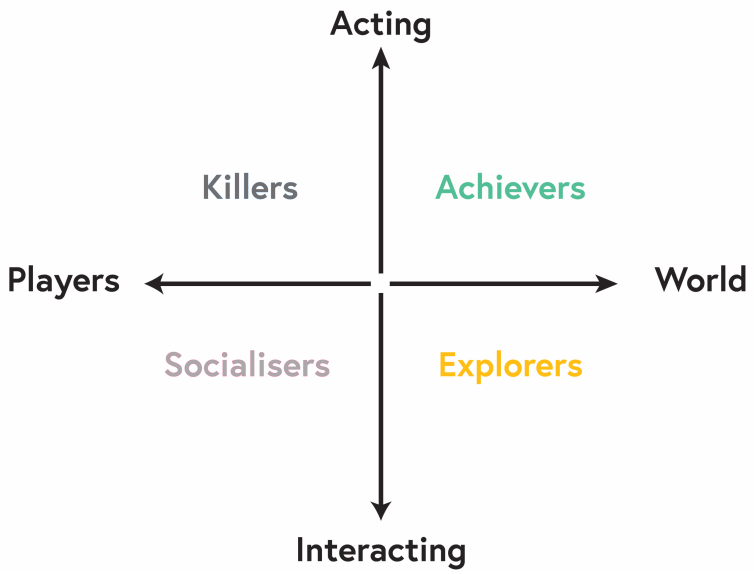


Figure 2: Bartle Taxonomy of Player Types

2.5.3 Five-Factor Model of Personality

The five-factor model, also referred too as the "Big Five", is a taxonomy for personality traits that is widely used in psychology studies to understand the connection between personality and behaviour [101]. The names of these traits produce a convenient acronym: OCEAN. The five personality traits consists of [116]:

1. **Openness to experience *(Inventive/Curious vs. Consistent/Cautious)*:**
   Distinguishes imaginative, creative motivations from down-to-earth to conventional ones.

2. **Conscientiousness *(Efficient/Organized vs. Extravagant/Careless)*:**
   Deals with the way we control, regulate, and direct our impulses.

3. **Extraversion *(Outgoing/Energetic vs. Solitary/Reserved)*:**
   Deals with the tendency to seek out stimulation and the company of others.

4. **Agreeableness *(Friendly/Compassionate vs. Critical/Rational)*:**
   Reflects differences in concern with cooperation and social harmony.

5. **Neuroticism *(Sensitive/Nervous vs. Resilient/Confident)*:**
   Reflects a tendency to experience (or not experience) negative emotions.

2.5.4 The Five Domains of Play

At *Gotlands Game Conference - 2012* [116] and at the *Game Developers Conference - 2013* [115], Jason Vandenberghe presented his work that was based on the five-factor model, where he correlated the five traits of the model with five domains of play that might fulfill them [116]. Here are the five domain suggested by Vandenberghe as written in Adam Ernest's book [36] and what they mean for understanding a player:

1. **Novelty $\longleftrightarrow$ Openness to experience:**
   Players who seek novelty like games that include a lot of variety and unexpected elements.

People who don't like novelty seek familiarity instead: games that offer them a comforting sameness.

2. **Challenge $\longleftrightarrow$ Conscientiousness:**
   High-challenge players prefer games that are difficult and require precision to win. Their conscientiousness drives them to act, to accomplish things, and perhaps to try to complete everything in a game. Low-challenge players like sandbox games and others in which the player is free to fool around without being required to achieve something.

3. **Stimulation $\longleftrightarrow$ Extraversion:**
   Players who enjoys party games and others that involve interacting with other players. Those who prefer to avoid stimulation prefer games they can play alone, games that let them be the only real person in the game world.

4. **Harmony $\longleftrightarrow$ Agreeableness:** In this section Vandenberghe is referring to social harmony where he sees cooperative games as good examples of games that achieves it and competitive games as ones that offer the opposite, conflict.

5. **Threat $\longleftrightarrow$ Neuroticism:**
   The game quality of threat (an element of danger, or frightening content—anything that is likely to generate unpleasant emotions) is popular with people who have high neuroticism

Vandenberghe goes on in his talk and subdivide each domain into 6 "facets" which he later reduced to 2 facets of games, except for "threat" that Vandenberghe later went on to explain that it is the domain that reflects the parts of the game that may cause a player to stop playing when they are otherwise enjoying the game.

- **Novelty:** Imagination - Adventurousness
- **Challenge:** Self-Efficacy - Self-Discipline
- **Stimulation:** Excitement-Seeking - Gregariousness
- **Harmony:** Sympathy - Accommodation
- **Threat:** Vulnerability - Anxiety - Angry-Hostility - Depression - Self-Consciousness - Immoderation

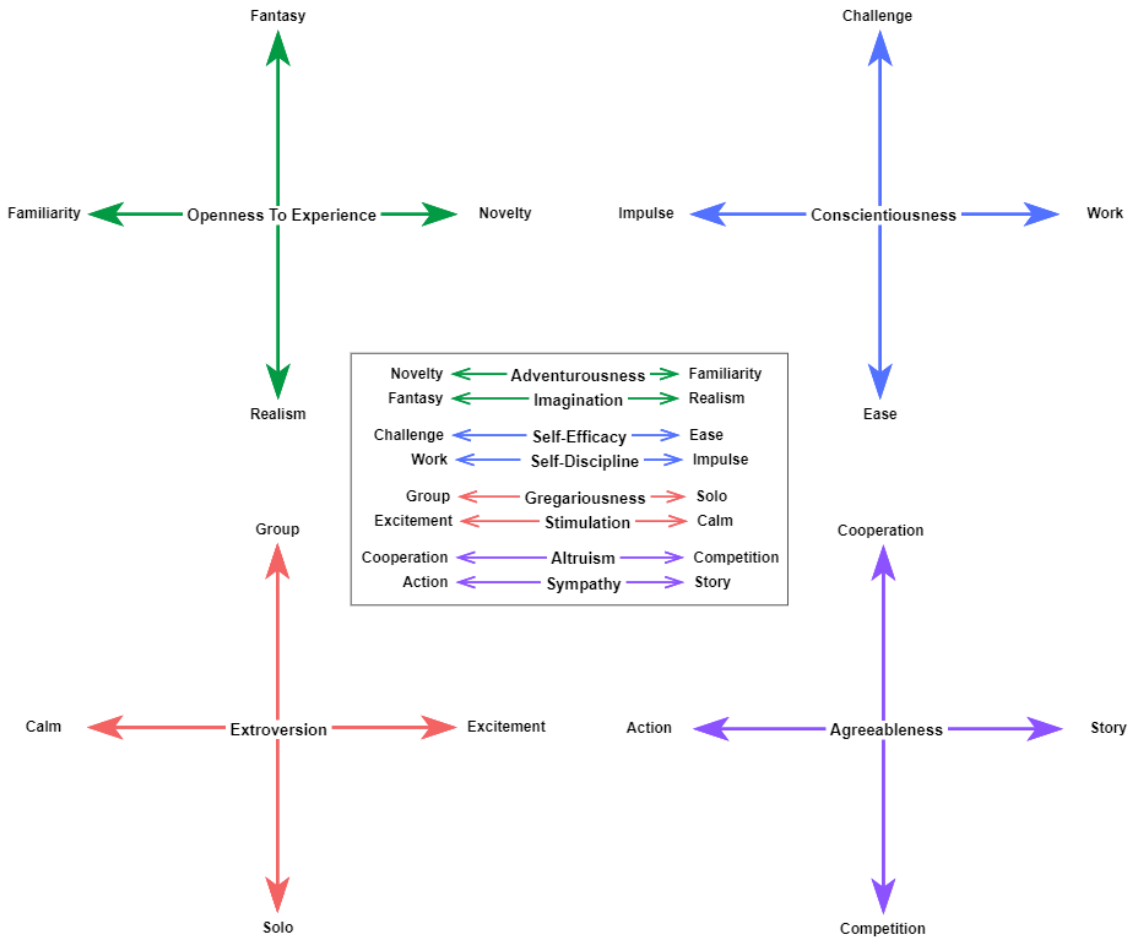


Figure 3: 4 Domains of Play - 8 Personality Traits

2.6 Game Design Patterns

Björk and Holopainen[18] presents and discusses the use of design patterns in the context of gameplay design, which can support the design, analysis, and comparison of games. Patterns are reoccurring characteristics relevant to gameplay, which can relate to each other in multiple ways. Moreover, gameplay design patterns can form hierarchies, influence or modulate each other, and can be implemented intentionally or not. Some relevant patterns include *Environmental Storytelling*, *Big Dumb Objects*, *Diegetically Outstanding Features*, and *Scripted Information Sequences*. The *Environmental Storytelling* pattern is defined as "Storytelling that occurs through movement and exploration of an environment."

2.7 Mechanics

2.7.1 MDA Framework

The MDA framework, presented by Hunicke[63], present a formal and iterative approach to game design, breaking a game down into three levels of abstraction:

- Mechanics(M) describe the rules and individual actions a game allows.
- Dynamics(D) describes the system, or the run time behaviour of the mechanics, player input, and their interactions.
- Aesthetics(A) are the emotional responses evoked in the player when interacting with the game. Hunicke presents eight types of fun: Sensation, Fantasy, Narrative, Challenge, Fellowship, Discovery, Expression, and Submission.

The MDA framework emphasizes the different perspectives between the player and the designer. While the designer creates the mechanics first, building towards the aesthetics, the player notices the aesthetics first, then to dynamics and finally to mechanics.

Although influential, the MDA framework has been criticized for its vagueness in definition, lack of depth, and the way fun is defined. Dormans and Holopainen [72, Chapter 4] discuss the criticisms from several sources in detail. Despite the issues, the MDA framework remains as a useful method of establishing a common language to discuss game design and analysis.

2.7.2 Exploratory Mechanics

Worsh and Smith[99] touches upon how game environments and mechanics shape and reinforce player identity. Bevensee [17] discusses how the MDA framework's aesthetic of Discovery support Explorers from Bartle's player types, amongst other types of aesthetics. As environmental storytelling creates narrative locations scattered across the game world, Bevensee argues that explorers are rewarded for discovering hidden narrative elements if they stray from the "main path". The "Game World Exploration" game design pattern by Björk and Holopainen echoes this sentiment, emphasizing the importance of the player's lack of complete knowledge of the game world as well as player's agency in their movement. Linderoth[74] argues that players learn less if there are built in game mechanics facilitate exploration for the player. Furthermore, three examples of these mechanics are presented: Highlighting, Vision Modes, and Point of Interest. Activating these mechanics can draw the player's attention towards the area of interest to a large degree depending on the implementation.

2.8 Sound Design Patterns

Alves and Roche[6] present a model and vocabulary for sound design patterns, where patterns are also reoccurring sound characteristics in gameplay sound design. One pattern can use many other patterns, and can belong or relate to multiple other patterns. Some high level sound patterns related to PEA include *Echolocation*, *Awareness*, and *Entrainment*. *Echolocation* is described as using sound to perceive aspects within the environment, while *Awareness* is described as using sound to signal relevant aspects of gameplay. As such, lower level patterns such as *Directionality*, which is when players explore the direction of a sound source, and *Consequent Sound*, the diegetic sensitivity to sound, can be used to achieve *Awareness* and *Echolocation*.

2.9 The Hook Model

While most of the aforementioned frameworks are concerned with attracting the player in real time, few directly address the retention or habit-forming aspect of environmental storytelling. However, many discuss relevant concepts regarding the gameplay loop or visual language. Piaskiewicz discusses the use of color as a visual language, implying that the player needs to learn and be skilled at identifying eye-catchers. Bellard discusses the need to use signifiers that the player needs to learn to read in-game affordances, Vredenberg argues that signposting indirectly leads to narrative progression as players navigate through the game space, and finally the Nudging theory discusses how nudges can be affected by strong preferences and habits. Eyal[38] pr the Hook Model presents a framework for user engagement through an unpredictable positive feedback loop, where each iteration of the loop increases the chances of repeating it. The model is a cycle which consists of four phases:

2.9.1 (Pull My Devil) Trigger

[1] Triggers are cues that influence daily behaviour, prompting the user to take action. Note that these triggers are not the same type as those defined by Fogg's behaviour model. Triggers can be internal or external.

External triggers do not manifest in the user's mind. Instead, they appear from somewhere to beckon the user towards the service.

Internal triggers come from within the user, often appearing after using the service repeatedly. As this is reinforced, internal triggers become associated with the user's behaviours and emotions. These triggers satisfy a need to eliminate a pain the user has.

2.9.2 Action

Actions are what the user does after being triggered. Here, similar to the Nudging Theory, Eyal uses Fogg's model to understand the ingredients required to initiate the action. Specifically, the three aspects are: Motivation, Ability, and Trigger, the latter of which is described above. Motivation is dependent on the target audience, as different types of audiences are attracted to different motivators. Eyal advises to keep the action as simple as possible to maximize the chances of the user performing the action repeatedly.

2.9.3 Variable Reward

Eyal argues that variable reward is the most powerful phase, the key to hooking the user to a service. Arguing that the reward itself is not the most exciting aspect, but rather the need to alleviate the craving for the reward that is most exciting. In other words, the journey is more exciting than the destination. If the reward is the same, users are less excited by the experience as there is no intrigue. Variable rewards create a sense of novelty, making the result unpredictable. Creating a degree of indeterminism maintains interest and desire. There are different reward types exist as well. Specifically, rewards can be social, material, or personal gratification.

Presenting a juxtaposition of items of relevant and irrelevant can further create intrigue. Eyal uses Twitter as an example, where a mix of mundane and relevant content(interesting news) along with simple action(flicking finger downwards) creates an unpredictable user experience.

Another aspect which increases compliance is providing and maintaining the user's sense of autonomy - the sense of freedom.

[1] This is only a reference to the Devil Trigger song from Devil May Cry 5. The actual phase name is "Trigger".

2.9.4 Investment

Immersion requires something from the user to improve the service, improving the chances for the user to go through the cycle again. The contribution the user invests into the service can be time, effort, or money. Eyal delves deeper into the concept of irrational value, where users value items they have put labor into. Conditioning is another aspect which can change the perception of an item for a user. Preferences can be changed through social pressure. Investing also makes the user less inclined to use alternatives that perform similar services.

3 Background

The following subsections will present a few examples of environmental storytelling in games.

3.1 Tomb Raider Franchise

Tomb Raider is an action RPG game that originally launched and became popular in 1996, and has been a topic of controversy across the years about whether or not her character is empowering to female audience or if it is a fan service to its male audience [95]. After Tomb Raiders success, the game received many sequels over the years, and even a movie adaptation [65] starring *Angelina Jolie*, and continued to do so even after the franchise's ownership has been exchanged multiple times. Even until this day, the game continues to be popular with its latest PC release being *Shadow of the Tomb Raider* year 2018 [34]. In the game we follow the story of a female character by the name of *Lara Croft*, an archaeologist-adventurer where with her high intelligence and athleticism ventures into ancient tombs and hazardous ruins around the world solving puzzles and uncovering history, secrets and artifacts.

The newer games in series used effective environmental storytelling techniques to attract player attention and to highlight environmental story telling elements. During the conference in 2017, *Brian Horton*, a creative director at Insomniac Games, highlighted these techniques in the game *Tomb Raider: Definitive Edition* [53], and discussed the extensive use of environmental storytelling to immerse the user in the game world, see figure 4.

(a) A radio tower can be seen in the distance as a landmark highlighting the player's destination where the tower itself is emphasized in the shot using the darker colors in the scene and the bottom up camera view.

(b) A projector in Tomb Raider that allows curious players to flip through the slide images and uncover a backstory.

Figure 4: Shots from Tomb Raider: Definitive Edition

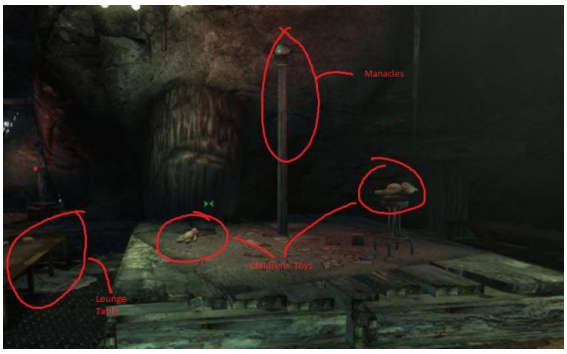
3.2 Bioshock 1

At a GDC, 2010, Worch and Smith [99] gives a presentation on environmental storytelling showing scenes from the game *Bioshock* [2] where they highlight uses of environmental storytelling to enrich the world and the core theme of the game. In the scenes presented, level designers used game elements to tell smaller stories that echoes the world at large.

In this figure 5a, we can notice multiple elements that work together to tell a story. For starters, we notice the money on the floor, both attracting the player's eyes and giving them incentive to get closer. Upon closer inspection, the player will notice the a machine that is toppled down on top of a splicer. Connecting the dots, the player can figure out that the money came from that machine, which can be an ATM or a vending machine, that fell and crushed the splicer who

was trying to trash or steal from it. This, and in combination with the water in the background, allows the player to make up an opinion on what happened there while also highlighting the core concept and theme of the game, societal decay.

(a) Bioshock - A Splicer Crushed by an ATM/Vending Machine. The subtext and associations of ATMs, Splicers, and the water in the background contribute to creating a larger picture. The theme of societal decay is reinforced by the death, while both the player looting the splicer's body questions the player's actions.



(b) Fallout - Child Slaver's Den. The teddy bears hint at how children were there, while the pole hints at how they were tortured. The booze and tables near the poles suggest that they were tortured for entertainment.

Figure 5: Examples of environmental storytelling as presented in the games Bioshock and Fallout 3

3.3 Fallout 3

In the same GDC, Worsh and Smith shows an example in the game *Fallout 3* [14][99] where the level designers also used object placement in the scene to tell a story and emphasize the core plot of what is happening. In this example, figure 5b, the player knows that they are exploring a Child Slaver's Den when they come across a scene that includes:

- Lounge tables next to a dance pole
- Alcohol
- Manacles on the pole
- A teddy bear in the scene

Putting these elements together, the player, and us, probably will come to the same disturbing conclusion of what happened there. According to Worsh and Smith, the viewer of this scene takes a mental leap, and even though they didn't see what transpired in the scene, they imagined the act that could have happened there inside their head due to the *Law of Closure* [43], referring to our innate humanly needs to categorize and fit visual elements into larger frameworks.

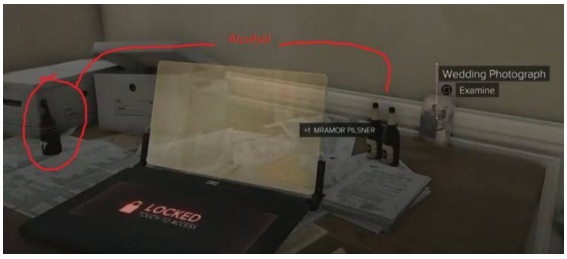
Games that are similar to Fallout 3 in terms of an open world RPG most likely use similar techniques for environmental storytelling. Such games include The Elder Scrolls series [16], The Witcher series[24], and Horizon Zero Dawn[55].

3.4 Deus Ex: Mankind Divided

At GDC 2017, Clemence Maurer a Senior Level Designer at *Ascendant Studio*, gave a talk about exploration and environmental storytelling in *Deus Ex: Mankind Divided* [33] where she stresses the importance of rewarding players for their attention to the environment and exploration [76]. The types of rewards can be functional, narrative or navigation which can be used to give incentive to the player to pay more attention or giving them the tools to make paying attention and exploration

easier. In the Deus Ex series, some of the stories and lore are presented to the player in the form hackable computers and emails between the NPCs in combination with props to tie the scenes and story together. To learn about the story that originates from the environment, the player might acquire a lead, or an invisible quest, to follow that might further uncover more stories and possibly new leads. According to Maurer, at the end of each lead, the players should be rewarded since that garners a higher interest and possibly immersion in the game.

(a) In this scene, the player breaks in the apartment of an NPC where they notice plenty of bottles of alcohol scattered throughout. In the corner of the room there is a computer device that the player, in the early parts of the game, have learned that they can interact with.



(b) On the table next to the computer is more bottle alcohol and a picture of a married couple with a date written on the back of it. The player can access the computer by either hacking it or entering the date as password which will give them access to private messages received by the owner of the apartment by people mourning the death of her husband.

Figure 6: Examples of environmental storytelling as presented in Deus Ex: Mankind Divided

In this instance in figure 6, the environment tells a story of a woman mourning the lost of her husband and turning to alcohol to numb her pain. Her using their date of marriage as a password sends a message to the player that their relationship was very important to her, which explains the copious amount of alcohol bottles in the room.

4 Methodology

This section describes the relevant approaches that can be taken to answer our research question. Here, a "**process**" is defined as a life cycle, a template structure used to plan and organize activities. A "**method**" is defined as a single activity or technique. As such, one process can contain multiple methods.

4.1 Wicked Problems

Environmental storytelling in games is often a design challenge, as each game is novel and different. As such, creating correct environmental storytelling pieces is highly context dependent, making it a wicked problem[94]. Due to complex factors, such as unstable requirements[60] or incomplete knowledge, there is no singular solution for it. Moreover, solutions are not definitive, and specific circumstances of production can influence the results[52].

4.2 Design and Analysis Processes

This section discusses relevant ways of working, including process models for planning, organizing, and executing design and analytic activities. These processes can be models or frameworks, and generally have a temporal order between phases.

4.2.1 Iterative Design

Many researchers advise using an iterative process when working with problems with wicked characteristics in interaction and game design. Interaction design problems often involves the user experience, and as such is similar to game design. Fullerton [48] discusses how early prototyping and play testing allows early feedback from players, proposing the Playcentric Design Process. Multiple game designers [48, Chapter 6] discuss the advantages of prototyping in game design. It allows designers to consider as many alternatives as possible before committing, testing their feasibility and making improvements on it in a timely manner.

4.2.2 Playcentric Design Process

The Playcentric Design Process is heavily iterative, emphasizing the inclusion of the player in every phase of the process, and focusing on the player experience. There are seven steps in the process:

1. **Brainstorming** involves setting the goals of the player experience, narrowing down the ideated concepts, and testing these concepts with mock-ups. Unlike the traditional Interaction Design concept of Brainstorming, which focuses on generating alternative ideas[89], Fullerton includes player testing within the Playcentric Design Process' Brainstorming phase.

2. **Physical Prototypes** are fast to create, evaluating them against the desired player experience goals.

3. **Presentation** of the concept game is optional, and is often used to obtain funding. It also helps establish a common understanding across the team.

4. **Software Prototypes** help demonstrate gameplay and should also be evaluated against the player experience goals.

5. **Design Documentation** should be made during the previous stages, including a list of goals, and are accessible to the team. Documentation should be collaborative and flexible.

6. **Production** involves creation of the main product, developed in sprints. The game should be constantly evaluated after a sprint to resolve issues. Gameplay should be solid by the end of production.

7. **Quality Assurance** checks if there are usability or accessibility issues for the target audience.

In each phase, iteration cycles should exist, where results are designed, tested, and evaluated repeatedly to ensure that the player experience reaches the desired level.

4.2.3 Research Through Design

Gaver [52] describes research through design as the process of obtaining knowledge based from design artefacts, and even collections of artefacts. These insights can be synthesized from artefacts done by ourselves, or by others. Gaver calls this type of meta-analysis "annotated portfolios", serving as practical guidance for design. Rather than formal theories, Gaver emphasizes the balance of annotations - the identified values, principles, and practice - in the portfolio, which may contain wildly different artefacts. As a result, observed patterns are tied to a concrete set of examples, and it is understood that the annotations are not constraints - only relevant principles should be considered depending on context.

Zimmerman et al.[127] presents a set of criteria for evaluating research contributions:

- The process should be well documented.

- The contribution should be novel.
- The contribution has to demonstrate its relevance in terms of context, motivation, and preferred state.
- The contribution should be extensible, allowing others to build on top of the contribution.

4.2.4 Fallman's Model

Fallman [39] presents another model for tackling wicked problems in Interaction Design. The model describes three categories of Design Research in a triangular structure:

Design Practice: Involves activities which are close or identical to those practiced outside of academia. Often these are within the industry, taking into consideration implementation contexts such as the organization.

Design Exploration: Explores possibilities outside of current paradigms, design exploration typically shows desirable, idealistic, or alternative possibilities. Design exploration also experiments, seeking to test new ideas.

Design Studies: Resembles traditional academic disciplines, design studies involves analytical work and discussing design theory. Contrary to Design Practice, Design Studies is more generic, aiming to describe and understand rather than change and create, striving to contribute to a body of knowledge.

Fallman encourages moving between different positions among the three positions, as more interesting results can be obtained as well as providing a more holistic view since the three categories can be understood as perspectives, each with tension occurring between each of them.

4.2.5 Grounded Theory

Grounded theory is a data-driven method used to form new theories [71, Chapter 18]. In contrast to more traditional methods, which develop a hypothesis through literature reviews, grounded theory first forms a theory by building categories derived from collected data, and finally review existing literature to ensure theoretical support. It is important to note that while the method is called "grounded theory", the theory is the result of the method rather than the process.

Grounded Theory is divided into 7 processes:

1. **Identify Substantive Area:** Often researching into one or more groups. In this context, game developers, level designers, and players can all be viable.
2. **Collect Data:** Data is then collected, using methods such as observations, interviews, or surveys. Alongside data collection.
3. **Open Coding:** Open Coding is then performed on the data, noting possible meanings and nuances. Each data-point is given a *code*, typically a phrase or word. *Codes* are categorized into *concepts*, concepts grouped into *higher categories*, and finally a *core category* emerges from the higher categories.
4. **Selective Coding:** When the core is established, selective coding is performed to delimite the coding process around a core category.

5. **Writing Memos:** Throughout the process, researchers write memos, which record challenges, especially those about code relationships.

6. **Finding Theoretical Codes:** When *theoretical saturation* is achieved, where additional coding stops producing new concepts, a theory is formed.

7. **Literature Review:** Finally, a literature review is performed and integrated with the theory.

Methodologies which take inspiration from grounded theory are called **grounded approaches**[72, Chapter 5]. Grounded approaches derive their theory as a result of the research, and evolves during research. Coulton and Hook discuss the suitability and issues of grounded approaches within game design research. They explain that since researchers always have preconceptions, the researcher's motivations, background, and in-depth description of the experience and decisions of the research should be provided. This is similar to Zimmerman's criteria for evaluating research contributions as well.

4.3 Methods

These are design and analysis methods which may fit in the different phases of several processes described above. Here, methods are defined as the way data is collected and evaluated.

4.3.1 Formal Analysis

Lankoski [71] explains formal analysis as examining an artifact in detail, looking at its specific elements and their relations. By looking at a game as a system, formal analysis can provide an understanding of a game, creating a foundation in which further analysis can be built upon. It is emphasized that a formal analysis of gameplay is independent of context, without regard of specific people playing a specific instance of the game.

Lankoski presents a small, visual art-centric pragmatic vocabulary for formal analysis using primitives:

- Components are individual game entities which are manipulated. Components can be game spaces as well, providing boundaries to the game.

- Actions can be player, component, or system initiated. Actions are often what give agency to these aspects of the game.

- Goals describe overall conditions of the game state each with impact to the gameplay. While goals are what players aim for while playing, they can also explain strategies of the game system or other components. Goal structures describe how different goals are related to each other, and can be obligatory or not.

Lankoski acknowledges that many modern games are too large to be fully described, and advises to only discuss relevant aspects. Within such areas of focus, the primitives, principles of design, along with their roles and relations can be described.

Fernandez-Vara presents a method called textual analysis [41, Chapter 1], describing it as an "in-depth study of a text", using inductive reasoning to "develop general theories which can be applied to other works". Three areas of building blocks are presented: The context, game overview, and formal aspects.

The context contains the way the game is produced and played, as well as other elements which relate to it. The game overview looks at the content, the basic features, and how it is read,

altogether giving a unique identity to the game. The game overview contains the summary of the game and who plays it. This includes the player's role, game interactions, and affordances. Formal aspects are interested in the pieces that construct the text. This refers to the system of the game, which includes its components and presentation.

4.3.2 Literature Review

Literature review is classified as secondary research. Relevant existing research are gathered and summarized, synthesized into relevant themes related to the area of interest. Although non-systematic literature reviews are not research methodologies by themselves, they are important in providing insight into the subject of interest and creating points of discussion. While there are many types of sources, which range from academic papers to blog posts, non-peer reviewed sources should be used with caution.

4.3.3 Data Gathering Through Play

Aarseth[3] discusses the need for researchers to personally play and experience the game as well as studying the games as an observer. Aarseth presents three ways of analyzing a game: First, by studying the formal design, rules and mechanics of it. Second, by obtaining second-hand player experience by observing others play or through reviews. Finally, the game can be personally played.

Different degrees of personal play depending on depth exists as well. Superficial play involves the analyst getting a "feel" for the game, playing for a few minutes. In light play, the analyst makes meaningful progress, but stops after it is made. In partial completion, a number of sub goals are reached. Total completion is only possible in games with defined endings that do not continue forever. There is also repeated, practitioner, and innovative play, involving emergent behaviours and skill mastery.

Many sources exist when performing non-play analysis. These involve game developer interviews, game forum discussions, player observations, and walkthroughs, amongst others. Aarseth argues that a combination of non-play and play analysis provides a more holistic, thorough analysis.

4.3.4 Stimulated Recall

Stimulated Recall is an interview method where the research subjects analyzes their own actions using stimuli such as audio or video recording. The method helps the participant remember and rebuild original situations as accurately as possible in order for them to be able to analyze their actions and thought process during actions [88]. Methods similar to stimulated recall has been used in game research, but stimulated recall has not been used as much. According to Pitkänen, stimulated recall can be a valuable tool in game research since it offers an aid to the participants in recalling their thought process during the experience, where otherwise it would have been challenging due to the immersive nature of games [88].

Stimulated recall has several advantages compared to traditional interviews. The interviewee will be forced to confront their actions as they happened, and discuss those moments with a less error margin due to them falsely recalling a scene. Showing the interviewee their actions puts them in a position to remember their exact response and can attempt to retrace their thought process in real time. Due to the nature of stimulated recall, the participants won't be relying only on their memory during the interview, reducing the amount of forgotten thought processes. That gives the researcher the ability to research the participants thought process with very little disturbance compared to having an observer.

One of the challenges of this method is the participants behavioural change due to the existence of a camera. They might feel more nervous leading them to behave less naturally than they otherwise would in the comfort of their homes. Yet, Pitkänen argues that the camera presence seems to only affect superficial behaviour. Reliability is also a challenge, as participnts may try to rationalize their actions without knowing their thought process at the time. Arguing that this could be a strength, Pitkänen believes it can lead to wider research material if the subject tries to make sense of it themselves.

Pitkänen provides a guide for setting up a stimulated recall study for game research based on a study in sociology made by Dempsey [29]. Here are the 6 steps in order:

1. **Understanding the game** advises the researcher to understand the game's available choices to players before the reason behind actions made in the game(s) in question.

2. **Understanding the idioculture of the gamer's society** advises the researcher to understand the culture associated with the game and its players. Games with a strong social level likely have communities with unique norms and cultures, which may greatly affect the playing experience. In turn, this may provide insight into player choices.

3. **Recording the game** Focuses on video recordings due to games' visual nature. Pitkänen highlights the importance of making players aware that the game is recorded as well as deciding which players are informants before recording to reduce bias. The player can also be recorded if relevant. Relevant actions should also be taken for different game types. For video games, both the audio and video of the game should be recorded.

4. **Planning the interview** The recordings should be watched very shortly after recording. The researcher must distinguish between important and unimportant recorded material, preferably extracting them using software. After the videos are edited, each interview should be planned, leaving room for free answers that are not stimuli-related. Pitkänen suggests to use an interview script template consisting of introduction, warm-up, substantive, and demographic questions. While the introduction and warm-up should occur before the interview, the substantive questions and demographic questions may take place when going through the video, as many of them relate to it.

5. **Interviewing the informants using stimulated recall** Pitkänen strongly suggests to interview the participants as shortly as possible after the initial event to enable better recall. The interviewer should make the situation as comfortable as possible, and there should be a balance between giving the informant space and following the prepared structure. Many stimulated recall interviews are semi-structured, as the particular actions in the video may provide unexpected answers which may provide interesting insight if followed up. If the video seems to be more important than the structure, straying away from the intended interview would be useful.

6. **Analyzing the interviews** Depending on the research questions, the researcher chooses how to analyze the data. Pitkänen presents Svartsjö's EPP method as a possibility. Verifying the researcher's interpretation of the data is important too.

More details about the EPP method, pitfalls, and ethical questions can be found in *Stimulated recall as a game research method* [88] page 4.

4.3.5 Observation

Aarseth[3] discusses the advantages of observing others play games, such as providing insights missed from first-hand play. Arguing that most aspects of play are non-verbal, observing player styles, techniques and behaviour is invaluable when combined with a level of the game's knowledge from the researchers. Cooper[25] argues that people typically are unable to identify and evaluate their own behaviours, particularly those which reflect poorly on themselves. Researchers can identify common behaviours, themes, and patterns when observing others play or utilize a product. Observations can be semi-structured or structured based on formality [59]. Semi-structured observations are more casual, used to explore territory new to the designer. A set of guiding questions can be used, but an open mind is most important during observation, allowing the subject to go offtrack when unexpected events occur.

Structured observations has a clear structure, with predetermined types of interactions or behavioural categories. Frameworks exist as templates to guide and structure such observations. One such framework is AEIOU, which categorizes observations into activities, environments, interactions, objects, and users. Both semi-structured and structured observations should be well-documented and systematic, with photos, video, and notes.

Fly-on-the-wall(FOTW)[59, Chapter 42] observation is yet another variant of observation which removes the researcher from direct involvement from those being researched. FOTW aims to minimize bias and behavioural influences from the researcher's interactions with users. Two types of FOTW techniques are suggested: **Secret outsiders** are distant observers, unseen by the participant, but is often limited in capturing depth and nuance in interactions. **Recognized outsiders** are known to participants, but position themselves to be as unobtrusive as possible. This could still incentivize participants to changing their behaviour, but can allow for more nuanced observations.

4.3.6 Interviews

Interviews are fundamental when collecting firsthand accounts of experience, opinions, attitudes and perceptions[59, Chapter 48], and can be used in both exploratory and evaluative purposes. Interviews can be structured or unstructured. Structured interviews follow a script containing questions, which allow for easier timekeeping, greater consistency, and are easier to analyze. However, they may be perceived as too formal and impersonal.

Unstructured interviews typically have a guiding set of topics, which are more flexible, natural, and can garner unexpected responses leading to greater insight. Often exploratory research work well with the unstructured format, as participants have more freedom to discuss topics not anticipated by the researcher.

Semi-structured interviews are a mix of both structured and unstructured, where a set of questions are used to guide topics, but follow up questions are used to probe thoughts and opinions, giving more flexibility for exploration than structured interviews.

Focus groups are group interviews which involve a set of well chosen people along with a moderator. Well moderated focus groups can create a peer setting, which allow participants to be more likely to share experiences, perceptions, wants, and insights. A nonthreatening group dynamic reveals valuable data, preferences, and understanding. Focus group participants may influence the opinions and answers of others, introducing bias.

Hanington[59] advises several design-related topics to encourage participants to provide more insight. Some include reviewing development processes, expressing and explaining undesired aspects of the current state, discussing underlying emotions in process, work-arounds and hacks,

mental models shared by multiple members, and how members establish social capital.

Interviews are often complemented with observations or questionnaires, as they can be more producted when based around artifacts. The stimulated recall method, for example, uses such complementary methods.

4.4 Prototyping

Prototyping is a simple experimental model that is a mock-up of the target solution or interaction, which is used to test or validate ideas. Prototypes can take on multiple forms ranging from a low fidelity prototypes, such as paper prototype, to a high fidelity prototype, such as a basic interactive system that gets the user as close as possible to the true representation of the end product [44][13][113][27].

According to Camburn *et al.* prototyping have several objectives where the 5 most cited ones are the following [20]:

- **Refinement:** is the process of gradually improving a design over several iterations.
- **Communication:** is the process of sharing information about the design and its uses with the design team and users.
- **Exploration:** is the process of seeking out new design concepts.
- **Active Learning:** is the process of gaining new knowledge about the design space or relevant topics.

4.4.1 Trade-offs and Types of Prototyping

In his article Ralhan highlighted 3 types of prototypes [92] that can be used in software development, as written in Ian Sommerville's book on software engineering, 1995.

1. **Throwaway Prototypes:** are used to clarify functional or user requirements and helps in identifying any potential risks, which are later discarded once they are evaluated and the requirements updated.
2. **Evolutionary Prototypes:** is the concept of developing the prototype over several iterations based on user evaluations and improvements.
3. **Incremental Development:** is the methodology where each delivered production software is taken as a prototype and after the evaluation by the users the changes and suggested and incorporated in the next release.

Prototypes are a helpful tool that allows us to discover problems or improvement with the product, even though time consuming, the benefits outweighs the cost. Tim Brown, CEO & President of IDEO gives a clear and short explanation on the benefits of prototyping:

"*They slow us down to speed us up. By taking the time to prototype our ideas, we avoid costly mistakes such as becoming too complex too early and sticking with a weak idea for too long. - Tim Brown*"[44]

4.4.2 Using Prototyping

To fulfill our goals for this research, small prototypes can be made, based on each Player Environmental Awareness (PEA) techniques we've uncovered, in either Unity [104] or Unreal engine [50], both engine are great platforms to prototype with each their own pros and cons. In short, and based on an article written by Evelyn Trainor-Fogleman comparing the engines [110], Unity is an easier platform to learn and use but is less optimized, while Unreal Engine provides more tools, higher efficiency and better VFX. The choice of engine depends on the type of technique we aspire to prototype, if we want to prototype a scene that is heavily influenced by camera composition and lighting contrast, Unreal Engine might be the better choice, but if we want to prototype a quick scene which is based on object placement for example, Unity will be a better choice.

5 Planning

This section outlines the plan to reach the desired result.

As this project aims to create and test guidelines for a new, exploratory concept, much of the work was focused on gaining knowledge to influence the guidelines or to evaluate its usefulness. Yet, time, competence, and other constraints had to be taken into consideration.

Given our research question and interests, our main goal was to create guidelines that will be used by game designers in order to provide a frame of reference when working with environmental storytelling. More specifically, the guidelines were made in relation to how Player Environmental Awareness (PEA) will be affected.

5.1 Desired Sub Goals

- Analysis of a multitude of existing theories and practices relevant to environmental storytelling, synthesized to better understand the value different techniques and domains present.
- An analysis of several commercial, off-the-shelf games in relation to Player Environmental Awareness (PEA) and environmental storytelling. This analysis will then be used to obtain user data in terms of player exploratory behaviour and the influence of PEA techniques.
- A framework describing concepts which affect Player Environmental Awareness (PEA).

We aimed to use a process similar to a grounded approach, based on our research question. Our research question confronts a wicked problem - it is something we do not know what to consider unless it was tried. As such, we initially wanted to prototype and test the theories, as many researchers propose iterative processes to tackle such issues [48][127][71]. Our prototypes could then be evaluated and analysed, which could then improve our guidelines. However, we have decided **against** producing prototypes for the following reasons:

- **A Story Plot:** This thesis is focused on player awareness and environmental storytelling. For us to know if the techniques that we are using in our prototype are effective, and functional, the tester needs to be able to notice and learn the story plot in the scene. If they are able to identify what the story is about, then we can rule out that the method was effective.
- **Knowledge in lighting and level design:** Some of the techniques we researched, e.g. lighting composition, requires us to engineer a scene using different techniques of lighting to dim out, or highlight certain objects/areas of the prototype in order to attract the tester's attention. With no prior experience in that field, we presume that this can be difficult to implement correctly given our time constraints.

- **Proper implementation of the techniques:** To test the techniques out, we need to have the knowledge on how and when to implement them into the scenes. During our research, we familiarized ourselves with the theory part of the techniques. Yet, implementing them to the degree where it correctly reflects the theory is problematic given our competence and resources.

- **Time:** Time is of the essence and is a resource that needs to be spend wisely. Based on our current progress and the gantt timeline, there is a high risk that we don't have enough time to attempt multiple prototypes or to learn a new skill to use in the prototype. We feel that the time can be better spent analyzing commercial games and gathering other types of data.

We were inspired by the grounded approach in multiple ways. Firstly, instead of prototypes, we have decided to gather many different types of data from different sources. Other than the literature study, we will interview practitioners and analyze scenarios in commercial games that align with our guidelines. We will perform stimulated recall sessions with users using these scenarios. For environmental storytelling, it is difficult to obtain data only from a few sources due to the domains and stakeholders that are involved. Developers, users, and the games themselves are all relevant, yet there are different ways to gather data from them.

Secondly, we performed open coding on most of the data we gather. By creating observations, we labeled each of them and categorized them later on. This allowed us to refine the guidelines as we were able to categorize and identify important aspects of environmental storytelling.

As with many processes that deal with wicked problems, we aimed to work with an iterative process throughout the project, continuously refining our guidelines at the end of each iteration. Specifically, we previously planned to refine the guidelines after:

- The Prestudy phase.
- Practitioner Interviews are performed.
- Each game analysis session.
- User interviews and stimulated recall.
- The soft evaluation.

The thesis was planned to be split into: Prestudy, Research, and Soft Evaluation.

5.2 Prestudy

The first five weeks were spent researching the domain, narrowing our scope, and determining the direction we wanted to proceed with the thesis. Mostly consisting of literature review, project planning, and establishing rough guidelines. The project's methodology and scope was redefined after completing initial research.

5.2.1 Literature Review

To achieve our sub goal of synthesizing existing theories, techniques, and domains related to environmental storytelling, a literature review has been conducted. The literature review covered a variety of different domains, covering topics such as game design, psychology, art theory, neuroscience, and sound design. Google Scholar and the Chalmers Library was used as databases. We quickly noticed that there was a lack of academic papers specifically about environmental storytelling. There were however a number of online presentations and articles about it from industry leaders. Some noteworthy sites include the Game Design Conference and Gamasutra.

While environmental storytelling in general were well discussed by industry leaders, it was difficult finding information about methods to capture or avoid player attention in the context of environmental storytelling. Our research has shown that such relevant information is scattered across different domains. For example, salience in environmental storytelling is seldom discussed, but the term seems more commonly used in level design and interaction design.

5.3 Research

Hook [71, Chapter 18] explains that data analysis is not a distinct phase in a grounded approach, but rather an iterative process where data is gathered strategically as the the process develops. We have identified and planned certain types of data to gather in advance already at this stage, and will consider changes to the plan as we progress. We have identified three general areas of data to analyze: The literature survey, analysis of commercial games, and the interviews. Practitioner interviews and Stimulated Recall are considered to be part of interviews. Each will be discussed in detail below.

5.3.1 Literature Review

A wide net was cast over the relevant domains, as discussed above. We planned to perform open coding on the relevant literature that we have found, making observations from the sources. Given the sheer amount of literature we have found, there is a possibility that not all can be coded given our time constraints. As such, we planned to prioritize certain aspects of the literature to code first. The prioritization criteria will depend on the literature's relevance in relation to environmental storytelling.

5.3.2 Off-the-Shelf Game Scenarios

Commercial game scenarios following our guidelines and the theories will be identified and analyzed. Here, scenarios refer to game areas with a predefined starting point and end point, or goal. The goals can be defined by the game itself, such as a quest, or by us, such as reaching an arbitrary point in the area. Our own experience and research shows that many open world RPGs are prohibitively large in scale to achieve total completion, and thus we aimed to only achieve what Aarseth calls "light play" [3] in the games we analyze. The scenarios will aim to serve as examples for the guidelines. The MDA framework[63], Björk and Holopainen's Game Design Patterns[18], as well as relevant theories were planned be used to analyze the games, as performing complete formal analyses following the guidelines of Lankoski [71, Chapter 3] of several open world RPGs would take too much time.

5.3.3 Practitioner Interviews

In order to understand the current standards and practices used for environmental storytelling, we first interviewed those working in the industry. Although we wanted to target as many different practitioners who are involved with environmental storytelling as possible, it was not feasible due to the practitioners' schedules. Instead, we planned on performing convenience sampling. This was meant to help us uncover blind spots which we would not have considered before. As these initial interviews are more exploratory, we did not present our rough guidelines to the practitioners to discuss, because it may skew the conversation away from the practices the practitioners perform and towards the guidelines themselves. Instead, we prepared topics derived from the literature study for the practitioners.

As these interviews are meant to explore the opinions and perceptions of practitioners, we would have liked to use unstructured focus groups to allow participants to share opinions and experiences with each other in order to provide insight on what they consider important when

creating environmental storytelling. This is particularly important as we as researchers do not have the knowledge or competence regarding both game development and environmental storytelling as the diverse roles involved in creating an environmental storytelling setup. However, we are aware that such focus groups are most likely infeasible for practitioners due to time zones, available times, and coordination issues. Focus groups also tend to take a longer amount of time to perform, which can reduce the appeal for practitioners to partake in the interview. Thus, we have opted for individual interviews to be more flexible around the practitioners' available times.

This interview was conducted online through voice and video calls, as the practitioners will mostly be located in different parts of the country or world. Although online interviews are more difficult to capture body language and are subject to technical difficulties, we argue that they are more accessible in the current pandemic as well as allowing us to reach more practitioners.

5.3.4 Stimulated Recall

Stimulated Recall was planned to be used to get data about environmental storytelling from players playing the identified game scenarios, which was planned on accomplishing our sub goal of obtaining user data regarding the influence of PEA techniques. Users were planned on being gathered using convenience sampling. Pitkänen's [71, Chapter 8] guide for stimulated recall was planned on being used. Besides the game's audio and video, the player were planned on being recorded. As these interviews are meant to make participants, these were planned on being individual, semi-structured interviews to reduce bias and obtain more insight. Open Coding was planned on being used to analyze the gathered data, which subsequently was planned on being used to refine the guidelines. If time permits, another round of finding scenarios based on the refined guidelines and stimulated recall sessions may be performed.

5.4 Soft Evaluation

We aimed to present the refined guidelines to the practitioners after the stimulated recall sessions. We called this a "soft evaluation" as we anticipated there will not be enough practitioners to provide empirical evidence to prove the usefulness of the guidelines. The domain of environmental storytelling consists of many domains, and we predicted that we will be unable to obtain the opinions of practitioners in each relevant domain. Furthermore, while the comments made by the practitioners are grounded by their experience, they are still subjective. Finally, we are unable to test users with the refined guidelines as we did not plan to create a prototype based on the guidelines. Nevertheless, the soft evaluation presented an opportunity for outside input from the developers.

This soft evaluation was the final iteration of the project, and helped achieve the sub goal of creating a framework describing concepts which affect PEA.

5.5 Updated Time Plan

There are several points of interest in the time plan. Firstly, the playthrough and analysis of games are broken up into iterations which allowed us to assimilate and perform open coding on the data. Secondly, the guidelines were refined at the end of the data collection sessions, which can be seen as separate iterations. Finally, we have made open coding take 11 weeks to reflect that it will be continuously done throughout the project.

5.6 Ethics

This section discusses some of the possible ethical issues involved with implementing environmental storytelling with the intention of manipulating the attention of players in different ways.

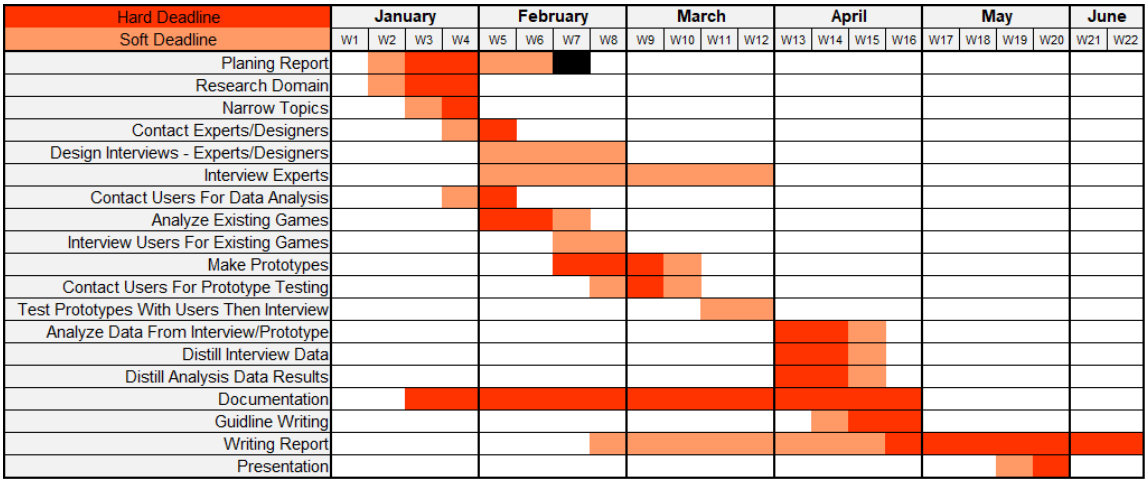


Figure 7: Our Initial Time Plan

5.6.1 Methodology

There are a few ethical concerns based on our process. Since grounded theory is a bottom-up approach, there is an assumption that researchers do not have preconceptions while identifying concepts and theoretical explanations. However, Coulton and Hook [72, Chapter 5] discuss how researchers always have bias, and through their research activities reveal themselves. This is an ethical issue as the researchers may specifically look for data which fits the preconceived notions of the theory. As a counterargument to this, they argue that having the researchers clearly stating their motivations, background, and extensively documenting their process can mitigate this issue. We also plan to document our process, keeping a project diary and continuously filling in this report. Furthermore, the report will contain motivations for important decisions made.

Interviews In both the practitioner interviews and stimulated recall interviews, we planned on recording the interviewees' video and voice. This can be particularly useful when analyzing attitudes, reactions, and body language, but privacy concerns may arise. Interviewees may also be more uncomfortable if they know they are recorded. Given the current pandemic, we performed a number of online interviews.

For practitioner interviews, we verbally asked for informed consentC to record their video and audio before the interview begins. We also informed interviewees about the purpose of the study, alongside ensuring confidentiality of the recorded data. Participant withdrawals are problematic as we planned on having the practitioner interviews as a focus group, but we could choose to not include the answers of that participant in the final results if desired. Interviewees are anonymous.

Similarly, for stimulated recall interviews, informed consent and purpose of study was planned on being provided, on paper if the interview were to be conducted physically.

Stimulated Recall Sessions We planned on having a number of stimulated recall playthrough sessions be physically performed, as we believed it allows us to better capture the player's reactions. We planned to record both the game's video along with the player's reactions in video format. Informed consent about this was planned on being asked before the session begins, and participants could withdraw their data after if desired. The room was planned on being made as comfortable as possible to increase player immersion or to prevent disruptions.

Confidentiality To maintain data privacy, access to the recorded data was only limited to the researchers. Furthermore, potentially sensitive information was anonymized if they are included in the report. Such information can be names, cultural background, or family relationships.

5.7 Misuse of Results

The results of this project can be misused in multiple ways. The nature of these guidelines are meant for designers, who trick the player in diverting their attention when traversing through the in-game environment. The player is thus unconsciously changing their behaviour.

Behavioural Changes Many of the relevant theories often try to influence behaviour without the player being aware of it. Nudges, for example, are manipulative in nature. Different types of nudges can be questionable as well. For example, deceiving nudges to change user perception can be unethical. We believe that the goal of these nudges within the environmental storytelling context is to increase player immersion, which is not a malicious intention.

There is also the issue of players being aware of these techniques, which can not only break their immersion of the game, consequently causing such techniques to backfire. While this can be a cause for concern, it is beyond the scope of this study.

Addiction Some of the guidelines are derived from theories which create a sense of addiction. The Hook Model encourages repeated actions, subconsciously embedding behaviour into the player without them realising that they are repeating the same activity. This can be problematic if designers abuse such loops, as players may play for overly long hours without rest. Spacing environmental setups apart, or simply giving reminders to the player could mitigate this issue.

There is also a possibility that such behaviour changes in games can influence the player's behaviour in the real world. Players deceived in-game may be more prone to repeating such behavioural changes if a similar situation occurs in reality. Within the context of environmental storytelling, however, one can argue that this is a low possibility, as there are different risks to consider in a game environment compared to real life. Bellard [11] also discuss the different affordances between games and reality that can influence the decisions of a player. For example, players may be more likely to enter an alley in a game as there is treasure at the end of it. In reality, people would most likely stick to the main road.

6 Process

This chapter discusses and describes the process taken to execute the project, with motivations for the decisions taken. The overall goal was to produce a set of guidelines, which were later modified to become Rules of Thumb (RoT).

6.1 Prestudy

In order to better understand the domain, we first performed a literature review. Relevant approaches to answer our research question were researched as well.

6.1.1 Literature Review

Although a grounded theory approach performs a literature review *after* the grounded theory is formed, a prestudy was deemed beneficial to us as we believed that a lack of domain knowledge would harm the interview with industry practitioners. Furthermore, given our time constraints and time plan, we deemed that a prestudy would be the best use of the initial weeks of the project. Ultimately, the literature review not only allowed us to better understand the problem domain and its scope, but also served to influence both the industry practitioners' interview guide and the open coding afterwards. The literature review was summarized into the Theory and Background section, and the research of relevant approaches for the project presented in the methodology section.

As mentioned in the Literature Review subsection in Planning (5.2.1), it was difficult finding relevant information in a single area. This was particularly true for concepts which were not often associated with environmental storytelling, such as audio or player psychology.

6.1.2 Uncertainties

Several uncertainties existed at this stage in the project. It was unclear if there were practitioners available for us to interview, and we were unsure of the amount of work required to perform stimulated recall interviews. It was decided that in the case where practitioners were not available, more games could be analyzed and coded instead.

The practical process of open coding was unclear at this stage as we had not done it yet, resulting in unclear estimates for how long coding each piece of data would take.

6.1.3 Changes in Planning

One major change in how the initial plan changed after performing the prestudy was how the guidelines would be iterated upon. Initially, we had decided to create the first iteration of guidelines after performing the prestudy and completing the planning report. However, we felt that we did not know enough specifically about PEA to spend time on it yet, and believed that it would be better to obtain more knowledge about environmental storytelling first. As such, we decided to create the initial set of guidelines after the practitioner interviews if practitioners were available, or after the analysis of the first set of games if the practitioners were not. In either case, we believed that the time immediately after the Prestudy would be better spent beginning to play through and analyze games.

6.2 Game Analysis

After the prestudy, we immediately began playing through the games, and annotating environmental aspects which caught our eye. The games were chosen based on convenience, ease of access, research goals, and the amount of secondary material surrounding the games, such as Lets Plays,

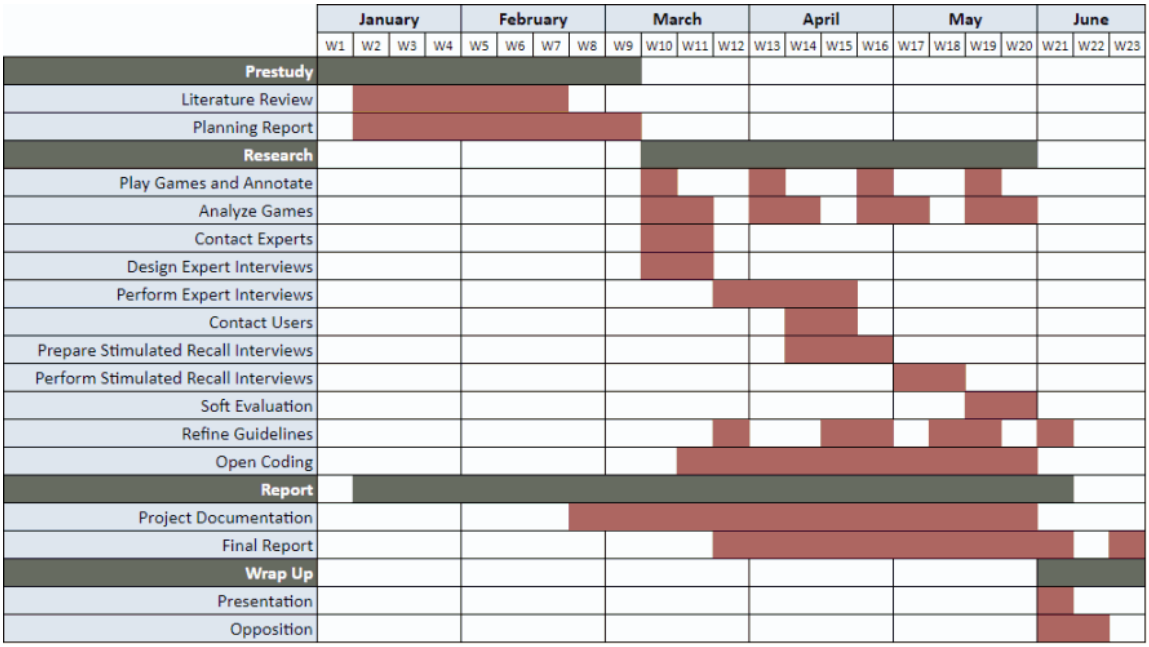


Figure 8: Our Time Plan after the Prestudy

walkthroughs, and blog posts. We wanted the game analyses to not only act as data for the grounded theory, but also serve as scenarios for stimulated recall users to play through. This meant that we needed to target games which allowed us to save states at any time in order for us to return to those game areas to design scenarios. With this in mind, the first pair of games chosen were Bioshock: Remastered and Fallout: New Vegas, whose box arts are shown in Figure 9a and Figure 9b respectively.

(a) Bioshock: Remastered [2]

(b) Fallout: New Vegas [85]

Figure 9: The games analyzed throughout the project.

The games played, annotated, and analyzed individually. Light play[3] was performed for both games, as both researchers stopped playing when meaningful progress was made. When annotating, screenshots were taken for environmental elements that caught the researchers' eye, or were deemed interesting, such as techniques that were found during the prestudy that were noticed in the games. Multiple screenshots could be taken for each "entry", or interesting environmental

element. Textual notes were then taken for some environmental elements, describing the aspects that attracted the researchers towards that environmental element. The games were largely first played through and annotated before being analyzed rather than being concurrently done. One week was spent performing light play and annotating, and another was spent performing open coding.

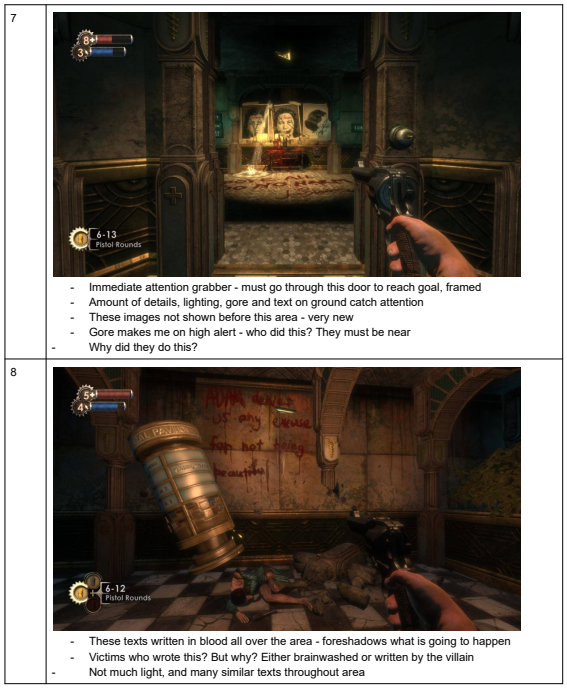
Although effective for visual environmental aspects, this approach was problematic when trying to capture motion, audio, or player interaction. Video capture was difficult as it required constant recording, resulting in large file sizes and was more difficult to annotate. Furthermore, we would not be able to put videos in the report. Thus, we decided to describe audio or movement aspects of the game through text, which naturally brought disadvantages. As both researchers were not particularly musically trained, it was difficult describing certain musical aspects. However, the use of screenshots and text allowed us to quickly note down entries and move on to the next, minimizing the impact to immersion, which brought our playthroughs closer to the intended player experience.

Using the captured screenshots and the textual notes, observations were created for each entry, or scenario. The observations were then open coded, where each observation was given multiple codes, as we believed each observation easily had multiple possible meanings and nuances. The observation and codes for the games can be found in Figures F and G.

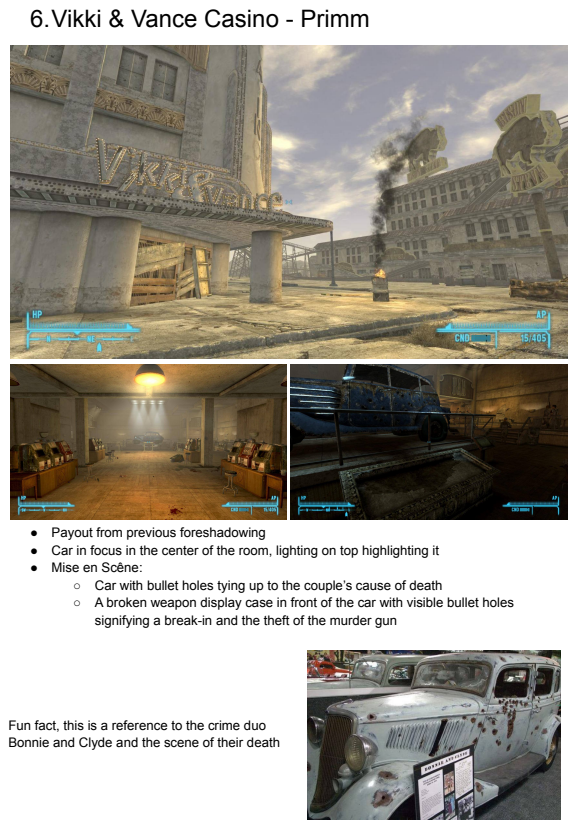
6.2.1 Problems Encountered

Multiple issues were uncovered while light playing, annotating, and analyzing the games. During light play, both researchers noticed the drastic difference in how each approached documenting entries through screenshots. The differences between what attracted each researcher's eye slowly surfaced as well, evident through the screenshots taken and later through the annotations. While this was not necessarily a problem, as we were aware that this would happen, seeing the annotations allowed each researcher to understand what techniques and environmental elements attracted each more. Furthermore, the individual interests of each researcher, along with the topics that were researched during the prestudy and for the practitioner interview guide likely affected each researcher's playthrough and annotations. For example, Bioshock Remastered's observations had a slightly larger focus on characterization and mechanics while Fallout New Vegas' focused more on level design and spatial composition techniques. The format of the data points between the games are shown in Figure 10.

As mentioned above, the games were also analyzed individually by the researchers. As such, the style of observations were also vastly different. When converting the annotations to observations, it was unclear if readers had access to the screenshots themselves or descriptions had to be provided. This affected the way observations were structured, which resulted in the observations in Bioshock Remastered being less atomic, where additional context is required from the screenshots, and those in Fallout: New Vegas to be more descriptive and understandable even without visual context, presented in Figure 11. After much discussion, it was decided that the observations should not rely on the screenshots as context, and should be self contained even if the screenshots are available. As such, it was decided that the next set of analyzed games will have a new "Description" column next to the Observation and Codes, which would textually explain the areas of interest of the screenshot relevant to the observation. The layout of the observation sheet was also synchronized, where both games included the game world location the observation was found.



(a) Two data points containing the ID, screenshot, and annotations for Bioshock: Remastered. Each bullet point became one observation.



(b) One data point containing the ID, screenshots, and annotations for one scenario in Fallout: New Vegas. Ten observations were derived from this specific scenario, using the annotations and additional analysis of the screenshots.

Figure 10: Differences in the creation of data points between the analyzed games.

6.3 Interview

6.3.1 Preparation Phase

After the game analysis and the open coding, we ended up with a set of concepts and techniques that we suspected are used in the industry. To further expand on those concepts and techniques and confirm our suspicions we decided to move on to interviewing industry practitioners. We started by composing a generalised message that was used to get in touch with both companies and individuals. We contacted as many practitioners as possible via emails and social media and managed to get in touch with four different practitioners.

6.3.2 Designing The Interview

As our topic was game related, we looked into different types of interviews as mentioned in our *Method* section (4.3.6). We already had specific topics we wanted to cover due to the research done in prestudy, yet wanted flexibility in case participants had something else in mind, and for that reason we decided to settle on a semi structured- interview. To be well prepared for the interviews, we looked into different articles describing methods and key points to keep in mind while interviewing, some of which discussed the importance of avoiding leading questions to allow

ID	Game	Level / Location	Observations	Code
7	Bioshock 1 Remastered	Medical Pavilion	Immediate attention grabber - must go through this door to reach goal, framed	**Framing, Door**
	Bioshock 1 Remastered	Medical Pavilion	Amount of details, lighting, gore and text on ground catch attention	**Relation of Player Encounters to Environmental Area, Characterization**
	Bioshock 1 Remastered	Medical Pavilion	These images not shown before this area - very new	**Novel Images**
	Bioshock 1 Remastered	Medical Pavilion	Gore makes me on high alert - who did this? They must be near	**Cautiousness, Alert**
	Bioshock 1 Remastered	Medical Pavilion	Why did they do this?	**Character Motivation**
8	Bioshock 1 Remastered	Medical Pavilion	These texts written in blood all over the area - foreshadows what is going to happen	**Environmental Text, Foreshadowing**
	Bioshock 1 Remastered	Medical Pavilion	Victims who wrote this? But why? Either brainwashed or written by the villain	**Character Motivation**
	Bioshock 1 Remastered	Medical Pavilion	Not much light, and many similar texts throughout area	**Dim Lighting, Similar Environmental Texts**

(a) The observations derived from the data points shown in Figure 10a.

ID	Game	Level / Location	Observations	Code
6/7	Fallout NV	Primm	Giant sign with the name of the casinos showing where the main entrance is, Vikki & Vance Casino and Bison Steve Hotel	**Signposting**
6	Fallout NV	Vikki & Vance Casino - Primm	The first thing the player sees when they enter is Vikki & Vances car centered in the middle of the player's FOV	**Camera Composition**
6	Fallout NV	Vikki & Vance Casino - Primm	Lighting Shining down on the car further highlighting it	**Lighting**
6	Fallout NV	Vikki & Vance Casino - Primm	The Colour palette of the car is different than anything in the room, blue vs yellow tones	**Colour Contrast, Saturation**
6	Fallout NV	Vikki & Vance Casino - Primm	Payout from previous scene - Road Sign reffering to the car	**Foreshadowing Payout**
6	Fallout NV	Vikki & Vance Casino - Primm	Broken empty display case next to the car	**Environmental Details, Prop Placement**
6	Fallout NV	Vikki & Vance Casino - Primm	Upon closer inspection you see a sign next to the display case stating that in the case is the machine gun used to shoot and kill the people in the car	**Written Narrative**
6	Fallout NV	Vikki & Vance Casino - Primm	Naked manequines placed next to the car	**Environmental Details**
6	Fallout NV	Vikki & Vance Casino - Primm	Upon closer inspection you see a sign next to the mannequins explaining that the garments worn by the mannequins belonged to Vikki & Vance	**Written Narrative**
6	Fallout NV	Vikki & Vance Casino - Primm	In one frame in the player's POV, the car and the related collection of props is visible in one frame, allowing the player to make up their interpretation of what happened	**Mise en Scène**

(b) The observations derived from the data points shown in Figure 10b

.

Figure 11: Differences in the observation writing styles and the way they were derived between the analyzed games.

the interviewee to give an honest answer, to act ignorant or like a fan of certain topics to aim for a more neutral/real response and to try and limit our own inputs to allow the interviewee to share their thoughts.

As part of the semi-structured interview, we wrote ourselves a guide to be used during the interview with questions, notes and things to remember as seen in Appendix B. Since we were expecting the topics of the interview to change often, we made a mind map to keep track of the current topic of discussion and how it is linked to other topics which we used for an easier transition as seen in appendix B.

Some of the practitioners were situated in Gothenburg which gave us the choice of either conducting a physical or a remote interview. We really wanted to conduct the interview physically, but after sending the *Doodle* link for scheduling to the practitioners, we noticed that the practitioners who don't live in Gothenburg's time align with the ones who do. For that reason we made three major choices:

1. We will conduct our interviews remotely via zoom.

2. Since three practitioners time aligned, we will conduct a focus group interview with them instead of an individual interview.

3. We will conduct a personal interview with the last practitioner.

Our plan from the beginning as mentioned in our *Practitioner Interviews* (5.3.3) section was to conduct an individual interview with the practitioners. That would've allowed for a more in depth analysis about the topic area and would've given us a higher level of control while allowing for an easier time to manage tangents. Switching to a focus group interview on the other hand is more time efficient, but most importantly, it allows the practitioners to bounce ideas off of each other which in turn allows for a wider scope of topics. That in turn lowers the burden on us as interviewers to keep the questions going but that also means that our question needs to be broader. Conducting a focus group interview however means that the interviewee needs to be more careful

with how they present certain information around the others.

After the interviews were booked, we started drafting the consent form that will be presented to the practitioners stating that their personal information and identity will be kept anonymous and that the interview will be video and audio recorded, consent form can be seen in appendix C. In our first version of the consent form that we used for the interview we wrote that *"the information provided for the study will be kept **confidential** in the report"*, that was a misstep from our parts, the information provide cannot be kept **confidential** since this thesis is public, what we intended to say was *"the information provided for the study will be kept **anonymous** in the report"*. This was changed in our newer version of the consent form and was used during the soft evaluation interviews, while the mistake was brought up to the practitioners and a new consent was taken. Due to the interview being remotely and recorded, we sent consent forms to the practitioners to read and we opted for a recorded consent with the document shown on the screen.

Before the interview, we discussed amongst ourselves the division of responsibility during the interview. We decided that Samir will take the role of the speaker and the topic leader while Chi Hong will take the role of note taker, time keeper and topic manager.

6.3.3 The Interview

We wanted to have a pilot interview before the actual interview, but due to lack of time and difficulty finding candidates for the pilot, we decided against it. The interview was recorded in both audio and video which was used by us as a mean to review the information presented. Due to our inexperience in conducting interviews, we encountered many difficulties in time management and topic coverage. Some topics covered ended taking longer time which led to some pre-prepared topics not getting the coverage we anticipated. The mindmap prepared for the interview ended up not being used due to the amount of information that was being brought up, while the speaker could not focus on both maintaining the interview and keeping track of the mindmap. On the brighter side, we managed to get the interviewee communicating and bouncing topics off of each other by the end of the focus group interview. We also managed to get a lot of new and valuable information about different techniques used in the industry to attract player's attention and that works to benefit environmental storytelling.

6.4 Analysing The Data - Open Coding

To analyse the data, we chose to do a grounded theory inspired analysis. After the interview was conducted, we reviewed the recorded data, transcribed relevant quotes, and condensed it in a document with practitioner quotes and the observations based on our interpretation of the quotes. We decided against transcribing the entire interview, as not only would it have taken more time, but not all the information was relevant to the RQ. We omitted aspects of the transcribed quotes we deemed irrelevant as well. This included punctuation and filler words. The observations were then open coded, with multiple codes assigned to each observation, shown in Figure H, Figure I and Figure J of the appendix.

6.4.1 Issues

One problem encountered while open coding the interviews was the lack of researcher synchronization. This impacted aspects such as the granularity of transcriptions and the inclusion of a "Quote" column in the observations. It also impacted our time efficiency since we had to go through an entire document again to add the changes. Since the work to transcribe and open code the interviews was split between the two researchers, what was interpreted as important differed slightly between the two. Furthermore, the method of transcribing quotes differed slightly as well. One researcher transcribed complete sentences with punctuation, while the other transcribed phrases relevant to

the observation. Furthermore, some observations do not have quotes as they were either relevant to the general topic rather than a single quote, or based on a previous quote.

6.4.2 Time-plan Change

Week 13:
After the open coding was conducted on the interviews and the games analysed, we noticed that we grossly underestimated the time it would take to do the coding and the analysis. This meant that we did not have enough time to do everything that was planned and other topics needs to be prioritised. To give ourselves more time to focus on the report writing, we first removed one iteration of game analysis, and secondly, our major change, was the removal of the *Stimulated Recall* session. Stimulated recall requires a lot of preparation and is a process that is very time consuming.

We judged that the information provided from stimulated recall interview will not be as valuable if the interview is not conducted on a larger scale. Instead we opted to push the *Code Categorisation, Soft Evaluation,* and *Guideline Refinement* to an earlier date.

Week 14:
After meeting our supervisor we noticed that we have even less time to work on our thesis report. That lead to us removing another iteration of game analysis and instead chose to start writing the *Rough Guidelines*, and again push the *Code Categorisation, Soft Evaluation,* and *Guideline Refinement* to an earlier date.

6.5 First Phase - Rough Guidelines

With our amassed knowledge from the prestudy, game analysis, practitioner interviews and data analysis, we felt confident enough to start writing our first set of guidelines. In this iteration, we opted to make a rough version of our guidelines which was only meant to serve as a foundation for our final version of the guidelines as seen below in Figure 12. Having a set of rough guidelines also marks a milestone in our project and allows us to have a rough answer to our RQ. After writing the rough guidelines, we learned that we have a solid foundation to answer our RQ but refinement and iterations are necessary to reach our final objective.

Old Guidelines

Player Contract

1. Set expectations of the game as early as possible, and fulfil those expectations.
    a. If designers want player expectations to be subverted, create a strong anticipation of the opposite before subverting them.
2. Encourage and support the optimal mood the player should be in when playing the game.
3. Create a strong anticipation for the player of the experience they will enter.

Camera

1. The framing of the camera should present the environment in a readable way.

Gameplay

1. Design good pacing of gameplay intensity alternating between giving the player a high and low cognitive load.
2. Give the player breathing space occasionally after high intensity gameplay sessions to increase the player's interest in the environment.
3. Place interactive objects in areas where designers want players to explore.
4. The environment should remain readable and clear for the target audience in order to convey gameplay elements.

Level Layout, Mise en Scene

1. Place contrasting levels of prop detail to attract the player's eye towards areas with greater levels of detail
2. Create contrasts of light and dark to draw the player's view towards the lighted areas.
    a. The environment should be contextualised properly to encourage players to move towards that area.
3. Reward player curiosity.
4. Have multiple layers of subtlety in a scene for strong environmental storytelling, ranging from the obvious to however deep you desire.
5. The amount of environmental storytelling elements should be consistent in some way throughout the game, in terms of both amount and degrees of subtlety.
6. Verticality: If the player is going down for quite a while, then they should know that if they go up, then there should be an exit
7. Giving the player a breathing room allows them to process the information they already have and give them time to go around read the room
8. Signposting can be used to lead the player to or away from a destination. They can be guiding signposts, ex signs, and light, or warning guideposts, ex danger signs

Narrative

1. Make players invested in the narrative if designers want players to be interested in the deeper levels of environmental storytelling.
2. The environmental storytelling should touch on or reflect the themes of the game narrative.
    a. The combination of gameplay and environmental elements should create moments that reflect the state of the world
        i. Gameplay and environmental storytelling elements should be well paced to maximise immersion in both
            1. The gameplay and environment can contrast or match each other, depending on the target theme

Figure 12: First Iteration: Rough Version Of Our Guidelines

Multiplayer

Development Process

1. If the development team is relatively small compared to the size of the game, maximise asset reusability
    a. Techniques such as kitbashing, which involves reusing and combining assets in different configurations, can be used to generate variations or refreshing environments.
    b. If the team is larger, more custom assets can be created to fit certain environments. This is, however, more expensive.

If the game is highly focused on exploration, encourage the player to explore with minimal hand holding.

1. There should be a high amount of player trust from the designers to let them learn the rules on their own.

Composition

Set the camera at different angles to create different feelings.

1. A top down camera angle gives the player a wide view of the scene below
2. A bottom up angled camera gives the player a sense of scale and destination

Consider different player observation angles for different needs

1. For example, When players are lost, invite observation with a high viewing angle
2. Using a pacing graph in combination with placing the player at a high viewing point is even better.
3. Players don't have the best attention span, having a Focal Point of goal or destination, reminding them of their objective is necessary

Contrast

Contrasting is an amazing way to attract players attention, if something pops out in a scene a player will notice it. Contrast can be used visually and auditory in a multitude of ways:

1. Colour Contrast
2. Thematic Contrast
3. Geometry Contrast
4. Music/Sound Contrast
5. Level of Detail Contrast
6. Light Contrast
    a. Using light sources to highlight an area is a very effective way to get the player's attention
7. Movement Contrast
    a. Movement is an amazing way to attract the attention of the player. Even the smallest movement in a static scene should be enough to be noticed.

Figure 12: First Iteration: Rough Version Of Our Guidelines (Continued)

6.6 Second Phase - Conceptualisation and Categorisation

After the rough guidelines were made, and as part of the open coding process of the grounded theory method, we started conceptualising the codes collected through the interviews and game analysis. Using a bottom up approach, the codes were grouped into code sets based on common properties, see appendix E. When we had enough codes in the code sets, **Concepts** emerged. Those concepts are the focal point of our final result.

After concepts started emerging, it became easier to conceptualise the rest of the codes, while at the same time became more complex. We noticed that most of the codes could fall under multiple concepts and could not be only defined by one. This lead to the realisation that a lot of the codes and concepts are interconnected. When all the codes were placed in their respective slots under a concept, we noticed that the concepts themselves could be grouped together creating the **Categories** and the categories could be grouped into **Themes**. Having the data in a document was hard to visualise, for that reason we opted to visualise the data using a diagram, as seen in appendix D. Using the diagram it became apparent that the concepts and categories have many common connections. Some concepts works effectively in isolation, but we learned by analysing the diagram that other concepts even though they do function in isolation, they are more effective when connected to other concepts.

With the data visualised in the diagram, and following the grounded theory approach, we further categorised the themes creating the **Core Categories** while categorising the core categories creates the **Theories**. Those layers were good for helping us understand the subjects that environmental storytelling contained, but weren't useful to target practical areas.

The further up we traverse the layers of the diagram, the more broad and detailed each data point became, and to make guidelines, we needed more defined concrete data. For that reason we decided that our area of focus should revolve around the last two layers of the diagram, the **Categories** and the **Concepts**.

6.6.1 Issues

One of the issues faced during this phase was caused due to the differences in codes that were brought up by the researchers, certain codes where the same but referred to different topics. That required us to go through the analysis and interview document and reword the code into something more befitting the data, that in turn caused some codes in the code set to lose traceability to the data sheet. Another issue we encountered was the amount of time the codes took to sort where we resorted to lengthy discussions to decide their primary placement. Codes that were based on game analysis were created when we were less knowledgeable about the techniques and methods used, which caused certain codes and observations to be irrelevant to the our RQ and in turn removed from the code set.

6.6.2 Time-plan Change

Week 17
We decided to prioritise conceptualising and categorising over game analysing, so we decided to push back game analysis another week. However, since Journey had already been played through and annotated the week before, work began on the analysis and open coding of Journey early in the week. This decision was quickly modified near the end of this week when we realised the amount of work required to refine the guidelines. This issue was amplified after encountering issues centered around the presentation of the guidelines which are discussed below. Ultimately, both researchers decided to commit to refining the guidelines by the end of this week.

6.7 Third Phase - Rules of Thumb

Having categorized the codes, we were ready to refine the guidelines. Many issues quickly surfaced when attempting to refine old guidelines and creating new ones. There were many discussions revolving around the structure, wording, and general presentation of the results given the nature of our data. We encountered the following issues with the use of guidelines to present our results:

- Definition of Guidelines
- Normative versus Descriptive Claims
- Varying Degrees of Confidence

6.7.1 Issues

Definition of Guidelines The Cambridge Dictionary defines guidelines as "information intended to advise people on how something should be done or what something should be"[56]. For us, this implied that guidelines were often more normative, providing remedies to problems. The Interactive Design Foundation defines guidelines as "sets of recommendations on how to apply design principles to provide a positive user experience"[118]. They further discuss how psychologists spend many years creating and refining design guidelines through many studies. Other guidelines can also be created by common sense. This suggests that those creating the guidelines should have a high level of practical experience and an understanding of recent research and events within the problem domain. The article further emphasizes that while design principles represent general points of direction, guidelines reveal how to approach guidelines, but are not direct instructions.

Given these definitions, we interpreted guidelines to be grounded by three principles: They should be influenced by recent research, best practices, and decades of practical experience.

Although we have performed a prestudy on the latest research on environmental storytelling, the games that we have analyzed were not recent - Although Bioshock: Remastered was released in 2016, the changes were mostly cosmetic, without changes to the core gameplay or environment. Bioshock was originally released in 2007, and Fallout: New Vegas in 2010. Although we believe the techniques used in both of these games are indeed still relevant, the advancements in both technology and game research may impact the aspect of recent research.

In terms of best practice, the sample size of practitioners are too small to be indicative of the industry's best practices in a holistic manner. Furthermore, the range of practitioners we had access to were mostly within the domains of level and game design. For a subject matter as large as environmental storytelling, we did not manage to access relevant experts from other domains, such as audio, narrative designers, and UI/UX designers.

Although both researchers have played many games as players before the project, we did not critically analyze the games we played. Furthermore, we do not have decades of experience on relevant aspects of game development, such as designing and creating environmental storytelling.

Normative versus Descriptive Claims One problem revolved around the validity of our results and the nature of guidelines. Guidelines in research are often normative in nature - claims that make value judgements[28][114]. As we did not plan to have summative evaluations due to time constraints, our results' validity is lower. As such, we believed that we should not make claims with a strong tone, and wanted some guidelines to take a more descriptive approach.

Degrees of Confidence Although we did not have summative evaluations, there were some claims which we had more confidence in. This was due to how some claims by practitioners during interviews were supported by our own research, or by our own experiences, or by our game analyses.

As such, we wanted guidelines which we had more confidence in to be more normative, while those which had less support could be descriptive.

It is important to note that a guideline may be descriptive. However, guidelines often carry connotations that define the "best practices" of particular areas, implying a stronger validity in the principles it is approaching. This suggests that deviating from the practice requires sufficient motivation. Furthermore, guidelines often offer solutions to problems, which we believe some of our results do not have enough validity to be presented as such. Therefore, the criteria and connotations that guidelines carried limited us from presenting our results with the tone we wanted to.

Given that we wanted both normative and descriptive guidelines with varying degrees of confidence, we wanted our wording to reflect these connotations, which resulted in many discussions attempting to standardize how each type should be worded. As guidelines had a normative connotation, we felt limited to using an imperative tone for all guidelines, which we did not want. Furthermore, we wanted to include some quotes from practitioners which were not necessarily normative nor descriptive.

With these issues in mind, we decided to use Rules of Thumb(ROTs) instead. Merriam-Webster [79] defines ROTs as "A general principle regarded as roughly correct but not intended to be scientifically accurate", which we felt to be more in line with what we wanted to express. For this project, we have defined Rules of Thumb to be:

"General context-dependent, roughly correct principles which aim to be practical"

More specifically, we have defined ROTs to address the issues discussed above. In terms of the structure and presentation of ROTs, we have decided that:

- ROTs can be normative, presented as a solution to problems, or descriptive, describing a phenomenon without value judgements.
- Recognizing that good environmental storytelling is multidimensional, requiring multiple categories and concepts working together, ROTs can have multiple concepts of relevance.
- ROTs can be worded in multiple ways, which can imply different degrees of confidence, or strength of claim.
- ROTs should aim to be short and easy to remember, similar to adages.

We concluded that using the category layer to group the ROTs helped structure them in a more readable manner. Having too many headers created confusion, yet having only the concepts made it difficult to understand how concepts related to each other. As a result, ROTs were created for both categories and concepts.

6.7.2 Time-plan Change

Week 18:
At this stage, we revised the time plan once more. Some practitioners had already confirmed to participate in the soft evaluation, which meant that we needed to set aside time to prepare for it. We also realised we wanted to make the guidelines more presentable and polished for the practitioners. Additionally, time needed to be set aside for report writing. As such, one major decision was to cut all practical activities other than the soft evaluation and focus on report writing on week 19. This meant that all game analysis would be cancelled, even though work had begun on open coding

Journey. It was also decided that the material found during the prestudy would also not be open coded, as we felt that obtaining feedback from the practitioners was more important for the project.

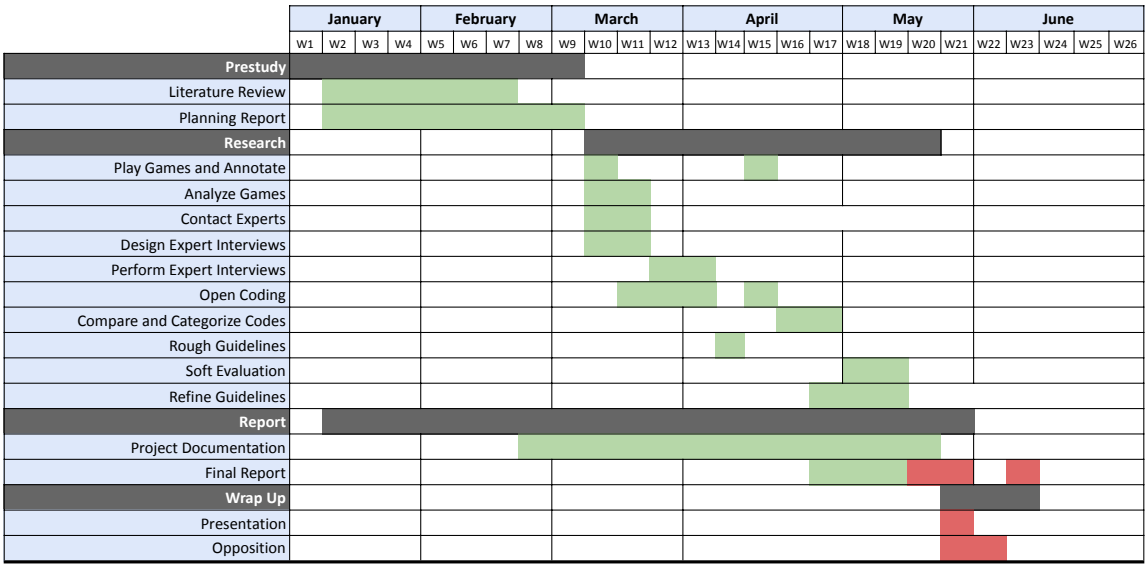


Figure 13: Our Updated Time Plan by Week 20.

6.8 Fourth Phase - Soft Evaluation

6.8.1 Preparation

Similar to the first interview, a generalized message was used to get in touch with both game companies and relevant individuals within those companies. We contacted both practitioners that we previously tried to get in touch with as well as new ones through emails and social media.

A total of three practitioners participated in the soft evaluation. All of them had previously participated in the first practitioner interview, which meant that they were familiar of the subject matter of the project. A *Doodle* link was sent to all participants to schedule the interviews.

6.8.2 Soft Evaluation Design

We decided on performing semi-structured individual interviews for the soft evaluation. Our previous experience of performing a focus group showed that it was difficult to give each practitioner a chance to provide input on a single topic, and took longer to conduct. Individual interviews allowed us to conduct shorter interviews granting higher flexibility while allowing each participant to speak for longer. Furthermore, we wanted practitioners to speak freely, without being influenced by other practitioners in the interview. Each interview lasted for approximately 1.5 hours, and were audio and video recorded for notetaking purposes later on.

A semi-structured interview was chosen once again as we had topics we wanted to cover, but wanted practitioners to choose topics they were interested in, and allowed us to be flexible regarding unexpected events. We specifically wanted to evaluate two topics:

- If the ROTs were well presented, usable, and understandable for both junior and senior practitioners.
- If the content and argumentation is sound, and what their general opinion is surrounding the

content. This involved discussing conflicts in our research and opinions, or additional aspects that we may have missed.

Unlike the first practitioner interviews, a much smaller guide was created for the soft evaluations. However, we anticipated that there would be too much material for each practitioner to go through. As a result, much effort was spent prioritizing specific categories and concepts to present for each practitioner to evaluate, where we created documents tailored to each participant, as shown in Figure 14. The prioritization was based on several factors:

- The concepts we find interesting to discuss with them.
- The ROTs we have less confidence about and would like some feedback on.
- Concepts we felt would be most interesting to the specific practitioner due to their background and interests.
- Claims that conflict with other industry practitioners or those found during our prestudy.
- Concepts and ROTs that previous practitioners did not cover.

6.8.3 During the Soft Evaluation Interview

After exchanging greetings, each interview began with allowing the participant to read the consent formC, and verbally agreeing to participate in the interview. We then sent the tailored, prioritized list of categories and ROTs to the participants as a PDF, mentioning that they can begin with concepts they are interested in, or go along with the prioritized list we made. The participants then read through each ROT in the specified concepts and categories, then provided feedback to each.

6.8.4 Refining the Rules of Thumb

As each interview took place between multiple days, it allowed us to continuously refine the ROTs between the interviews, taking the feedback into account. One particular practitioner provided additional textual feedback after the interview, which covered six categories. [2]

(a) First Interview (b) Second Interview (c) Third Interview

Figure 14: Differences between the prioritized concept lists. Concepts were removed and modified after feedback from each interview.

[2] We would like to once again thank the practitioner [A] who went the extra mile to provide additional feedback.

6.8.5 Issues

After the first soft evaluation interview, we quickly realised that we severely overestimated the amount of material we could discuss with participants within the time limit. Out of the 15 categories, we found that the first participant could only go through approximately 2.5 over the course of the interview, which caused us to create individual priority lists for each participant, reducing the "high priority" categories to 2. Not all categories were covered after the three soft evaluation sessions.

7 Results

This chapter presents the final results of the project, the Rules of Thumb divided into categories and concepts regarding environmental storytelling. We initially began with a grounded theory approach, performing open coding on observations to derive codes. We grouped the codes into concepts, and the concepts into categories, resulting in a total of five layers of groupings, shown in Figures 15 and 16. We found that the concepts and categories functioned well to group related RoTs together, and as such moved on to create guidelines based on the concepts and categories, which shifted into Rules of Thumb later in the process.

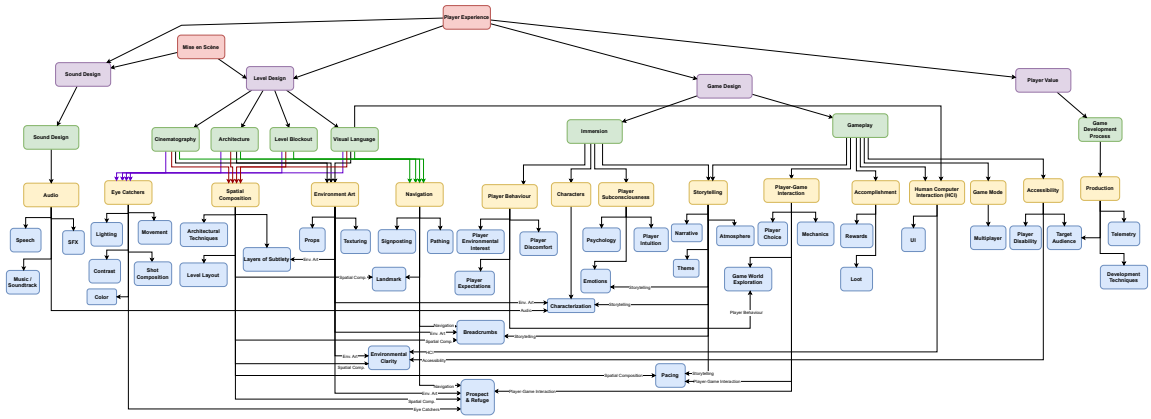


Figure 15: An overview of the entire result of our open coding containing 5 layers of groupings.

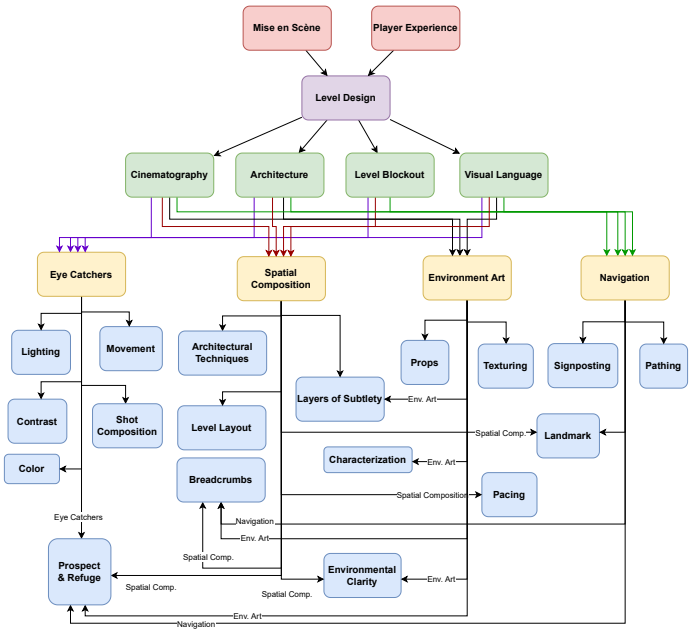
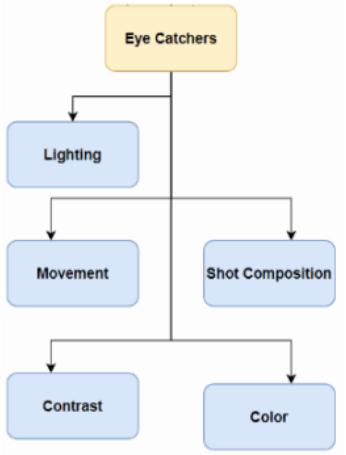


Figure 16: An example containing all 5 layer. Some relationships have been omitted for clarity. Each color represents a different layer within the diagram. From top to bottom, the layers are: Theory, Core Categories, Themes, Categories, and Concepts.

Eye Catchers

For environmental storytelling to be effective, it first needs to be noticed.

1. **Use eye-catchers to attract the player's gaze.**
2. **Don't use many eye-catchers in one frame.**
3. **"If everything is important in a scene, then nothing is important."** [Appendix I (Row 63)]



Eye-catchers are techniques which emphasise the dominant subject of the composition. In games, these techniques are essential when catching the player's attention. Eye catchers are usually not defined only by one element, but it is multiple concepts and techniques working together. Having multiple eye catchers in one frame can be detrimental to attracting attention, since it reduces the contrast of the object of interest.

The creation of this category came from previous research, our own game analysis, and expert interviews. Piaskiewicz [87] discusses the use of eye catchers to draw the player's attention towards the composition's dominant figure, emphasizing the use of contrasting different environmental elements and avoiding telling too many stories at the same time. Similarly, experts have mentioned several techniques to focus the player's attention on certain areas of the environment using lighting, movement and other contrasting elements. [Appendix H (Row 108)][Appendix J (Row 7,40)].

During the soft evaluation, one level designer also discussed eye catchers are discussed and used daily, often to lead the player's eye from one point to the next point of interest. This is something we have noticed during our game analyses as well. [Appendix F (Row 46-48, 91-102)].

Lighting

1. **Use lighting to guide the player or to highlight objects of interest.**
2. **Players will more likely follow light sources focused around an area of interest.**

Lighting is an effective way to guide players and attract their attention toward predetermined areas. Lighting can take many forms like spotlights, point lights and emissive objects but serves the same purpose of illuminating an area or an object.

Piaskiewicz [87] explains that lighting builds the mood and depth of a scene. To do so, the use of light contrast can emphasize objects or areas of importance, which can aid navigation or show interactable objects. We found this idea of using lighting to support navigation and gameplay to be extremely prominent in our game analyses as well, where lighting contrast or emissive materials often signified areas of interest [Appendix F (Row 3,8,13,56,80)] [Appendix G (Row 30,41)], useful loot [Appendix F (Row 46)], or to even set up moments of anticipation using shadows [Appendix F (Row 19,21)].

Figure 17: Bioshock 1: Examples of the use of lighting for player guidance.

Colour

1. **Use colours to highlight or hide an object.**
2. **Use colours to convey emotions.**
3. **High contrast colours that do not blend with the rest of the colour palette are often used for highlighting.**
4. **Meanings of colours depend on context and the player's knowledge.**

Figure 18: Warm and cool colours are often used to show the relationships between colors.

By manipulating colour settings like hue, saturation, alpha and luminance a designer can either highlight or hide objects and destinations. Colours can also be used to evoke emotions ex. Warm colours – such as red, yellow and orange – can spark a variety of emotions ranging from comfort and warmth to hostility and anger. Cool colours – such as green, blue and purple – often spark feelings of calmness as well as sadness [98][54][21].

Supported By:
[Appendix F (Row 69, 74,115,121,228)]
[Appendix G (Row 21,26,31,56)]
[Appendix J (Row 7-11, 19)]

Shot Composition

1. **Use the placement of the camera to your advantage:**
   - A high angle camera shot gives the player a wide view of the scene below
   - A low angle camera shot gives the player a sense of scale and destination
2. **Composition is best used together with other concepts.**
   - Chokepoints
   - Contrast
   - Lighting
   - Landmarks
   - Eye Catchers

Composition is an arrangement of scene elements that is used to arrange space into an appealing picture. Scenes with applied rules of composition present a harmonic idea that is easy to understand and isn't confusing to the observer. The opposite of composition would be chaos where it's hard to determine which element is the dominant [87]. Composition can be applied in **Environment Composition** (the big picture), **Environment Element Composition** (set dressing and smaller details), and in **Visual Feedback and Navigation**

Supported By:
[Appendix F (Row 25,81)]
[Appendix G (Row 8,13,20,23,29)]
[Appendix H (Row 30,113)]
[Appendix I (Row 45-46)]

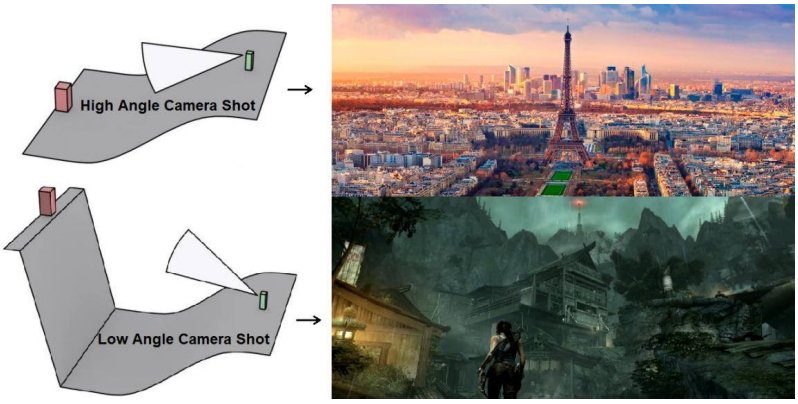


Figure 19: A high angle view of the Eiffel Tower[83] gives a wide view of the city, while a long angle view in *Tomb Raider: Definitive Edition* gives a sense of destination [53].

Contrast

1. Use contrast to highlight an object of interest and attract the player's gaze.
2. The absence of something is equally important.
3. Less is more.

Contrast is the difference or degree of difference between things having similar or comparable natures. It can be used as a way to attract players' attention by making something pop out in a scene. Contrast has strong connections to saliency, the more distinct and attention grabbing something is, the more salient is it [5].

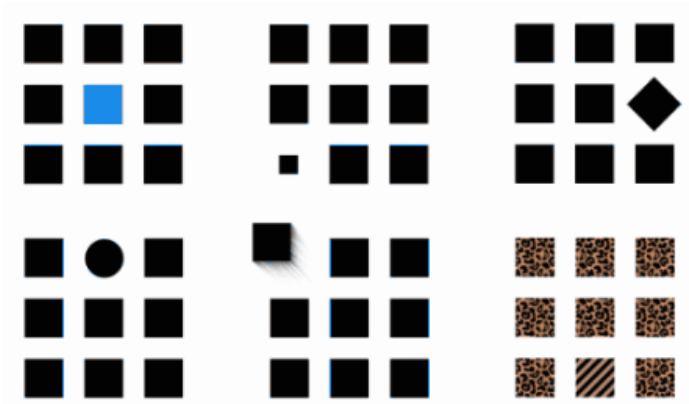


Figure 20: Bottom-up saliency is about contrast. Contrast of color, size, orientation, shape, movement and texture [11]

Contrast can be used in many areas, as both an **eye-catcher** or as means for **storytelling**.

The different areas of contrast and spatial contrast are:

Areas of Contrast	**Spatial Contrast**
Lighting	Geometry
Thematic	Scale
Music	Orientation
Colour	Pattern
Movement	-

Table 1: Different Areas of Contrast and Techniques for Spatial Contrast

Supported By:
[Appendix F (Row 3,7,70,111,115,121,129,155,172,231,264)]
[Appendix G (Row 5,9-11, 15-17,21-22,32,60)]
[Appendix H (Row 107)]
[Appendix I (Row 22,44, 66-69)]
[Appendix J (Row 7-11,13,18-19,35-44)]

Lighting Contrast

1. Use light in a darker environment to attract player's gaze.
2. Use shadows in a brighter environment to attract player's gaze.
3. Light and Shadow go hand in hand to attract the player's gaze.

Using light sources to highlight an area is an effective way to get the player's attention. Lighting contrast is usually used by shining light on an area or object in a darker or dimmed room, the lit area will then be the eye-catcher. Lighting contrast doesn't necessarily need to be a light in a dark room, it can also be shadows in a well lit room.

Supported By:
[Appendix F (Row 121, 130, 162, 231, 248, 278)]
[Appendix H (Row 108)]
[Appendix I (Row 22)]
[Appendix J (Row 10, 35-43)]

Figure 21: Bioshock 1: An example of the use of shadows and a more extreme example of the use of lighting contrast to attract attention where the eyes are attracted to the shadow on the wall or the lit areas of the room.

Colour Contrast

1. Placing highly contrasting colours close to each other attracts the player's gaze.
2. Use lighting together with contrasting colours to highlight them further.

Colours can be used as a way to attract attention by having high contrasting colours close to each other. The colour that pops out is the eye-catcher, and is usually the one that contrasts the colour palette of the environment around it. Contrast in colours can be affected by many factors such as hue, saturation and transparency.

Supported By:
[Appendix F (Row 231)]
[Appendix G (Row 21,31,56,59,60)]
[Appendix J (Row 19)]

Figure 22: Bioshock 1: Cold colours are contrasted by Warm colours, lighting used to highlight the point of interest and make colours more visible, railings have a gradient from darker to lighter colours moving up

Geometry Contrast

1. In an environment with repeating shapes, use a different geometrical shape than the environment for the object of interest to attract the player's gaze.

Using shapes and Geometry can be used as a means to attract attention by having a different geometry of an object than what is around in the environment.[11][87]

Supported By:
[Appendix J (Row 13,19)]

Scale Contrast

1. In an environment with similar sized objects, make the object of interest a different size than the environment to attract the player's gaze.

In the same manner, the scale of game objects can be used to attract attention by having an object of a different scale than what is around in the environment. [11][87]

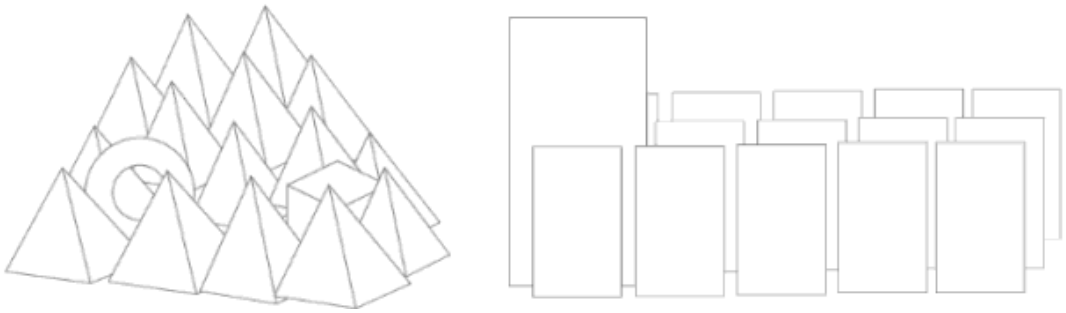


Figure 23: Both Geometry and Scale can be used together to further highlight the object.

Movement Contrast

1. Add movement in a static environment to attract the player's gaze.
2. Using even small movement in a frame is enough to make the player notice in a static environment.

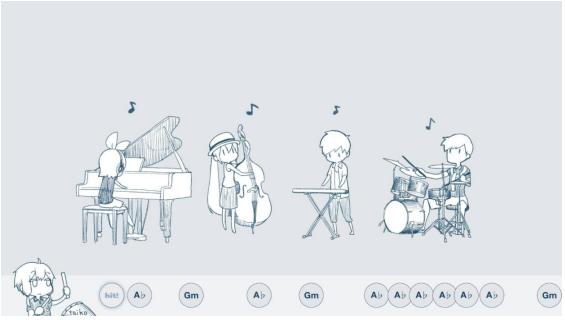
Movement is an effective way to attract the attention of the player. Even the smallest movement in a static scene should be enough to be noticed and can be used as a means to tell a story, ex. Smoke coming out of a cigarette shows that there was someone in the area recently. Objects in movement in a non-moving environment can attract the player's gaze, movement can be a displacement of the object or an NPC animation.

Supported By:
[Appendix F (Row 111)] [Appendix J (Row 49-53,56)]

Music/Sound Contrast

1. Use music shifts to set the tone of the scene and either prepare the player or calm them down.

The sudden shift in music, harmonically, rhythmically or melodically, can indicate that something is about to happen and be used as a mood and/or tempo change, shown in Figure 24c. Suddenly switching from a calm ambient melody to a more intense music sets the tone of what is to come and can be used to snap a person out of a moment, while switching from a more intense melody to a calm one helps calm the player after a hectic moment and give them a feeling of rest and safety. As music may not always catch the player's eye, it can be considered more of an "Attention Catcher".



(a) Stable Key

(b) Sudden Modulation to Relative Minor

(c) Constant Modulation, along with harmonic rhythm contrast

Figure 24: After 21 minutes and 38 seconds of establishing two stable keys, GYARI's *abgm* [57] uses modulation to create harmonic and rhythmic contrast, increasing intensity. *abgm* also uses the visual narrative to contextualize the modulation through the characters, establishing a comedic tone to the piece.[3]

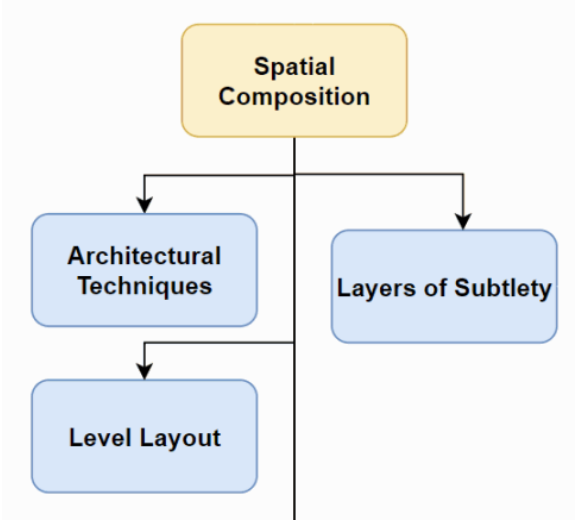
Supported By:
[Appendix I (Row 66-70)]
[Appendix J (Row 2-4,12,19,63,65)]

[3]We acknowledge that this is the extent of our music theory knowledge, and we are aware of the possible incorrect aspects of the analysis.

Spatial Composition

Having different layers of subtlety provides more depth to the environment, opportunities for narrative hooks, and expands the target audience.

1. Spatial Composition and Environment Art should complement each other.
2. The layout should reflect the experience goals and themes of the game.



Spatial Composition is the foundation of the environment [121]. The overall big picture 3D arrangement of core masses, spatial composition is the "composition" as practised in 3D arts like architecture, interior design, and sculpture. Acting as a base for environment art, the spatial composition needs to account for a wide variety of viewing angles and positions [87].

As the environment art often depends on the layout and massing of the level, both need to support each other to deliver the experience designers want [122]. For example, Layers of subtlety uses both, where larger objects are created during blockout phases and smaller, more subtle props later during production. [Appendix I (Row 26-27)]

Architectural Techniques

Architectural techniques facilitate navigation and improves the player's understanding of the game space, enhancing the narrative.

1. The level should establish a strong sense of progression through the player journey.

Figure 25: Denial and Reward: A landmark catches the eye, while navigating toward it, the path is blocked and the viewer can't get through (Denial). The viewer takes an alternative route through an alley and is rewarded by a better angle of the landmark (Reward) [91].

Architectural techniques are often used in spatial composition[11]. There are many techniques designed to facilitate player navigation and enrich the player's journey through the environment. One example is denial and reward, which temporarily obscures the objective location, then presents the player with a new angle of visibility to create a strong sense of progression [91]. The interviewed practitioners greatly emphasized the use of architectural principles to guide players throughout a level, discussing how the combination of chokepoints, landmarks, and framing help improve the level, using Disney theme parks as an example [I(Row 45-46)]. One participant during our soft evaluation echoed this sentiment while discussing how landmarks can be used, discussing how The Last of Us[108] uses this technique extensively.

Level Layout

The overall structure of the level aids in both navigation and player experience goals, facilitating environmental readability and immersion.

1. Establishing a strong sense of verticality can easily guide the player.
2. The level layout is essential to understanding the pacing of the level.
3. Give the player tools to access environmental elements.

The level layout is the core idea of a level, containing the overall structure or overview of it [123]. Design concepts important to level layout include: Spatial Flow, how players move around the level, Parti, the main idea of the layout, Typology, common layout patterns and functions.

Yang explains that experience goals, which are things that players should learn, feel, or do in the level, should guide the pacing, which in turn is reflected in the design of the level [124]. Combined with gameplay, different spatial flows can influence player emotions or navigation. Pacing was heavily discussed during practitioner interviews, where placing an empty room between arenas can affect their mindset [Appendix H(Row 47-54)].

Verticality is often effective in orienting the player, which in turn may enhance storytelling, gameplay, or emotional aspects [Appendix J (Row 20-21)]. Yang discusses how this is often due to how games do not roll the camera, maintaining a stable orientation of the sky and horizon.

The level layout also determines the affordances of a level, which determines where players can go. Bellard [11] discusses different player behaviours through the lens of affordances, while our interviews discussed the importance of providing tools for players to access environmental elements, taking mechanics, level readability, and affordances into account, amongst other concepts [J(Row 31-34), H(Row 60,71)]. Practitioners also discussed the use of limiting affordances to allow players to focus on certain areas [H(Row 38)].

Figure 26: Getting Over It [12] uses verticality to give players a clear goal and player created storytelling, while Journey [107] uses verticality to create a shift in atmosphere, marking a shift to the next narrative beat - specifically, the next monomyth stage.

Layers of Subtlety

Having different layers of subtlety provides more depth to the environment, opportunities for narrative hooks, and expands the target audience.

1. Consistently having all layers throughout the game creates an immersive world.
2. Adjust the amount and depth of layers to your target audience.
3. Integrate the subtle layers with obvious ones to create cohesive narratives.
4. A constant trickle of environmental storytelling will slowly attract the player towards increasingly subtle environmental elements.

Layers of Subtlety is a concept of structuring environmental storytelling by degrees of obviousness, discussed by practitioners during our focus group interview. Surface layers are extremely obvious, which are near unmissable to the majority of players. As such, these surface layers are often large, contrasting elements, clearly presenting the theme and tone to the player [Appendix H(Row 26-35)].

Deeper layers are increasingly subtle, where smaller props may be scattered throughout the level, which are less noticeable. The more inquisitive players will thus be rewarded with deeper knowledge of the game world. [Appendix H(Row 32-33)].

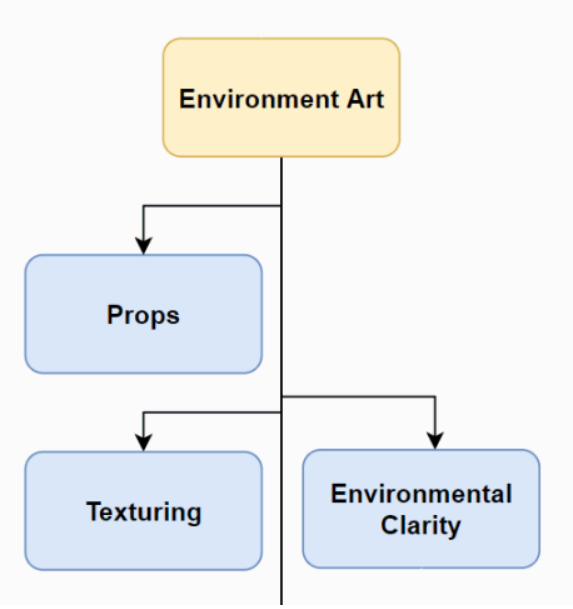
One practitioner discussed the importance to be consistent with the frequency and amount of both obvious and subtle layers throughout the game, as it is important to maintain the narrative interest of the interested players and set expectations. Setting expectations early can also increase the narrative interest of the less observant players [Appendix H(Row 42-46)]. Furthermore, they mention that during their own playthrough of Dark Souls, a consistent amount of all layers gradually increased their interest in the environment as they become increasingly invested in the game [64(Row 11-14)].

There is no defined amount of layers. That is often heavily dependent on many aspects such as the target audience, game genre, production constraints, and stylistic choices [65(Row 9)]. One practitioner discussed how multiplayer games often focus on stories created through player interaction, resulting in shallower layers of environmental storytelling [65(Row 6)]. During our game analyses, we noticed how more subtle layers often used indexical signs, traces of events or items, and mysterious symbolic motifs to hint at the history and events that transpired [F (Row 63-64, 66-67)]. This is similar to Worsh and Smith's goldfish on a window pane example, where a small part hints at the cause, the larger pictures [99].

Figure 27: Black Ops 4 [111]: Contraband contextualises the location using props, text, and lighting to communicate subtle layers of environmental storytelling, while using the placement of larger props and structures to show the theme and feel of the location. The obvious and subtle layers combine across different environmental elements to present a cohesive side narrative of the inhabitants on the island, while also being relevant to the main narrative of Black Ops 4 through the smugglers.

Environment Art

1. Prioritise the macro scale first before moving on to the smaller elements.
2. Preserve the readability of the level layout.
3. Environmental storytelling works best when there is a mix of both obvious and subtle.
4. The visual language should be consistent.



Environment art involves the creation of building visual art for game levels without altering the core layout and gameplay affordances. It consists of creating art assets and placing them within the game environment.

Readability is highly dependent on the mechanics of the game and their target audience. A combat-centric game should likely make enemies readable. On the other hand, a Prop Hunt [4] or hidden object game should be cluttered and confusing, yet be clear what a prop is.

Supported By:
[Appendix H (Row 26-27,31,42)]
[Appendix I (Row 26-27,41)]
[Appendix J (Row 28-30)]

[4] https://steamcommunity.com/sharedfiles/filedetails/?id=135509255

Props

Props create, contextualise, and enhance the existing narrative, adding depth to the themes along with reflecting the state and history of the game world.

1. Motifs with no explicit meaning or an aura of mystery can pique player interest.
2. Dense clusters of props will create areas of interest.
3. The props should reflect the state of the game world.
4. The more objects communicate with other objects, the more believable the world becomes.

Props are the objects in a level that are not part of the level layout or geometry. Props can vary wildly in size, ranging from corpses and crates to trains and houses.

Props are usually critical to environmental storytelling due to its wide range of uses and nature. Props can be static or dynamic, such as explosive barrels, or interactive, such as vehicles, which are often complex and help players in more interesting ways. They can also be part of the gameplay in innovative ways, such as Prop Hunt of Mimics in Prey[8].

Props can greatly increase the player's interest in the environment through placement, repetition, and density [87]. Unique posing of corpses can imply deeper meanings of their final moments, motifs can be created through repetition, and hero props ground players and provide unique identities to areas. All contribute to the atmosphere of the game.

Supported By:
[Appendix F (Row 19,273,276)]
[Appendix G (Row 37)]
[Appendix H (Row 50,63,119-121)]
[Appendix I (Row 33-34)]

Figure 28: Prey [8] maintains player tension by having enemies impersonate any prop [51].

Texturing

Textures sell the storytelling through the visual language. Textures reflect the history of the world, increasing the depth of the world and player immersion.

1. Use textures to communicate affordances and level boundaries in subtle ways.
2. Consistent use of textures as visual patterns create a robust visual language.
3. Textures on props can embed narrative and create an area of interest.
4. Communicate the history and state of the world with textures.

Yang defines textures as "2D images that cover the 3D surface of the map", where multiple textures combine to form materials. Although texturing is often done near the end of the level production pipeline, it is often essential to environmental storytelling. Furthermore, textures can aid navigation by communicating affordances through eye catchers, while embedding narrative through hints of wear and tear, for example. Using textures as a strong visual language not only increases the readability of the environment, but also encourages players to look at the environment more.

Textures are strong tools to effectively communicate the history and current state of the world, which helps create a more believable world. Consequently, textures also become a core element of creating the atmosphere and theme of the game. Changing textures of the same 3D model can allow players to understand how time has progressed in a game world on a larger scale. A well-textured room can characterise an inhabitant or even a society through signs of their previous actions.

Supported By:
[Appendix F (Row 96,196-197)] [Appendix J (Row 7-9,)]

Figure 29: Hidden doors in Sekiro [47] are often marked with a white, human-like silhouette, suggesting that it is used often by someone [64].

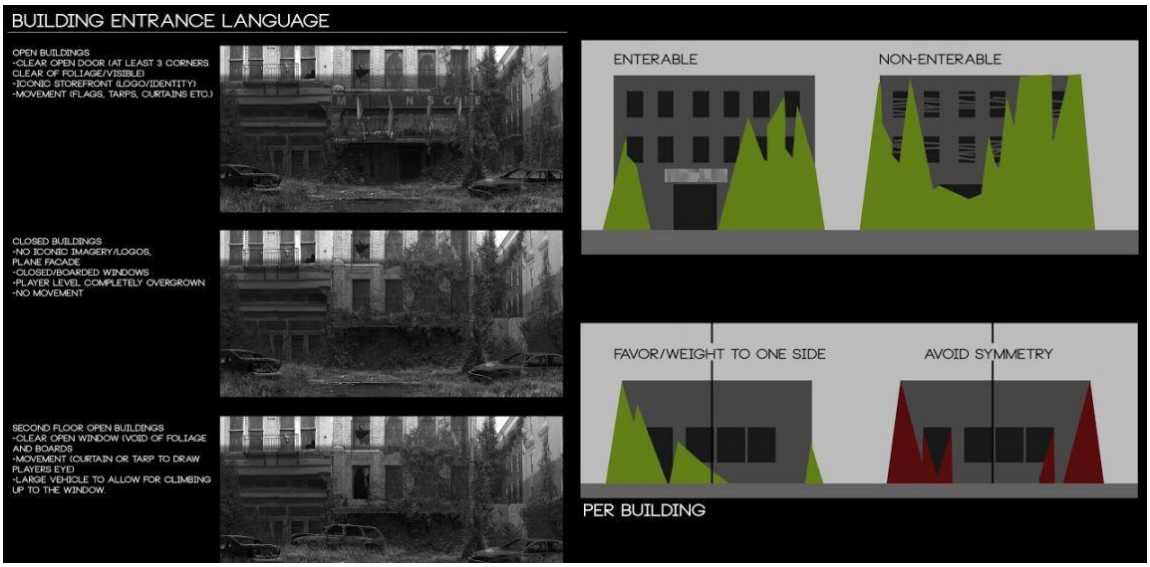


Figure 30: An internal style guide for The Last of Us Part 2 [68] showing how ivy coverage can communicate whether the player can enter a building or not.

Environmental Clarity

Being able to clearly read the environment allows the player to notice the important details.

1. A clear environment enables more players to be drawn to environmental storytelling.
2. Simplifying the environment further highlights important elements.
3. Visual language, theme, atmosphere and player expectations are core aspects of defining what clarity is in a game.

Environmental Clarity is the readability of a level or scene. Readability is dependent on consistent visual patterns that players can notice that help them reason about spatial logic. A clear environment that conveys meaningful gameplay information to the player encourages players to not only look at the environment, but also facilitates gameplay elements such as navigation and interaction. Reducing visual noise can also increase environmental clarity, allowing players to spot important details contextually relevant to them. As a result, it can also allow players to spot environmental storytelling more easily as well.

One way of simplifying the environment is to consider accessibility. By ensuring that players with disabilities can understand the environment, the visual and audio patterns are often simplified in a reductive manner, allowing them to be more readable to a larger target audience. If those with disabilities can understand the environment, normal players will likely be more than able to do the same.

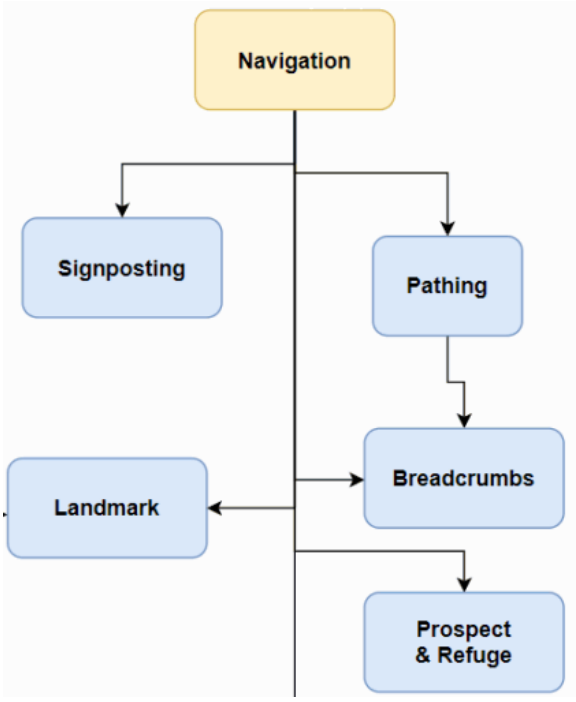
Environmental clarity is distinctly different depending on genre conventions and the game itself. Clarity is highly connected to what players consider relevant to them and player expectations. Furthermore, a game that strives to make the world more realistic will likely be more cluttered. As such, the theme, atmosphere, player expectations, and how the visual language is built in a game is crucial to defining clarity in a game. A game of Prop Hunt should likely be clear about the level boundaries and what a prop is while being extremely cluttered, while the sterile, clean world along with the player identity in Mirror's Edge allows for an extremely clear environment through its "Runner's Vision".

Supported By:
[Appendix H (Row 65-67,71-72)]
[Appendix I (Row 17,29,44)]

Navigation

Navigation techniques can be used to lead the player to areas of interest where designers can setup for environmental storytelling.

1. Scripted events can be used to force the player toward a designated location.
2. Presenting an interesting location that requires effort to access will make the player want to access it even more.



Pathing

Being able to clearly read the environment allows the player to notice the important details.

1. "To pass through a well-designed level is a hike, not an expedition." - Bennett Foddy

Pathways

1. Pathways need to be visually distinct from the environment.
2. Give the desired route a different texture to create a pathway.
3. Give the desired route a different height to create a pathway.

Players can be led down a path or attracted toward a location using the environment and the terrain. Pathways are an effective way of conveying a sense of direction to the player and can be used even in spaces that wouldn't otherwise have them. Pathways can be made by either changing the texture or by raising or hollowing the terrain.

Figure 31: Fallout New Vegas [85]: Pathways leading the player to their next objective.

Supported By:
[Appendix J (Row 45)]

Breadcrumbs

Breadcrumbs can double as a navigation and a storytelling tool.

1. Use breadcrumbs to lead the player to a desired location.
2. Breadcrumbs can be either permanent or transient.
3. Let breadcrumbs tell a story of what transpired in the area.

Breadcrumbs is a trail of objects leading to a destination. The object can take on many forms like blood, marks, lanterns or posts. A not so obvious use of breadcrumbs is using the player's innate need to kill enemies to set up a trail of enemies leading to a target destination.

Supported By:
[Appendix F (Row 94,104,117-119)]
[Appendix H (Row 24-25)]

Figure 32: Bioshock 1 [2]: Breadcrumbs leading the player to an area of interest or toward their next destination. Breadcrumbs can take many forms, in this example it's a paper trail or bright lanterns.

Leading Lines

1. Use leading lines to subtly move players in the right direction without the need for additional prompts or breadcrumbing.
2. Leading lines rely on the player being at a certain position looking at a certain area to be effective.
3. For this concept to work it's a good idea to combine it with techniques like funnels and chokepoints.

Leading lines is a very subtle way to help guide the player's eyes toward a specific location and helps give the player a sense of direction. Leading lines can range from pipes on the ceiling and walls to landscaping the environment.

Leading lines are hard to accurately define and there are a lot of bad examples on what leading lines are. Due to the nature of 3D games, the player's camera perspective and depth of field, leading lines in the scene will always converge somewhere in the distance, it is a linear perspective. That doesn't mean that every line in the scene converging to that focal point are leading lines [11][121].

Figure 33: Depth of field in a 3D-Game will always create some kind of leading lines, but that doesn't mean that where the lines converge is a point of interest.

Another reason why leading lines are hard to define and hard to notice, is that a game is not a screenshot. Taking a screenshot from the perfect angle will most definitely highlight some leading lines. But the player won't necessarily be in that perfect spot looking in that specific angle, which means that leading lines will be very hard to notice.

However, there is still some truth to this concept, when used correctly our gaze will follow these invisible lines. As mentioned previously, perfect conditions need to be met for the player position and orientation in order for leading lines to be effective. Prior setup is required. Consider using leading lines when you know the exact player's position and their potential orientation, a choke point is a good example of when it can be used to a greater effect. In an open area, using

pathways, and mountain structures can be a good way to lead the gaze, while in a closed area pipes can be used.

Figure 34: Uncharted 4 A Thief's End [82]: A better use of leading lines where the mountain in the background and the pathway converges at the point of interest.

Signposting

1. Use signs and objects to guide the player.
2. Signs can be used to foreshadow a location or a narrative.
3. Warning Signs often pique player curiosity, especially when risk is low, and can sway the player away from a path without forcing them. (Don't say we didn't warn ya)

Signposting refers to points of transitions or points in a space, narrative, or world that is meant to guide the player to a target destination. Signposting can be either actual signs with written text, environmental objects like props or light sources.

Signposting is divided into 3 types [117]:

- Directional: guiding the player from point A to B.
- Orientational: pointing the player towards alternate routes or spaces.
- Contextual: conveys narrative information to the player.

Figure 35: Fallout New Vegas [85]: Signs in Fallout New Vegas are used often, in this example there is a sign of warning to alert the player of the dangers ahead (Orientational signposting) and a sign that both guides the player to their next destination (Directional signposting) and set up a narrative foreshadowing (Contextual signposting).

Supported By:
[Appendix G (Row 24,29,56,58,60)]
[Appendix H (Row 63)]
[Appendix I (Row 22,54-58)]

Landmark

Landmarks can be used as a tool to create points of interest that reflect the theme and story of the area around them.

1. Use landmarks to guide the player to their next destination.
2. Landmarks should be memorable and easily visible in different areas of the map.
3. Noticing the landmark getting closer gives the player a sense of progression.

Landmarks are structures that stand out in a scene and are effective in drawing the player's attention. Landmarks work very well in combination with camera composition and leading lines. A bottom up angled camera view of the landmark gives it a sense of importance and gives the player a sense of scale and destination.

Figure 36: Rise Of The Tomb Raider [31]: A shot of a landmark in the distance clear in the player's field of view setting up their next destination for their journey.

Supported By:
[Appendix G (Row 2-3,6-7,11,13,17,48-49)]
[Appendix H (Row 28)]
[Appendix I (Row 41,44-46)]
[Appendix J (Row 17)]

Prospect and Refuge

Players are often attracted to areas of higher Prospect and Refuge. Therefore, more players are likely to explore environmental storytelling in those areas.

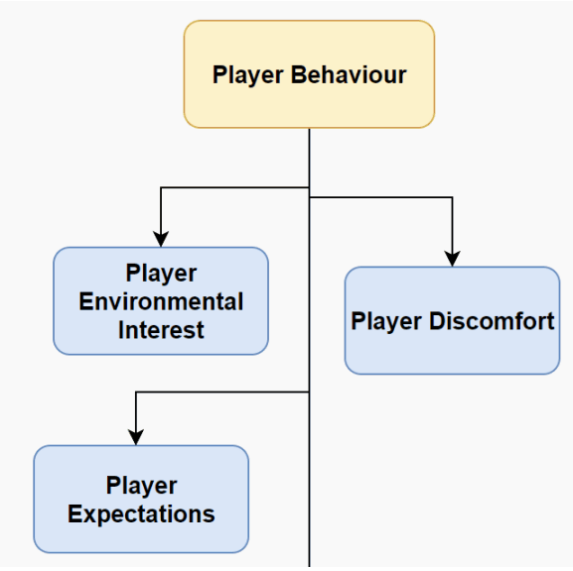
1. Give players access to vantage points to help them plan their routes.
2. Make it clear which areas are safehouses from a distance to allow the player to easily identify them.

Prospect-refuge theory says that humans have an "inborn desire" to seek out prospects (vantage points / lookout points) and refuge (areas and interiors safe from view / predators).

Refuge in game design is any space where the player feels safe, a breathing space, a safe house. Identifying said space from a distance is not necessarily an easy task in games since threat assessment is a core skill that players must develop over time [121].

Player Behaviour

The way players act and think in relation to the game. These behaviours lean on the conscious side, where the player is relatively aware of these actions.



Player Environmental Interest

The more interest players have in the environment, the more likely they will investigate and explore deeper into the subtle aspects of environmental storytelling.

1. The immersed player will look for the subtle environmental storytelling aspects the most.
2. Remove conflicting gameplay elements to increase environmental interest.
3. Player monetary investment is often not indicative of their degree of immersion.
4. Let players come to their own conclusions through the Law of Closure.

Player Environmental Interest is how much the player wants to learn about the details within the environment. This is assumed to be directly related to player actions which reflect such interest, such as exploring areas of the level unrelated to gameplay, interpreting narratives based on the environment, or investigating areas. The greater the interest, the more players tend to ask "what happened here" in relation to the environment, as presented by Worsh and Smith.

Gameplay elements that shift the player's focus away from the environment include combat, as players do not have time to appreciate the environmental details in an intense situation.

While traditional single payment narrative driven games should not take player monetary investment as a means of gaining player immersion into account, this may be less true for games with alternative methods of monetization, such as gacha games[40].

Supported By:
[Appendix F (Row 67,204,250,256)]
[Appendix H (Row 33,37-46,64-65,85)]
[Appendix I (Row 34,39-40)]

Player Expectations

Setting expectations condition players to be immersed, attracting them to environmental storytelling elements. Players will act upon their expectations, increasing environmental storytelling awareness.

1. Set expectations of the game as early as possible, and fulfil those expectations.
2. Subverting expectations requires a strong anticipation of the opposite.
3. Encourage and support the optimal mindset the player should be in during play.
4. Tailor the anticipation towards the specified target audience prior to playing the game.
5. Compensate players for their time and effort.

Players constantly have expectations of a game. Prior to purchasing the game, the box art, screenshots, and trailers tell players why they should play, creating a strong anticipation for the player of the experience they will enter. Setting pre-game expectations encourages players to be in the correct mindset as well, increasing immersion.

The game should deliver these expectations. During the game, pacing will create moments of tension, the environment setting the mood, and gameplay mechanics giving players an identity. All of this will set anticipation of what is to come, setting expectations. The layers of subtlety in the beginning of a game can set expectations for the amount of environmental storytelling for the rest of the game.

Setting up expectations allows designers to fulfil or subvert them based on intent. While subverting expectations is fine, have a clear intention to do so.

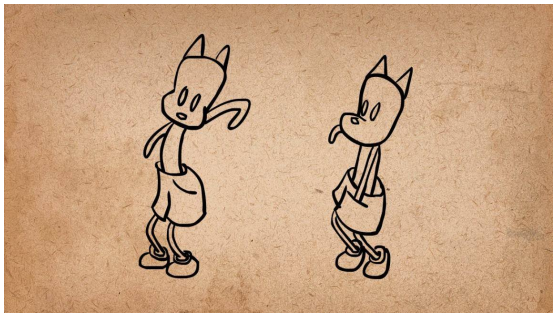


Figure 37: The animation principle of anticipation is used heavily in game animations.[4]

Taber describes the player contract as "what the player perceives the game is allowed to do in the game space" [103]. We would like to modify this a little, and instead describe the player contract as "what the player perceives the game experience to be". When players agree to craft this contract, they are given a choice to participate in the experience the developers have advertised. Many meta-aspects of games can affect this, such as genre conventions, company history, and previous iterations of franchises.

Creating such expectations before the game begins also allows players who do not wish for such an experience to simply not play it. Players who are willing to "go along with the game" are more likely to be immersed early in the game, leading to greater interest in environmental storytelling. If players fight against the game at every turn, they will most likely not have fun.

Players can be misled if the game violates the contract and expectations are subverted. This may occur on several levels. The contract may be broken if the rules of a game are twisted without warning, the tone of the game is different than expected, or the difficulty of a game is wildly unexpected. While subverting expectations is fine, it is important to be aware of such expectations, and the intention behind subverting them.

Figure 38: Dark Souls' [46] box art hints at its difficulty before players begin the game through its "Prepare to Die" subheader while Journey [107] establishes the theme and destination of the game on their box art and at the start of the game.

Supported By:
[Appendix H (Row 33,44-46,68-70,73-83)]
[Appendix I (Row 8,31,33)]

Player Discomfort

While physical discomfort can guide players away from certain areas, emotional discomfort can often increase investment, leading to greater environmental interest.

1. Beware of physical discomfort, ex extremely bright lighting, it will likely reduce environmental interest.
2. Emotional discomfort can be effective in characterisation.
3. Emotional discomfort and fear can make a player more alert [86].

Player discomfort can be mental or physical, wanted or unwanted. Horror games, for example, aim to make players uncomfortable. Physical discomfort is generally undesirable, especially if they are related to accessibility. If unavoidable, players should be warned beforehand.

On the other hand, emotional discomfort is useful in creating memorable moments or increasing tension. Both, however, will often repel players, who will try to progress through the scene as quickly as possible, uninterested in environmental storytelling.

(a) High Sanity

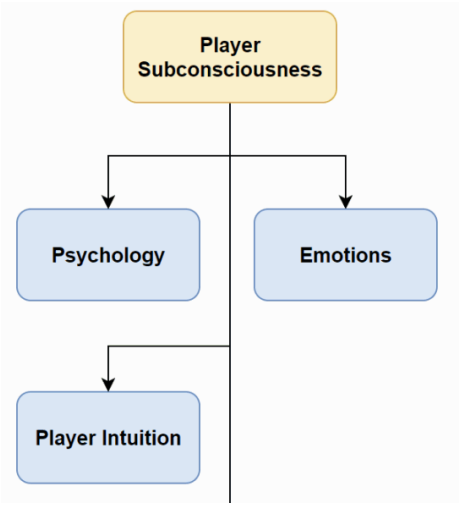
(b) Low Sanity

Figure 39: Amnesia: The Dark Descent [45], Then environment changes depending on the player's sanity, the lower it is, the more things start to look morphed and out of place leading to discomfort.

Supported By:
[Appendix F (Row 75)]

Player Subconsciousness

1. "People in general typically care about other people, but typically don't care about places."
2. "Like climate change, people don't really care about the Earth becoming a hellhole, but they do care when it's affecting themselves, or someone they care about."



The behavioural aspects of a player that lean towards the subconscious. That is, psychological behaviours that most players are not normally aware of themselves or do not need conscious reasoning to activate. It is important to note that player actions are a combination of both conscious and subconscious.

Evoking player empathy of characters will lead to players caring about the game world by extension.

Supported By:
[Appendix H (Row 55-56)]

Psychology

Understanding the underlying mechanisms that influence how players think and react to certain situations in games will let us manipulate environmental storytelling interest.

1. Players can be conditioned through norms established through the game.
2. A sense of unease will heighten cautiousness but can also increase anticipation.
3. The attention span of players should coincide with the pacing of the level.
4. People often want answers to mysteries they find.

In general, psychology is the study of behaviour, encompassing both conscious and subconscious phenomena. In this context, psychology is understanding the underlying mechanisms that influence how players think and react to certain situations in games. One aspect to consider is players' attention spans when pacing levels or designing quests. Although players who find themselves having fun may have longer attention spans, it is important to not tire players out.

Conditioning is also an important factor to consider. Games often have implicit norms created through level design and gameplay. Players gradually learn these patterns such as common environmental storytelling placements and probable areas for loot, some of which have become tropes, such as loot behind a waterfall. Feelings such as cautiousness can heighten environmental awareness, but may make players more "combat-ready" than a sense of exploration, preventing players from investigating the subtle layers of environmental details.

Supported By:
[Appendix F (Row 10,14,18,24,45,61,84,127-128,209,238)]
[Appendix H (Row 46-48)]
[Appendix I (Row 20)]
[Appendix J (Row 5)]

Player Intuition

After players notice environmental storytelling elements, the player's real world knowledge lets them connect the dots or understand connotations.

1. "What is intuitive behaviour does not need to be learned."
2. Players will naturally follow intuitive, contextually coherent expectations in the environment.
3. Learned meanings and cultural understandings are not universally the same.
4. Established gameplay norms can make players investigate the environment further.

People in general have learned behaviours through their experiences in life. Players will often use knowledge from previous experiences to understand the environment or fill in the gaps. Expectations can be used to connect objects, develop characters, or ease navigation.

Connecting players' knowledge of the real world to the game world can create complex narratives through the expectations created in the environment. Players can follow contextual expectations between objects through techniques such as indexical signs.

Figure 40: The Witness [109], players quickly understand that the apple is related to the path on the sign that helps solving the puzzle

Relying heavily on learned meanings may harm player experiences depending on the target audience. Concepts such as colour symbolism or name connotations may be lost to an international audience. At the same time, the theme of the game may be heavily rooted in certain cultures, and tangential learning may occur. We believe that intention is key here.

Supported By:
[Appendix F (Row 198,214,221,244,253,283)] [Appendix H (Row 30-35)] [Appendix I (Row 30)]

Emotions

Players with different emotional states react differently to storytelling elements, affecting awareness.

1. Players in the correct mindset will evoke stronger emotions than those who aren't.
2. Evoking player empathy through the environment often increases investment.
3. Music is a powerful tool to evoke emotions.

Emotions are mental states, often related to behavioural responses and feelings. Narrative driven games tend to evoke strong emotions through players, with the specific emotion dependent on theme and atmosphere. Horror games aim to evoke feelings of fear and panic, while narrative games may evoke feelings of sorrow, awe, or catharsis. Certain feelings are likely to increase environmental interest than others.

Players who are immersed will often have the strongest emotions, as they are invested in the narrative, environment, characters, and atmosphere. This is a positive feedback loop, however - the stronger emotions players have, the more immersed they will be. As such, it is important to enable immersed players to have such moments of emotions through storytelling, which can be through the environment.

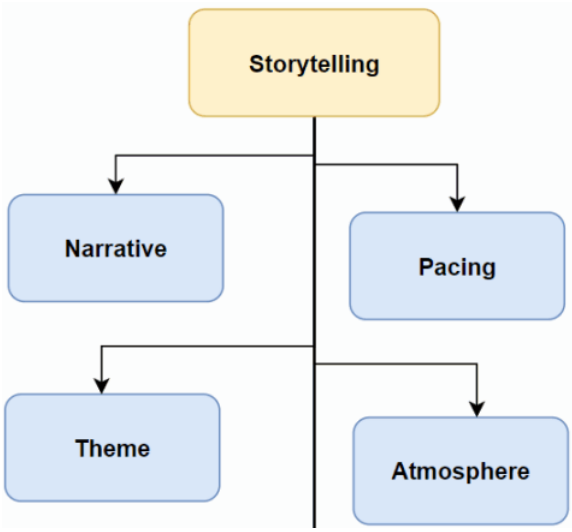
Empathy is a strong emotion to encourage players to pay more attention to environmental storytelling. This is due to the theory that people care about people, but not places. Yet, when places are associated with characters, players will thus care more about them as they serve the character.

Figure 41: This War of Mine [1] uses the gameplay, environment and characters to evoke universal themes of survival and desperation, allowing players to establish a strong emotional connection to scenarios they can relate to.

Supported By:
[Appendix H (Row 4,20,23)]
[Appendix I (Row 66)]
[Appendix J (Row 2-5,12)]

Storytelling

1. The environmental storytelling should touch on or reflect the themes of the narrative.
2. The combination of gameplay and environmental elements should create moments that reflect the state of the world.
3. The gameplay and environment can contrast or match each other, depending on the theme.



Storytelling is the way a narrative is told through the player's point of view, the way the story is presented and organised. In other words, it is the plot or syuzhet [90]. Films can have non-linear narratives42.

In games, the player's journey is the plot. Environmental storytelling often reflect game events which have transpired, leaving only hints of past events. Worsh and Smith, Carson and Jenkins discuss using environmental storytelling to create a sense of cause and effect, allowing the player to interpret and conclude previous events[67], [99], [23]. Carson further stresses the importance of establishing a strong "big picture" idea of the world, or the theme and tone of the game.

The player's actions is also part of the story, both in gameplay and character. During the soft evaluation, one practitioner discussed the importance of having the player empathize with the character's journey to mirror the feelings of the character they play.

The themes may dictate whether the actions of the player match within the environment. One practitioner mentioned the strong impact The Last of Us created using the contrast between the player's actions and the environment to touch on themes of hope and the harsh reality of the game world, creating confronting moments [Appendix H(Row 20-21)].

Figure 42: Christopher Nolan's Dunkirk uses a non-linear narrative structure [81], with the storytelling structured and paced differently than the narrative, which happens in parallel and merges together near the end of the film.

Narrative

Environmental storytelling can either enhance or create narratives.

1. Greater narrative investment increases interest in deeper levels of environmental storytelling.
2. Narrative hooks throughout the environment pique the player's interest.
3. Interlink environmental storytelling pieces to create a cohesive narrative.
4. Foreshadowing narrative events can build anticipation, leading to a greater payoff.
5. Failures often make for better stories.

The narrative is the chronological structure of events in a story, or the fabula[90]. The narrative is often useful to ground environmental elements, making them more coherent within the game world. Different environmental setups containing side narratives can be related to the main narrative or characters, which may attract players who are invested in the narrative to seek out more subtle pieces of environmental storytelling [H(Row 23-25)]. Practitioners discussed the use of "hooks" to draw the player's interest in and make them invested, arguing that it is the heavily invested players who look for deeper levels of environmental storytelling [H(Row 24, 39-41,49)]. Furthermore, they discussed the impact in using multiple environmental setups around an area to tell a cohesive narrative, not only characterising events, but the characters within the area[H(Row 24)]. This "breadcrumbing" of the environment further draws the player in, looking for the missing puzzle pieces to the narrative.

Subtle foreshadowing of the narrative through environmental elements can build anticipation or let players engage in active problem solving, leading to a stronger payoff. To this end, props, signs, and audio are examples of tools to hint at the future, such as Figure 43. [G(Row 19, 27)][F(Row 188-190)].

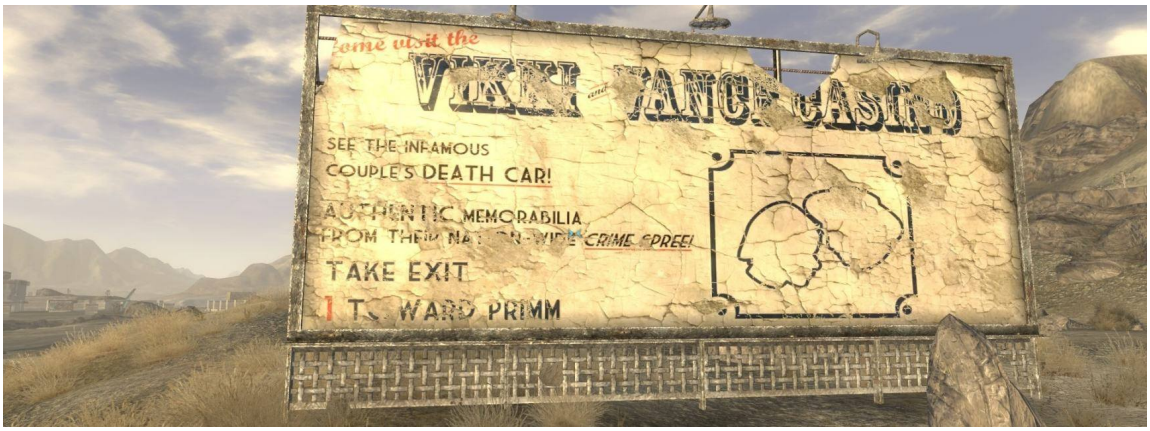


Figure 43: This sign from Fallout New Vegas hints at the expectations of the attractions in the city, the Couple's Death Car, which ties into a side narrative of a similar criminal couple in the game.

Adjust the depth and complexity of the narrative according to the target audience. If the target audience does not lean towards complex storytelling, it may be difficult to make them invested if they do not understand motivations and themes of characters within the story. As such, less players may pay attention to environmental storytelling. More importantly, production resources could be used in other areas to better increase player value [I(Row 16-17, 32)].

It is important to note that environmental storytelling does not necessarily need an explicit

main narrative. Rather, it is dependent on the genre and atmosphere of the game. A strong atmosphere can allow players to simply interpret the narrative through the environment, which is also viable, as Kasavin describes [69].

Theme

Environmental storytelling often reflects the themes of the game, increasing cohesion - which increases immersion.

1. Obvious parts of the environment allows uninterested players to understand the theme.
2. Establish the theme of the game early; it should influence many aspects of the game.

The theme is the central topic, subject, or message in a narrative [69]. A theme is often split into a thematic concept, which is a word describing what readers think the text is about, and a thematic statement, a sentence describing what the narrative says about the concept. While environmental storytelling should connect to the theme, it can do so in many ways: Through side narratives, characterization, or even through the player's interactions with the environment. Horton argues that the best stories are supported by universal themes, as environmental storytelling should not be bound by culture [62].

Practitioners discussed many aspects that could be affected by the theme, ranging from environment art to audio [H(Row 21, 32)] [I(Row 74)]. Audio is equally important, with one practitioner discussing how it can subtly hint at the theme and atmosphere through the contrast between player actions and audio [J(Row 3-5,60, 73)].

Games should often strive towards ludonarrative consistency, where the narrative told through the story agrees with the narrative told through gameplay, as Hocking critiques Bioshock for lacking [61]. As the game environment is often used both during gameplay and narrative beats, it is important for the environment to take both into account. However, this does not have to be the case. Depending on the theme, games may aim towards creating a sense of ludonarrative dissonance instead. Williams discussed embracing ludonarrative dissonance while producing Spec Ops: The Line, as a theme about "Hypocrisy" may try to make players question their gameplay actions through the environment [119]. This can extend outside the game, as Spec Ops shows through the main menu 44.

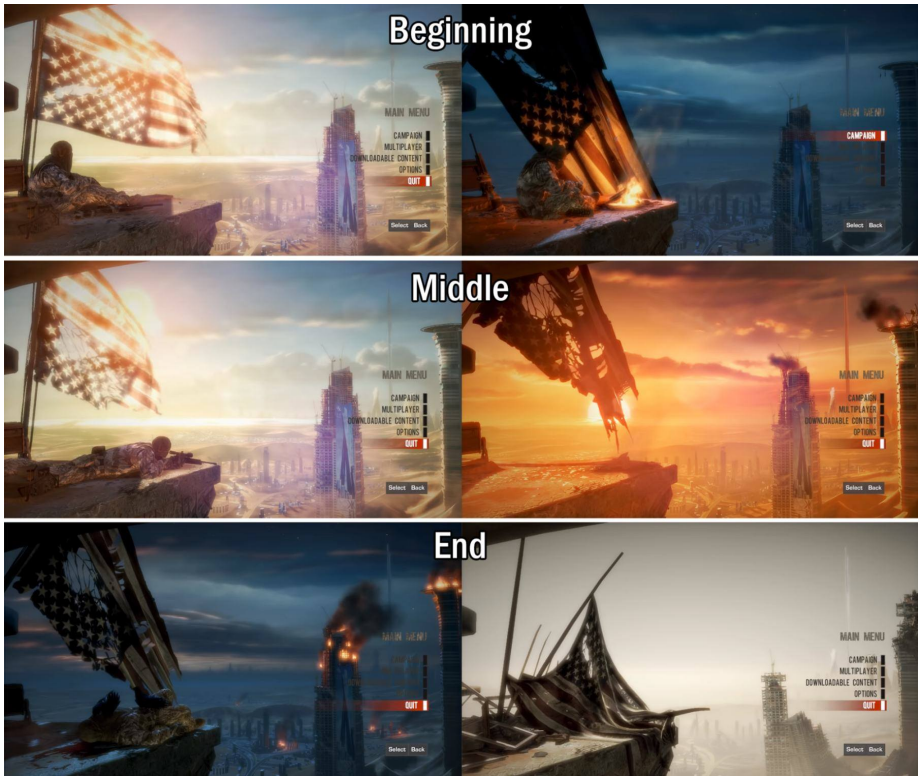


Figure 44: The main menu's game environment in Spec Ops: The Line [120] reflects the campaign progression of the player, while reflecting the themes of the game itself symbolically and literally.

Atmosphere

Atmosphere builds player investment, which may lead to more curious players.

1. The atmosphere is a combination of themes of the work and tone of the author.
2. Frequent and consistent environmental storytelling can enhance the mood.
3. A strong atmosphere builds investment in the player.
4. Leave room for player imagination.

Greg Kasavin describes mood, or atmosphere, as "the combination of theme plus the author's attitude towards that theme" . Atmospheric games typically have strong tonal cohesion, internal consistency, and specific detail, where inquisitive players are rewarded when they investigate the world of the game[69].

Environmental storytelling fits into this property of specific detail. It is important to note that although narrative, sound, and art can elevate the mood, it is not central. Ultimately, Kasavin concludes that atmosphere builds investment in the player, leading to players looking for deeper levels of environmental storytelling. Carson's emphasis on creating a "big picture", or atmosphere, using a set of rules supports this, elaborating that establishing a clear atmosphere gives a clear direction to the production team, and insures that the world will be seamless [23].

One practitioner discussed how a consistent, frequent trickle of subtle environmental storytelling gradually increased their investment into the narrative of Dark Souls, resulting in them looking for more subtle pieces of environmental storytelling [64 (Row 5-7,11-14). We believe this "trickle" of narrative is nearly synonymous with what the atmosphere is, as not only is it the "specific detail" that Kasavin describes, but also supports how atmosphere increases player investment, which in turn increases the player's interest in looking for subtle environmental storytelling. Furthermore, it suggests that every piece of a game's environment is cohesively building storytelling, developing characters, and contextualizing locations to build atmosphere.

Practitioners during soft evaluation agreed with the idea that atmosphere is ultimately not dependent on graphics and sound, with one concluding that a good atmosphere leaves room for the player's imagination, despite the specific detail Kasavin mentions. We found similar moments of using our imagination to guess or conclude certain environmental storytelling elements during our playthrough of games, often leaving us trying to find closure [F(Row 5,13-14,28-29, 130, 135-136, 236)][G(Row 38-40, 41-46, 58-63)].

Pacing

Pacing allows players to pay more attention to the environment during low cognitive moments.

1. Alternate between high and low cognitive loads for players.
2. A masterfully paced game will let players' mindsets match the next gameplay or narrative beat.
3. Players are more likely to spot environmental storytelling elements in low intensity moments.
4. Limiting level affordances during low intensity moments can draw the players' attention towards their surroundings.

Yang defines pacing as the general order and rhythm of activities and events in a level, for example Figure 45 and 46. [125]. Practitioners during interviews greatly emphasized the importance of pacing to heighten the player's environmental awareness, stressing the need for players to wind down, allowing them to match the mindset of the next narrative or gameplay beat [H (Row 47-54, 70)][Appendix J(Row 15,27,51)]. Yang discusses the use of different documentation and plotting techniques for pacing, such as flowcharts, graphs, and Beat Sheets[125]. Our interviews revealed similar techniques, with one practitioner mentioning that they immediately use a pacing graph to attract player attention, allowing them to place environmental storytelling elements into low intensity, narrative moments [I(Row 18)].

A well paced game is particularly crucial in a narrative heavy game, with participants discussing how alternative cognitive loads for players reduce fatigue [I (Row 20-21)]. A player in the correct mindset that matches the beat will most likely find more subtle environmental elements, as they are more easily immersed [I (Row 4)][H (Row 62,70)].

Limiting player interactions during an important narrative beat can shift the player's focus away from gameplay and towards the narrative and environment [Appendix J(Row 68)]. Combined with spatial composition techniques and eye catchers, player attention can be effectively directed towards understanding the environment during exploration and understanding the space around them [11].

Players will likely investigate areas in more detail the smaller the affordances in the level is [Appendix I(Row 36-37)]. It is important to note that restricting interaction for long periods of

time might quickly reduce immersion.

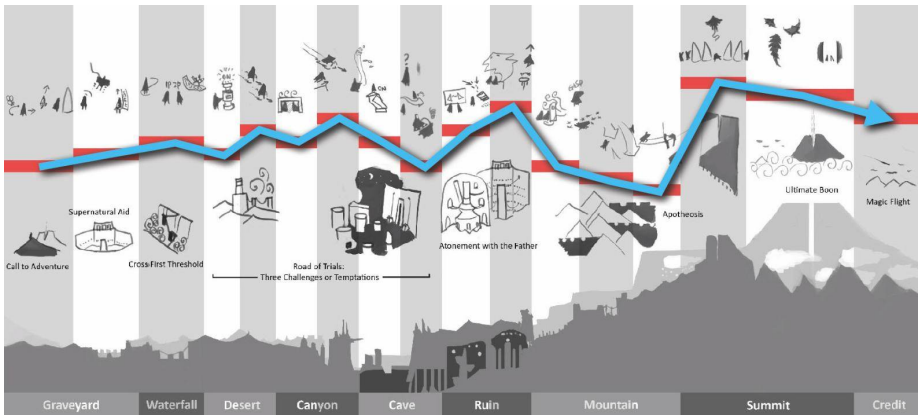
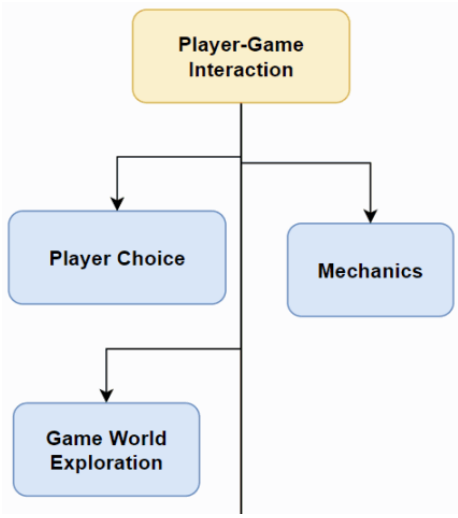


Figure 45: Journey [107] designed the level of intensity for each level accordingly, allowing players to match their mindset to the next beat. It is important to note that in Journey, intensity is mainly about emotional intensity.

Figure 46: Open world games often allow players to take multiple routes towards an objective. This Assassin's Creed [112] level layout shows the level of challenge and danger in layers, with green being "safe" and red as "high security". The images to the left show possible player paths.

Player-Game Interaction

1. The combination of visual, sound, and player interaction should be used cohesively to communicate the player experience.



The player experience essentially contains the game rules, visual and sound elements, and the player's interaction. A more cohesive environment will deliver a better player experience. [23] [69] [126] [119]

Supported By:
[Appendix H (Row 60-61)]
[Appendix J (Row 54)]

Player Choice

Explorative players who make choices to discover subtle environmental elements are rewarded with self-satisfaction. It can also enlarge the target audience.

1. Players should be able to make the active choice of straying from the main path.
2. Subtle environmental storytelling should be optional for players.
3. Player types will likely affect player choice.

Open-world games often offer players the freedom to control a character in a game world. This offers the opportunity for players to make different types of decisions that affect what the character does, how they do it, and why the player does it. In order for players to make a decision, the game should present the available options first.

Rather than simple eye candy, game environments aid the player in facilitating decision making and clearly presenting available choices. For example, clearly communicating the critical

path to the player through signposting in the environment will give players a conscious choice of exploring other options before proceeding.

During our soft evaluation, multiple practitioners discussed the ROTs' lack of focus on environmental storytelling, but agreed on how player choice can indeed be important to environmental storytelling. Interesting aspects that were discussed included how players are rewarded for those who make the choice to discover subtle environmental elements, which may lead them perform similar choices in the future. Some players who do not care about the narrative may not feel rewarded even if they discover such environmental elements, however. While allowing players to make a conscious effort in discovering optional content, one practitioner argues that allowing all players to discover such aspects will enhance the atmosphere, increasing immersion.

Supported By:
[Appendix I (Row 22-23,51-56,60-63)]
[Appendix J (Row 40-43)]

Figure 47: Journey [107] uses lighting to visually communicate the goal and collectibles of the level, allowing players to make a choice to stray away from the main path and explore.

Mechanics

Mechanics can manipulate and direct player attention towards or away from gameplay elements in the environment.

1. Place interactive objects in areas where designers want players to explore.
2. Mechanics should provide players tools to discover environmental storytelling elements.
3. Puzzles can let players inspect the environment after an intense gameplay beat.
4. Contextual hints through interactions can push players to investigate plotlines.

The MDA framework states that mechanics are the base components in the game, such as the rules, player actions, and algorithms in the game engine[63]. Mechanics are the tools which allow players to navigate and interact with the world, consequently being the ways players can discover environmental elements. Conversely, they can reduce environmental storytelling interest

by emphasising gameplay environmental elements through “vision modes” such as Figure 48 [74].

Alternative game modes which require more thought on the environment, such as puzzles or route finding, can lead players to uncover more subtle environmental storytelling elements. Pacing these slower, problem solving gameplay beats well can enhance this effect.

Mechanics can provide further context and hints to environmental storytelling. One example is the type of loot found when searching through a corpse, which may lead to players interpreting their final moments, shown in Figure 49. As such, by having the player put effort to interact with the environment may increase investment.

Supported By:
[Appendix F (Row 145-147,151-153)]
[Appendix H (Row 2-4,30)]
[Appendix I (Row 2-4,21,38)]
[Appendix J (Row 107-110)]

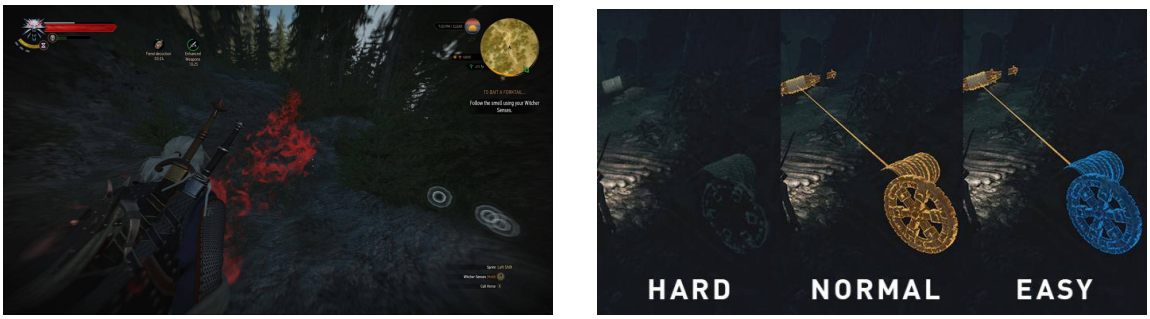


Figure 48: Both The Witcher 3 [24] and Shadow of the Tomb Raider [34] feature Vision Modes which highlight gameplay information such as puzzle clues and quest trails.

Figure 49: Finding a corpse with alcohol scattered around it, along with being full of alcohol when looting it strongly suggests to the player the way this person died in Bioshock 1. [2].

Game World Exploration

Open world exploration allows players to become increasingly invested, often leading to a greater appreciation of environmental storytelling.

1. Consider soft capping areas rather than hard capping them to preserve player choice.
2. Prioritise player freedom, preserve interactivity.
3. Encourage the player to explore with minimal hand holding.

Game World Exploration is defined as how players navigate around an open area within the game. Players who explore are often curious about activities and interactions within the area. While linear games may not always allow players to explore, open world games are often the opposite.

There is a strong emphasis on player freedom when talking about exploration, as player choice gives players a sense of pride and accomplishment when their efforts get rewarded. Soft capping areas discourage players from navigating away from the area of interest without limiting their freedom.

Minimal hand holding lets players feel that they are in control. It gives players a stronger sense of intrinsic motivation when they discover rewards on their own. However, it may reduce your target audience as some may want a more directed experience. Here, we believe that setting expectations early is important, as both Carson and practitioners emphasize the importance of establishing the desired player expectations to not only attract the desired target audience, but also allow them to make a conscious choice in participating in the experience. One practitioner also mentioned the importance of player trust in terms of allowing players to learn the rules on their own, exploring the game's mechanics.

Players begin exploring for a myriad of reasons, often depending on player types[32]. Gamists would explore to often find loot or rewards, while Narrativists may explore the world to look for side quests or environmental storytelling. Although players may have different reasons, the game can nurture player environmental interest through the consistent placement of subtle environmental storytelling throughout the game, as practitioners discussed in our interviews.

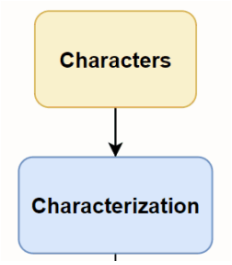
Supported By:
[Appendix F (Row 168-173)]
[Appendix H (Row 6-7,10,62)]
[Appendix I (Row 10,19)]
[Appendix J (Row 72)]

Characters

Characterization

Relatable characters ground and provide depth to the narrative, allowing players to care about the characters and consequently the environment.

1. Tell your story through interesting characters and showcase how they are affected by it.
2. Use character's dialogues to guide the player to an area of interest.
3. Characters can tell narratives about an area to the player through their appearance, actions, and speech.
4. The occupants' patterns of behaviour shape that area.



"Man is by nature a social animal" - Aristotle
"We care more about people than places" - Redacted practitioner

A character is defined as "a person represented in a story" [30]. Characterization is the representation of the attributes, features, and qualities that distinguish an individual within a story [77][78]. Relatable characters are one of the key elements of stories, allowing players to relate to the story, increasing investment.

Believable characters help drive the plot, create conflict, and provide depth to the story. By showing how well-crafted characters are affected by the plot and environment, they will be more relatable to them. Once the player forms a connection to the characters, they will be more interested in knowing more about them. Players who care about the characters will often care about the narrative, paying attention to the subtle layers of environmental storytelling. Designers can then use characters to drive a narrative about using the environment, actively making use of the environment to convey the narrative.

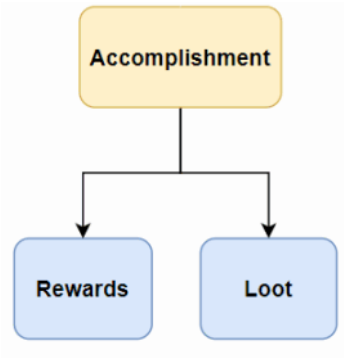
Characters can also interact with the player in multiple ways to immediately direct players to areas of interest. By calling the player towards an area within the environment, players can explore that area.

Environments can characterize those who have lived or frequent areas in the game. Yoder describes how Gone Home uses environmental storytelling to characterize occupants to great effect through traces of their behaviours, arguing that environmental storytelling is more than cause and effect. Yoder discusses that the environment acts as a snapshot of the accumulation of a

character's behaviours across different periods of time, creating a representation of that character[7]. Practitioners have supported this as well, discussing how understanding the stories of inhabitants stir up emotions and increase investment.

Supported By:
[Appendix F (Row 10,16-17,29,53-55,107-110, 134-137,188,208-210)]
[Appendix G (Row 19,41-47,59-63)]
[Appendix H (Row 18-23,55-57,67)]
[Appendix I (Row 33-35)]
[Appendix J (Row 51)]

Accomplishment



Rewards

Rewarding curiosity is a good incentive for the player to be more curious about the environment.

1. Always reward curiosity. That will make the player pay more attention to more leads.
2. Rewards can be a physical object like loot, or intrinsic as a piece of lore and narrative.

Players often expect to be rewarded for their efforts. If a player follows up on a lead or accomplishes a task and does not get anything in return, they will be less prone to follow up on future leads. Always reward the player for paying attention, especially if they follow up on subtle leads. Rewarding curiosity will make the player more curious to follow up on new leads and explore more, making them not only look for deeper levels of environmental storytelling, but actively contemplate about it. The Hook Model supports this idea that repeated rewards create a loop to not only encourage users to perform the same actions for variable rewards, but also to facilitate the action every time the loop is passed, stressing that the anticipation of the reward is stronger than the reward itself[38].

It is important to note that while rewards can be extrinsic or gameplay related, such as a power up, it can be intrinsic as well - the satisfaction of discovering a new piece of lore, or by learning something new of a character. Bellard discusses how players enjoy learning within the context of learning more about the environment[11]. Multiple practitioners during our interviews emphasize that this intrinsic reward while more powerful for attracting players to environmental storytelling, it requires players to care about the world and environment in some way. This can be through characterization, for example.

Supported By:
[Appendix F (Row 4,11,19,41,47,60,76,77-79)]
[Appendix G (Row 38-40)]
[Appendix H (Row 33-34,49-52, 57)]
[Appendix I (Row 33-35)]

Loot

Loot can be used to lure the player toward their location which can be used to set up a narrative around them.

1. Loot attracts players, use them as bait to lure the player to a location and use that chance to add environmental storytelling elements to the area.
2. Loot can be used to tell a story of their owner or the environment they are in.
3. Loot like keys and maps can be used to establish objectives and encourage exploration.

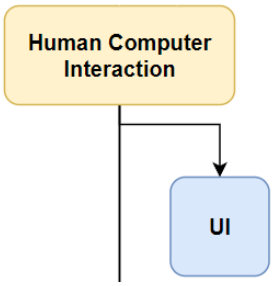
While games have many types of collectibles, items which function as rewards is very common to a wide range of games. As such, loot tends to be attractive to players. Designers should take that chance and surround the loot with environmental storytelling. Loot picked up by the player can be tailored to their owner and be used to tell a story about them or the environment they live in. During our game analyses, we quickly associated loot with environmental setups, creating an inherent association and expectation. As such, when this expectation was subverted through the use of traps or atmospheric shifts, a gameplay beat can quickly be introduced, heightening intensity and immersion after investigating the environment.

Loot, or more so lack thereof can be used in combination with the theme and mechanics of the game. A reduced amount of loot can starve the player of resources making them more perceptive while searching the environment establishing a sense of rhythm between exploring and looting. This rhythm was briefly mentioned during one of the soft evaluation sessions as well, which gives players moments to explore and find environmental storytelling.

Supported By:
[Appendix F (Row 4,11,19,41,47,60,76,77-79,115-124,130-139)]
[Appendix G (Row 38-40)]
[Appendix H (Row 57)]
[Appendix I (Row 30-35)]
[Appendix J (Row 33)]

Figure 50: Along with Eye Catchers, Bioshock Remastered [2] uses loot to attract players to environmental storytelling elements and subsequently reward them. Here, the loot in the game world acts as part of the environmental storytelling.

Human-Computer Interaction



UI

The user interface often directs the player's attention in a stronger fashion compared to the environment.

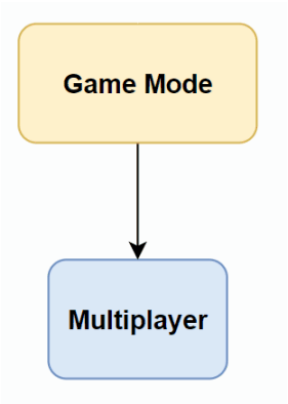
1. Highlight objects to make them more noticeable by the player.
2. Don't add too many UI elements on the screen. Clarity is more important.
3. Quest markers are helpful for navigation and allow for predictable player pathing.
4. Lack of quest markers encourages exploration.

Having a cluttered UI might be overwhelming to some players. Quest markers are a good tool to help player's save time and more easily find objects and places of interest. Quest markers also allow for predictable player pathing which can be used to set up events on the way. Not having quest markers allows the player to rely on other forms of navigation and be more explorative.

Supported By:
[Appendix F (Row 71,86,108,275)]
[Appendix H (Row 65, 71-72)]

Figure 51: Not only does Bioshock Remastered [2] use the UI to tell the player to pick up the camera, the non-diegetic glowing outline on the camera game object further communicates that this camera is an important gameplay element, and can be considered as part of the UI as well.

Game Mode



Multiplayer

Multiplayer has a distinct focus on the target audience and experience goals, requiring different techniques and considerations to attract or create environmental storytelling.

1. Use Macro- level design to implement environmental storytelling in games.
2. Players will likely notice more environmental storytelling elements in areas of downtime.
3. Unique environmental storytelling elements may be used for callouts by the players if they are strategically placed in the map and easily identifiable.

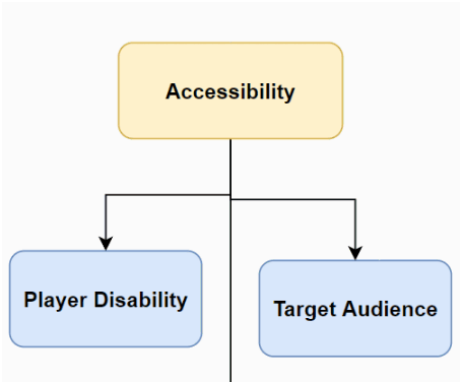
Practitioners discussed the considerations for environmental storytelling in multiplayer games, discussing the player's focus on gameplay, who often do not have time to stand around and look into the smaller details of the environment (Micro- Level Design). As such, the macro-Level design consisting of landmarks, buildings, bigger objects and clear setups are often a better fit in multiplayer to tell a story.

Practitioners mentioned how designers often place more environmental storytelling in areas of downtime in multiplayer levels, citing Overwatch and Left 4 Dead. Ultimately, practitioners emphasized multiplayer's focus on allowing players to create their own stories through the others they interact with, and how the environment should support that.

In a team based multiplayer game, objects that stick out and are easy to identify may become used for callouts in communication between teammates. One practitioner mentioned the emergent nature of how subtle environmental storytelling aspects were used as callouts.

Supported By:
[Appendix I (Row 1-17,24-27,29)]

Accessibility



Player Disability

Designing a game for accessibility increases readability of the important elements in the scene, allowing for easier player discovery.

1. Allow control over accessibility settings in your game.
2. Accessibility settings can be useful for players with or without disabilities.
3. Use clean fonts with enough spacing between the lines on a solid background to make it easier to read.
4. Avoid automatically advancing text to give time for the player to read.
5. Consider pause screens that still lets the player view and analyse the environment.

Accessibility settings are meant to make the readability and intractability easier for people with accessibility issues. But that doesn't mean that people without disabilities won't be able to benefit from those settings, on the contrary, these features can greatly benefit everyone. A great example of a setting that is adapted and used by everyone is subtitles, where this functionality was designed to aid people with hearing impairment but it is also used and appreciated by others.

Accessibility settings can make an area easier to read which makes highlighting objects of interest more effective. Consider using pause screens that allow the player to still view their environment while paused. That can be used to give the player a stress free environment to analyse the space they are in and plan for their next step [37][49].

Target Audience

Knowing your target audience allows you to tailor the experience and focus your resources towards maximising player value. The degree of environmental storytelling can then be tuned to fit them.

1. Consider meta or social aspects of the target audience behaviours which can affect play, such as communities, modding, and walkthroughs.
2. Know the target audience well, and maximise the game's player value.

Knowing your target audience early on allows you to tailor the game to them and even attract them through targeted advertisement. Remember that you can't make a game for everyone, tailor the weight you put into environmental storytelling towards the audience you know is coming to play your game.

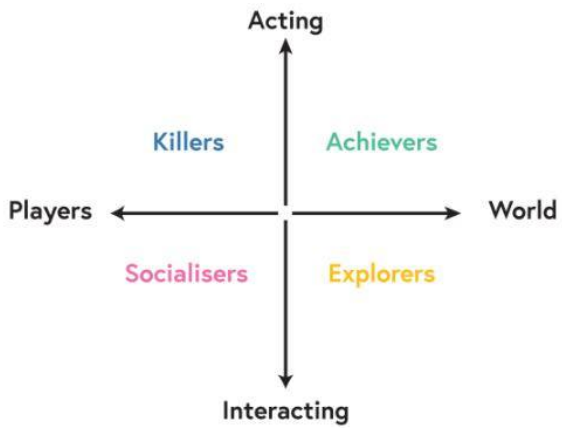
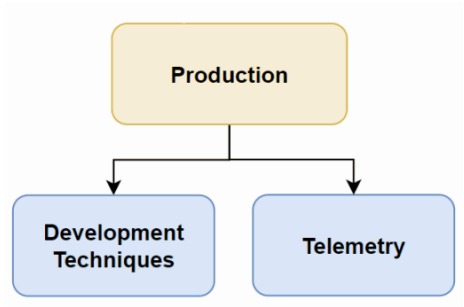


Figure 52: Bartle Taxonomy of Player Types [10]

It is important to first understand the target audience, and balance the work put into environmental storytelling towards that audience that will allow you to bring the maximum value to those players. Knowing who will play your game allows you to know what themes they are susceptible to and what things to avoid.

Supported By:
[Appendix H (Row 82-83)]
[Appendix I (Row 9-10,12,32)]
[Appendix J (Row 58-62)]

Production



Telemetry

Understanding the behaviours and interests of the target audience can allow designers to tailor the game towards greater interest in environmental storytelling elements.

1. Telemetry can categorise player types to further understand the target audience.
2. Track player behaviours, categorise them, work towards resolving their pain points.

One practitioner briefly discussed remotely monitoring and measuring player data, which can generate insight for the target audience's behaviours. This in turn may allow designers to have a more holistic view of the player base, categorising different players according to their behaviours into "types". Environmental storytelling in a game can thus be tailored towards players who are more interested in the narrative and exploration, or reduced entirely to focus resources towards polishing gameplay if the target audience is largely interested in gameplay.

Telemetry may be difficult or near impossible to perform for self contained, single player narrative driven games, relying more on playtesting during production. Here, it should be emphasised that the main goal of telemetry in terms of environmental storytelling is to better understand the target audience.

Supported By:
[Appendix I (Row 15-17,20)]

Development Techniques

The development processes and techniques used should account for development constraints while fitting the themes and focus of the game.

1. Consider moulding the process to fit the theme and experience goals of the game.
2. Have clear indicators for important experience goals for gameplay and narrative beats.
3. If the development team is small compared to the size of the game, maximise asset reusability.

Development techniques are defined by many facets of production. The focus of the game, which includes core aspects such as the theme and experience goals, should influence how the game is created. For example, a narrative focused game should adapt a process which prioritises pacing and character development while developing content. Moreover, the environment created should support the characters' journey.

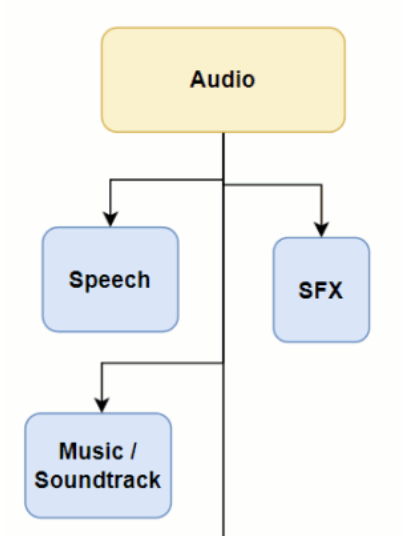
Practitioners discussed the use of different environmental storytelling production techniques based on different production constraints. Production constraints can define many processes and practices used for creating the environment, and consequently environmental storytelling. As many environmental storytelling elements often have low development priority, it is important to use appropriate techniques according to constraints to maximise player value.

Games with lower resource budgets often lean towards reusing assets, using techniques such as kitbashing, which involves reusing and combining assets in different configurations. This can be used to generate variations for refreshing environments at a lower cost. However, too many similar environmental storytelling elements in a game may reduce player environmental interest, even if there are variations. Providing similar gameplay rewards for discovering such environmental aspects may also reduce environmental interest, as there is a lack of anticipation for the next environmental setup players come across. A larger team with a higher budget may create more custom assets that can fit specific environments or even gameplay beats.

Supported By:
[Appendix H (Row 15-19,58-59,75-76)]
[Appendix I (Row 9)]
[Appendix J (Row 24-25,58-62)]

Audio

Audio is an integral part of a game that contributes to the overall experience. It can be used to make the game more immersive, evoke emotions and add to the tension.



Speech

Speech and dialogues can be used as a tool to either highlight or enhance an area of interest or narrative.

1. Companion's dialogue can be used to guide the player's attention to specific areas.
2. Use NPC to NPC dialogue interaction to expand on the narrative in the area.

Companions can be used as the connection between the player and the environment. Making use of the dialogue of a curious companion can help the player be more invested in the world around them. Companions can also point out areas of interest, which is a less intrusive way of highlighting.

Having NPC's interacting with each other in an area brings life into an area, and can be used as a medium to either set up smaller environmental narratives or to fuel the main narrative. Audio logs may also provide insight into deeper levels of storytelling or characterization, or foreshadow narrative elements.

Speech is often spatial, and can be located within the game environment. Our game analysis revealed several instances of this, which was used to draw the player's attention to a certain area, or even act as bait.

One practitioner discussed the use of speech in Morrowind to aid the player in navigation from one area towards another by stating wayfinding elements, similar to how one might ask for directions in real life. Without the use of a map, this type of verbal wayfinding encourages the player to be deeply aware of the environment, encouraging them to explore and potentially find more subtle environmental storytelling.

Supported By:
[Appendix F (Row 16-17,77,103,136,177-180,217-219)]
[Appendix I (Row 65,71-75)]

Figure 53: The Elder Scroll: Skyrim [15] [35], if the player is in the area, they can hear the NPC's interacting and get to learn about the history and lore of the world. So powerful is Heimskr's speech that even the player may convert to the worship of Talos, providing greater context to the statues and amulets within the world. [5]

[5] PRAISE TALOS

SFX

Sound effects help give feedback to players, increase immersion and can be used as tools to attract the player's attention to a direction of interest.

1. Use audio cues to attract the player's attention to a specific area.
2. Audio Logs can be a more effective than journals in terms of storytelling.

Audio cues can be used as leads to attract player attention or communicate key points or indicate success, giving the player a higher feeling of satisfaction on picking up on the lead due to how subtle and time boxed audio cues tend to be. Practitioners discussed the use of audio cues and music to highlight moments through contrast of the environment.

Practitioners further highlighted how audio logs should generally be used sparingly and at the right moments to maintain player interest. The player will be more interested in audio logs if they are about a character they are previously introduced to, as players often care more about characters. Types of players also need to be considered. Some may stop to listen to the logs - these players need to feel that they are back in action when done, while other players will ignore it and just move on. It should be noted that while audio logs shouldn't be too distracting from other gameplay aspects, the inverse applies as well - other gameplay aspects shouldn't be too distracting for audio logs either.

Supported By:
[Appendix F (Row 16-17,77,103,136,177-180,217-219)]
[Appendix H (Row 55-56)]
[Appendix I (Row 65,69-75)]
[Appendix J (Row 67)]

Music / Soundtrack

Music is a powerful tool that can be used to elevate the narrative and the theme of a scene.

1. Use music to evoke player emotions.
2. Re-using the same soundtrack with a shift in the melody can convey different messages to the player.
3. Re-using the same soundtrack in multiple instances in the game can be used to tie these instances together.
4. Use silence to your advantage, by removing stimuli the player will start seeking stimulation and head toward a more interesting location.

Music has the ability to evoke powerful emotional responses such as chills and thrills in listeners [97]. On the other end of the spectrum, the absence of music can be used to create a moment of tension or set an eerie tone. Designers can also use the silence and lack of stimuli to gravitate the player toward another more interesting path.

During interviews, practitioners talked about different uses of soundtracks to support environmental storytelling. If a soundtrack is used in the earlier stages of the game, it can be then

re-used as a throwback to that moment in later stages of the game, while changing it slightly will allow the player to read between the lines and interpret a different message from it than what it originally conveyed. The use of music to create associations between areas through variations in music. This could tell underlying themes and stories of the environment.

Diegetic and spatial audio can further contextualize an area, providing hints to the history of the area. Practitioners also mentioned the use of diegetic music to influence mood, set anticipations, support player actions, indicate time periods, and create memorable beats. These emotions can contrast with player actions, which may tell underlying stories and cause players to question their actions, as one practitioner alluded to using Shadow of the Colossus[66] and Journey as examples.

Supported By:
[Appendix F (Row 194-195)]
[Appendix I (Row 66-70)]
[Appendix J (Row 1-6,11-12,53,55,63-67)]

---

8 Discussion

In this chapter, we will discuss our approach in answering our RQ and our way of working. We will also present our opinions on the results of the project, and the artifacts that were created along the way. Finally, we will discuss the ethical issues stemming from these results along with the future work which can be built on top of this project.

8.1 Methodology Discussion

Throughout our thesis project, we had many problems encountered and other moments that were very beneficial to our thesis. During our early work on the project, the researchers learned that they have an extremely different way of thinking and reasoning, that lead to many misunderstandings, bad communication and lengthy time consuming discussions. But as we continued to work together, and after multiple iterations of improving our communication, we started seeing the potential of having different perspectives and used that to our advantage giving us a wider view on the topics of work. We also "weaponized" our ability to have a discussions and used it to filter out many RoTs that were not relevant to environmental storytelling from the list further narrowing the scope of our work. Due to our wide scope that was set up in the beginning of the project, we encountered many cases where we felt short on time but we managed to be flexible and either rescheduled, removed or changed tasks which allowed us to fulfil our set goals within the deadline.
The highlight of our project that helped expand our scope and allowed us to make our RoTs was the interviews with the practitioners. The focus group and individual interviews gave us an insight on how games and environmental storytelling are made within the industry, and made us aware of many used methods and techniques that cannot be found in research papers.

If we were to do this thesis again, there are multiple things we would change. First and foremost, we would start by narrowing our scope down to only RPGs in games, that would've probably given us higher quality results due to them being focused on one area instead of spread thin across multiple like ours does. We also would've followed the Grounded Theory method of not conducting any literature research until the end of the project. By the end of the project we learned that the results that we gathered lacks validity, and that was due to the limited time available and lack of knowledge which lead to poor planning. Conducting interviews during our prestudy phase instead of literature research would have given us pointers that would've allowed us to gather more references for our results increasing validity.

For students reading this and are planning on doing a similar project or thesis, we strongly recommend investigating what others consider best practice for creating guidelines, RoTs or hints early and what define each of them. We also recommend interviewing practitioners in the field you are researching at the beginning of the project, that will allow for a narrowed scope of research and will give pointers on what exactly to search for. After interviewing and researching consider moving on to testing the data yourself, playing games and using the RoTs to analyse them in our case, that will allow for a deeper understanding of how they are used in practice. The set of rules that you want to create should be iteratively improved after each key phase of the project starting from after the interview.

8.2 Results Discussion

Over the course of the project, the vision of the results gradually changed as a result of time constraints, obtained knowledge, and presentation. While our main goal remained the same - to present considerations to attract players towards environmental storytelling, there was much discussion surrounding how the results should be. Our initial vision of the results were to produce a framework of concepts and their relationships affecting PEA through a grounded theory approach, along with a list of guidelines for PEA as the central knowledge contribution. Our final results

had a slightly larger focus on the RoTs, and a much lower focus on the assumption of PEA but rather on environmental storytelling in general. Our framework, which became the theory with categorized codes, was much broader, containing a combination of level and game design concepts. Our final knowledge contribution uses the grounded theory to produce multiple RoTs within each category and concept. The soft evaluation feedback could have also been better integrated, given more time.

Even after the research was conducted and the results were produced throughout the project, the problem presented in the beginning of this thesis about making the players interested in environmental storytelling remains a wicked problem. We have learned that even with our results, there are a lot of intricacies and interconnectedness with the different concepts that we attempted to highlight in our result section. Even the RoTs themselves are very context dependent based on the game type, genre and constraints that are presented in the design and production phase of the game. That means that even with our attempt to isolate the fields into concept and highlighting how they would contribute to environmental storytelling, there is still no one true answer to our research question that we could give the users of our RoTs. It is a collection of the concepts presented working together to increase the chances of the player noticing and getting more invested in the environmental storytelling elements of a game.

8.2.1 Time Constraints

As shown in our initial timeline and subsequent time plan changes, we constantly had to reduce our scope for the project due to time and resource constraints. As a result, decisions were made to cut down and prioritize activities, reducing the confidence and completeness of our results.

Our results contains inconsistent referencing styles, with some concepts having integrated references while others have them as a list at the end. We made the mistake of not referencing our concepts while we were writing them in the results, which led to us having to add the references during our report writing phase. As a result, it took more time to add the references, reflected in the referencing format in our results. In certain sections in the results we referenced our statement properly by adding references next to relevant statements, while in others we opted for a more generalised referencing by using a "**Supported By**" statement at the end of section. This method of referencing isn't very effective since the reader will not know what statement is supported by which reference, especially since we do not talk about how the reference supports the concept in detail, but it was more time efficient which was something we had to take into consideration.

The decision to not perform stimulated recall meant that we had no user feedback to understand the influence of PEA techniques in a more practical setting. Additionally, our reduction from four game analysis iterations to one provided a less holistic view for the RoTs. As we obtained a plethora of new knowledge after the practitioner interviews, another game analysis iteration afterwards could have generated more relevant and interesting codes in a new perspective. Finally, we did not perform open coding on our literature study nor the soft evaluation, which could have provided a more complete theory.

While we acknowledge that these activities are important to the contribution of a stronger result, we believe that our decision to focus on the practitioner interviews had a larger impact on the practicality of our results, especially since the target audience of the RoTs are designers and developers. Furthermore, it provided a more grounded understanding on the perspective of production, which is essential when developing environmental storytelling.

8.2.2 Obtained Knowledge

As we gathered more data and performed more open coding, the knowledge we obtained began to expand the scope. Categories such as *Player Subconsciousness*, *Player Behaviour*, and *Storytelling* were some categories which were greatly expanded by the practitioner interviews. As our time gradually seeped away, this was particularly problematic as it was difficult to cut away irrelevant knowledge - the line between what knowledge was relevant to our RQ or not was difficult to discern - our discussions often centered around how certain concepts increased immersion, which would cause a chain reaction to attract players towards environmental storytelling. It could be argued that nearly everything in a game affected immersion, and as such, much of the gathered data remained in the final results in some form.

Rather than a list of guidelines, the larger scope made it increasingly difficult to synthesize results taking into account the practicality of the results. To this end, rather than a list of guidelines of each concept, we chose to also include Rules of Thumb to categories as well as concepts. We argue that this allows designers to quickly find RoTs they are interested in as well as provide a much clearer structure to the overall results. Furthermore, more general RoTs pertaining to the entire category could be included in each category, increasing clarity.

8.2.3 Presentation of Results

Our results group each concept under a single category, which we deemed most appropriate for a report. One issue with presenting the results in such a format is the loss of fidelity[6]. As Figure 57 shows, many concepts belong to multiple categories due to their close relation to them. Our final results does not reflect this, as we believe it is better to maintain clarity at the cost of accuracy. For concepts that belonged to multiple categories, we tried to assign them to categories with higher relevance in terms of the RoTs or through meaning.

In reality, we encountered the issue of one concept relating to many categories during the initial code categorization process. We had the impression that the traditional grounded theory approach uses a more rigid tree structure when categorizing codes, assuming that codes with commonality are naturally grouped together into a single category. As such, we encountered many roadblocks when doing so, eventually deciding that a concept can belong to multiple categories, with the rule that every level of the grounded theory tree can connect to one layer above and below. The grounded theory thus allowed us to present our thoughts in an accurate method, but the Rules of Thumb provided a more readable and understandable interface.

Another issue with the presentation of results is the formatting and medium of the results impacting the practicality of it. The lack of video and audio integration, which could better communicate examples and observations, could not be used due to inherent limitations. Furthermore, links are not intuitive and directly integrated into the results, requiring the reader to travel back and forth to the reference section. Finally, although we acknowledge the importance of academic grounding of the results through references, we argue that it reduces the readability of the results. As such, an online website could have been better to present the results, but would have required more effort to implement.

8.2.4 Soft Evaluation Feedback

The practitioners provided valuable feedback during the soft evaluation, some of which we were unable to integrate into the final results due to time constraints and lack of knowledge. One particular aspect which all participants criticized were the lack of reference images providing examples or descriptions of the concept or category. The suggestions included:

[6] One might go as far as to say this is cheating. Or lying.

- Provide examples **outside of games**, such as films, theatre, and books. Show the differences between techniques used to enable the concept outside and within games.
- Provide both **good and bad examples**, discussing how the concept was badly done in one game and well done in another.
- Provide examples **in sketches**, drawings, and level layouts.

For the final suggestion, we believe that on a higher level, the practitioner meant to provide examples tailored to practitioners within the concept's domain use to communicate the core, rough ideas on a daily basis. For example, audio designers may communicate with chord progressions or audio files containing motifs.

The overall emphasis on additional visual examples by all participants seem to point towards how practitioners on all skill levels tend to use case studies and visual examples to learn, get inspiration, or to use as points of discussion in contrast to reading text describing the use of each concept. This is supported by one practitioner mentioning that they play through, compare, and analyze games in order to obtain inspiration or understand how aspects of a game is implemented.

While we highly agree with these suggestions, we quickly encountered the issue of the lack of knowledge to fulfill these suggestions. More specifically, we are not highly aware of neither good nor bad examples for certain concepts, both inside and outside of games. We are unsure of where to find sketches which represented the concepts we presented. Our lack of knowledge and experience further creates an issue of not knowing how practitioners from different domains communicate with each other within the industry. Finally, we did not want to present unsupported information. We believe that finding more concrete examples for each concept will greatly increase the practicality of the results for future work.

The feedback gathered from the soft evaluation helped us improve our Rules of Thumb, but the data gathered is still in a recording format. Due to time limitation, we did not synthesise the recording into raw data and observations the same way we did the interviews. That lead to us not being able to reference that data in our results section which could've been used to increase the validity of our data.

8.3 Generalizability and Validity

While our focus is on the environmental storytelling of RPGs generally within video games, we believe many of the principles and concepts to attract players to environmental storytelling can be generalized across different types of media and entertainment. This has been alluded to by several practitioners during interviews, as they used movies as examples to explain certain concepts. Our prestudy further supports this, as some GDC presentations similarly used films and books as examples to bring their point across. We believe that environmental storytelling can take many forms, depending on the media format. For example, while movies have a strong, directed view of the scene, the environment is still presented as the background. Books use words to describe their worlds, with different phrases having subtle connotations which readers may pick up. Real life may present interesting environments to people. However, we believe the techniques to apply each concept differs from format to format, which may limit the use of these RoTs for other types of media.

Our validity has been impacted in multiple ways. Our reduced scope removed multiple activities which would have increased our validity, such as performing stimulated recall on users. Our game analysis is inherently biased, as we noticed how both researchers noticed distinctly different aspects of the environment. The low number of practitioners for the interviews and soft evaluations also cannot provide a complete view of how the industry applies certain concepts. Finally, while we had a soft evaluation, it was not a summative evaluation, which would have given our results

higher validity.

8.4 Ethics

One issue we have with consent during interviews were errors in phrasing within the consent formC. Our first interviews mentioned that the data will be "confidential", whereas it was meant to be "anonymous". To rectify this, we contacted the impacted practitioners afterwards to notify them of the change with all of them providing re-consent.

One practitioner during the interviews described game designers as "manipulators", who "make players feel like they are in charge, but they should never be in charge - only the illusion that they are" [Appendix J(Row 69-70)]. Many of the techniques and concepts involve manipulating, influencing towards feeling or acting a certain method, which may sometimes be intense or confronting. The results have further strengthened this ethical issue, as concepts such as fulfilling or subverting player expectations discuss in detail.

Behavioural change in games can influence the player's behaviour in reality, which we suspect may be more probable the more subtle it is, similar to how nudges in the Nudging Theory or Triggers in the Hook Model work. Without explicit consent by the players, the deceptive qualities of the techniques used, particularly those which take advantage of subconscious or learned expectations of players, can be especially harmful if used with malicious intentions. One example of such harm is to create addictive behaviour for players in games.

Players who are aware of the techniques used to attract their attention may have their immersion broken, or choose to rebel against the intended designer behaviour. This may cause applied concepts to backfire or have weaker effects depending on the specific implementation of them.

One term that was discussed during interviews was the creation of a player contract, formed between the developers and players, with players agreeing to partake in the experience developers have created expectations of. If expectations are broken, players may feel cheated, resulting in a loss of trust or hatred for the developers.

Finally, the results presented here are context dependent due to the process and artifacts used, and lean towards conventional design, which may stifle creativity. The practitioners we interviewed often discussed concepts through the perspective of conventional, narrative driven games, aimed towards a certain target audience. Our research has shown that not all game designers agree on certain aspects or best practices. One example is Bennett Foddy's argument for creating unreadable levels to encourage route planning and trial and error. Yet, many practitioners discuss the importance of readability and clarity. We have not delved into the arguments between the conventional and unconventional for many of the concepts, which may give our results a less holistic view.

8.5 Future Work

Our work is by no mean close to done or being perfected, our RoTs needs more validation to be considered useful. If we are to continue working on this project in the future, we would want to interview more practitioners from different field of work in the industry and test our results with them by getting them to evaluate it to increase the validity of the data we have. During our soft evaluation phase, some practitioners asked for examples of comparisons of how these concepts are used. Adding those examples requires us to conduct more game analysis instances and noting down and take screenshots of the different ways these concepts are used in them. Some concepts that we have brought up in our RoTs originated from other medias like cinematography, photography

and architecture. For that reason, we want to include examples from those different medias to the RoTs.

9 Conclusion

This project set out to explore and investigate different aspects and techniques to draw players towards environmental storytelling, establishing a assumption that players who were more conscious of their surroundings would notice more environmental storytelling elements. Our Research Question was thus:

"What should be considered when designing for supporting Player Environmental Awareness?"

Our research activities, particularly our interviews with practitioners, revealed this assumption is incorrect - it would be highly dependent on many other factors working together, and we believe it would be misleading to continue this line of thought. Our goal to research techniques to attract players towards environmental storytelling did not change, however. As such, we have modified our research question to:

"What should be considered when designing for supporting Environmental Storytelling?"

To answer this question, we followed a grounded theory inspired approach, setting out to create guidelines for designers. We analyzed two games, interviewed four industry practitioners, and performed a soft evaluation with three practitioners. We also performed open coding on the games and the interviews, resulting in a list of codes grouped into different concepts and categories and their relationships, forming a tree structure. From the lowest level, our grounded theory contained 5 levels: Concepts, Categories, Themes, Core Categories, and Theories.

With the goal of creating guidelines, we diverged from creating a full grounded theory after categorizing the codes. We encountered many limitations while creating guidelines, causing us to redefine our results as Rules of Thumb. Our main issues we attempted to solve was the freedom to use both normative and descriptive phrasing, involve several concepts and categories for one RoT, and connote the lower validity of our results due to the lack of a summative evaluation. In the end, we chose to create RoTs, using our basis for the Grounded Theory as a foundation. Specifically, we created RoTs for the two lowest levels of our categorized codes, the categories and concepts, to increase clarity and facilitate usage.

The Rules of Thumb serve as the main answer to the project's research question, providing practical suggestions for designers to consider, or to serve as inspiration or points of discussion. The grounded theory also serves as a supplementary answer, especially due to the fact that the relationships between the concepts and categories are fully described. The RoTs were also derived from the grounded theory, and as such enhances the reasoning and grounding of the RoTs.

We present our answer to the RQ using Rules of Thumb, with a foundation based on the Grounded Theory. Compared to our initial assumptions, we found that a much larger aspect affects attracting players towards environmental storytelling, and even with our research and results the true answer to the RQ remains a wicked problem. One particular topic practitioners emphasized was the use of player investment and immersion to encourage players to explore environments and interpret the embedded storytelling within. As games often strive to increase player immersion, concepts such as player psychology, pacing, and player expectations became relevant, significantly expanding the scope of our results. We identified 110 Rules of Thumb, grouped under the 46 concepts and 15 categories established during the categorization of codes, shown in Figure 54.

These categories are related to core categories of Game Design, Level Design, Sound Design, and Player Value.

Future work include a number of feedback obtained from the soft evaluation sessions which we have acknowledged, but have not implemented due to time constraints and the lack of knowledge. These include providing more visual examples from different types of media, both good and bad examples, and low fidelity examples relevant to the practitioners of associated disciplines. Interviews with more practitioners from different disciplines, such as those from audio design or producers, to obtain their perspective would provide a more holistic view and greater validity to the results. A summative evaluation with practitioners would also be interesting, especially with a range of different cultures, different studio sizes, or studios with different genre proficiencies.

Accessibility
Target Audience
Player Disability

Accomplishment
Loot
Rewards

Audio
Speech
Music / Soundtrack
SFX

Characters
Characterization (Character Development)

Environment Art
Environmental Clarity
Texturing
Props

Eye Catchers
Contrast
Movement
Shot Composition
Lighting
Colour

Game Mode
Multiplayer

Human-Computer Interaction
UI

Navigation
Pathing
Signposting
Prospect & Refuge
Landmark
Leading Lines

Player Behaviour
Player Environmental Interest
Player Expectations
Player Discomfort

Player-Game Interaction
Player Choice
Mechanics
Exploration

Player Subconsciousness
Player Intuition
Psychology
Emotions

Production
Development Techniques
Telemetry

Spatial Composition
Architectural Techniques
Level Layout
Layers of Subtlety

Storytelling
Narrative
Theme
Atmosphere
Pacing

Figure 54: The identified 15 categories and 46 concepts identified from which the 110 Rules of Thumb were derived. One concept can belong to many categories.

References

[1] 11 Bit Studios, *This War of Mine*, 2014. [Online]. Available: https://www.thiswarofmine.com/.

[2] 2K Boston and 2K Australia, *BioShock 1*, [Digital], 2007.

[3] E. Aarseth, "Playing research: Methodological approaches to game analysis," in *Proceedings of the digital arts and culture conference*, 2003, pp. 28–29.

[4] AlanBeckerTutorials. "2. anticipation - 12 principles of animation." (2015), [Online]. Available: https://www.youtube.com/watch?v=F8OtE60T8yU. Accessed 26 May 2022.

[5] Alex. "Level Design In Pursuit of Better Levels." (), [Online]. Available: https://docs.google.com/document/d/1fAlf2MwEFTwePwzbP3try1H0aYa9kpVBHPBkyIq-caY/edit. Accessed 16 May 2022.

[6] V. Alves and L. Roque, "A pattern language for sound design in games," in *Proceedings of the 5th Audio Mostly Conference: A Conference on Interaction with Sound*, 2010, pp. 1–8.

[7] Andrew Yoder. "Environmental Storytelling and Gone Home." (), [Online]. Available: https://andrewyoderdesign.blog/2015/09/24/environmental-storytelling-and-gone-home/. Accessed 24 May 2022.

[8] Arkane Studios, *Prey*, [Digital], 2017.

[9] J. A. Bargh, A. Lee-Chai, K. Barndollar, P. M. Gollwitzer, and R. Trötschel, "The automated will: Nonconscious activation and pursuit of behavioral goals," *Personality and social psychology review : an official journal of the Society for Personality and Social Psychology, Inc*, vol. 81, 2001. DOI: 1014-27.

[10] R. Bartle, "Hearts, clubs, diamonds, spades: Players who suit muds," 1996. [Online]. Available: https://mud.co.uk/richard/hcds.htm.

[11] M. Bellard, "Environment design as spatial cinematography: Theory and practice," in *Game Developers Conference*, 2019.

[12] Bennett Foddy, *Getting Over It with Bennett Foddy*, [Digital], 2017.

[13] J. Beres. "What is prototyping and why is it important?" (2021), [Online]. Available: https://www.infragistics.com/community/blogs/b/jason_beres/posts/what-is-prototyping-and-why-is-it-important. Accessed: 17 February 2022.

[14] Bethesda Game, *Fallout 3*, [Digital], 2008.

[15] Bethesda Game Studios, *The Elder Scrolls V: Skyrim*, 2011. [Online]. Available: https://elderscrolls.bethesda.net/en/skyrim.

[16] Bethesda Softworks, *The Elder Scrolls*. [Online]. Available: https://elderscrolls.bethesda.net/en/.

[17] S. Bevensee, "Establishing a framework of environmental storytelling," 2014. [Online]. Available: https://projekter.aau.dk/projekter/files/198204907/ES_Report_1.0.pdf.

[18] S. Björk and J. Holopainen, "Games and design patterns," *The game design reader: A rules of play anthology*, pp. 410–437, 2005.

[19] D. Bordwell, K. Thompson, and J. Smith, *Film art: An introduction*. McGraw-Hill New York, 1993, vol. 7.

[20] B. Camburn, V. Viswanathan, J. Linsey, *et al.*, "Design prototyping methods: State of the art in strategies, techniques, and guidelines," *Design Science*, vol. 3, e13, 2017. DOI: 10.1017/dsj.2017.10.

[21] J. Cao. "12 colours and the emotions they evoke." (2021), [Online]. Available: https://www.creativebloq.com/web-design/12-colours-and-emotions-they-evoke-61515112. Accessed 23 May 2022.

[22] A. Caraban, E. Karapanos, D. Gonçalves, and P. Campos, "23 ways to nudge: A review of technology-mediated nudging in human-computer interaction," in *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. New York, NY, USA: Association for Computing Machinery, 2019, pp. 1–15, ISBN: 9781450359702. [Online]. Available: https://doi.org/10.1145/3290605.3300733.

[23] D. Carson, "Environmental storytelling: Creating immersive 3d worlds using lessons learned from the theme park industry," *Gamasutra. com*, vol. 1, 2000.
[24] CD Projekt Red, *The Witcher*. [Online]. Available: https://thewitcher.com/en.
[25] A. Cooper, R. Reimann, D. Cronin, and C. Noessel, *About face: the essentials of interaction design*. John Wiley & Sons, 2014.
[26] E. D., "What is player behavior?," 2020. [Online]. Available: https://www.universityxp.com/blog/2020/6/18/what-is-player-behavior.
[27] R. F. Dam and T. Y. Siang. "Design thinking: Get started with prototyping." (2021), [Online]. Available: https://www.interaction-design.org/literature/article/design-thinking-get-started-with-prototyping#:~:text=A%5C%20prototype%5C%20is%5C%20a%5C%20simple,or%5C%20possible%5C%20changes%5C%20in%5C%20direction.. Accessed: 17 February 2022.
[28] K. deLaplante. "Descriptive versus Normative Claims." (), [Online]. Available: https://criticalthinkeracademy.com/courses/45150/lectures/655333. Accessed 30 May 2022.
[29] N. P. Dempsey, "Stimulated recall interviews in ethnography," 2010. DOI: https://doi.org/10.1007/s11133-010-9157-x.
[30] C. Dictionary. "Character." (), [Online]. Available: https://dictionary.cambridge.org/dictionary/english/character. Accessed 16 May 2022.
[31] C. Dynamics, *Rise of the Tomb Raider*, [Digital], 2015.
[32] R. Edwards. "Gns and other matters of role playing theory." (2001, October), [Online]. Available: http://www.indie-rpgs.com/articles/3/. Accessed: 30 December 2021.
[33] Eidos-Montréal, *Deus Ex: Mankind Divided*, [Digital], 2016.
[34] ——, *Shadow of the Tomb Raider: Definitive Edition*, [Digital], 2018.
[35] ERIK PETROVICH. "Skyrim: The 15 Best NPC Quotes In The Game." (), [Online]. Available: https://gamerant.com/skyrim-best-npc-quotes/. Accessed 16 May 2022.
[36] A. Ernest, *Fundamentals of game design*. New Riders, 2008, vol. 3, pp. 82–83, ISBN: 978-0-321-92967-9.
[37] Extra Credits. "Accessibility - The Curb Cut Effect." (), [Online]. Available: https://www.youtube.com/watch?v=PJoax1Z1x4Y. Accessed 25 May 2022.
[38] N. Eyal, *Hooked: How to build habit-forming products*. Penguin, 2014.
[39] D. Fallman, "The interaction design research triangle of design practice, design studies, and design exploration," *Design issues*, vol. 24, no. 3, pp. 4–18, 2008.
[40] J. FAMULARO. "FIRE EMBLEM HEROES' IS A GACHA GAME – HERE'S WHAT THAT MEANS." (), [Online]. Available: https://www.inverse.com/article/27267-what-are-gacha-games-fire-emblem-heroes. Accessed 13 June 2022.
[41] C. Fernández-Vara, "Game spaces speak volumes: Indexical storytelling," 2011.
[42] B. Fogg, "A behavior model for persuasive design," in *Proceedings of the 4th International Conference on Persuasive Technology*, ser. Persuasive '09, Claremont, California, USA: Association for Computing Machinery, 2009, ISBN: 9781605583761. DOI: 10.1145/1541948.1541999. [Online]. Available: https://doi.org/10.1145/1541948.1541999.
[43] I. D. Foundation. "Gestalt principles." (), [Online]. Available: https://www.interaction-design.org/literature/topics/gestalt-principles. Accessed: 13 June 2022.
[44] ——, "What is prototyping." (), [Online]. Available: https://www.interaction-design.org/literature/topics/prototyping. Accessed: 17 February 2022.
[45] Frictional Games, *Amnesia: The Dark Descent*, [Digital], 2018.
[46] FromSoftware, *Dark Souls Prepare to Die Edition*, 2011. [Online]. Available: https://store.steampowered.com/app/211420/DARK_SOULS_Prepare_To_Die_Edition/.
[47] ——, *Sekiro: Shadows Die Twice*, [Digital], 2019.
[48] T. Fullerton, *Game design workshop: a playcentric approach to creating innovative games*. CRC press, 2014.

[49] Game Maker's Toolkit. "Improving Games for Those with Cognitive Disabilities — Designing for Disability." (), [Online]. Available: https://www.youtube.com/watch?v=ObhvacfIOg0. Accessed 25 May 2022.
[50] E. Games. "Unreal engine." (2008), [Online]. Available: https://www.unrealengine.com/en-US/. Accessed: 7 February 2022.
[51] G. M. Gaming. "Prey - Mimic Encounter." (2017), [Online]. Available: https://www.youtube.com/watch?v=GwELOsDipQE. Accessed 16 May 2022.
[52] W. Gaver, "What should we expect from research through design?" In *Proceedings of the SIGCHI conference on human factors in computing systems*, 2012, pp. 937–946.
[53] Gnomon. "The art of environment storytelling for video games - part two." (2017), [Online]. Available: https://youtu.be/Kr_uSTkBKtk?t=3604. Accessed: 18 February 2022.
[54] A. S. Gremillion. "Colors and emotions: How colors make you feel." (2019), [Online]. Available: https://99designs.com/blog/tips/how-color-impacts-emotions-and-behaviors/. Accessed 23 May 2022.
[55] Guerrilla Games, *Horizon Zero Dawn*, Feb. 28, 2017. [Online]. Available: https://www.guerrilla-games.com/games.
[56] "Guideline." (), [Online]. Available: https://dictionary.cambridge.org/dictionary/english/guideline. Accessed 30 May 2022.
[57] GYARI. "Abgm." (2015), [Online]. Available: https://www.youtube.com/watch?v=KYQ2fu8eixM. Accessed 25 May 2022.
[58] S.-F. H, "The player engagement process-an exploration of continuation desire in digital games," *In DiGRA Conference*, 2011.
[59] B. Hanington and B. Martin, *The pocket universal methods of design: 100 ways to research complex problems, develop innovative ideas and design effective solutions*. Rockport, 2017.
[60] A. R. Hevner, S. T. March, J. Park, and S. Ram, "Design science in information systems research," *MIS quarterly*, pp. 75–105, 2004.
[61] C. Hocking, "Ludonarrative dissonance in bioshock: The problem of what the game is about," *Well played*, vol. 1, pp. 255–260, 2009.
[62] B. Horton, J. Lynch, R. Olguin, and B. Recktenwald. "The art of environment storytelling for video games - part two," Youtube, Gnomon. (2017), [Online]. Available: https://youtu.be/Kr_uSTkBKtk?t=2692.
[63] R. Hunicke, M. LeBlanc, and R. Zubek, "Mda: A formal approach to game design and game research," in *Proceedings of the AAAI Workshop on Challenges in Game AI*, San Jose, CA, vol. 4, 2004, p. 1722.
[64] IGN, Claytonpetra. "Shinobi Shortcut Secret Doors." (2019), [Online]. Available: https://www.ign.com/wikis/sekiro-shadows-die-twice/Shinobi_Shortcut_Secret_Doors. Accessed 16 May 2022.
[65] IMDB. "Tomb Raider Franchise." (), [Online]. Available: https://www.imdb.com/search/keyword/?keywords=tomb-raider. Accessed: 18 February 2022.
[66] Japan Studio and Team Ico, *Shadow of The Colossus*, [Digital], 2005.
[67] H. Jenkins, "Game design as narrative architecture," *Computer*, vol. 44, no. 3, pp. 118–130, 2004.
[68] John Sweeney. "The Last of Us Part2." (2020), [Online]. Available: https://twitter.com/johnsweeney2147/status/1280646295837802496/. Accessed 16 May 2022.
[69] G. Kasavin, "Creating atmosphere in games," in *Conference audiovisual presentation presented at the GDC, GDC*, 2012.
[70] A. Kelly, "Think twice: Review of thinking, fast and slow by daniel kahneman (2011)," *Numeracy*, vol. 10, Jul. 2017. DOI: 10.5038/1936-4660.10.2.15.
[71] P. Lankoski, S. Björk, *et al.*, "Game research methods: An overview," 2015.
[72] P. Lankoski and J. Holopainen, "Game design research: An overview," *[Online], https://www.researchgate. net/publication/323748642 Game Design Research An Overview (Accessed: 26 June 2019)*, 2017.

[73] M. K. Lee, S. Kiesler, and J. Forlizzi, "Mining behavioral economics to design persuasive technology for healthy choices," in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ser. CHI '11, Vancouver, BC, Canada: Association for Computing Machinery, 2011, pp. 325–334, ISBN: 9781450302289. DOI: 10.1145/1978942.1978989. [Online]. Available: https://doi.org/10.1145/1978942.1978989.

[74] J. Linderoth, "Why gamers dont learn more," *DiGRA Nordic 2010 Proceedings*, 2010.

[75] C. Mauer, "Level design workshop: Rewarding exploration in "deus-ex: Mankind divided"," in *Game Developers Conference*, 2017. [Online]. Available: https://www.gdcvault.com/play/1024599/Level-Design-Workshop-Rewarding-Exploration, Accessed 30 December 2021.

[76] C. Maurer. " Rewarding Exploration in "Deus Ex: Mankind Divided"." (2017), [Online]. Available: https://youtu.be/-38BH95ERn0. Accessed 18 February 2022.

[77] Merriam Webster. "Character." (), [Online]. Available: https://www.merriam-webster.com/dictionary/characterization. Accessed 16 May 2022.

[78] ——, "characterization." (), [Online]. Available: https://www.merriam-webster.com/dictionary/characterization. Accessed 16 May 2022.

[79] Merriam-Webster. "Rule of Thumb." (), [Online]. Available: https://www.merriam-webster.com/dictionary/rule%5C%20of%5C%20thumb. Accessed 30 May 2022.

[80] B. Mishra, *Psychology: The Study of Human Behaviour*. PHI Learning Private Limited, 2008, ISBN: 9788120333376.

[81] MuffinMcFluffin. "Dunkirk Timeline." (), [Online]. Available: https://www.nolanfans.com/forums/viewtopic.php?f=45&p=1133353. Accessed 16 May 2022.

[82] Naughty Dog, *Uncharted 4 A Thief's End*, [Digital], 2016.

[83] Noémie Fompeyrine, *Paris's resilience journey*, [Online; accessed 16 May 2022]. [Online]. Available: https://resilientcitiesnetwork.org/networks/paris/.

[84] D. Norman, *The psychology of everyday things*. Basic Books, 1988.

[85] Obsidian Entertainment, *Fallout New Vegas*, [Digital], 2010.

[86] K. H. Organisation. "Fears and Phobias." (), [Online]. Available: https://kidshealth.org/en/teens/phobias.html#:~:text=Fear%5C%20helps%5C%20protect%5C%20us.,cautions%5C%20us%5C%20to%5C%20be%5C%20careful.. Accessed 25 May 2022.

[87] M. Piaskiewicz. "Composition in level design." (2014), [Online]. Available: http://level-design.org/?page_id=2274. Accessed 16 May 2022.

[88] J. Pitkänen, "Studying thoughts: Stimulated recall as a game research method," in *Game Research Methods*. Pittsburgh, PA, USA: ETC Press, 2015, pp. 117–132, ISBN: 9781312884731.

[89] J. Preece, H. Sharp, and Y. Rogers, *Interaction Design: Beyond Human-Computer Interaction*. Wiley, 2015, ISBN: 9781119066002. [Online]. Available: https://books.google.se/books?id=ZC1EDwAAQBAJ.

[90] V. Propp, *Morphology of the Folktale*. University of Texas Press, 2010.

[91] T. Pugh. "Level Design Tips and Tricks." (), [Online]. Available: https://www.gamedeveloper.com/design/level-design-tips-and-tricks. Accessed 16 May 2022.

[92] P. Ralhan, "Prototyping," *[Online], (Accessed: 16 February 2022)*, 12/18/2000. [Online]. Available: https://www.studocu.com/row/document/jomo-kenyatta-university-of-agriculture-and-technology/software-engineering/prototyping-lecture-notes-1/16331471.

[93] rec.games.frp.advocacy. "The threefold model." (2008), [Online]. Available: https://www.darkshire.net/jhkim/rpg/theory/threefold/. Accessed: 4 February 2022.

[94] H. W. Rittel and M. M. Webber, "Dilemmas in a general theory of planning," *Policy sciences*, vol. 4, no. 2, pp. 155–169, 1973.

[95] A. Romano. "Why we've been arguing about Lara Croft for two decades." (2018), [Online]. Available: https://www.vox.com/culture/2018/3/17/17128344/lara-croft-tomb-raider-history-controversy-breasts. Accessed: 18 February 2022.

[96] A. K. Shah and D. M. Oppenheimer, "Heuristics made easy: An effort-reduction framework," *Psychological Bulletin*, 2008. DOI: https://doi.org/10.1037/0033-2909.134.2.207.

[97] Shahram Heshmat Ph.D. "Music, Emotion, and Well-Being How does music affect the way we think, feel, and behave?" (), [Online]. Available: https://www.psychologytoday.com/us/blog/science-choice/201908/music-emotion-and-well-being. Accessed 16 May 2022.

[98] D. R. Simmons, "Colour and emotion," *New directions in colour studies*, pp. 395–414, 2011.

[99] H. Smith and M. Worsh. ""What Happened Here?" Environmental Storytelling." (2010), [Online]. Available: https://www.gdcvault.com/play/1012647/What-Happened-Here-Environmental. Accessed 18 February 2022.

[100] H. Smith and M. Worch, "What happened here? environmental storytelling," in *Game Developers Conference*, 2010, pp. 9–13.

[101] C. J. Soto and J. J. Jackson, "Five-factor model of personality," 2020. DOI: 10.1093/OBO/9780199828340-0120. [Online]. Available: https://www.oxfordbibliographies.com/view/document/obo-9780199828340/obo-9780199828340-0120.xml#:~:text=The%5C%20five%5C%2Dfactor%5C%20model%5C%20of,Experience%5C%20(sometimes%5C%20named%5C%20Intellect)..

[102] F. Strack and R. Deutsch, "Reflective and impulsive determinants of social behavior," *Personality and social psychology review : an official journal of the Society for Personality and Social Psychology, Inc*, vol. 8, pp. 220–47, Feb. 2004. DOI: 10.1207/s15327957pspr0803_1.

[103] B. Taber. "The Contract." (), [Online]. Available: https://www.gamedeveloper.com/design/the-contract. Accessed 16 May 2022.

[104] U. Technologies. "Unity." (2020), [Online]. Available: https://unity.com/. Accessed: 7 February 2022.

[105] K. S. Tekinbas and E. Zimmerman, *Rules of play: Game design fundamentals*. MIT press, 2003.

[106] R. H. Thaler and C. R. Sunstein, *Nudge: Improving decisions about health, wealth, and happiness*. Penguin, 2008, ISBN: 9780143115267.

[107] Thatgamecompany and Santa Monica Studio, *Journey*, [Digital], 2012.

[108] The Last Of Us, *The Witness*, [Digital], 2013.

[109] Thekla Inc., *The Witness*, [Digital], 2016.

[110] E. Trainor-Fogleman. "Unity vs unreal engine: Game engine comparison guide for 2021." (2021), [Online]. Available: https://www.evercast.us/blog/unity-vs-unreal-engine#:~:text=The%5C%20Main%5C%20Differences%5C%20Between%5C%20Unity%5C%20and%5C%20Unreal%5C%20Engine,-The%5C%20first%5C%20key&text=native%5C%20programming%5C%20language.-,Unity%5C%20uses%5C%20C%5C%23%5C%20in%5C%20both%5C%20the%5C%20Unity%5C%20editor%5C%20and%5C%20the,Epic%5C%20products)%5C%20and%5C%20C%5C%2B%5C%2B.. Accessed: 17 February 2022.

[111] Treyarch, *Call of Duty: Black Ops 4*, [Digital], 2018.

[112] Ubisoft, *Assassin's Creed*, [Digital], 2016.

[113] Usability.gov. "Prototyping." (), [Online]. Available: https://www.usability.gov/how-to-and-tools/methods/prototyping.html#:~:text=Low%5C%2Dfidelity%5C%20prototypes%5C%20are%5C%20often,sketches%5C%20are%5C%20quicker%5C%20to%5C%20create.&text=High%5C%2Dfidelity%5C%20prototypes%5C%20are%5C%20computer,mouse%5C%2Dkeyboard)%5C%20user%5C%20interactions.. Accessed: 17 February 2022.

[114] G. Valkenburg. "Normative and descriptive statements." (), [Online]. Available: http://www.govertvalkenburg.net/node/170. Accessed 30 May 2022.

[115] J. Vandenberghe, "Applying the 5 domains of play: Acting like players," *GDC*, 2013. [Online]. Available: https://www.youtube.com/watch?v=6uX6ye66NK0.

[116] ——, "The five domains of play," *GGC*, 2012. [Online]. Available: https://www.youtube.com/watch?v=cnZ9Fx_tsE8.

[117] B. Vredenberg, "Signposting, mise-en-scene, and environmental storytelling - understanding signposting as part of the embedded narrative in environmental storytelling,"
[118] "What are Design Guidelines?" (), [Online]. Available: https://www.interaction-design.org/literature/topics/design-guidelines. Accessed 30 May 2022.
[119] W. Williams, "We are not heroes: Contextualizing violence through narrative," in *Game Developers Conference*, 2013. [Online]. Available: https://www.gdcvault.com/play/1017980/We-Are-Not-Heroes-Contextualizing, Accessed 24 May 2022.
[120] Yager Development, *Spec Ops: The Line*, [Digital], 2012.
[121] R. Yang and A. Yoder. "The level design book." (), [Online]. Available: https://book.leveldesignbook.com/process/blockout/massing/composition#spatial-composition. Accessed: 23 May 2022.
[122] ——, "The level design book." (), [Online]. Available: https://book.leveldesignbook.com/process/env-art#concept-art. Accessed: 23 May 2022.
[123] ——, "The level design book." (), [Online]. Available: https://book.leveldesignbook.com/process/layout. Accessed: 23 May 2022.
[124] ——, "The level design book." (), [Online]. Available: https://book.leveldesignbook.com/process/preproduction#experience-goals. Accessed: 23 May 2022.
[125] ——, "The level design book." (), [Online]. Available: https://book.leveldesignbook.com/process/preproduction/pacing. Accessed: 23 May 2022.
[126] ——, "The level design book." (), [Online]. Available: https://book.leveldesignbook.com/process/preproduction. Accessed: 23 May 2022.
[127] J. Zimmerman, J. Forlizzi, and S. Evenson, "Research through design as a method for interaction design research in hci," in *Proceedings of the SIGCHI conference on Human factors in computing systems*, 2007, pp. 493–502.

Appendix A The 3 Triggers of Nudging

Facilitator (Lack of ability)	Description
Defaults	Set a default setting
Opt-Out	Make the default choice "Accepted" a but still give the user the option to opt-out
Positioning	Sorting choices in a list, ascending or descending order, alters the users view on the product while grid allowed users to search in a non-systematic way
Hiding	Making undesirable options harder to reach
Suggesting alternatives	Offer alternatives to choices

Table 2: Nudging Facilitators

Signal (Trigger actions)	Description
Ambient feedback	Using the ambience to prompt actions from users, such as emulating rippling water to motivate passersby to drink more water.
Create friction	Less intrusive way of nudging than "Just-in-Time". Instead of having an interruption that requires immediate attention, friction aims to do that more sneakily. Example: When unlocking the car, the bike key drops to prompt the user to take the bike instead.
Instigating empathy	Using user's empathy toward something to prompt an action.
Just-in-time prompts	An interrupt that draws the user's attention to a behavior at appropriate times.

Table 3: Nudging Signals

Spark (Lack of motivation)	Description
Multiple viewpoints	Due to confirmation bias, users tend to seek information to match their beliefs. That leads them to pay less attention or reject information that contradicts their reasoning. This nudge group the searched information with the other viewpoints for comparison.
Remind the consequences	Nudges in this category prompt individuals to reflect on the consequences of their actions.
Public commitment	A "Be true to our word" method whereby verbally or physically confirming a choice will make users more committed to it.
Reduce the distance	Reducing psychological distance, prompts users to make a decision they were pushing for later. Example: Getting a flood insurance by simulating a flood experience.
Raising visibility of user's actions	Spotlight effect, shine a light on a user's action to make them more noticeable to them and others.
Placebos	Manipulate the user by altering the game to make the user believe that something good is happening. Example: In "Wrong Lane Chase" the stage background gets slowed down to give the illusion of the obstacles slowing down. That increased player performance and diminished player's stress.
Reciprocity	Most likely inapplicable in this context.
Adding inferior alternatives	Having an inferior (decoy) alternative next to an object will make said object more preferable.
Throttling mindless activity	Add a time buffer to allow the user to reverse their action in a scenario where the user are doing a mindless activity.
Make resources scarce	The scarcer a resource is, the more wanted it becomes.
Biasing the memory of the experience	The peak-end rule suggests that our memory of past experiences is shaped by two moments: their most intense and the last episode.
Deceptive visualizations	Use of optical illusions to alter player perception and judgment. Example: Adjusting the size of the bar graph makes players think they have higher scores.
Enabling social comparisons	The herd instinct bias refers to our tendency to replicate others' actions, even if this implies overriding one's own beliefs.

Table 4: Nudging Sparks

Appendix B Interview Guide

Guide

Introduction

1. Introduce ourselves
    a. University students
2. Purpose - Goal of study
    a. The study will be concerned with various aspects of environmental storytelling.
3. What we are expecting from them, what their role in the study is
    a. The purpose of this interview is to investigate the use of environmental storytelling within the game industry.
4. Time it will take
5. Introduce themselves - what is their company, job, responsibilities
6. **Before we start,** informed consent
    a. Read consent form
    b. If physical, sign consent form, begin recording
    c. If online,
        i. give summary of consent,
        ii. begin recording,
        iii. and then read actual consent form, let them voice consent

Warm Up Questions

- "Before we start we are going to use this chance to get to know each other better"
- Who are you,
- What have you studied,
- What have you worked in/on, how long,
- Hobbies
- Favourite games, media
    - Why is it your favourite?
    - "Oh so you mean you like that X genre"

Figure 55: Practitioner Interview Guide

Substantive Questions

General Structure

7. **Personal** experience
    a. Them as players:
        i. Importance of ES when they play
        ii. What games do they like - Why?
        iii. Game Types
        iv. Why do they like the game industry - why start working here?
        v. “Is it nostalgia or was there something that got you hooked?”
    b. Lead into their job
8. **Practical** questions - professional experience
    a. Have you worked with ES?
    b. What did you work on
    c. Challenges
    d. Inspirations
    e. when use - reasons to use ES
    f. Perception of importance in ES
9. **Industry**: How they see others working with it, **as a whole**
    a. How they see ES in game industry as whole - other interesting things, other genres, opportunities they would like to investigate
    b. Techniques that they are aware of, or others use
    c. Where or what domain is the technique from?

Things to remember:

- Follow up questions to touch upon subtopics
- Remember to touch upon
- If they mention books, other techniques, follow up

Figure 55: Practitioner Interview Guide (Continued)

Topics

- Creation of Visual Environmental Storytelling Setups
    - **"How do you approach creating environmental storytelling aspects?"**
    - Definition of ES
    - Considerations when working on ES?
    - Memorable times when making environmental storytelling
    - Staging, Mise en scene
        - Might not know terms, can be called prop placement, composition
    - What kind of techniques do they like to use?
    - Rule of thumb
- **Manipulating the Player's attention**
    - **"Do you consider ways to draw the player's attention towards ES parts or aspects? How?"**
    - Spatial Cinematography
        - Saliency and Affordances
            - Saliency = Attracting player's attention
            - Affordance = Where Players can go
        - Prospect and Refuge
    - Eye catchers
    - Psychology - Altering behaviour to train player attention
        - Nudging theory
        - Hook model
    - Ethics
- How their **target audience** affects creation of ES
    - "**Do you think about the players when creating ES?"**
    - How they choose target audience
    - **Player Behaviour types**
        - How different players affect techniques applied
- **Uses** of Environmental Storytelling
    - "**You have mentioned that you use environmental storytelling for <insert stuff they said> (subtle and builds atmosphere). What other ways have you used it, if any?**
    - Navigation
        - Landmarks
        - Contrast
        - Signposting
    - Telegraphing
        - Breadcrumbs
        - Tells player what to expect
        - Foreshadowing
- **Sound** ES
    - **"Have you considered how sound impacts areas with environmental storytelling? If you do consider sound, how?**
    - Spatial sound
    - How is sound designed to attract attention?
    - How other companies work, can follow up with this

Figure 55: Practitioner Interview Guide (Continued)

- How **Gameplay / Mechanics** affects how environmental storytelling is made and how its noticed
    - **“Does the gameplay and mechanics affect how you make environmental storytelling pieces?”**
    - Considering genre (fast paced/ slow paced area)
    - Mechanics + dynamics
    - View (1st person, 3rd person, side scrolling)
    - 2D vs 3D games
    - How Gameplay / Mechanics affect Techniques and ES creation
- Actually Interpreting narrative in ES setups
    - No need to focus/highlight on this part as this is an assumption of the entire thesis

- **Difficulties in creating ES in real life scenarios**
    - **“Were there any challenges when creating these ES scenarios?”**
        - Challenges in storytelling in 2d games
        - What are the challenges of storytelling in 3D games?
    - Budget/production considerations & constraints

- ~~**Demographic Questions**~~
    ~~d. Other than the role, what kind of player are you?~~
    ~~e. Educational background~~
    ~~f. Gender, age, voluntary~~

Mindmap

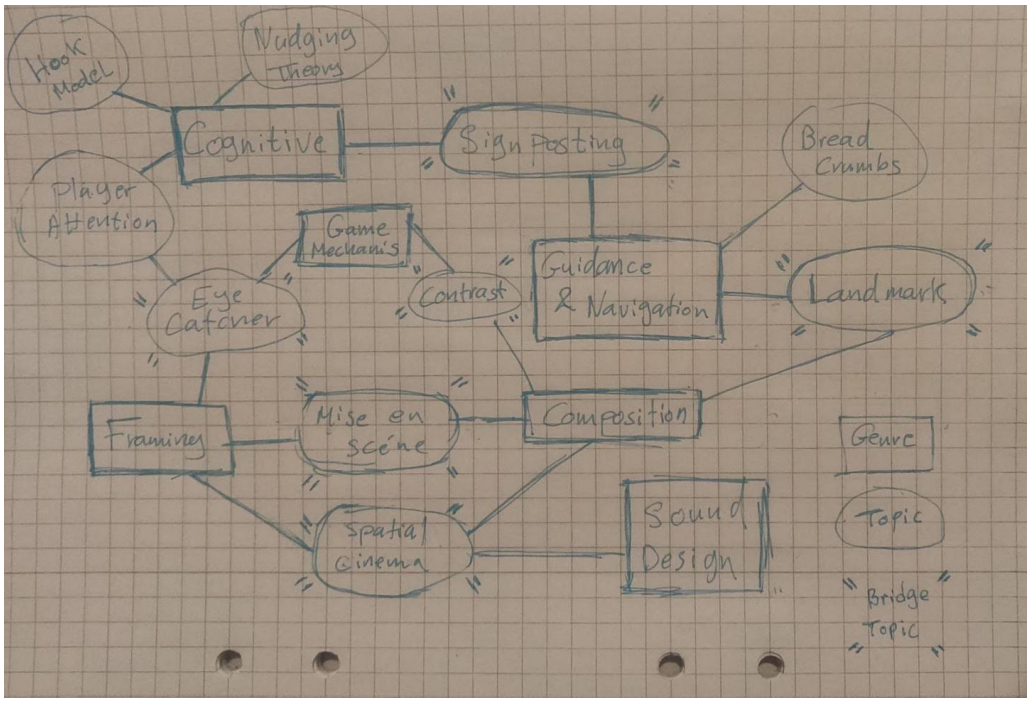


Figure 55: Practitioner Interview Guide (Continued)

Appendix C Interview Consent Forms

Expert Interview Consent Form

This consent form is for game industry experts invited to participate in a Master Thesis research study conducted by Samir Aoun and Chi Hong Chao from the University of Gothenburg. The study will be concerned with various aspects of environmental storytelling. The purpose of this interview is to investigate the use of environmental storytelling within the game industry.

Please carefully read the points below:

Purpose

- I understand the **purpose and nature of the study**, and have had the opportunity to ask questions about the study or anything concerning me.
- I understand that I will not directly benefit from this research.

Recording

- I understand that I am being **audio and video recorded** in the interview.
- I understand that the audio and video recording **will be seen by only the researchers**, when they need to synthesise the data.
- I understand that the **audio and video recordings will be deleted** after the study is published.
- I am aware that **other parties, such as Google, <u>may</u> have access to this information** as the recordings may be put in Google Drive.

Data Handling and Confidentiality

- I understand that I can **withdraw permission to use my data**, partially or wholly, from the interview until May 1st, or Week 17. If withdrawn, the material will be omitted and deleted.
- I understand that even if I agree to participate now, I can **withdraw at any time** or refuse to answer any questions without negative consequences.
- I understand that a **copy of the synthesised data used in the report will be given to me to review and approve** before it is published. Possible issues to review include ensuring quotes are not taken out of context. The synthesised data **cannot be withdrawn after approval**.
- I understand that **my identity will remain anonymous**. This will be done by changing and disguising my name and any details which may reveal my identity or the identity of people I speak about. The data will not be shared with anyone.
- I understand that **the information I provide for the study will be kept confidential in the report**. In the case personal information is used, I understand that the information will be framed in such a way that it cannot be traced back to me.
- I understand that **I am free to contact the people involved in the research** to seek further clarification and information.

_____ _____

Name of Participant Signature

_____

Date

Figure 56: Practitioner Interview Guide

Expert Interview Consent Form v2

This consent form is for game industry experts invited to participate in a Master Thesis research study conducted by Samir Aoun and Chi Hong Chao from the University of Gothenburg. The study will be concerned with various aspects of environmental storytelling. The purpose of this interview is to investigate the use of environmental storytelling within the game industry.

Please carefully read the points below:

Purpose

- I understand the **purpose and nature of the study**, and have had the opportunity to ask questions about the study or anything concerning me.
- I understand that I will not directly benefit from this research.

Recording

- I understand that I am being **audio and video recorded** in the interview.
- I understand that the audio and video recording **will be seen by only the researchers**, when they need to synthesise the data.
- I understand that the **audio and video recordings will be deleted** after the study is published.
- I am aware that **other parties, such as Google, <u>may</u> have access to this information** as the recordings may be put in Google Drive.

Data Handling and Confidentiality

- I understand that I can **withdraw permission to use my data**, partially or wholly, from the interview until May 1st, or Week 17. If withdrawn, the material will be omitted and deleted.
- I understand that even if I agree to participate now, I can **withdraw at any time** or refuse to answer any questions without negative consequences.
- I understand that a **copy of the synthesised data used in the report will be given to me to review and approve** before it is published. Possible issues to review include ensuring quotes are not taken out of context. The synthesised data **cannot be withdrawn after approval**.
- I understand that **my identity will remain anonymous**. This will be done by changing and disguising my name and any details which may reveal my identity or the identity of people I speak about. The data will not be shared with anyone.
- I understand that **the information I provide for the study will be kept anonymous in the report**. In the case personal information is used, I understand that the information will be framed in such a way that it cannot be traced back to me.
- I understand that **I am free to contact the people involved in the research** to seek further clarification and information.

_____ _____

Name of Participant Signature

_____

Date

Figure 56: Practitioner Interview Consent Form (Continued)

Soft Evaluation Consent Form

This consent form is for game industry experts invited to participate in a Master Thesis research study conducted by Samir Aoun and Chi Hong Chao from the University of Gothenburg. The study will be concerned with various aspects of environmental storytelling. The purpose of this interview is to **gather expert feedback on the preliminary results of the study**.

Please carefully read the points below:

Purpose

- I understand the **purpose and nature of the study**, and have had the opportunity to ask questions about the study or anything concerning me.
- I understand that I will not directly benefit from this research.

Recording

- I understand that I am being **audio and video recorded** in the interview.
- I understand that the audio and video recording **will be seen by only the researchers**, for notetaking and double checking purposes.
- I understand that the **audio and video recordings will be deleted** after the study is published.
- I am aware that **other parties, such as Google, <u>may</u> have access to this information** as the recordings may be put in Google Drive.

Data Handling and Confidentiality

- I understand that I can **withdraw permission to use my data**, partially or wholly, from the interview until May 16th, or Week 21. If withdrawn, the feedback will not be used for the results.
- I understand that even if I agree to participate now, I can **withdraw at any time** or refuse to answer any questions without negative consequences.
- I understand that **quotes may be taken from this interview to be used**. These quotes will be made anonymous.
- I understand that **my identity will remain anonymous**. This will be done by changing and disguising my name and any details which may reveal my identity or the identity of people I speak about. The data will not be shared with anyone.
- I understand that **the information I provide for the study will be kept anonymous in the report**. In the case personal information is used, I understand that the information will be framed in such a way that it cannot be traced back to me.
- I understand that **I am free to contact the people involved in the research** to seek further clarification and information.

_____ _____

Name of Participant Signature

_____

Date

Figure 56: Practitioner Interview Consent Form (Continued)

Soft Evaluation Consent Form for [C]

This consent form is for game industry experts invited to participate in a Master Thesis research study conducted by Samir Aoun and Chi Hong Chao from the University of Gothenburg. The study will be concerned with various aspects of environmental storytelling. The purpose of this interview is to **gather expert feedback on the preliminary results of the study**.

Please carefully read the points below:

Purpose

- I understand the **purpose and nature of the study**, and have had the opportunity to ask questions about the study or anything concerning me.
- I understand that I will not directly benefit from this research.

Data Handling and Confidentiality

- I understand that I can **withdraw permission to use my data**, partially or wholly, from the interview until May 16th, or Week 21. If withdrawn, the feedback will not be used for the results.
- I understand that even if I agree to participate now, I can **withdraw at any time** or refuse to answer any questions without negative consequences.
- I understand that **quotes may be taken from this interview to be used**. These quotes will be made anonymous.
- I understand that **my identity will remain anonymous**. This will be done by changing and disguising my name and any details which may reveal my identity or the identity of people I speak about. The data will not be shared with anyone.
- I understand that **the information I provide for the study will be kept anonymous in the report**. In the case personal information is used, I understand that the information will be framed in such a way that it cannot be traced back to me.
- I understand that **I am free to contact the people involved in the research** to seek further clarification and information.

_____ _____

Name of Participant Signature

_____

Date

Figure 56: Practitioner Interview Consent Form (Continued)

Appendix D Grounded Theory Diagram

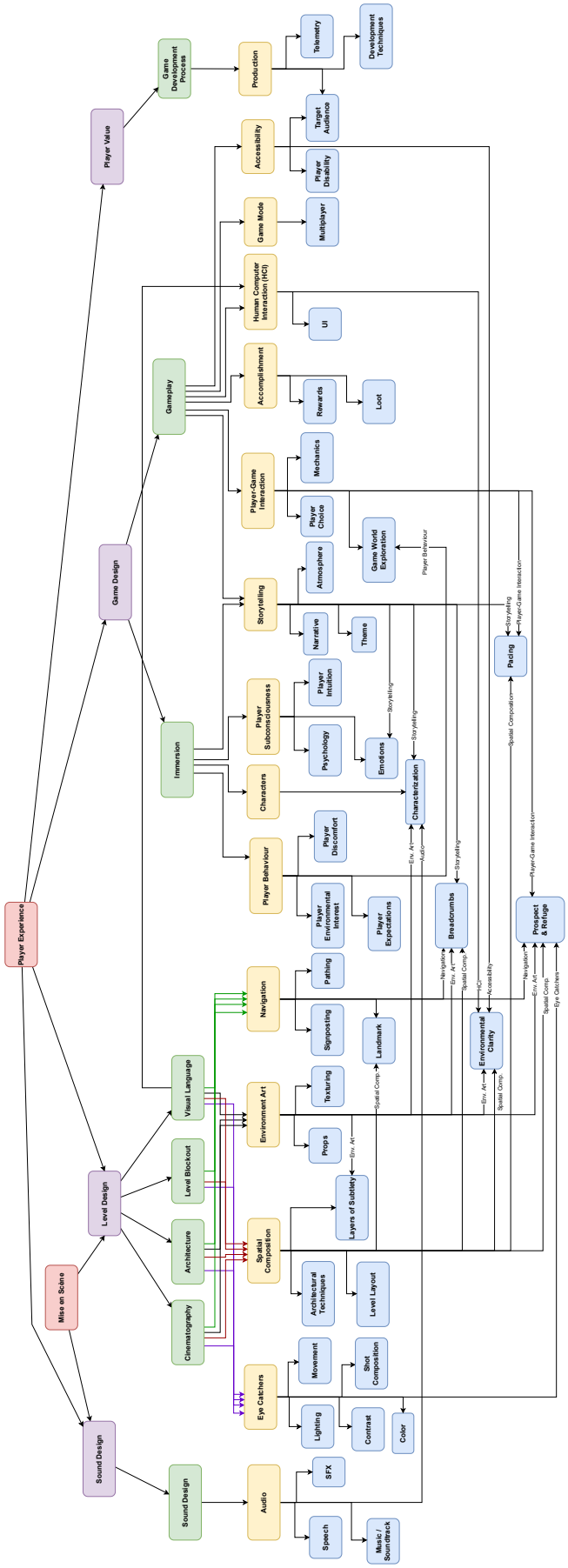


Figure 57: Graph of the Grounded Theory

Appendix E Grounded Theory Codeset

	B	C	D	E	F	G	H	I	J	K
1	**Theories**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**
2	**Core Categories**	**Level Design**	**Level Design**	**Level Design**	**Level Design**	**Level Design**	**Level Design**	**Level Design**	**Level Design**	**Level Design**
3	**Themes**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Cinematography, Architecture, Visual Language**
4	**Categories**	**Eye Catchers**	**Eye Catchers**	**Eye Catchers**	**Eye Catchers**	**Eye Catchers**	**Spatial Composition**	**Spatial Composition**	**Spatial Composition, Environment Art**	**Environment Art**
5	**Concepts**	**Contrast**	**Movement**	**Shot Composition**	**Lighting**	**Colour**	**Architectural Techniques**	**Level Layout**	**Layers of Subtlety**	**Texturing**
6		Colour Contrast	Attention Through Movement	Camera Composition	Light Source	Higher Colour Saturation	Denial and Reward	Affordance (Level Affordance)	Subtle ES Layer	Environmental Text
7		Size Contrast	Attention through Animation	Vantage Point	Guiding Light	Saturation	Repetition	Critical Path	Clear Presentation of Obvious Elements	Harsher Environmental Text Font
8		Level of Detail Contrast	Flashing Lights	Layer Composition	Spotlight	Highly Saturated Colours		Perception of Shallow Narrative	Obvious Surface Layer	Abnormal Texture
9		Detail blending	Enemy Animation	One point perspective	Emissive Lighting	Colourful		Interlinked Environmental Pieces	Indexical Sign	Novel Images
10		Objects Being Out of place		Fog (Obscure Visibility)	God Rays	Common Colour (Consistent Colour Palette)		Level Geometry	Level of Detail	Gore
11		Gameplay and Environmental Contrast		Subconcious (Subconsciously Guiding Player)	Dim Lighting	New Colour Palette		Player Positioning	Macro/Micro Level Design	Blood
12		Highlighting		Focal Point	Lighting Removal	Strong Colours (Saturation and Contrast)		Points of Interest	Frequent ES	Increasing Details
13		Geometry Contrast		Framing	Window of Light			Space Design	Environmental Contextualization	Warning (Textual Warning)
14		Music Contrast		One Point Perspective	Strong Lighting			Enemy Placement	Contextualizing Environments	World State
15		Colour Temperature Contrast		Vanishing Points	Atmospheric Lighting			Empty Spaces	Hints of History (of Area)	Unknown Sign Meaning
16		Lighting Contrast		Camera Angle	Cone of Light			Sloped Geometry		Thematic Enhancement
17		Geometry Contrast		Big Changes (Sharp/Big Camera Angle Changes)	Creepy Lighting			Verticality		Blood Trails
18		Spatial Contrast (Framing, Small to Large Area)		Scale	Clear Silhouette			Bigger Strokes		Environmental Text Progression
19		Unique Shapes (Geometry Contrast)		Leading Lines	Realism (Cheating Realistic Lighting)			Level Capping Areas		Diegetic Labels (Diegetic Text)
20		Thematic Contrast to Previous Locations		Symmetric View	Epileptic Flashes			Geometry Contrast		
21		Highlight by Removal		Outer Prop Placement (Supporting Props)	Harsh Lighting			Enclosed Space		
22		Shape and Geometry Design		Prop Hiding	Warm Lighting			End of Corridor (Dead End)		
23				Special View (Unique Set Piece)	Saturated Lighting			Inter-Setup Relatedness		
24					Reflective Surface			Man made Structure		
25					Shadow of Enemy			Non-Hostile Enemy (Trap)		
26								Solving Puzzle		
27								Similar Environmental Texts		
28								Curved road		
29								Macro Scale ES		

Figure 58: Grounded Theory Codeset: Part 1

	L	M	N	O	P	Q	R	S	T	U	V
1	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Mise en Scene, Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**
2	**Level Design**	**Level Design, Player Experience**	**Level Design, Player Experience**	**Level Design**	**Level Design**	**Level Design**	**Level Design**	**Game Design**	**Game Design**	**Game Design**	**Game Design**
3	**Cinematography, Architecture, Visual Language**	**Cinematography, Architecture, Level Blockout, Visual Language, Gameplay**	**Cinematography, Architecture, Level Blockout, Visual Language, Immersion, Gameplay**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Cinematography, Architecture, Level Blockout, Visual Language, Immersion, Gameplay**	**Cinematography, Architecture, Level Blockout, Visual Language**	**Immersion**	**Immersion**	**Immersion**	**Immersion**
4	**Environment Art**	**Spatial Composition, Environment Art, Accessibility, Human Computer Interaction**	**Spatial Composition, Storytelling, Player-Game Interaction**	**Navigation**	**Navigation**	**Navigation, Spatial Composition, Environment Art, Eye Catchers, Player-Game Interaction, Human Computer Interaction**	**Navigation, Spatial Composition**	**Player Behaviour**	**Player Behaviour**	**Player Behaviour**	**Player Subconsciousness**
5	**Props**	**Environmental Clarity**	**Pacing**	**Pathing**	**Signposting**	**Prospect & Refuge**	**Landmark**	**Player Environmental**	**Player Expectations**	**Player Discomfort**	**Player Intuition**
6	Object Orientation	Reductive Simplification	Sandwiching Breathing Space	Path manipulation	(Environmental) Directionality Hints	Vantage Points	Massive Structures	Initial Player Disinterest	Setting Expectations	Averting Gaze	Connection to Common Knowledge
7	Physical Affordances	Less is More	Breathing Space	Route Planning	Sudden (Sign) Obviousness	Threat Assessment	Scale	Player Investment	Player Mindset		Missing (Contextual) Piece (of Environmental Setup)
8	Prop Placement	Environmental Consistency	Downtime	Pathways	More Signs (Increasing Sign Frequency)	Previous Encounters		Inspecting Subtle ES Layer	Fulfilling Player Expectations		Prop Relation to Common Knowledge
9	Items Reflecting World State	Environmental Readability	Low Cognitive Load	Forced to pass through	UI Signposting (Arrow to Goal)			Player Monetary Investment	Tension		Sense of Area of Interest
10	Rotation	Object Consistency	Pacing Graph	Hard to Enter Location	Telegraphing			Game World Interest	90s Game Design		Player (Gaming Common) Knowledge (Based on previous gaming experiences)
11	Interactable (Pickups)	Level of Noise	Player Fatigue	Confined Space				Player Interest	Early Player Investment		Open Door (Straying from Norm)
12	Orientation	Accessible Structure	Alternating Cognitive Load	Effort To Reach Area				Lack of Interest	Teasing the Player		Player Alert
13	High Prop Density	Rational Level Design	Moments of Contrast	Corridor				Lack of Corpse (Contextual Puzzle)	False Expectations		
14	Chaotic Prop Placement	Density	Limit Affordances	Dead End				Urge to progress narrative	Player Anticipation		
15	Details	Empty Spaces	Removing Player Mechanics	Single Path				Urge to Investigate	Environmental Expectations		
16	Common Loot Types	Higher Visibility (Environmental Readability/Clarity)	Hold off Mechanics	Player (Audio) Guidance				Unknown Reason for Death	Setting the Mood		
17	Corpses	Unclear Methods for Understanding (Environmental Text)	Limiting Interactivity	Breadcrumbs				Unknown Character History	Suspension		
18	Environmental Details		Scripted Event	Signifying Possible Room (Secrets or Guidance)				Sense of Area of Interest	Subverting Expectations		
19	Common Motif		Creation of Environmental Setups during Play	Player Challenging (Path of Resistance)				Environment Awareness (Through Scripted Event)	Difference from Game Norm (Subverting Established Game Norms)		
20	Abnormal Traces		Limiting Stimulants	Calling for the player				What Happened Here	Previous Experience Expectation		
21	Common Motif Placement			Terrain Design				Player Curiosity	Subverting Loot Expectations		
22	Common Setups (Similar Prop Placements)							Law of Closure	Reward Expectations		
23	High Loot Expection (of Locked Prop)							Removing Conflicting Gameplay Elements	Separated Loot from Corpse		
24	New Related Motif (Motif Variations)							Contextual Puzzle	Approaching Climax (Anticipation)		
25	Special Object (Uncommon Prop)								Hint of Enemy Motion (Horror Anticipation)		
26	Special Prop (Uncommon Prop)								Open Door (Straying from Norm)		
27	Prop Connection to Corpse (Prop Relations)								Pre-game Immersion		
28	Detective Board (Characterization through Props)								Player Trust (Trust in Player)		
29	Meta-Reason for Prop Placement								Player Conditioning		
30	Prop Placement Pattern								Fighting Against Expectations		
31	Sign Motif Hint										
32	Micro Scale ES										
33	Connection of Prop to Location										
34	Objects of Interest										
35	Corpses										
36	Altar										
37	Corpse Dress (Corpse Clothing)										
38	**Destroyed Structures**										
39	Contextual Reasoning (of Environmental Elements)										

Figure 59: Grounded Theory Codeset: Part 2

	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	**Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**	**Mise en Scene, Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**	**Mise en Scene, Player Experience**	**Player Experience**
2	**Game Design**	**Game Design**	**Game Design**	**Game Design**	**Level Design**	**Game Design**	**Game Design**	**Game Design**	**Game Design**	**Level Design, Game Design**	**Game Design**
3	**Immersion**	**Immersion, Gameplay**	**Immersion, Gameplay**	**Immersion, Gameplay**	**Immersion, Gameplay**	**Gameplay**	**Gameplay**	**Gameplay**	**Immersion, Gameplay**	**Cinematography, Architecture, Visual Language, Immersion, Gameplay, Sound Design**	**Gameplay**
4	**Player Subconsciousness**	**Player Subconsciousness, Storytelling**	**Storytelling**	**Storytelling**	**Storytelling**	**Player-Game Interaction**	**Player-Game Interaction**	**Player-Game Interaction**	**Player-Game Interaction, Player Behaviour**	**Storytelling, Environment Art, Characters**	**Accomplish ment**
5	**Psychology**	**Emotions**	**Narrative**	**Theme**	**Atmosphere**	**Game Conventions**	**Player Choice**	**Mechanics**	**Game World Exploration**	**Characterization**	**Loot**
6	Character - Environment Relation (Caring more about places related to people)	Evoking Emotions through Environmental Storytelling	Written Narrative (Textual Narrative)	Thematic Direction	Horror Elements	Subverting Traditional Game Design Guidelines	Current Player Goal	ES Identification Mechanisms	Minimal Handholding	Character Interest (Player's Character Interest)	Lack of Loot
7	Human Psychology (We care more about people)	Evoking Unique Player Emotions	Shop Narrative/Detail	Subconscious Understanding of Theme	Shadow Silhouette	Gameplay Norms	Reminder of Objective	Looting Mechanic	Gradual Appreciation of ES	Personalised Theme Song	High Loot Expectation
8	Reminder of Objective, Peripheral Vision	Player Emotions (Through Music)	Foreshadowing	Thematic Planning	Atmospheric Lighting	Contextual Hint through Loot	Unique Player Experiences for Each Player	Adding Context to Environmental Setups through Enemy Mechanics	Gradual Narrative Interest	Character Motivation	Near Loot
9	Obstruction (from Sight)	Emotional Scene	Narrative Hooks	Ritual	Atmospheric Cohesion		ES Gameplay Uses	Player Futility	Consistent Trickle of ES	Character Identity	Attracted to Loot
10	Attention Span	Empathetic Trigger	Meta-game Storytelling	Religion	Shady Atmosphere		Cheesing the Game	Puzzle	Worldbuilding	Character Behaviour (Characterization through Traces)	
11	Reason for Death	Feeling of Achievement (Finding Secret Areas)	Baseline Narrative		Sense of Awe			Relation of Player Encounters to Environmental Area	Incentivizing Observation	Indirect Characterization	
12	Reason for Prop Placement	Empathetic Corpse	Generating Narrative Interest					ES Categories	Level Capping Areas	Detective Board (Characterization through Props)	
13	Finding Reason for Death (Hints)	Player Alert	Subtle Narrative						Player Freedom	(Prop) Placement Motivation	
14	Cautiousness		Player Prerequisites for Interpretation						Feeling of Achievement (Finding Secret	Using NPC's speech to guide player	
15	Sense of Unease		Interlinked Environmental Pieces						Hidden Entrance	First Encounter	
16	Player Manipulation (Illusion of Player Choice)		Modifying Narrative to Support Gameplay						Hidden Sign	Related Character Speech (Navigation Speech)	
17	Unknown Motif Meaning		Narrative Moment						Secret	Related Quest Character (Interest in NPC Death)	
18	Trained to Follow (Conditioning the player)		Underlying Story						Sense of Event (Scripted Sequence)		
19	Spatial and Temporal Proximity between Related Player Events (Connecting The Dots)		Narrative Interpretation						New Environment (Unique Location Environment)		
20			Chain of Events								
21			Hidden in Plain Sight (Integrated Technique in Narrative)								
22			Flashbacks								
23			Enemies								
24			Big Bad Evil Guy								

Figure 60: Grounded Theory Codeset: Part 3

	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ
1	**Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**	**Player Experience**	**Mise en Scene, Player Experience**
2	**Game Design**	**Game Design**	**Game Design**	**Game Design**	**Player Value**	**Game Design, Player Value**	**Player Value**	**Sound Design**	**Sound Design**	**Sound Design**
3	**Gameplay**	**Gameplay**	**Gameplay**	**Gameplay**	**Game Development Process**	**Game Development Process, Gameplay**	**Game Development Process**	**Sound Design**	**Sound Design**	**Sound Design**
4	**Accomplishment**	**Game Mode**	**Accessibility**	**Human-Computer Interaction**	**Production**	**Production, Accessibility**	**Production**	**Audio**	**Audio**	**Audio**
5	**Rewards**	**Multiplayer**	**Player Disability**	**UI**	**Development Techniques**	**Target Audience**	**Telemetry**	**Speech**	**Music / Soundtrack**	**SFX**
6	Environmental Story Payout	Environmental Support for Inter-Player Storytelling	Accessibility Considerations	Non-Diegetic Spatial Highlight	Reusing Props	Social Aspects	Tracking	Audio Logs	Melody Shift	Sound Contrast
7	Foreshadowing Payout	Inter-Player Storytelling	Epileptic Flashes	Clear Narrative Interpretation (UI Hints)	Narrative Focus During Development	Game World Disinterest		Spatial Speech	Diegetic Music	Audio Cues
8	Satisfying Curiosity	PvE		UI Textual Object Descriptions	Kitbashing	Lack of Subtle ES Interest (Player ES Disinterest)		Related Narration Speech	Soundtracks as Support	
9	Intrinsic Rewards	Callouts			Chapter-based Development	Balancing ES (Balancing ES Based on Target Audience)		(Dialogue) Vagueness	Temporal Soundtracks	
10	Fulfilling Player Expectations	Waiting for Other Players			Defining Player Types	Knowing Target Audience		Focus on Dialogue	Silence	
11		Downtime Room			Master and Refine (Iterative Development of Franchises)	Converting Players to New Experience		Mystery Caller	Personalised Theme Song	
12					Harmony In Game Design	Transitioning Players		Special Location Hint (Related Audio Recording to Location)	Thematic Music	
13					Budget Constraints	Player Value		Reason for Death Sound Hint (Audio Log Hinting at Event)	Music Contrast	
14					Technical Constraints	Lack of Player Environmental Interest		Related Sound Recording (Contextual Audio Log)	(Evoking) Player Emotions (Through Music)	
15						Player Types		Related (Contextual) Voice Recording	Music (Shifting Music Tone)	
16									Character Recognition (Through Soundtrack)	
17									Atmospheric Music Genre	
18									Special Audio (Contextual Spatial Music)	
19									Spatial Music	
20									Player Interpretation (Of what the music is trying to convey)	

Figure 61: Grounded Theory Codeset: Part 4

Appendix F Observations of Bioshock 1

	A	B	C	D	E
1	ID	Game	Location	Observations	**Code**
2	1	Bioshock 1 Remastered	Welcome To Rapture	Lots of objects, details	**High Prop Density, Details**
3		Bioshock 1 Remastered	Welcome To Rapture	Spotlight effect, other places relatively dark	**Spotlight, Contrast**
4		Bioshock 1 Remastered	Welcome To Rapture	More objects means loot	**Near Loot**
5		Bioshock 1 Remastered	Welcome To Rapture	Can see someone died, had time to make makeshift grave	**Death, Corpse**
6		Bioshock 1 Remastered	Welcome To Rapture	2 paths - one leading to main path progression, other to this grave - a dead end	**Dead End**
7	2	Bioshock 1 Remastered	Welcome To Rapture	Dark, not very visible other than the doors - acted as “spotlight” /sign	**Spotlight, Contrast**
8		Bioshock 1 Remastered	Welcome To Rapture	Can still see blood smears and traces on corpses	**Blood Traces, Corpses**
9		Bioshock 1 Remastered	Welcome To Rapture	Clearly very gory, attracted my eye with all the blood	**Gory Scene**
10		Bioshock 1 Remastered	Welcome To Rapture	Somebody did a lotta damage to these people - maybe ill encounter it too?	**Reason for Death, Foreshadowing**
11	3	Bioshock 1 Remastered	Welcome To Rapture	Corpse with money - loot	**Near Loot**
12		Bioshock 1 Remastered	Welcome To Rapture	Spotlight attracting attention	**Spotlight**
13		Bioshock 1 Remastered	Welcome To Rapture	Bent over register - wants the money?	**Final Moments**
14		Bioshock 1 Remastered	Welcome To Rapture	How did he die?	**Reason for Death**
15	4	Bioshock 1 Remastered	Welcome To Rapture	First little sister encounter - spotlight at a distance	**Spotlight, Contrast, First Encounter**
16		Bioshock 1 Remastered	Welcome To Rapture	Easily hear her speaking, though atlas also speaking at the same time	**Spatial Speech, Related Narration Speech**
17		Bioshock 1 Remastered	Welcome To Rapture	Enemy? Dont know, doesnt look like - atlas explains	**Cautiousness**
18	5	Bioshock 1 Remastered	Medical Pavilion	Again corpse over register, looks like splicers killed them on the way through	**Reason for Death**
19		Bioshock 1 Remastered	Medical Pavilion	Glint of money + eve, amount of props, details and light drew me here	**High Prop Density, Details, Loot**
20		Bioshock 1 Remastered	Medical Pavilion	Blood splatter seen far away	**Blood Traces**
21		Bioshock 1 Remastered	Medical Pavilion	Emissive nature of loot attracts eye	**Emissive Lighting**
22	6	Bioshock 1 Remastered	Medical Pavilion	Clearly crushed by pillar	**Reason for Death**

Figure 62: Observations of Bioshock 1 Remastered.

	A	B	C	D	E
1	ID	Game	Location	Observations	**Code**
23		Bioshock 1 Remastered	Medical Pavilion	Although dark, forced to pass through this corridor, and thus catches attention	**Confined Space, Forced to pass through**
24		Bioshock 1 Remastered	Medical Pavilion	Who made the pillar fall though?	**Questioning Reason for Death**
25	7	Bioshock 1 Remastered	Medical Pavilion	Immediate attention grabber - must go through this door to reach goal, framed	**Framing, Door**
26		Bioshock 1 Remastered	Medical Pavilion	Amount of details, lighting, gore and text on ground catch attention	**Relation of Player Encounters to Environmental Area, Characterization**
27		Bioshock 1 Remastered	Medical Pavilion	These images not shown before this area - very new	**Novel Images**
28		Bioshock 1 Remastered	Medical Pavilion	Gore makes me on high alert - who did this? They must be near	**Cautiousness, Alert**
29		Bioshock 1 Remastered	Medical Pavilion	Why did they do this?	**Character Motivation**
30	8	Bioshock 1 Remastered	Medical Pavilion	These texts written in blood all over the area - foreshadows what is going to happen	**Environmental Text, Foreshadowing**
31		Bioshock 1 Remastered	Medical Pavilion	Victims who wrote this? But why? Either brainwashed or written by the villain	**Character Motivation**
32		Bioshock 1 Remastered	Medical Pavilion	Not much light, and many similar texts throughout area	**Dim Lighting, Similar Environmental Texts**
33	9	Bioshock 1 Remastered	Medical Pavilion	From believing adam good to warnings - somethings wrong, dont know what	**Environmental Text Progression, Cautiousness**
34		Bioshock 1 Remastered	Medical Pavilion	Stronger lighting, larger/longer words - harsher and more attention grabbing	**Harsh Lighting, Harsher Environmental Text Font**
35		Bioshock 1 Remastered	Medical Pavilion	Need to know whats going on	**Urge to progress narrative**
36		Bioshock 1 Remastered	Medical Pavilion	Strangely black on floor not strong contrast - why? Hastily written? No time?	**Reason for Writing Style**
37	10	Bioshock 1 Remastered	Medical Pavilion	Very dark, but clearly arranged in a pattern	**Prop Placement Pattern, Dim Lighting**
38		Bioshock 1 Remastered	Medical Pavilion	Scripted scene occurs before this, must pass through here	**Forced to pass through, Scripted Event**
39		Bioshock 1 Remastered	Medical Pavilion	Why arranged like this?	**Reason for Prop Placement**
40		Bioshock 1 Remastered	Medical Pavilion	Some form of pursuit of beauty, deranged	**Character Motivation**
41	11	Bioshock 1 Remastered	Medical Pavilion	Many details, loot	**Details, Loot**
42		Bioshock 1 Remastered	Medical Pavilion	Secret / must work to reach this area - must be some form of reward	**Secret, Effort to reach area, Reward Expectations**
43		Bioshock 1 Remastered	Medical Pavilion	Looking for code to safe, Safe code beside coffin	**Finding Keys**
44		Bioshock 1 Remastered	Medical Pavilion	Ornate, obvious coffin - for who? Portrait of person, probably coffin for him	**Reason for Setup**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	Code
45		Bioshock 1 Remastered	Medical Pavilion	Corpse on ground - why?	**Reason for Death**
46	12	Bioshock 1 Remastered	Medical Pavilion	Spotlight, corpse and gore and loot	**Spotlight, Gore, Corpse, Loot**
47		Bioshock 1 Remastered	Medical Pavilion	Reason to move in to get loot	**Attracted to Loot**
48		Bioshock 1 Remastered	Medical Pavilion	Motifs - scissors seen in images now pinned on corpse - feeling like getting closer to something, just as bloody	**Motifs, Approaching Climax**
49	13	Bioshock 1 Remastered	Medical Pavilion	Stands out not only because of spotlight effect, but uprightness of corpse	**Spotlight, Pose**
50		Bioshock 1 Remastered	Medical Pavilion	Wheelchair not often seen	**Special Object**
51		Bioshock 1 Remastered	Medical Pavilion	Normally setups often have blood and gore, not this	**Lack of Gore**
52		Bioshock 1 Remastered	Medical Pavilion	Looking at poster trying to relate to corpse - cosmetics? beauty?	**Related Props**
53	14	Bioshock 1 Remastered	Medical Pavilion	Linking ideas from poster to here - asymmetry as perfection? What part?	**Inter-Setup Relatedness**
54		Bioshock 1 Remastered	Medical Pavilion	Deranged nature of doctor/whoever did this	**Character Behaviour**
55		Bioshock 1 Remastered	Medical Pavilion	Brighter light shown on this picture why	**Spotlight**
56	15	Bioshock 1 Remastered	Neptune's Bounty	Man made. More gore, spotlight, can only walk towards pillar	**Man made Structure, Gore, Spotlight, Forced to pass through**
57		Bioshock 1 Remastered	Neptune's Bounty	Symmetrical view - i simply looked up after exiting bathysphere	**Symmetric View**
58		Bioshock 1 Remastered	Neptune's Bounty	Gore definitely catches eye	**Gore**
59	15a	Bioshock 1 Remastered	Neptune's Bounty	Smuggler text on pillar shows why was hanged	**Environmental Text**
60		Bioshock 1 Remastered	Neptune's Bounty	Can loot, thus move closer and investigate	**Loot**
61		Bioshock 1 Remastered	Neptune's Bounty	Particularly bloody though - why	**Blood, Reason for Death**
62		Bioshock 1 Remastered	Neptune's Bounty	Clearly tortured badly	**Reason for Death**
63	15b	Bioshock 1 Remastered	Neptune's Bounty	Bible? Cross related to how he is crucified like jesus	**Prop Relations to Player Knowledge, Motifs, Indexical Sign**
64		Bioshock 1 Remastered	Neptune's Bounty	Religion?	**Religion**
65		Bioshock 1 Remastered	Neptune's Bounty	Many letters, unknown why	**Details**
66	16	Bioshock 1 Remastered	Neptune's Bounty	No spotlight, red stands out - is the gun thing of a little sister	**Contrast, Emissive Lighting, Indexical Sign**
67		Bioshock 1 Remastered	Neptune's Bounty	Blood trails from the concrete lets us guess little sister crushed and killed by falling concrete, crawling out - wheres the corpse?	**Blood Trails, Law of Closure, Missing Piece**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	Code
68	17	Bioshock 1 Remastered	Neptune's Bounty	Corridor leads eye to the end - other than windows, nowhere to look	**Enclosed Space, Leading Lines**
69		Bioshock 1 Remastered	Neptune's Bounty	Contrast between mossy green and orange fire - cold to warm feeling draws attention	**Colour Temperature Contrast**
70		Bioshock 1 Remastered	Neptune's Bounty	Shadow clearly shows some ones there - probably foe, be on guard	**Shadow Silhouette, On Guard**
71		Bioshock 1 Remastered	Neptune's Bounty	Quest Arrow pointing directly forward - must move forward	**UI Signposting, Single Path**
72	18	Bioshock 1 Remastered	Neptune's Bounty	Electricity - new type of spotlight	**Special Spotlight**
73		Bioshock 1 Remastered	Neptune's Bounty	Again similar crucifixion pose	**Motif**
74		Bioshock 1 Remastered	Neptune's Bounty	Many details, want to enter to investigate - have been seeing a lot of red lately	**Details, Urge to Investigate, Common Colour**
75		Bioshock 1 Remastered	Neptune's Bounty	More importantly, probably theres some good loot because its barred and hard to enter	**Epileptic Flashes, Averting Gaze**
76		Bioshock 1 Remastered	Neptune's Bounty		**High Loot Expectation, Hard to Enter Location**
77	18a	Bioshock 1 Remastered	Neptune's Bounty	Voice recording and object descriptions show what happened - torture	**Related Voice Recording, Textual Object Descriptions**
78		Bioshock 1 Remastered	Neptune's Bounty	Again bible motif, film motifs	**Religion, Motifs**
79		Bioshock 1 Remastered	Neptune's Bounty	Loot!	**Loot**
80	19	Bioshock 1 Remastered	Neptune's Bounty	More blood, spotlight, corpse	**Blood Trails, Spotlight, Corpse**
81		Bioshock 1 Remastered	Neptune's Bounty	In front of a door, after opening - cannot miss	**Framing, Door**
82		Bioshock 1 Remastered	Neptune's Bounty	Blood trails from top - hinting something from the ceiling?	**Blood Trails, Directionality Hints**
83	20	Bioshock 1 Remastered	Neptune's Bounty	Spotlight on sign, showing where to go	**Spotlight, Sign**
84		Bioshock 1 Remastered	Neptune's Bounty	Never seen such clear signs before in other areas, why?	**Sudden Obviousness, Sense of Unease**
85	21	Bioshock 1 Remastered	Neptune's Bounty	bible/religion motif again	**Religion, Motifs**
86		Bioshock 1 Remastered	Neptune's Bounty	Clearly used them to smuggle, according to object name	**Textual Object Description, Clear Narrative Interpretation**
87		Bioshock 1 Remastered	Neptune's Bounty	A mess - taken out, boxes on floor all over the place - scuffle?	**Chaotic Prop Placement, Narrative Interpretation**
88	22	Bioshock 1 Remastered	Neptune's Bounty	God rays strong spotlight effect	**God Rays, Spotlight**
89		Bioshock 1 Remastered	Neptune's Bounty	Crumbling pillars, probably loot there	**High Loot Expection, Destroyed Structures**
90		Bioshock 1 Remastered	Neptune's Bounty	Strange - no death	**Lack of Gore, Straying from Established Norm**
91	23	Bioshock 1 Remastered	Neptune's Bounty	Many props/details - again religion and letters	**HIgh Prop Density, Details, Religion**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	**Code**
92		Bioshock 1 Remastered	Neptune's Bounty	Clear lighting	**Lighting**
93		Bioshock 1 Remastered	Neptune's Bounty	“Somethings here” - dont care why yet	**Sense of Event, Lack of Interest**
94	23a	Bioshock 1 Remastered	Neptune's Bounty	More letters here - breadcrumbs?	**Motif, Breadcrumbs**
95		Bioshock 1 Remastered	Neptune's Bounty	Light peeking from crumbly wall - something must be there	**Window of Light, Contrast, Signifying Possible Room**
96		Bioshock 1 Remastered	Neptune's Bounty	Wall can probably be broken	**Visual Language**
97	23b	Bioshock 1 Remastered	Neptune's Bounty	Letters again on floor, probably where originated	**Common Motif**
98		Bioshock 1 Remastered	Neptune's Bounty	Sound recording and props give idea what happened	**Related Sound Recording, Prop Arrangement, Narrative Interpretation**
99	23c	Bioshock 1 Remastered	Neptune's Bounty	More letters - with god ray spotlights shining on them	**Motif, God Rays, Spotlight**
100		Bioshock 1 Remastered	Neptune's Bounty	Evidence - police raided smugglers?	**Diegetic Labels, Connection to Common Knowledge**
101		Bioshock 1 Remastered	Neptune's Bounty	All bible books out now - searched through	**New Related Prop**
102		Bioshock 1 Remastered	Neptune's Bounty	Hand print sign on all the smuggler boxes - another motif	**New Related Motif**
103	23d	Bioshock 1 Remastered	Neptune's Bounty	Splicer sings “Jesus loves me …. For the bible tells me so” as you near	**Spatial Speech**
104		Bioshock 1 Remastered	Neptune's Bounty	More letters!	**Motif, Trained to Follow, Breadcrumbs**
105		Bioshock 1 Remastered	Neptune's Bounty	Stronger lighting	**Lighting**
106		Bioshock 1 Remastered	Neptune's Bounty	Feeling of nearing objective as we can see interrogation room sign - more details are happening - heightened awareness	**Increasing Details, More Signs, Nearing Goal, Higher Awareness**
107	23e	Bioshock 1 Remastered	Neptune's Bounty	Glowing quest object	**Non-Diegetic Spatial Highlight**
108		Bioshock 1 Remastered	Neptune's Bounty	Detective board, clearly this sullivan has been investigating smugglers and is part of some detective team	**Detective Board, Chain of Events**
109		Bioshock 1 Remastered	Neptune's Bounty	Splicer in adjacent room not only for photo tutorial, also probably used as test subject	**Characterization, Working Style**
110		Bioshock 1 Remastered	Neptune's Bounty	Trail of letters lead to camera - but why the trail in the first place?	**Unknown Breadcrumb Reason**
111	24	Bioshock 1 Remastered	Neptune's Bounty	Electricity flashing attracts eye in dark place	**Contrast, Flashing Lights**
112		Bioshock 1 Remastered	Neptune's Bounty	See splicer on ceiling, disappearing	**Hint of Motion**
113		Bioshock 1 Remastered	Neptune's Bounty	Scare - heightened awareness, preparation to fight	**Cautiousness, Alert, Horror Elements**
114		Bioshock 1 Remastered	Neptune's Bounty	Look for where the enemy is	**Alert**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	Code
115	25	Bioshock 1 Remastered	Neptune's Bounty	Room has warm lighting compared to cold sea - attracting attention there - want to go there	**Colour Temperature Contrast**
116		Bioshock 1 Remastered	Neptune's Bounty	How to enter room though?	**Puzzle**
117	25a	Bioshock 1 Remastered	Neptune's Bounty	Blood trails and gore catch attention, but trails lead to somewhere	**Blood Trails, Gore, Breadcrumbs**
118		Bioshock 1 Remastered	Neptune's Bounty	Breadcrumbs to behind the boxes	**Breadcrumbs, Prop Hiding**
119	25b	Bioshock 1 Remastered	Neptune's Bounty	Find opening behind boxes,definitely go inside to check	**Hidden Entrance, Colour Temperature Contrast**
120		Bioshock 1 Remastered	Neptune's Bounty	“Ooooo a secret place”	**Feeling of Achievement**
121		Bioshock 1 Remastered	Neptune's Bounty	Warm Lighting contrasting with jade easily attracted me	**Colour Temperature Contrast**
122	25c	Bioshock 1 Remastered	Neptune's Bounty	Loot, much gore inside - turret clearly killed them in sleep somehow - mattress, corpse posed as crawling towards opening	**Loot, Gore, Corpse Posing, Prop Placement**
123		Bioshock 1 Remastered	Neptune's Bounty	Turret attacks you as you enter too	**Enemy Mechanics**
124		Bioshock 1 Remastered	Neptune's Bounty	Sudden darkness as lights turn off after you enter - heightened awareness as you hear enemies outside	**Scripted Event, Alert, Lighting Removal**
125	26	Bioshock 1 Remastered	Neptune's Bounty	Chained corpse - new pose	**New Corpse Pose**
126		Bioshock 1 Remastered	Neptune's Bounty	Much blood, but red lighting - something is special here	**Blood, Special Lighting**
127		Bioshock 1 Remastered	Neptune's Bounty	Why chained to bed?	**Reason for Death**
128		Bioshock 1 Remastered	Neptune's Bounty	Splicer attacks you when you enter room - were they related to chained corpse?	**Reason for Death, Enemy Relation to Corpse**
129		Bioshock 1 Remastered	Neptune's Bounty	Obvious white spotlight on corpse contrasted with red makes me look at corpse first	**Spotlight, Contrast**
130	27	Bioshock 1 Remastered	Neptune's Bounty	Peculiar room - even though no strong spotlight, TV as primary lighting attracts eye	**Emissive Lighting, Cone of Light**
131		Bioshock 1 Remastered	Neptune's Bounty	Needed to hack/enter code to enter this room - must be something here	**Hard to Enter Location, High Loot Expectation**
132	27a	Bioshock 1 Remastered	Neptune's Bounty	Closer inspection - loot - not much	**Subverting Loot Expectations**
133		Bioshock 1 Remastered	Neptune's Bounty	Crooked poster, kind of broken wall - probably something behind - how to access?	**Signifying Possible Hidden Object, Puzzle**
134	27b	Bioshock 1 Remastered	Neptune's Bounty	Strongest lighting here, with reflective surfaces etc	**Strong Lighting, Reflective Surface**
135		Bioshock 1 Remastered	Neptune's Bounty	Pills beside couple - clearly some sort of drug overdose suicide	**Reason for Death Prop Hint**
136		Bioshock 1 Remastered	Neptune's Bounty	Sound recording shows why they decided to suicide - found daughter as little sister	**Reason for Death Sound Hint**
137	27c	Bioshock 1 Remastered	Neptune's Bounty	All lights turn off after listening to recording, heightened awareness - somethings wrong or coming	**Lighting Removal, Horror Elements, Scripted Event, Alert**
138		Bioshock 1 Remastered	Neptune's Bounty	Last time lighting was gone, enemies appeared - probably enemies here too	**Previous Experience Expectation**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	**Code**
139		Bioshock 1 Remastered	Neptune's Bounty	After all enemies are killed, poster falls to reveal a safe	**Scripted Event, Answer for Hidden Object**
140	28	Bioshock 1 Remastered	Neptune's Bounty	Torture? Prisoners?	**Connection to Common Knowledge, Reason for Death**
141		Bioshock 1 Remastered	Neptune's Bounty	Clearly something being written as warning	**Warning, Environmental Text**
142		Bioshock 1 Remastered	Neptune's Bounty	This is after you kill the mini boss - same area	**Relation of Player Encounters to Environmental Area, Characterization**
143		Bioshock 1 Remastered	Neptune's Bounty	Bullet holes and casings - shot dead?	**Prop Connections, Reason for Death**
144		Bioshock 1 Remastered	Neptune's Bounty	Tricked somehow - what kind of person was the boss?	**Indirect Chracterization, Environmental Text**
145	29	Bioshock 1 Remastered	Neptune's Bounty	Scripted “flashback events” - showing characters from the past in same area	**Scripted Event, Flashbacks**
146		Bioshock 1 Remastered	Neptune's Bounty	Aware that i am generally safe in these “cutscenes”, focus on dialogue rather than environment	**Gameplay Norms, Focus on Dialogue**
147		Bioshock 1 Remastered	Neptune's Bounty	Heightened awareness of characters though	**Character Awareness**
148	30	Bioshock 1 Remastered	Smuggler's Hideout	Ive seen that hand somewhere - the smuggler boxes now on a flag	**Sign Motif Hint**
149		Bioshock 1 Remastered	Smuggler's Hideout	I must be in the smugglers den	**Motif, Indexical Sign**
150		Bioshock 1 Remastered	Smuggler's Hideout	Not strong lighting - shady, discreet feeling	**Dim Lighting, Shady Atmosphere**
151	31	Bioshock 1 Remastered	Smuggler's Hideout	Corpse again - many alcohol on him and around - did he drink to death?	**Corpse, Reason for Death Prop Hint**
152	31a	Bioshock 1 Remastered	Smuggler's Hideout	Definitely been drinking	
153		Bioshock 1 Remastered	Smuggler's Hideout	Fully loaded alcohol when looting him	**Looting Mechanic Reason for Death Hint**
154	32	Bioshock 1 Remastered	Smuggler's Hideout	Small hole with loot	**Loot**
155		Bioshock 1 Remastered	Smuggler's Hideout	Light just happens to shine on the spot, contrasting with in the darkness	**Lighting, Contrast**
156		Bioshock 1 Remastered	Smuggler's Hideout	Just in range to be picked up	**Looting Mechanic**
157		Bioshock 1 Remastered	Smuggler's Hideout	Why there? I don't know	**Reason for Prop Placement**
158	32a	Bioshock 1 Remastered	Smuggler's Hideout	Right after explosion of bathysphere of atlas’s family	**Location, Story Context**
159		Bioshock 1 Remastered	Smuggler's Hideout	Emotional scene, interesting in that you see how corpses/environmental storytelling are made in real time	**Emotional Scene, Creation of Environmental Setups during play**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	Code
160		Bioshock 1 Remastered	Smuggler's Hideout	Burned and crushed	**Reason for Death**
161	33	Bioshock 1 Remastered	Smuggler's Hideout	Small signs point to where doors lead	**Signposting**
162		Bioshock 1 Remastered	Smuggler's Hideout	Bright red emissive lighting attracting eye	**Emissive Lighting, Strong Colours**
163		Bioshock 1 Remastered	Smuggler's Hideout	Happens to be where atlas tells you to go - confirms is correct direction	**Related Character Speech**
164	34	Bioshock 1 Remastered	Arcadia	Much loot, coffin with person inside	**Corpse, Loot**
165		Bioshock 1 Remastered	Arcadia	Rather than lighting, the open door leading to this room attracted attention - generally functional doors are closed, but this one was open already	**Open Door, Difference from Game Norm**
166		Bioshock 1 Remastered	Arcadia	Simple corridor leading to cache	**Confined Space, Corridor**
167		Bioshock 1 Remastered	Arcadia	Smugglers motif suggesting this is where they hid weapon supplies	**Motif Hint**
168	35	Bioshock 1 Remastered	Arcadia	From a small starting area opening up to this	**Spatial Contrast**
169		Bioshock 1 Remastered	Arcadia	God rays and greenery not seen before this level	**God Rays, New Colour, New Environment**
170		Bioshock 1 Remastered	Arcadia	Creates sense of awe, larger than it is	**Sense of Awe**
171		Bioshock 1 Remastered	Arcadia	As if in greenhouse	**Connection to Common Knowledge**
172		Bioshock 1 Remastered	Arcadia	Lighting shining directly on greener areas, creating greater contrast	**Lighting, Saturation, Contrast**
173		Bioshock 1 Remastered	Arcadia	Generally increases sense of exploration - greater awareness of environment in beginning	**Encouraging Exploration, Alert**
174	36	Bioshock 1 Remastered	Arcadia	Table on top of hill	**Prop Placement**
175		Bioshock 1 Remastered	Arcadia	Chair clearly rolled down hill	**Related Prop Placement,**
176		Bioshock 1 Remastered	Arcadia	But how'd she die on such a shallow hill - explosion?	**Corpse, Reason for Death**
177	37	Bioshock 1 Remastered	Arcadia	Cry for help	**Spatial Speech**
178		Bioshock 1 Remastered	Arcadia	If no subtitles, would not have know was splicer	**Mystery Caller**
179		Bioshock 1 Remastered	Arcadia	Attracted me, as many enemies immediately are hostile and do not call for help	**Non-Hostile Enemy**
180		Bioshock 1 Remastered	Arcadia	Heightened cautiousness	**Cautiousness**
181	38	Bioshock 1 Remastered	Arcadia	Another shadow - clearly enemy	**Shadow Silhouette**
182		Bioshock 1 Remastered	Arcadia	When approached, disappear	**Horror Elements, Scripted Event**
183		Bioshock 1 Remastered	Arcadia	Heightened cautiousness - but looking for enemy instead of environment	**Enemy Cautiousness**
184		Bioshock 1 Remastered	Arcadia	Darkness other than signposting and enemy shadow - quick to see	**Clear Silhouette, Eye Catcher**
185	39	Bioshock 1 Remastered	Arcadia	Clear spotlight	**Spotlight**
186		Bioshock 1 Remastered	Arcadia	details, loot, and weird antler toy thing - new motif	**Details, Loot, New Prop Motif**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	Code
187		Bioshock 1 Remastered	Arcadia	Shadow in the back makes it a bit ominous	**Shadow**
188	40	Bioshock 1 Remastered	Arcadia	Atlas - person you are talking to	**Related NPC Prop**
189		Bioshock 1 Remastered	Arcadia	Something fishy	**Alert**
190		Bioshock 1 Remastered	Arcadia	Foreshadowing narrative	**Foreshadowing**
191		Bioshock 1 Remastered	Arcadia	Accept and move on - nothing to do	**Player Futility**
192	41	Bioshock 1 Remastered	Arcadia	Why are we seeing these posters only here though?	**Reason for Prop Placement**
193		Bioshock 1 Remastered	Arcadia	We know this is a vacation place from the posters put above - what to gain here?	**Reason for Prop Placement, Placement Motivation**
194	42	Bioshock 1 Remastered	Arcadia	Music can be heard coming from these speakers even from outside, a few rooms far away - getting louder as you get closer - very high class hotel waltzy music	**Spatial Music, Music Genre, Atmospheric Cohesion**
195		Bioshock 1 Remastered	Arcadia	This must be the main chamber/room if the music is here	**Special Audio**
196	43	Bioshock 1 Remastered	Arcadia	I first noticed something different with ceiling - cracked?, many patches	**Abnormal Texture**
197		Bioshock 1 Remastered	Arcadia	Weird - looked like mold, not normal ceiling	**Abnormal Texture**
198		Bioshock 1 Remastered	Arcadia	Looks like a store room	**Details, Connection to Common Knowledge**
199		Bioshock 1 Remastered	Arcadia	Needed hacking to get in - spent effort	**Effort To Reach Area**
200	43a	Bioshock 1 Remastered	Arcadia	Look down, Noose, see rope tied to corpse	**Reason for Death**
201		Bioshock 1 Remastered	Arcadia	Why did he die? No idea	**Motivation for Death**
202		Bioshock 1 Remastered	Arcadia	Loot around him, but thats it	**Loot**
203	44	Bioshock 1 Remastered	Arcadia	How did he get buried	**Method of Death**
204		Bioshock 1 Remastered	Arcadia	Maybe someone was trying to bury him instead?	**Law of Closure**
205	45	Bioshock 1 Remastered	Arcadia	Clear sign	**Signposting**
206		Bioshock 1 Remastered	Arcadia	Looks like something is here	**Sense of Area of Interest**
207		Bioshock 1 Remastered	Arcadia	Turns out main quest needs you to go here later	
208	46	Bioshock 1 Remastered	Arcadia	Clearly crawled a distance from blood trails	**Blood Trails, Corpse Pose**
209		Bioshock 1 Remastered	Arcadia	From who? Who killed him?	**Reason for Death**
210		Bioshock 1 Remastered	Arcadia	Some baddie must be coming from there	**Deduction, Telegraphing**
211		Bioshock 1 Remastered	Arcadia	Did it? Not really - at least, not a super strong miniboss	**Subverting Expectation**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	**Code**
212	47	Bioshock 1 Remastered	Arcadia	Glyphs hidden behind bush - what does it mean?	**Motif, Hidden Sign, Unknown Sign Meaning**
213		Bioshock 1 Remastered	Arcadia	Saw before, common motif for something - but for what?	**Common Motif**
214	47a	Bioshock 1 Remastered	Arcadia	Looks like some egyptian hieroglyph?	**Connection to Common Knowledge**
215		Bioshock 1 Remastered	Arcadia	Cannot translate - nothing to	**Lack of Methods for Understanding**
216		Bioshock 1 Remastered	Arcadia	Appeared in the creepy splicer cult cave too	**Previous Motif Encounters**
217	48	Bioshock 1 Remastered	Arcadia	In game explanation by atlas about posters - trustworthy?	**Sense of Unease, Related Narration Speech**
218		Bioshock 1 Remastered	Arcadia	Triggered when entering level - more aware of environment if not seen first - what is he talking about? What kind of things is he mentioning?	**Scripted Event, Environment Awareness, Unknown Character History**
219		Bioshock 1 Remastered	Arcadia	Then notice the posters and signs, doubting identity of atlas	**Character Identity, Sense of Unease**
220	49	Bioshock 1 Remastered	Arcadia	What a funny position to die in	**Corpse Pose**
221		Bioshock 1 Remastered	Arcadia	Looks like a doctor or something	**Corpse Dress, Connection to Common Knowledge**
222	50	Bioshock 1 Remastered	Arcadia	How the hell this dude die when inventing stuff	**Reason for Death**
223		Bioshock 1 Remastered	Arcadia	Putting corpses for sake of putting corpses? Probably not, but nothing else to go on	**Meta-Reason for Prop Placement**
224		Bioshock 1 Remastered	Arcadia	Ignore the corpse setup quickly as there is nothing to do	**Ignored Setup**
225	51	Bioshock 1 Remastered	Arcadia	Decaying world	**World State**
226		Bioshock 1 Remastered	Arcadia	Dont see broken vending machines often - attracted because loot and is strong lighting	**Special Prop Placement, Loot, Lighting**
227		Bioshock 1 Remastered	Arcadia	Not much else - oh hey loot	**Loot**
228	52	Bioshock 1 Remastered	Arcadia	Red lighting - signifies something important is here	**Strong Colour, Visual Language**
229		Bioshock 1 Remastered	Arcadia	First time pass through, nothing much to loot - other than sound recording which hints at what kind of special flowers are there	**Lack of Loot, Special Location Hint**
230		Bioshock 1 Remastered	Arcadia	Second time pass - turns out is part of main quest	**Main Quest Setup**
231	53	Bioshock 1 Remastered	Arcadia	Warm lantern lighting contrasted in dark background easily attracted me	**Warm Lighting, Colour Contrast**
232		Bioshock 1 Remastered	Arcadia	Slumped over - carried lantern?	**Corpse Pose, Prop Connection to Corpse**
233		Bioshock 1 Remastered	Arcadia	Audio recording doesnt really explain much either	**Unknown Reason for Death**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	Code
234	54	Bioshock 1 Remastered	Arcadia	Interesting - have not seen handbags often	**Special Prop**
235		Bioshock 1 Remastered	Arcadia	Whats in the handbag?	**Loot**
236		Bioshock 1 Remastered	Arcadia	Died over gene bank - overdose?	**Reason for Death, Connection to Location**
237	55	Bioshock 1 Remastered	Arcadia	Dead cat with blood - different corpse type, cat more emotional - something special	**Special Corpse, Empathetic Trigger, Cat**
238		Bioshock 1 Remastered	Arcadia	How die?	**Reason for Death**
239		Bioshock 1 Remastered	Arcadia	Blood trails to overturned box - was cat inside? Crushed by falling box?	**Blood Trails, Corpse Pose, Reason for Death**
240		Bioshock 1 Remastered	Arcadia	No loot made me focus more on environment	**Lack of Loot, Empathetic Corpse, Finding Reason for Death**
241		Bioshock 1 Remastered	Arcadia	Until… end of corridor - separated from death setup	**Separated Loot from Corpse**
242	56	Bioshock 1 Remastered	Arcadia	Altar like thing at the end - soft lighting, but one way corridor makes me look towards it	**End of Corridor, Altar, Lighting**
243		Bioshock 1 Remastered	Arcadia	Scarecrow things - all over the place, creepy atmosphere with jade green lighting	**New Motif, Creepy Lighting**
244	56a	Bioshock 1 Remastered	Arcadia	Always wine on these tables - offering?	**Common Setups, Common Loot Types, Reason for Prop Placement, Connection to Common Knowledge, Ritual**
245		Bioshock 1 Remastered	Arcadia	Blood this time - sacrifice?	**Abnormal Traces, Blood, Ritual**
246		Bioshock 1 Remastered	Arcadia	Round Stones enhance feeling of religious altar	**Outer Prop Placement, Thematic Enhancement**
247	57	Bioshock 1 Remastered	Arcadia	More glyphs - still dont know what mean	**Common Motif, Unknown Motif Meaning**
248		Bioshock 1 Remastered	Arcadia	Emissive lighting and its shapes makes it very catch my eye	**Emissive Light, Unique Shapes**
249	58	Bioshock 1 Remastered	Arcadia	See person running out in flames, die in front of you	**Scripted Event, Alert**
250		Bioshock 1 Remastered	Arcadia	What happened here	**Law of Closure**
251		Bioshock 1 Remastered	Arcadia	On high alert - some enemy nearby - indeed there were, but nothing special	**Alert**
252	59	Bioshock 1 Remastered	Arcadia	Big posters, grandiose, lavish	**Large Scale, Sense of Splendour**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	**Code**
253		Bioshock 1 Remastered	Arcadia	Like vacation place, well lit, many Colours	**Connection to Common Knowledge, Colourful, Lighting**
254		Bioshock 1 Remastered	Arcadia	Different to the run down, breaking apart, contrasting with other places	**Thematic Contrast to Previous Locations**
255		Bioshock 1 Remastered	Arcadia	Still breaking down here, however - except hints at what it was before	**Hints of History**
256	60	Bioshock 1 Remastered	Arcadia	Notice blood on sack - very used to corpse existing too - where is the corpse?	**Lack of Corpse, Subverting Expectations, Blood, Law of Closure, Puzzle**
257		Bioshock 1 Remastered	Arcadia	No trails, no loot	**Lack of Loot, Subverting Expectations**
258	60a	Bioshock 1 Remastered	Arcadia	Under the stage, can find corpse with blood	**Solving Puzzle, Finding Corpse**
259		Bioshock 1 Remastered	Arcadia	Made me wonder, but not necessarily look for it	**Sense of Wonder**
260		Bioshock 1 Remastered	Arcadia	Only encountered because exploring in general	**Passive Search**
261		Bioshock 1 Remastered	Arcadia	Made connection because was close in time and space	**Spatial and Temporal Proximity between Related Player Events**
262	61	Bioshock 1 Remastered	Arcadia	Interesting view - trees under water, illuminated with warm lights contrasting with sea	**Special View, Contrasting Lighting**
263		Bioshock 1 Remastered	Arcadia	attracts my attention because never really seen this before	**Special View**
264	62	Bioshock 1 Remastered	Arcadia	Bright sign catches eye, in front of you when you open door	**Contrast, Sign**
265		Bioshock 1 Remastered	Arcadia	Sign tells me where i am	**Signposting**
266		Bioshock 1 Remastered	Arcadia	I dont really care though	**Lack of Interest**
267	63	Bioshock 1 Remastered	Arcadia	Not sure why there is a corpse here	**Reason for Death**
268		Bioshock 1 Remastered	Arcadia	Maybe because the turrets are meant to protect Langford	**Finding Reason for Death, Contextual Reasoning**
269		Bioshock 1 Remastered	Arcadia	But there's loot!	**Loot**
270	64	Bioshock 1 Remastered	Arcadia	Watching someone die in real time, again	**Creation of Environmental Setups during Play**
271		Bioshock 1 Remastered	Arcadia	Watching her write on window in real time, creating ES in real time	**Creation of Environmental Setups during Play**
272	64a	Bioshock 1 Remastered	Arcadia	Entering room, try to see the face of this person you were supposed to deliver thing to	**Interest in new Environmental Setup, Related Quest Character**
273		Bioshock 1 Remastered	Arcadia	Clearly she spent long time here, books piled up, messy work desk	**Character Identity, Character Motivations, Prop Placement, High Density of Props**
274	65	Bioshock 1 Remastered	Arcadia	More light	**Lighting**
275		Bioshock 1 Remastered	Arcadia	Glowing object - clear loot	**Non-Diegetic Spatial Highlight**
276		Bioshock 1 Remastered	Arcadia	Busy scene - somebody important just died, waw	**Details, High Density of Props**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

	A	B	C	D	E
1	ID	Game	Location	Observations	**Code**
277		Bioshock 1 Remastered	Arcadia	Places of interest with more light - chemical thrower my current goal, im guessing i need to return to the console later on	**Visual Language, Player Goal**
278	66	Bioshock 1 Remastered	Arcadia	Glyphs - emissive, can see it far away	**Emissive Lighting, Motif**
279		Bioshock 1 Remastered	Arcadia	What does it mean? No idea	**Unknown Motif Meaning**
280	67	Bioshock 1 Remastered	Arcadia	Scarecrow motif - lighting almost spotlight	**Motif, Strong Lighting**
281		Bioshock 1 Remastered	Arcadia	Dangling like hanging	**Hanging, Common Motif Placement**
282		Bioshock 1 Remastered	Arcadia	Ominous again - heightened awareness, probably enemies nearby	**Atmospheric Lighting, Alert**
283		Bioshock 1 Remastered	Arcadia	Ritual table - clearly something like that	**Ritual, Details, Connection to Common Knowledge**

Figure 62: Observations of Bioshock 1 Remastered. (Continued)

Appendix G Observation of Fallout New Vegas

	A	B	C	D	E
1	**ID**	**Game**	**Level / Location**	**Observations**	**Code**
2	1	Fallout NV	GoodSpring, Starter Area	Water tower in the player's FOV as soon as they exit the starter house	Massive Structures, Landmark
3			GoodSpring, Starter Area	Cross building in the player's FOV as soon as they exit the starter house	Landmark
4			GoodSpring, Starter Area	Red building in the player's FOV as soon as they exit the starter house	Eye Catcher
5			GoodSpring, Starter Area	The red building is the only building in sight with a different Colour palette	Contrast
6	2	Fallout NV	GoodSpring, Water Tower	Cross Building in sight of the player at all time	Landmark, Calling for the player
7			GoodSpring, Water Tower	Top of the hill of the water tower is a good vantage point for the player to plan their next step	Vantage Point
8			GoodSpring, Water Tower	Low angle composition giviging the player a wider view of the world	Camera Composition
9			GoodSpring, Water Tower	The scenery has the same shades and Colour palette	Detail blending, Contrast
10			GoodSpring, Water Tower	Fog in the distance lowering visibility further decreasing focus on the terrain	Fog, Contrast
11			GoodSpring, Water Tower	Multiple Buildings in sight adding details to a more "bland scene", catches the player's attention and helps them plan their routes	Level of Detail, Contrast, Landmark, Route Planing
12			GoodSpring, Water Tower	Signs (Props) used in the scene to warn the player from potential dangers and prevent them from taking the "Bee Line" road to their next destination	Warnings, Path manipulation
13	3	Fallout NV	GoodSpring, Cross Memorial	Cross is always in view when moving toward it making it a focal point in the center of interest	Landmarking, Layer Composition
14			GoodSpring, Cross Memorial	A small upward hill in the scene calling the player to go on top of it	Terrain Manipulation, Calling for the player, Affordance
15			GoodSpring, Cross Memorial	Once on top of the hill the player have a vantage point over the wasteland for the player to plan their next step	Vantage Point
16			GoodSpring, Cross Memorial	Fog in the distance lowering visibility further decreasing focus on the terrain	Fog, Contrast
17			GoodSpring, Cross Memorial	Multiple Buildings in sight adding details to a more "bland scene", catches the player's attention and helps them plan their routes	Level of Detail, Contrast, Landmark, Route Planing
18			GoodSpring, Cross Memorial	Signs (Props) used in the scene to warn the player from potential dangers and prevent them from taking the "Bee Line" road to their next destination	Warnings, Path manipulation
19	4	Fallout NV	Road between GoodSpring and Primm	Location of the next Area "Primm" foreshadowed by previous NPCs to be a city with a roller coaster	Foreshadowing, Using NPC's speech to guide player
20			Road between GoodSpring and Primm	Low angle view providing a wide visibility to the player and showing the road leading to their target location	Camera Composition
21			Road between GoodSpring and Primm	The scene has a very similar Colour palette and a low level of detail blending the background together, allowing the houses in the distance to be more noticeable	Coulour Contrast, Level of Detail Contrast
22			Road between GoodSpring and Primm	Fog in the distance lowering visibility further decreasing focus on the terrain	Fog, Contrast
23			Road between GoodSpring and Primm	Curved road makes composition softer and more natural	Curved road, Camera Composition
24	5	Fallout NV	Road between GoodSpring and Primm	Giant road signs on the road to Primm confirming the track the player chose	Signposting, Props
25			Road between GoodSpring and Primm	Higher level of detail and contrast attracting the player gaze	Level of Detail Contrast
26			Road between GoodSpring and Primm	Higher Colour saturation	Saturation
27			Road between GoodSpring and Primm	Sign foreshadowing what to expect in the city, an exhibition for an infamous car	Foreshadowing
28	6/7	Fallout NV	Primm	Giant sign with the name of the casinos showing where the main entrance is, Vikki & Vance Casino and Bison Steve Hotel	Signposting
29	6	Fallout NV	Vikki & Vance Casino - Primm	The first thing the player sees when they enter is Vikki & Vances car centered in the middle of the player's FOV	Camera Composition
30			Vikki & Vance Casino - Primm	Lighting Shining down on the car further highlighting it	Lighting
31			Vikki & Vance Casino - Primm	The Colour palette of the car is different than anything in the room, blue vs yellow tones	Colour Contrast, Saturation
32			Vikki & Vance Casino - Primm	Payout from previous scene - Road Sign reffering to the car	Foreshadowing Payout
33			Vikki & Vance Casino - Primm	Broken empty display case next to the car	Environmental Details, Prop Placement
34			Vikki & Vance Casino - Primm	Upon closer inspection you see a sign next to the display case stating that in the case is the machine gun used to shoot and kill the people in the car	Written Narrative
35			Vikki & Vance Casino - Primm	Naked manequines placed next to the car	Environmental Details
36			Vikki & Vance Casino - Primm	Upon closer inspection you see a sign next to the mannequins explaining that the garments worn by the mannequins belonged to Vikki & Vance	Written Narrative
37			Vikki & Vance Casino - Primm	In one frame in the player's POV, the car and the related collection of props is visible in one frame, allowing the player to make up their interpretation of what happened	Mise en Scène
38	7	Fallout NV	Bison Steve Hotel - Primm	Multiple instances in the hotel where we notice drugs and alcohol, usually next to a skeleton	Prop Placement, Environmental Details
39			Bison Steve Hotel - Primm	An interactable miscellaneous disc that gives a backstory to something that happened in the hotel	Prop Placement, Interactable
40			Bison Steve Hotel - Primm	A payout in another room than where the disc is found that ties up the environmental story	Environmental Story Payout

Figure 63: Observations of Fallout New Vegas.

	A	B	C	D	E
1	**ID**	**Game**	**Level / Location**	**Observations**	**Code**
41	8	Fallout NV	Sheriff's Office - Primm	Lighting shining down on 2 bodies laying on a bed - The town sheriff and his wife	Lighting
42			Sheriff's Office - Primm	A set of clothings next to the bed, one belonging to the sheriff and the other to the wife	Prop Placement
43			Sheriff's Office - Primm	Standard house, clean, no signs of struggle or force entry	Environmental Details
44			Sheriff's Office - Primm	The sheriff and the wife both dead on the bed, both in a sleeping position	Environmental Details
45			Sheriff's Office - Primm	The sheriff and the wife's head is blown to pieces, chunks of their head is splattered across the bed	Environmental Details
46			Sheriff's Office - Primm	Drawers, fridges and lockers are all emptied	Environmental Details
47			Sheriff's Office - Primm	In one frame in the player's POV, the player can see all the environmental details, the bed and the clothing in one sight, and the room in the peripheral visions	Mise en Scène
48	9	Fallout NV	Mojav Outpost	A monument of 2 Statues on top of a mountain visible form a very far distance	Landmark
49			Mojav Outpost	By following the road to the next objective, the monument get more and more dominant in the view and starts covering more of the player's peripheral. A combination of "High angle" and a "Side angle" composition technique is used	Landmark, Composition
50			Mojav Outpost	At the bottom of the hill are many vehicles heading toward the direction of the monument	Prop Placement, Environmental Details, Object Orientation
51			Mojav Outpost	Sharp high angle at the bottom of the hill putting more weight on the monument	Composition
52			Mojav Outpost	Angled line is used to help create a more dynamic scene	Composition
53			Mojav Outpost	Looking from the bottom toward the monument gives out an effect as if the entire environment is absorbed into a single point, the monument. Feels similar to "One point perspective" style of drawing	One point perspective?
54			Mojav Outpost	Next to the monument on top of the hill is a didactic sign explaining the lore behind the monument	Written Narrative
55			Mojav Outpost	On top of the hill reveals an outpost, cars are now passed the monument and are still moving in the same direction, still no cars heading the opposite direction	Prop Placement, Environmental Details, Object Orientation
56			Mojav Outpost	Neon-Green sign used to show that this place used to be a checkpoint	Sign Posting, Highly Saturated Colours, Colour Contrast
57			Mojav Outpost	Standing on the bottom, of the hill while the car row and the monument are in sight creats a shot that allows the player to interpret a story of what happened there	Mise en Scène
58	10	Fallout NV	Novac	A big, half-flashy broken sign is used to both highlight the name of the town, and to tell a bit of lore of how the name came to be named "Novac"	Sign Posting, Environmental Detail, Lighting
59			Novac	In town, the player can notice a giant T-Rex building towering over all others	LOD Contrast, Colour Contrast, Size Contrast, Out of place?
60			Novac	Inside the T-Red is a shop with a sign in the background that emphasizes the fact that "Yes! THEY DO HAVE T-REXES LEFT TO SELL" creating a sense of urgency	Signposting, Colour Contrast, Higher Colour Saturation, LOD Contrast, Environmental Detail
61			Novac	Breaking in the storage room behind the clerk shows a room that is FILLED with T-Rex figurines, and even more inside the boxes	Prop Placement, Environmental Detail
62			Novac	While interacting with the clerk, he emphasizes the fact that the T-Rexes are very sought after and there arent many left, calling him out reveals that he has way to many figurines and dont know how to get rid of them. Checking his wares shows that he is selling 1000 rexes for the lowest price possible	Written Narrative, Shop Narrative/Detail
63			Novac	Breaking in the clerk's house shows more T-Rexes placed around the room in different situations, highlighting either the clerk's obsession with the T-Rexes, or him becoming insane over the fact that he doesnt know what to do with all them	Prop Placement, Environmental Detail

Figure 63: Observations of Fallout New Vegas. (Continued)

Appendix H Observations of The Industry Practitioners' Focus Group Interview Part 1

	A	B	C	D	E
1	**Topic**	***Quotes***	**Observations**	**Code**	**Speaker Role**
2	Horror Games	*I think its very interesting from a design standpoint horror does the opposite of what you usually expect from a game to do.*	From a design standpoint, horror games break traditional game design guidelines	**Subverting Traditional Game Design Guidelines**	[A] Level Designer
3	Horror Games	*In other games, you usually give the player tools to handle a situation. In horror you take away those tools. I find it really interesting how you make something [still] enjoyable and fun, but to invoke an entirely different feeling*	A normal game give players tools to deal with situation, horror games take away tools, but still need to be fun and evoke different emotions	**Removing Player Mechanics, Maintaining Fun**	[A] Level Designer
4	Horror Games	*Instead of empowerment, you should feel small and stuff like that.*	The player doesn't feel empowered in horror games, but rather feels small, weak and scared	**Evoking Unique Player Emotions**	[A] Level Designer
5	Good ES and Storytelling in From Soft Games	*Every area really has its own feel*	From Software games have unique atmospheres in each game area	**Unique Atmospheres**	[B] Lead Game Designer, Game Director
6	Good ES and Storytelling in From Soft Games	*The game overall really encourages the player to explore them, both in a navigational and gameplay sense [...] with barely any handholding*	From Software games encourages the player to explore the area, in both navigational and gameplay sense to learn rules on own, with minimal handholding	**Minimal Handholding, Encourage Exploration**	[B] Lead Game Designer, Game Director
7	Good ES and Storytelling in From Soft Games	*to learn the rules on your own.*	Puts trust in player to learn the rules on their own	**Player Trust**	[B] Lead Game Designer, Game Director
8	Good ES and Storytelling in From Soft Games	*They do kind of combine the number crunchy gameplay [with] how you level up your character and build, with exploration because they are very 90s in their design*	From Software has old roots in the 1990s, which often combines RPG mechanics and encouraging exploration	**Encourage Exploration, RPG Mechanics, 90s Game Design**	[B] Lead Game Designer, Game Director
9	Good ES and Storytelling in From Soft Games	*they put a lot of trust and requirements on the player*	The games in the 90s put a lot of trust and requirements in the player	**Player Trust**	[B] Lead Game Designer, Game Director
10	Good ES and Storytelling in From Soft Games	*it was kind of the same when Breath of the Wild came out [...] because so many in the industry had been kind of missing this in the AAA games*	Similarly, Breath of the Wild was a big hit when it came out by big game developers because so many in the industry had been missing player trust in AAA games	**Player Trust, Industry Appreciation**	[B] Lead Game Designer, Game Director
11	Good ES and Storytelling in From Soft Games	*I remember playing the first Dark Souls game [...] and for the first 30 hours or whatever I was under the impression that this game doesn't really have any kind of story. But then it very very gradually grew on me.*	The participant had a gradual interest in narrative as they continued to play, and it took a long time to grow such an interest.	**Gradual Narrative Interest**	[B] Lead Game Designer, Game Director
12	Good ES and Storytelling in From Soft Games	*I was very slowly starting to notice these kind of trickling down of information, and how these objects and places and characters connected together.*	Slowly noticing the trickling down of information and how objects, places, characters connect together	**Consistent Trickle of ES**	[B] Lead Game Designer, Game Director
13	Good ES and Storytelling in From Soft Games	*Because it was consistent and [...] frequent enough that you had this constant trickle and it was there if you looked for it.*	The environmental storytelling was consistent and frequent enough that it was there if you looked for it, like a constant trickle	**Consistent Trickle of ES, Frequent ES**	[B] Lead Game Designer, Game Director
14	Good ES and Storytelling in From Soft Games	*So that it rewarded curious players the same way that checking behind the waterfall gives you a chest - its kind of the same thing.*	It rewarded curious players in the same way checking behind the waterfall gives you a chest	**Player Curiosity, Reward**	[B] Lead Game Designer, Game Director
15	Good ES and Storytelling in From Soft Games	*Many games from the 90s did it that way due to technical constraints - they couldn't do it any other way*	Games from the 90s had to rely on subtle methods of conveying narrative through environmental storytelling due to these technical constraints	**Technical Constraints, Subtle Narrative**	[B] Lead Game Designer, Game Director
16	Good ES and Storytelling in From Soft Games	*Going even further, games relied on the manuals [...] to inform the player of whatever was going on*	Going even further back, games relied on manuals to inform curious players of whatever was going on.	**Meta-game Storytelling, Technical Constraints, Player Types**	[B] Lead Game Designer, Game Director
17	Good ES and Storytelling in From Soft Games	*If you read the manual ahead of time, you wouldn't really get it because you didn't know who these characters were*	Players without knowledge of the game context wouldn't understand the narrative even if they read the manual	**Player Prerequisites for Interpretation**	[B] Lead Game Designer, Game Director
18	Good ES and Narrative in The Last of Us	*Naughty Dog has a unique way of making content: They don't typically try to do a level overview document or a game design document, they call it a chapter overview, paying attention to the fact that it is a narrative focused game.*	On the development side - Naughty dog makes content uniquely. Typically, Level Design Docs or GDDs not created, but Chapter Overview instead - it pays attention to fact that it is a narrative focused game.	**Narrative Focus During Development, Chapter-based Development**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
19	Good ES and Narrative in The Last of Us	*They're very focused on the characters, the character journeys and character development, and the characters [are] vulnerable, and they're usually [...] reacting to different stimuli*	Focuses on characters, the character journeys and development - they are vulnerable, usually reacting to different stimuli	**Character-focused Development**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
20	Good ES and Narrative in The Last of Us	*Environmental storytelling for me is some of the best in class by far. [...] offen quite emotional because of the state of the world*	Environmental storytelling in TLOU is well done because it is often emotional when reflecting the state of the world the game is based in	**Evoking Emotions through Environmental Storytelling**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
21	Good ES and Narrative in The Last of Us	*Trying to touch on themes of hope, and touch on themes of heavy contrast between what was before and [...] now so could be brutally attacked by enemies in potentially a child's room.*	Trying to touch on themes of hope, contrast between now and before of the world, can be brutally attacked in child's rooms, creating confronting moments	**Thematic Direction, Gameplay and Environmental Contrast, Moments of Contrast**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
22	Good ES and Narrative in The Last of Us	*They also do very good pacing with those elements as well*	Good pacing with gameplay and environmental storytelling elements	**Good Pacing**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
23	Good ES and Narrative in The Last of Us	*I've never been so swept up just searching people's houses and hearing their stories*	Simply progressing through the environment can evoke strong emotions	**Evoking Emotions through Environmental Storytelling**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
24	Good ES and Narrative in The Last of Us	*Usually they breadcrumb them in quite a nice way, where [...] you'll find a whole town's story and some of it will be interlinked, so I think thats where they hook you*	Usually breadcrumbed in a nice way, where a town's story is interlinked - which I think is where they hook you	**Interlinked Environmental Pieces, Breadcrumbs, Narrative Hooks**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
25	Good ES and Narrative in The Last of Us	*Its not as simple as [...] an anecdotal thing [...] but then i need to find out what happened to her because I found that there, and I know somethings going to happen to her...*	The side stories were well done because they were not anecdotal, but different setups connected to each other, pushing you to discover the full story	**Interlinked Environmental Pieces, Breadcrumbs, Encouraging Exploration, Player Curiosity**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
26	Attracting Players Who Don't Notice ES	*I think [Environmental Storytelling] works the best when it is subtle*	ES works best when it is subtle	**Subtle Environmental Storytelling**	[B] Lead Game Designer, Game Director
27	Attracting Players Who Don't Notice ES	*For players who are less interested or less observant, I would just have it in a span*	Different layers of environmental storytelling ranging from obvious to subtle can be used to account for different player types	**Layers of Subtlety**	[B] Lead Game Designer, Game Director
28	Attracting Players Who Don't Notice ES	*A game like Bioshock [...] has extremely clear - heres the big statue, the fallen icon - you can't miss it*	Bioshock, for example, has extremely obvious envrnmental storytelling pieces, like landmarks and big setups that "you can't miss"	**Obvious Surface Layer**	[B] Lead Game Designer, Game Director
29	Attracting Players Who Don't Notice ES	*when you have [...] the most important environmental storytelling elements, they also place them in such a way that is clearly presented to you*	The most important environmental storytelling elements are clearly presented to the player.	**Clear Presentation of Obvious Elements**	[B] Lead Game Designer, Game Director
30	Attracting Players Who Don't Notice ES	*they know that when you enter through this corridor you will see it - it will be in the center of the screen, there are no enemies, no gameplay, that can conflict with it.*	Extraneous game elements are removed and the main environmental storytelling element is framed in such a way to ensure all players can notice it.	**Framing, Clear Presentation of Obvious Elements, Removing Conflicting Gameplay Elements**	[B] Lead Game Designer, Game Director
31	Attracting Players Who Don't Notice ES	*After that, you can scatter out how many subtle things you want on the side - you can have all the details.*	Smaller, more subtle environmental storytelling elements can be scattered or integrated around the main ES element, which is often larger to capture the player's attention.	**Subtle ES Layer**	[B] Lead Game Designer, Game Director
32	Attracting Players Who Don't Notice ES	*Some players will [...] not even pause and look at it, but they will subconsciously get that "ok, things have gone bad here, got it"*	Some players may not even stop and think about the obvious elements, but they will subconsciously understand the theme and atmosphere	**Subconscious Understanding of Theme**	[B] Lead Game Designer, Game Director
33	Attracting Players Who Don't Notice ES	*Someone who is more curious will linger around and look around, start looking and say [...] under this fallen statue theres something else, or, over in this corner, whats that?*	Those who are more curious will explore the scene, linger around, inspect closer - under and around the larger, obvious setups. They wil then understand more details of the theme	**Curious Players, Inspecting Subtle ES Layer**	[B] Lead Game Designer, Game Director
34	Attracting Players Who Don't Notice ES	*I got the impression that there was some kind of old poster. Thats what you see at a distance. But if you really look at it, you will get more.*	For example, from far away, players will get the impression that there was an object of interest, attracting them. Upon moving closer, they will get more details, partially satisfying their curiosity. Those, who are interested, who invests more time to inspect are rewarded	**Objects of Interest, Satisfying Curiosity**	[B] Lead Game Designer, Game Director
35	Attracting Players Who Don't Notice ES	*I think this is when it works the best, when you allow for a variety of players*	ES works best when those who want to ignore it can, but can also pique the interest of those who are interested.	**Player Types**	[B] Lead Game Designer, Game Director
36	Attracting Players Who Don't Notice ES	*It took me 30 hours to start appreciating the ES for more than this subconscious perspective, and I think its really important for games [to have this].*	I believe it is very important to give player some time to gradually become invested in the narrative, then appreciating the environmental storytelling	**Gradual Narrative Interest, Gradual Appreciation of ES**	[B] Lead Game Designer, Game Director
37	Attracting Players Who Don't Notice ES	*"Generally speaking, when you start playing a game, you are not really that interested in it"*	Players are not invested or interested in the narrative or gameplay in the beginning of playing a game.	**Initial Player Disinterest**	[B] Lead Game Designer, Game Director
38	Attracting Players Who Don't Notice ES	*Sure, with a AAA - you played 60 dollars, yes, you are invested, you are going to give this game a fair chance. But even that is becoming less and less true, with all the subscription services.*	Although players spend money on games and will therefore give it a chance, it is not a strong reason. This is also less and less true due to subscription services reducing the cost even further.	**Player Monetary Investment, Initial Player Disinterest**	[B] Lead Game Designer, Game Director
39	Attracting Players Who Don't Notice ES	*"You're not going hook anyone with the details of a poster in a corner[...] because you are not invested yet"*	When starting a game, most players will not be interested in the subtle ES layers because they are not invested or interested in the narrative.	**Initial Player Disinterest, Lack of Subtle ES Interest**	[B] Lead Game Designer, Game Director

Figure 64: Observations of the industry practitioners' focus group interview, Part 1.

	A	B	C	D	E
1	**Topic**	***Quotes***	**Observations**	**Code**	**Speaker Role**
40	Attracting Players Who Don't Notice ES	*Its the same issue as any kind of media - you have to hook the player early*	Similar to other types of media, they need to hook the player early and to get them invested	**Narrative Hook, Early Player Investment**	[B] Lead Game Designer, Game Director
41	Attracting Players Who Don't Notice ES	*But the more you hook them, the more of the subtle things you can do, because the more they will appreciate the more they will look around.*	The more you hook them and get them deeper into the narrative, the more of the subtle things you can do, because the more they will look around, the more they will appreciate the environmental storytelling	**Gradual Narrative Interest, Gradual Appreciation of ES**	[B] Lead Game Designer, Game Director
42	Attracting Players Who Don't Notice ES	*But I think it is important to keep having this kind of span of things because you will have players who play through the entire game [...] without consciously caring about the narrative part of it, but they do still, I think, care about it to some extent.*	There should be a range of obvious and subtle ES layers even in the beginning of a game. For players who are not as interested, it will be mostly for the atmosphere, which they do care about, but also for the select few who are interested in the beginning as well	**Consistent Trickle of ES, Player Types**	[B] Lead Game Designer, Game Director
43	Attracting Players Who Don't Notice ES	*It is important to convey the minimal sense of narrative to everyone, I think, for all kinds of reasons.*	It is important to have an equal sense of narrative to all types of players for greater immersion and for players who gradually become interested in the narrative.	**Gradual Narrative Interest, Baseline Narrative, Consistent Trickle of ES**	[B] Lead Game Designer, Game Director
44	Attracting Players Who Don't Notice ES	*For those people who do care from the beginning [...] They will read that Skyrim book the first thing they do. If they enter this room and theres this big fallen statue, there's nothing else, their interest in the narrative is going to drop, because they perceive that [...] the game is only about the shooty shooty part.*	If only obvious aspects are presented to players who are interested in the beginning, their narrative interest will drop early - they will perceive that the game is only about the gameplay	**Curious Players, Perception of Shallow Narrative**	[B] Lead Game Designer, Game Director
45	Attracting Players Who Don't Notice ES	*If you are going to have subtle things 5 hours in, I think you need them in the start as well, because I think its really important to be consistent in that way.*	Subtle ES should be throughout entire game because it is really important to be consistent	**Consistent Trickle of ES, Subtle ES Layer**	[B] Lead Game Designer, Game Director
46	Attracting Players Who Don't Notice ES	*You're setting expectations.*	It also conditions players to look for these things, because it is about setting expectations.	**Setting Expectations, Player Conditioning**	[B] Lead Game Designer, Game Director
47	Breathing Space	*"Its very easy to end up in a position where you're making a combat-based game, so I will make an arena, and after theres an arena as well, and the player doesnt get these breaks between gameplay areas"*	It is easy to end up forgetting to place breaks for players in between high-intensity periods. In terms of level design, even combat-centric games require breathing space.	**Good Pacing, Breathing Space**	[A] Level Designer
48	Breathing Space	*Even an empty room can have a very important part of level design [...]. Theres gonna be something here, and theres gotta be something here - and here is a space for breathing where we want to talk about something.*	A breathing space creates moments of downtime, and during that time players can just roam around or talk	**Sandwiching Breathing Space, Downtime**	[A] Level Designer
49	Breathing Space	*Based on the hook, if you want a game that has a lot of narrative / environmental storytelling, [...] you need to make the players care somehow*	Based on the hook, if you want a narrative heavy game with lots of environmental storytelling, you need to make players care somehow	**Generating Narrative Interest, Character Interest**	[A] Level Designer
50	Breathing Space	*I also remember [The Last of Us] as a masterclass in environmental storytelling. [...] You're running around in a couple of sewers and there are zombies everywhere and its awful. And then you enter a shelter that has been cleared and you realize that there were people that have been living here. [...] They don't say anything. There's not a single written word, its only set pieces and the absence of gameplay, using props to tell a story.*	A powerful, emotional narrative can be created using only set pieces, props, and the absence of gameplay, as shown by The Last of Us.	**Breathing Space, Downtime, Set Pieces, Prop Placement**	[A] Level Designer
51	Breathing Space	*You have this intense gameplay experience, you understand how difficult it is to live in this world, [...] and then you enter this area where its calm, and the player can focus on something else. Since they care about the world, they're still having fun. They're still entertained.*	First there is an intense gameplay experience - players understand difficulty of living in this world, gruesomeness of the world. Then, enter somewhere calm, focus on something else Since they care about the world, still having fun, still entertained	**Good Pacing, Generating Narrative Interest, Sandwiching Breathing Space, Maintaining Fun**	[A] Level Designer
52	Breathing Space	*When you get that balance correct, then thats when you hit the sweet spot.*	When you achieve a balance of pacing and hit a sweet spot, thats when it works best	**Good Pacing**	[A] Level Designer
53	Breathing Space	*Even though you don't notice everything, every player doesn't notice everything.*	Power of games is that even if you do not notice everything, each experience is different	**Player Types, Unique Player Experiences**	[A] Level Designer
54	Breathing Space	*That's the power of games as well: Having one of these moments where someone is telling you "Oh did you notice this thing here?" and then you get curious and go back and see.*	Social aspect - if others tell you about their experience, you become interested and curious, going back to see	**Social Aspect, Gradual Narrative Interest**	[A] Level Designer
55	People Care about People	*"People in general typically care about other people, but typically don't care about places, or the game world"*	People, and players often care more about other people or themselves, but are disinterested in places.	**Character Interest, Game World Disinterest**	[B] Lead Game Designer, Game Director
56	People Care about People	*"Like [...] climate change, people don't really care about the Earth becoming a hellhole, but they do care when its affecting themselves, or someone they care about."*	People only care about places when they are related to the people they care about.	**Character Interest, Character-Environment Relation**	[B] Lead Game Designer, Game Director
57	Differences between TLOU and Bethesda Games: Caring about People	*The Last of Us [...] is all about these characters and how they move through this world. Its not really about the world; the world is there to enhance the characters.*	TLOU's environmental storytelling works well because it is used to complement the characters rather than the opposite.	**Character Interest, Character-Environment Relation**	[B] Lead Game Designer, Game Director
58	Differences between TLOU and Bethesda Games: Development Process	*[Bethesda games and TLOU] were extremely different in how they're developed. [TLOU] is based on a chapter standpoint, [...] they're super expensive, whereas Bethesda games are surprisingly low budget. The Skyrim team must have been less than a quarter of the size of TLOU team.[...] In Fallout, when you enter an area, [...] only a few people on a team were really involved in making that content. They don't have access to basically any custom props.*	Previous Bethesda games and TLOU's development were extremely different. The Last of Us's development was super expensive, heavily focusing on characters. Many custom assets are built for each level, crafted to perfection. Bethesda's budget was very low comparatively, with a team size less than a quarter of TLOU. They also had to make do with what they had, with only a few team members working on a given space.	**Development Process, Budget Constraints**	[B] Lead Game Designer, Game Director
59	Differences between TLOU and Bethesda Games: Development Process	*They pretty much have to do it with what they have. There are some really good level design techniques with how you can reuse various objects in all kinds of ways [...] There is a technique [...] where you reuse objects in different configurations [...] called Kitbashing.*	Different budgets result in different development processes, which in turn require different techniques to efficiently develop ES content. For Skyrim, Kitbashing was extensively used.	**Kitbashing, Reusing Props**	[B] Lead Game Designer, Game Director
60	Encouraging Players to Find Environmental Storytelling	*I think the most important thing in terms of getting players to find it, is obviously provide mechanisms for players to identify and understand it*	Players need to have the gameplay mechanics and tools to find, identify and understand ES	**ES Identification Mechanisms**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
61	Encouraging Players to Find Environmental Storytelling	*and also break it down into categories as well, in terms of what each ES element is going to provide for me. Theres going to be surface layer stuff in the environment, maybe even collectibles*	Break it down into categories in terms of what each kind of ES element is going to provide for me	**ES Categories**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
62	Encouraging Players to Find Environmental Storytelling	*Back to the Future [...] is a good reference for worldbuilding. They start the film, and they haven't shown a single character yet, and thats important as well because they want to build the world first, and then people can understand the world a little bit more [...] these things have presented themselves in a way without you really thinking too much about it as a viewer.*	Back to the Future is a good reference in worldbuilding and good environmental storytelling - rather than characters, the world is presented to the viewer first in such a way that players can easily and quickly understand the world.	**Worldbuilding, Low Cognitive Load**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
63	Encouraging Players to Find Environmental Storytelling	*I think Division is quite good at that where they have a lot of signposting and items in the world which are feeding back to the state of the world.[...] and thats kind of like a base layer.*	The Division's surface layer uses signposting and props to give hints and traces of the state of the world	**Signposting, Items Reflecting World State**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
64	Encouraging Players to Find Environmental Storytelling	*You can always delve deeper and find things for yourself, if you got a considered eye. For me, [...] you're not going to be looking for these things unless [...] I care about the world and the state its in.*	For players to look at environmental storytelling on the deeper level, they need to care about the world and the state its in.	**Subtle ES Layer, Player Investment**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
65	Encouraging Players to Find Environmental Storytelling	*Unless the world is readable, and clear, and I can understand the information that its giving me, and that these things are presented in a way where I can find them.*	Alongside caring about the world, the world also needs to be readable and clear to the player, who can understand the information in it in order for players to be able to find these things.	**Player Environmental Interest, Environmental Clarity**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
66	Enviromental Readability and Clarity	*Naughty Dog has a distinct advantage as well because they have such an accessibility-focused studio .[...] So when they're lending themselves into this really deeper level of how do we make sure that everyone can appreciate our game, they simplify things in a very reductive, to make sure everything is clear and readable for the player to discover*	Naughty dog has a distinct advantage as they focus on accessibility, simplifying things in a reductive manner to make things clear and readable for even disabled players to discover	**Environmental Clarity, Accessibility Considerations**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
67	Enviromental Readability and Clarity	*If they are falling in love with characters, you're gonna wanna know more about those characters as well. Thats really critical as well. Its having people in the right mindset, presenting the world in a way where it supports that discovery in the environment, and then giving them space to do it.*	When players strongly care about the characters, they will naturally try to find out more about them in various ways, such as the environment. To do so, players need to be in the right mindset, while the game needs to support ES discovery.	**Character Interest, Enviromental Clarity, Character-Environment Relation**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
68	The Right Mood	*its always going to be down to the user how they feel at any given moment, [...] some people will still miss things.*	Ultimately, it is up to player and how they feel at any given moment when playing the game Thus, they can miss things - depends on how much he/she cares about that experience - if they want to be completely immersed or not.	**Player Mindset**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
69	The Right Mood	*And for me, that comes down to how much i care about this experience. Because if I sit down to watch a film, I'm not going to have a bunch of distractions and I might choose very specifically to watch a film like Parasite with no one, because I care about it and i want it to be special.*	When preparing to watch a film, one may put themselves in the right "mood" when watching a film to make it a special experience.	**Player Mindset**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
70	The Right Mood	*If you have a beautifully masterfully paced game, people will discover a lot of things because you pace it well enough for them to take a break at the right times. When they are coming back into it, their mood can match the next experience.*	Players will discover more things in a well paced game because their mindset can match the next gameplay or narrative beat.	**Good Pacing, Sandwiching Breathing Space, Player Mindset**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer

Figure 64: Observations of the industry practitioners' focus group interview, Part 1. (Continued)

	A	B	C	D	E
1	**Topic**	***Quotes***	**Observations**	**Code**	**Speaker Role**
71	Simplifying for Accessibility	*If there is a lot of noise on the screen, [...] the eye struggles to settle. Masters of composition will create beautiful works of art by giving the eye a chance to follow on a journey on its own through a painting. When you're doing level design, you're doing something similar.[...] If you take it a step further and you are considering highly accessible options [...]. even people who dont have the same physical affordances when they are interacting with the world, everything becomes simplified, [...] clearer, [...] readable.*	Level design does similar things as painting composition to move the eye through a space, and rest on the right areas. When taking accessibility into consideration, such as Colourblindness and different physical affordances, the world needs to readable and clear enough for all players to fully experience it.	**Environmental Clarity, Accessibility Considerations, Physical Affordances, Composition**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
72	Simplifying for Accessibility	*Its really reductive in a way to make sure that the things that are important are popping and have that place of importance in the world so that players can discover them even if they have challenges with their eyes and other things.*	By being reductive, things that are important are easily discoverable and have their own place of importance in the world, even by players who have disabilities .	**Accessibility Considerations, Enviromental Clarity, Reductive Simplification**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
73	Making Players Care, Setting Expectations	*They discussed setting player anticipation which I think is a key role in this as well.*	Setting player anticipation is a key role in making players care	**Player Anticipation**	[A] Level Designer
74	Making Players Care, Setting Expectations	*If we talk about Amnesia: The Dark Descent, [...] they were talking about [...] the game starts when you press the icon to start the game, or even before that. You know that I am going to enter this experience and you brace yourself for it.*	For example, Amnesia The Dark Descent tries to set player anticipation and expectations when the player decides to start the game from the computer.	**Player Anticipation, Player Expectations**	[A] Level Designer
75	Making Players Care, Setting Expectations	*Everything in the game really tried to emphasize on that. [...] you enter a splash screen where they tell you "you're going to enter an experience based on horror, play it with a headset". [...] Even when the player is in the menu, they're like, OK, I'm already immersed.*	By setting expectations and encouraging the player to be in the right mood, the player is immersed even before the game begins.	**Player Anticipation, Player Expectations, Player Mindset, Pre-game Immersion**	[A] Level Designer
76	Making Players Care, Setting Expectations	*The reason [The Souls Games] can be so extremely inaccessible is because they set the anticipation for the player that its going to be inaccessible, and thats part of the charm.*	By setting up the player anticipation, players who want and expect that specific experience from the game will like it.	**Player Anticipation, Player Expectations, Player Mindset**	[A] Level Designer
77	Making Players Care, Setting Expectations	*But if you opened up Dark Souls and thought that you would get a story like for example TLOU which is extremely accessible, you wouldn't like it.*	If the game does not follow through after setting up the anticipation, or creating false expectations, players would not like the game.	**False Expectations, Player Anticipation**	[A] Level Designer
78	Making Players Care, Setting Expectations	*Some might argue that [bracing yourself to be scared] makes you even more scared. [...] So you're just looking like, what is going to happen, so it ramps up the tension.*	Having expectations and creating player anticipation increases tension, resulting in a greater payoff.	**Player Expectations, Player Anticipation, Tension, Player Mindset**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
79	Making Players Care, Setting Expectations	*Bad films jumpscare people too often, and they lose that sense of dread. So you've gotta use it sparingly.*	If player anticipation is not well set up, there will be no tension for players.	**Player Anticipation, Tension**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
80	Making Players Care, Setting Expectations	*In [Amnesia], it takes quite a long time before the first jumpscare. [...] For the first 20-30 minutes before you ever see an enemy or any kind of danger - they tease you about danger, you think its going to be dangerous several times*	Amnesia sets up anticipation well by slowly teasing the player several times about danger, creating rising tension, before they finally scare the player.	**Player Anticipation, Tension, Teasing the Player**	[B] Lead Game Designer, Game Director
81	Making Players Care, Setting Expectations	*I think if they hadn't had a splash screen, [...] I think a lot of players would just play it like any other first person [...] walking sim.*	Building anticipation and expectations even before the game begins can be crucial to the overall player experience because it sets the mood	**Pre-game Immersion, Player Mindset**	[B] Lead Game Designer, Game Director
82	Making Players Care, Setting Expectations	*It was good to set the expectations and know their audience as well,[...] because people might be like, oh thats not what I'm up for, and then they might leave, and thats fine as well, because if they dont want to play the game, they're not going to enjoy it, so its good to marry those expectations.*	By knowing their audience well, the Amnesia developers set up player expectations well, attracting players who wanted such an experience and turning those who don't away. Players who don't want that particular experience would not enjoy it even if they played it. Fulfilling player expectations with what the audience wants is good.	**Knowing Target Audience, Fulfilling Player Expectations**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
83	Making Players Care, Setting Expectations	*Dark souls is a good example [...] The box specifically said, "prepare to die". [...] because they set that expectation, thats what people are after.*	Dark souls set expectations even on box art, which said "prepare to die", attracting players who want a difficult experience.	**Knowing Target Audience, Fulfilling Player Expectations**	[C] Lead Game Designer, Senior Level Designer, Narrative Designer
84	Player Contract	*Theres an old [academic] term [...] which is a player contract. [...] When you start a horror game, [...] I don't want to be scared in real life. I want to enter this experience that is crafted for me that is scary. Thats true for other games as well. When I start an RPG, I make a player contract [...] and build this anticipation about entering this journey together.*	An academic term for this is called a player contract, where players agree to enter an experience detached from reality. The developer creates this anticipation of what the experience will be about, and willing players agree to partake in this advertised experience.	**Fulfilling Player Expectations, Player Contract**	[A] Level Designer
85	Player Contract	*If you can craft that before you even start the game, [...] thats when you get a player thats very immersed, and thats finds back to environmental storytelling, thats when you can add these kinds of things.*	If the player contract is crafted by the player before the game begins, that player will be extremely immersed when the game begins. Those players are the ones who will appreciate these environmental storytelling details - and it is also the type who will look for them in the beginning.	**Player Contract, Pre-game Immersion, Player Anticipation, Early Player Investment**	[A] Level Designer
86	Player Contract	*Its almost like playing a tabletop role playing game. If you always go against what the dungeonmaster says, then you dont have a good experience, because you are fighting against the game. But if everyone is aligned, [...] thats when the game starts rolling.*	Similarly, in tabletop RPGs, if players keep fighting against what the Dungeonmaster says, they will not have a good time because they are fighting against the game. In contrast, if everybody is aligned and agrees to go on this journey together, that's when the ball starts rolling.	**Fighting Against Expectations**	[A] Level Designer

Figure 64: Observations of the industry practitioners' focus group interview, Part 1. (Continued)

Appendix I Observation of The Industry Practitioners' Focus Group Interview Part 2

	A	B	C	D	E
1	**Topic**	**Quotes**	**Observations**	**Code**	**Speaker Role**
2	***Environmental Storytelling in Multiplayer***	*Here and there, Valve has scattered environmental storytelling about [Left 4 Dead's] environment, same as Last of Us [...] but especially when they turn up the knob, is in the safety vaults, or the places where each level ends. [...] Because thats the place people are going to spend a little more time. That is the down time. Some players are going to reach the vault before the other players, they're gonna spend the 30 seconds looking at it, because they can't do anything else.*	Left 4 Dead places much more environmental storytelling emphasis in the safe houses, the location players need to reach at the end of a level. These safe houses are places of downtime, where players who arrive earlier than others do not have to fight, and is the place where they will spend a little more time, increasing the probability of them investigating the environment.	Downtime Room, Removing Conflicting Gameplay Elements, Waiting for Other Players	*[B] Lead Game Designer, Game Director*
3	***Environmental Storytelling in Multiplayer***	*Overwatch is the same, but in reverse. In Overwatch, all the matches start in a closed off room for each team, those rooms are filled to the brim with enviromental storytelling about Overwatch's world.*	Similar to L4D, players who begin a match in Overwatch are put in a room with many environmental storytelling elements.	Downtime Room, Removing Conflicting Gameplay Elements	*[B] Lead Game Designer, Game Director*
4	***Environmental Storytelling in Multiplayer***	*Overwatch's world has no bearing whatsoever on the actual gameplay. Sure, there are subtle hints in the [...] main parts of the levels as well, but I would argue [...] that players are going to appreciate and notice the ones in the starting rooms by far more than anything out there, and that also helps set the mood [...] of what is this world im entering or progressing through.*	It is important to note that the game world and gameplay of Overwatch are quite separated, meaning that the environmental storytelling aspects do not affect gameplay. More players are most likely going to notice the environmental storytelling elements in the starting room compared to those in the rest of the level because of the downtime in the starting room, which in turn helps set the mood for players.	Downtime Room, Subtle ES Layer, Player Mindset	*[B] Lead Game Designer, Game Director*
5	***Environmental Storytelling in Multiplayer***	*You can create a private match and explore the environment, but you'd have to respect the fact that its not the majority of the audience that would do that. I think what you want to do is try to make sure the environment supports the player in a way which is immersive enough where they feel like they're creating their own stories.*	The majority of a multiplayer game audience wouldn't explore a level just to look for environmental storytelling. Instead, the environment should be immersive enough to let multiple players create their own stories	Inter-Player Storytelling, Environmental Support for Inter-Player Storytelling	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
6	***Environmental Storytelling in Multiplayer***	*I feel like Multiplayer so often is more about the stories you're telling through the people you interact with. [...] That to me is probably more interesting and why you don't necessarily see as deeper environmental storytelling in multiplayer games.*	Multiplayer more often is about the stories between people/players and their interactions, because it is the genre which enables such interactions. The emphasis on players creating their own stories is most likely why there is less environmental storytelling in such games.	Inter-Player Storytelling, Obvious Surface Layer	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
7	***Environmental Storytelling in Multiplayer***	*But - its not to say there aren't instances of it. [...] This is someone who jumped in a private match on Call of Duty: Black Ops 4. Contraband . [...] Basically what you are doing is contextualizing environments, and through these contextualization [...] you can add a lot more layers of detail that the majority of your players will not care about.*	One instance of detailed environmental storytelling in a multiplayer map is in Call Of Duty Black Ops 4: Contraband, which contextualizes the environment through layers of detail, creating an inherent story related to the level. Being a multiplayer map, the majority of players will not notice the more subtle layers due to the high intensity gameplay.	Contextualizing Environments, Subtle ES Layer, Lack of Player Environmental Interest	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
8	***Environmental Storytelling in Multiplayer***	*But, there will be people who do [notice the ES details], and interestingly enough there are also pro players who use them for callouts, "I'm near this thing or that thing". [...]*	But, those who do care are rewarded, and there may be unintended usage scenarios, such as pro players who use ES signs and elements for callouts for map awareness.	ES Gameplay Uses, Reward, Player Curiosity, Subtle ES Layer, Callouts	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
9	***Environmental Storytelling in Multiplayer***	*Again, know your audience, and then balance the weight you put into your environmental storytelling towards that audience, because I think everything in game development to a degree has to be down to what value you bring to your players.*	It is important to first understand the target audience, and balance the work put into environmental storytelling towards that audience, because the game needs to bring the maximum value possible to the players.	Player Value, Knowing Target Audience, Balancing ES	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
10	***Designing Experiences for Different Player Types***	*For me, you always want to convert people to an experience which you know is going to be cool or fun, and not necessarily have them missing out on something.*	Rather than ignoring different types of players outside of the target audience, it is better to be able to convince the different players types that the game experience is fun	Converting Players to New Experience, Player Types	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
11	***Designing Experiences for Different Player Types***	*In a way, when you finish a single player campaign, theres a goal for developers to potentially transition you into multiplayer, and share an experience with your friends, and ideally some aspects of the game have prepared you for multiplayer: I've seen the story, [...] what else does this game have to offer?*	One example of converting or convincing players is to create a transition between single player campaigns and multiplayer of a game. Some methods include combining familiar aspects and new concepts, as well as social aspects of joining a game with friends.	Transitioning Players, Social Aspects	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
12	***Designing Experiences for Different Player Types***	*You can't make a game for everyone. [...] I think its down to tailoring the weight you put into [Environmental storytelling] towards the audience you know is coming to play your game*	One cannot make a game for everyone. Rather, it is down to tailoring the weight of environmental storytelling towards your target audience	Knowing Target Audience, Balancing ES	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
13	***Designing Experiences for Different Player Types***	*PvE has way more weight, because you know there are those moments of calm.*	More effort would be put into creating environmental storytelling in games with Player vs Enemies, as designers can put moments of calm more predictably into the level.	Breathing Space, PvE, Balancing ES	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
14	***Designing Experiences for Different Player Types***	*We often knew that players would be sitting there, doing emojis and this sort of stuff, and thats going to compete with the narrative you are trying to craft, but we dont want to remove that social interaction, either, so its like, where is the balance.*	Although player actions may compete with the narrative developers want to craft, we don't want to remove that player interaction. As such, there needs to be a balance between the depth of narrative and player interaction, based on the audience.	Balancing ES, Knowing Player Audience, Game World Disinterest	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
15	***Designing Experiences for Different Player Types***	*You can also categorize players with telemetry as well, which is going to break down [the player types].*	Players can be categorized with telemetry, helping to break down player types and understand your audience better.	Telemetry	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
16	***Designing Experiences for Different Player Types***	*Is there going to be the single player enthusiast, who doesn't even want to play with his friends, and you've gotta know that [...] 15,10% is that player. [...] The majority of people is like PvE, Looter shooter gun collecting enthusiast who don't give a crap about your narrative and you really have to hit them over the head for them to even appreciate it in the smallest of ways, so thats when you might have to tone down some deeper level "Parasite" narrative to something more like "The Rock and Michael Bay".*	A small percentage of players in PvE games are often single player enthusiasts. The large majority of players who play PvE probably do not care about the game narrative, as they are having fun with the gameplay and player interactions. To support these actions, the narrative may have to be more grandiose and perhaps less contemplative or "deep".	Balancing ES, PvE, Telemetry, Modifying Narrative to Support Gameplay	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
17	***Designing Experiences for Different Player Types***	*The narrative can have deeper levels and the environmental storytelling can have deeper levels. But, in terms of the core objective and things they need to understand and all the players are doing -this-, you need to be really clear, simple, focused around easily understood things in the environment which are strong to the player. More than ever, because they are distracted by the idiots around them.*	Both the narrative and environmental storytelling can have deeper levels. But, the core objective and things they need to understand in the midst of player interactions are more important. Thus, the environment needs to be clear and simple, focusing on easily conveying gameplay related elements to the player despite all the distractions.	Balancing ES, Layers of Subtlety, PvE, Environmental Clarity	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
18	***Attracting Player Attention Techniques***	*We use a pacing graph [to attract player attention], straight away, so I know that I put the moment into a narrative moment to make them potentially see things.*	A pacing graph can be used to see when players enter narrative moments, which are more controllable by the designers. In doing so, players are more likely to see environmental storytelling elements placed within these narrative moments which often have less or no intensive gameplay elements.	Pacing Graph, Narrative Moment	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
19	***Attracting Player Attention Techniques***	*You can also incentivize observation through their positioning. If you move the player forwards to a balcony or something and stop them, straight away, they are actually observing and you are inviting observation as well, because of the level geometry itself, so that can be a nicer way.*	Players can also be attracted towards a location by positioning as welt. This can be done by placing the player in an area where they can overlook a large area. The level geometry should also be designed to invite players to observe, or focus on areas of interest.	Level Geometry, Positioning, Incentivizing Observation	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
20	***Attracting Player Attention Techniques***	*I think [Participant U] touched on framing, making sure its just a quieter, slow paced moment. That pacing I think is really important though, because in a varied experience, monitoring the fatigue of players. We've said things like "this mission is too long, we're going to cut it because its not fun to play for such a long time"*	Framing, lowering the intensity of gameplay are useful when trying to direct or encourage attention of environmental elements. Pacing is important to created a varied experience. Telemetry can be used to monitor the fatigue of players to determine if players are under a cognitive load for overly extensive amounts of time, in which case the intense gameplay moments should be made shorter.	Good Pacing, Telemetry, Player Fatigue, Alternating Cognitive Load	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
21	***Attracting Player Attention Techniques***	*Theres a good amount of time that you want to be in a cognitive load which is high, and then a good amount of time you want a break to solve a puzzle. [...] These kinds of moments they can direct your attention to things, or through the puzzle solving you can direct the player's attention to those things as well to make sure they are noticed.*	To achieve good pacing, there should be alternating moments of high and low cognitive loads for players. There are sweet spots for both, and during the low cognitive load sessions designers and developers can direct the player's attention to certain elements more easily.	Good Pacing, Alternating Cognitive Load, Sandwiching Breathing Space, Removing Conflicting Gameplay Elements	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
22	***Attracting Player Attention Techniques***	*Something I've noticed many games do and I do this as well sometimes - you light up the area and try the make the area you are "supposed" to go very clear - this is the door you need to take to progress the story or the critical path. But theres also more paths. That is when you get this play of understanding which I kind of enjoy both to create and play: When you realize you are exploring, you're making the active choice of straying from the main path to see if you can find something more. Because then you are not confused where you are supposed to go - you are making a choice.*	Lighting can be used to aid player navigation. One technique is to make the direction to the critical path very clear using bright lighting. Players can then understand that they are exploring if they choose to stray from the main path. This player choice is important because they do not become confused.	Player Choice, Lighting, Contrast, Critical Path, Signposting, HIghlighting,	*[A] Level Designer*
23	***Attracting Player Attention Techniques***	*If you go into a balcony and you see an interesting object in a distance, the game should scream to you this is where you should go. But if you turn and go somewhere else, you know you are making that choice.*	Similarly for player positioning and level geometry, there should be a clear indicator of where the player should go to progress the critical path. The player can then understand the choices they have, and are aware that they are making a choice to explore./	Player Choice, Critical Path, Signposting, Positioning, Level Geometry, Observation	*[A] Level Designer*
24	***Attracting Player Attention Techniques***	*It depends on how we talk about environmental storytelling as well. [...] If I was working on a multiplayer map and the one time I did work on a multiplayer map, what I was thinking from an environmental storytelling perspective then is mainly to create this macro scale environmental storytelling, where I was thinking ok, how do we make these callout points [...] so that players can create their own narrative?*	As multiplayer games are about player interactions and the narratives they create, the environmental storytelling in multiplayer levels are often more on a larger, macro scale which are more related to buildings and the level geometry. The environment needs to support player interactions, for example through callout points.	Callouts, Macro Scale ES, Environmental Support for Inter-Player Storytelling	*[A] Level Designer*
25	***Attracting Player Attention Techniques***	*If its just an arena, where everything looks the same, you can't talk about the level. So I think its very important to get that sort [of environmental storytelling] - which is also environmental storytelling, in a way, its just a very macro scale [type].*	A multiplayer level needs to be designed in such a way that players can talk about the level.	Environmental Support for Inter-Player Storytelling	*[A] Level Designer*
26	***Macro vs Micro Scale ES***	*I agree that the macro stuff is the most important when you start working, because thats when you can really affect the overall design of an area - thats when you really need when you are planning the level out on paper, doing the first blockouts, then you need these big set pieces. You need to take into consideration how you are entering this area, how are you framing these things, because they are going to affect so much.*	Since the macro level ES encompasses the general layout of a level, it greatly affects the overall design of an area. From a production point of view, the early sketches, blockouts, and big set pieces are designed early on, because they are the foundation of the rest of the level. Therefore, the macro level design is the most important.	Macro Scale ES, Level Geometry	*[B] Lead Game Designer, Game Director*
27	***Macro vs Micro Scale ES***	*Whereas the minor things, the details, the minor props, you can add, you can tweak them much later. From a production point of view, they are less important. They are also less important in the sense that some players are not going consciously care about them, whereas everyone is going to care that you are in a bank.*	The micro environmental storytelling elements, such as the props, are less important as they can be tweaked much later in production. It is also less important because less players will care about them compared to the macro level design, which everyone is consciously aware of.	Micro Scale ES, Props, Lack of Subtle ES Interest	*[B] Lead Game Designer, Game Director*
28	***How to convey environmental storytelling***	*[The techniques] is basically [movies and pictures] that, looking at all the techniques. And also architecture, of course, even more. Looking at composition, noise, density of detail in the environment.*	Many of the techniques utilized in level and game design are derived from cinematography and architecture. Concepts such as composition, noise, and density of detail are examples of such techniques.	Composition, Architecture, Cinematography	*[B] Lead Game Designer, Game Director*
29	***How to convey environmental storytelling***	*I would guess in a multiplayer game, or action segment of a level, it could be detrimental to have too much density, or too much noise. Not just [...] to make a game that is accessible to a lot a people, but for everyone. If it is unclear if the person is behind cover, if the size and shape of the blocking cover is unclear to me, because I want to make it stand out in some narrative sense, thats just going to be detrimental to the overall experience.*	It is possible that having too much detail in a multiplayer game or action segment is detrimental to the overall player experience, if the environment becomes unclear or unreadable during gameplay for the sake of narrative. It should be clear if the enemy is behind cover, for example.	Environmental Clarity	*[B] Lead Game Designer, Game Director*
30	***Player Intuition***	*Its worth keeping in mind people in general have an intuitive behaviour which they have learned in life, and what is intuitive does not need to be learned.*	People in general do not need to learn behaviour that is intuitive. This intuition is what they have learned in life.	Intuition	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
31	***Player Intuition***	*The reason you can tap into that is because if I walk into a place for me which maybe has some intuitive expectations, I can follow those expectations to invite the story further. In Zelda they have a chest - you have an intuitive understanding of what a chest is, its interesting to open, theres a spectacle on it, all these amazing things happen, in terms of the flourish for the player.*	If designers create environments with some intuitive expectations, players can follow these expectations to naturally progress the story. Zelda, for example, places items in chests, and when players open it they create a spectacle for the player. Players have intuitively understood what chests do - they contain items.	Intuition, Environmental Expectations, Fulfilling Player Expectations	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*

Figure 65: Observations of the industry practitioners' focus group interview, Part 2.

	A	B	C	D	E
1	**Topic**	**Quotes**	**Observations**	**Code**	**Speaker Role**
32	***Player Intuition***	*Knowing your audience, taking them into a game which may have deeper levels of environmental storytelling and layers there which can be finely tuned could be as simple as a child's bedroom, a home office or something.*	It is important to know your audience and the types of intuitions they generally have. Deeper levels of environmental storytelling can exist by designing commonly understood areas, such as a child's bedroom or office, well.	Knowing Target Audience, Layers of ES, Intuition	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
33	***Player Intuition***	*Dishonored is great with these safes, and you're on the lookout for these safes all the time because you have a reward - intrinsic reward in a gameplay sense, but also you have expectations from the environment in terms of where a safe might actually exist, and its contextualized well in the environment and the storytelling, and the things you find in a safe speak further to the narrative sometimes as well so that - that is where everything is coming together in terms of the environment, maybe a collectible I found here is speaking to another thing here, the environment is guiding me there, and then I need to understand how to break into this safe, and looking through the environment I'm thinking: what kind of person lives here?*	The safes in Dishonored are a good example, because players expect useful items in them. In the game, it does provide this intrinsic reward for the player when it is opened. The safes are also placed in believable locations where people expect them to be in reality, and they are contextualized well in both the environment and storytelling. Finally, the items the player finds can further enhance the narrative. The combination of intuition, expectations, and contextualization from the environment and storytelling create strong environmental storytelling. When props, the environment itself, and gameplay are linked together to create a cohesive narrative, players will begin to intuitively delve into the deeper layers of environmental storytelling.	Intrinsic Rewards, Player Expectations, Environmental Contextualization, Environmental Expectations, Interlinked Environmental Pieces, Intuition	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
34	***Player Intuition***	*That again is intuitive - if its this kind of person, maybe they would put their safe key here - those kind of things can be way deeper layers of environmental storytelling that ultimately sometimes boil it down to: People want to understand what has happened to spaces because they are interested in it.*	Players intuitively think about how the environment and props play a part in the narrative. Ultimately, this is because people want to understand what has happened to spaces because they are interested in it.	Intuition, Environmental Expectations, Fulfilling Player Expectations, Game World Interest, What Happened Here	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
35	***Player Intuition***	*At a surface level, there could be so many simple things that can influence that from an environment point of view maybe it helps to break down the types of ES that you want to do and how they support the player as far as is it just visual, am I supposed to interact with it, to absorb more story, is it intuitive, do I need to delve deeper to find it?*	Breaking down how different types of environmental storytelling support the player can help understand the multiple things which can influence why and how people understand spaces. Environmental elements can be simply visual, interactive, to develop the narrative, is intuitive, or need players to think about it to find these elements.	What Happened Here, Types of Environmental Storytelling, Intuition	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
36	***Gameplay and Mechanics affect on ES***	*It can be tracked with rational level design. Monitoring each part of your level and how many things they put into it*	By using **Rational Level Design** the developpers are able to objectively quantify elements of user experience in order to create a consistent gameplay experience	Rational Level Design, Tracking, User Experience	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
37	***Gameplay and Mechanics affect on ES***	*A game can decide to be empty of traditional mechanics, ex. collectibles, enemies, actions, may not be present until a certain point.*	Holding off traditional mechanics from a game allows the player to be comfortable with their current kit and focus more on immersing themselves in the game and environment	Hold off Mechanics, Late Introduction, Immersion	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
38	***Gameplay and Mechanics affect on ES***	*Last of us limits the number of affordances provided in the beginning of the game, which allows the player to focus on understanding the game. Helps emphasise certain things by turning off others.*	By removing affordance from a scene, gives the player the chance to process what is already in their arsenal and what is around them	Limit Affordances, Highlight by Removal	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
39	***Challenges that come with designing Mechanics for ES***	*Player not really caring about it*	The developpers can try as much as they can, but it won't do much if the players arent interested in the ES aspects	Player Interest	*[B] Lead Game Designer, Game Director*
40	***Challenges that come with designing Mechanics for ES***	*It's not that bad if people don't consciously care or notice environmental storytelling, because it is inherently subtle, it's more about creating immersiveness. It's only super important in a select few titles to focus on player awareness.*	Attracting the player attention is not as important on the field as getting the players immersed in the game, in some titles its more crucial	Immersion, Sublte ES	*[B] Lead Game Designer, Game Director*
41	***Challenges that come with designing Mechanics for ES***	*Multiplayer games tend to go for more* ***Macro Level Design*** *due to the number of things happening around the player. And even that is meant to add to the sense of immersion.*	In multiplayer games, the players don't have time to stand around and look into the smaller details of the environment (**Micro- Level Design**) but that doesn't that the developpers totally ignore the environmental storytelling of a game, they just change the perspective from smaller objects like props to massive objects like landmarks and buildings and clear setups, and use that to tell a story	Macro/Micro Level Design, Immersion	*[B] Lead Game Designer, Game Director*
42	***Drawing Techniques, Vanishing Points and Composition***	*Do drawing techniques like 'One point perspective' and 'Vanishing points' also used in level design? - Sam - // - Yes they are - Everyone*	Techniques and methods taught in art and drawing are used in Level Design, or at least they are massively taken into consideration.	One Point Perspective, Vanishing Points	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
43	***Drawing Techniques, Vanishing Points and Composition***	*It's a subgenre of Composition in Level Design*	Composition in Level Design is used while level designing	Composition in Level Design	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
44	***Drawing Techniques, Vanishing Points and Composition***	*About FNV Mojave Outpost Monument – In the sense of massive open world games:* *Is the scale of the point of the monument big enough?* *Is there enough contrast in the environment?* *No, it's not good enough. Lots of brown on grey. Lots of Colours blending*	Clarity, Readability and Level of Noise are taken into consideration while level designing. In the frame shown from Fallout NV, Micheal thought that the level of design couldve been more refined, the Colours in the scene are blending together and clarity isn't taken into consideration	Clarity, Readability, Level of Noise, Colour Contrast, Scale, Landmark	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
45	***Architectural Principles***	*Using landmarks and points of interest can be used as set up for a greater viewpoint* *Looking for ways to keep important things important even if obstructed briefly* *Using that in combination chokepoints*	An architectural principle known as **Denial and Reward** is a technique, where you can lure the players attention with a beautiful sight, obscure it using certain objects like trees which will remove it from the player's FOV making them having to go around said obstacle to see it again, and there the designers can reward the player with an even BETTER sight, or with anything really	Denial and Reward, Curiousity, Obstruction, Highlight by Removal	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
46	***Disney Principles***	*The way they frame the castles so its visible from anywhere in the park*	Disney parks are very influential on how to craft environments from a level design point of view. The park is designed in a way that the castle can always be seen from any angle of the park.	Framing, Composition, Landmark	*[B] Lead Game Designer, Game Director*
47	***Tommy Norberg***		Tommy Norberg is a **Level Designer** that people in the Swedish industry, afawk, tend to reffer to when thinking about level design		*[A] Level Designer*
48			Tommy Norberg has a lot of contents around Landmarks, Focal Points and Breadcrumbs amoung other things	Landmark, Focal Point, Breacrumbs	*[A] Level Designer*
49		*Everything we are talking about are things level designer always think about*	Simply a confirmation from the speaker that we are on the right track		*[A] Level Designer*
50		*Skills earned by level designers are learned through techniques and later becomes used subconsciously* *ex: Using the rotation and orientation of an object to point the players*	Level designers tend not to think of techniques when working on the games, all the skills they amassed becomes subconscious to them. Using rotation and orientation of objects can be used to subconciously guide the player's focus and sense of direction	Subconcious, Orientation, Rotation	*[A] Level Designer*
51		*If while running around the level and there is nothing to remind the player of the objective, the player might end up being confused.*	Player's attention span is assumed not to be very high, for that reason, the player's needs to be constantly reminded of their goal, or destination, throughout their gameplay and exploration	Attention Span, Reminder of Objective	*[A] Level Designer*
52		*After 30 seconds the player will probably forget their objective*	Having a **Focal Point** of goal or destination in the player's FOV. It's okay for the designer to drop it from the player's peripherals for a set amount of time, but not for long. The focal point needs to be visible to the player as a reminder of the objective	Focal Point, Attention Span, Reminder of Objective. Peripheral Vision	*[A] Level Designer*
53		*Constantly remind the player of the objective*	–> Quote	Reminder of Objective	*[A] Level Designer*
54	***Player Anticipation and Player Contract***	*'There is no actual reason for me to be here'– 'There is no reason for me to play this game'*	The players are making a choice to play the game	Player Contract	*[A] Level Designer*
55	***Player Anticipation and Player Contract***	*If the game tells the player that "this" is an important piece and the player chooses to ignore it, then they will not have a good time ,and that is outside the developer's control*	When the the designers presents important moment to the players, and if they choose to ignore it, the player will then not enjoy themselves, It's like they are choosing to go against the game, or choosing simply choosing not to play it. In such scenario, there is no player contract and the designers can't do much more to help fix that	Player Contract	*[A] Level Designer*
56	***Player Anticipation and Player Contract***	*BUT, it's on the developer's to ensure that if the player do follow the lead, that there is actually something there.*	The players that choose to follow the trails laid by the developers and designers need to feel that their choice was worthwhile. If the developers and designers lead the player, then they also need to ensure that the player is compensated for the time spent. That is what creates the **Player Contract**, and lays a foundation for **Player Anticipation** for future leads.	Player Anticipation, Player Contract	*[A] Level Designer*
57	***Player Anticipation and Player Contract***	*Need to be clear on what are an accessible structure and what isn't*	Designers and developers need to be consistant and clear on what objects can be interacted with and what structures can be accessed. This ties back to player anticipation, where the players should be able to tell what element in the game is worth inspecting	Accessible Structure, Clarity, Consistency, Player Anticipation	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
58	***Player Anticipation and Player Contract***	*Have a clear and consistent signposting*	- Same as above -	Signposting	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
59	***Player Anticipation and Player Contract***	*With good planning, random building can add value to the player experience*	Just because certain structures are not accessible to the players doesn't mean that they are not useful. When done correctly, these buildings can elevate immersivness and player experience by adding another layer of environmental storytelling.	Player experience, Immersion	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
60	***Player Anticipation and Player Contract***	*Don't waste player's time, if an area is highlighted and they go to it, reward them*	Always reward the players for paying attention and discovering a lead	Rewarding, Player Contract	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
61	***Player Anticipation and Player Contract***	*The Witcher 3 did a very good job in crafting points of interest and their density*	An example of a good use of **Points of Interest**	Points of Interest, Density, Player Awarness	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
62	***Player Anticipation and Player Contract***	*Good balance of giving the players enough information is needed*	A balance between giving the players enough information to pique their interest while hiding information away to make them feel accomplished upon discovery	Subtle ES, Highlight by Removal, Player Interest	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
63	***Player Anticipation and Player Contract***	*If you have many important things in a scene, you can end up in a scenario where, if everything is important in a scene, then nothing is important*	Don't have too many details in a scene	Less is More, Highlight by Removal	*[B] Lead Game Designer, Game Director*
64	***Player Anticipation and Player Contract***	*Be conscious about how many players will experience certain content.* *The lower the percentage of players is, the harder it is to argue to add content in that scenario*	There is a limtied budget when making a game, knowing your player base, and designing around that helps managing resources and applying them to where is more important.	Player Types, Budgetting	*[B] Lead Game Designer, Game Director*
65	***Player Anticipation and Player Contract***	*Using sound to highlight areas and rewarding players who pay attention will make them feel more special* *Making something less obvious to make it more rewarding*	Audio cues can be used as leads to attract player attention, and might give the player a higher feeling of satisfaction on picking up on the lead due to how subtle and time boxed audio cues tends to be.	Audio Cues, Player Contract, Player Anticipation, Highlighting, Player Experience	*[B] Lead Game Designer, Game Director*
66	***Sound Design***	*Soundtrack is very important since it will influence the mood of the player and set their anticipation for what is about to happen*	Soundtracks and music are a very important aspect in level design, it influences the player's mood and set anticipations for the scenario. A good example of a '*Masterful*' use of music and soundtrack is in '*Amnesia: Dark Descent*' where it's used to implemented a sense of dread	Player Anticipation, Setting the Mood	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*

Figure 65: Observations of the industry practitioners' focus group interview, Part 2. (Continued)

	A	B	C	D	E
1	**Topic**	**Quotes**	**Observations**	**Code**	**Speaker Role**
67	***Sound Design***		Use backing soundtracks to support the player's actions and not go against them	Soundtracks as Support	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
68	***Sound Design***		*Tom Clancy's The Division* was an example of a game that was brought up with a good use of **Diegetic Music**	Diegetic Music	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
69	***Sound Design***		Soundtracks and Audio cues can also be used to create a contrast in a scene, elevating or highlighting certain moments. Ex. In 'The Last of Us' a scene where the characters were dancing to music became a more beautiful and heavier scene due to the contrast by the chaos around them	Sound Contrast	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
70	***Sound Design***		Music can be used as a temporal keypoint and can indicate a certain time period	Temporal Soundtracks	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
71	***Sound Design***		Using audio logs at the right moment can add a lot to the environment	Audio Logs	*[C] Lead Game Designer, Senior Level Designer, Narrative Designer*
72	***Sound Design***		Using lots of logs in the game makes them less interesting especially when used incorrectly	Audio Logs, Less is more	*[B] Lead Game Designer, Game Director*
73	***Sound Design***	*We care more about people than places*	Mix Audio logs with other factors like NPCs, that will allow the audio logs to teach you more about the NPC	Audio Logs, Human Psychology (We care more about people)	*[B] Lead Game Designer, Game Director*
74	***Sound Design***		Match the moment, tailor the audio logs to the scenario	Audio Logs, Thematic Planing	*[B] Lead Game Designer, Game Director*
75	***Sound Design***		When using audio logs, a balance needs to exist tailored for the different types of players Some players will stop playing and listen to the logs, these players need to feel that they are back in action when done. Other players will ignore it and just move on so the audio log cannot be too distracting from other aspects	Audio Logs, Player Types	*[B] Lead Game Designer, Game Director*

Figure 65: Observations of the industry practitioners' focus group interview, Part 2. (Continued)

Appendix J Observations of the industry practitioner's individual interview

	A	B	C	D	E
1	**Topic**	**Quotes**	**Observations**	**Code**	**Speaker Role**
2	***Game Design Choices In "Shadow of The Colossus"***	*When killing the boss, the music shifts and becomes sad*	Using music to evoke player emotions, set up a mood and tell a story	Music, Player Emotions	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
3	***Game Design Choices In "Shadow of The Colossus"***	*Doesn't make you feel heroic*	Reverting player expectation, and makes them question their actions	Player Expectation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
4	***Game Design Choices In "Shadow of The Colossus"***	*Shifting the tone of the music*	By changing the tone of the music, the designers can evoke certain feelings and tell an underlying story	Music, Melody Shift, Player Emotions, Underlying Story	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
5	***Game Design Choices In "Shadow of The Colossus"***	*Players expects to kill stuff*	Throughout the years, gamers have been conditioned in most games to *"See enemy --> Beat/Kill enemy"* knowing that, designers can set up a scene and revert expectations. Maybe some kind of reality check, *"Why is your character doing what he is doing? Is it his will or yours?"*	Player Expectation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
6	***Game Design Choices In "Shadow of The Colossus"***	*The only life that you meet, is the big bosses that you kill, for every boss you kill the landscape gets emptier and colder*	Using empty spaces can create a sense of loneliness and in turn emphasize the player's action in the game of making the world even more lonely	Empty Spaces	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
7	***Texturing and Player Attention***	*In every single video game since The Last of Us the Colour yellow is constantly being used*	Video games has recently started adapting the Colour yellow in texturing as a mean to guide the player	Texturing, Contrasting Colour	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
8	***Texturing and Player Attention***	*In God of War the yellow marks where hidden and used as a pard of narrative*	Since the Colour yellow became overused, and is a bright Colour that is a bit in your face, God of War took the opportunity and integrated it as a part of their storyline making it a technique that is hidden in plain sight	Hiden in Plain Sight, Texturing, Contasting Colour	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
9	***Texturing and Player Attention***	*The Colour yellow is extremely overused in the industry, though for a good reason, yellow is very contrasty to a lot of Colours, using a Colour that blends with yellow is very rarely used*	As quoted, the Colour yellow is highly contrasted to most of the other Colours, while Colours that blends with yellow are rarely used in design making Yellow a Colour that is very visible in a scene	Contrasting Colour	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
10	***Texturing and Player Attention***	*Using warm lights to guide the players, tends to also be yellow*	Light is used to guide players, warm lights tends to be shaded yellow	Guiding Light, Contrasting Colour	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
11	***Journey***		In journey the designers intentionally use as very little dialogue as possible and instead use evey other medium to present the narrative, in turn making journey a very good example of how to tell a story with spoken narrative	Non-Spoken Narrative	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
12	***Journey***	*Interpret things between the lines, if you hear a melody once, and the same melody in another place in time, and the vocals has shifted its tone, whatever happens in between melodies, gets you to interpret those words differently*	A change in the same melody can represent different things and have different meanings. It is up for player interpretation	Music, Melody Shift, Player Interpretation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
13	***Journey***	*Journey is set in the desert, where the Colours are mostly yellow, so instead of using yellow as a highlight they use geometry to make contrasting areas*	Shapes and geometry can also used in contrast with the environment to attract attention	Geometry Contrast	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
14	***Journey***		Sloped geometry = big airtime = fun, player's innately find airtime fun, it becomes instinctual for when the player sees a slope when moving at high speed to aim for that slope in hope to get airtime	Sloped Geometry, Player Anticipation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
15	***Journey***	*In a scene of the game, the player is sliding down a slope, there the game sets up a moment, give the player time to take it in...*	Giving the player a breathing space allows them to process things better and gives them a moment to take in whatever they are looking at	Breathing Space	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
16	***Journey***	*...and for the first time since the start of the game the camera changes angle after a sharp turn...*	Big changes are without a doubt going to be noticeable, in Journey, the camera is always positioned behind the player, switching the camera angle from its default position will be very noticeable by the player and can be used in future setups	Big Changes, Camera Angle	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
17	***Journey***	*...then a big building is framed in the players pov in the distance that catches the player's eyes*	Big objects attract attention, a landmark in the players field of view is used to tell the player the location of their next destination	Landmark, Framing	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
18	***Journey***	*Contrasting a moment, from something very dreamy and grand to something more serious*	Moments and moods can also be used in contrast setting up expectations of what is to come	Moment Contrast	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
19	***Journey***	*Contrast is very much used in journey through shapes, Colour palettes and music*	<-- Quote	Genometry Contrast, Colour Contrast, Music Contrast	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
20	***Verticality***	*If I'm going down for quite a while, then I should know that if I go up, then there should be an exit*	**Verticality** is the position that is at right angle from the horizon, also known as *Up and Down*. In Game Design one of the uses of verticality is to guide the player. As quoted, if the player has been moving *Downwards* for a longer period of time, they then will expect that if they move *Upwards* instead that they will find an exit	Verticality, Player Expectiation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
21	***Verticality***	*Up and Down is so black and white*	In comparison to *West, East, North, South, or Forward, Backward, Left, Right that are* based on the player's camera position and rotation, the *Up and Down* position will never change, and the player will always be able to tell which side is Up or Down	Player Expectation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
22	***Player Manipulation***	*One of the most impressive things about a very well-designed games, is knowing what the players expect by now, we have them in our right hand*	Designers and developpers have learned from previous games and can now predict what the players will do in their own game, and use that and adapt accordingly	Knowing Your Players	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
23	***Player Manipulation***	*We know that the player is supposed to expect this because we told them this 20 times*	Players that have invested a huge amount of time in gaming have learned to recognize design choices made by the developers and have reached the point where they will instinctively follow a lead or an interaction since most techniques used in game design are rehashed from previous iterations	Player Maniuplation, Player Knowledge	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
24	***Player Manipulation***	*Don't make your own rules after you set up ground rules, otherwise the player will feel cheated*	When game rules and contracts have been set with the player, its usually a bad idea to break them, otherwise the player will feel cheated. Ex: Throughout the game the developper marked breakable chests in yellow, the player caught up on that and started breaking every yellow chest. But this one time the player found a chest marked in yellow but it wasn't breakable	Player Contract, Player Expectation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
25	***Environment Artist's understanding of Level Design & Game Design***		An Environmental artist is supposed to elevate the level designers' choices	Enhancing Level Designer Choices	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
26	***Environment Artist's understanding of Level Design & Game Design***		Level designers are responsible to ensure that the platforms are there if the player wants to use them	Knowing Your Players	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
27	***Environment Artist's understanding of Level Design & Game Design***		Breathing rooms can be used to implement storytelling elements	Breathing Space	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
28	***Micro-scale ES***	*Smaller props is the last thing that needs to be done when thinking about making a space tell a story*	Using props in an environment to tell a story is very effective, but that should be the last thing a designer implements in a room, the focus should be more on the environment and the space	Prop Placement, Space Design	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
29	***Micro-scale ES***	*Why did we place this building here, and not there? That is something that always need to tell something about the space*	Always think about the placement of the assets in a scene, give everything meaning when possible	Space Design	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
30	***Micro-scale ES***	*If making a train station, you wouldn't put the ticket seller at the other end of the town, these things are obvious for us but the second we stop thinking about that when designing those spaces, then we lose weight and validity for those spaces*	Always think about what each placement means, even when it is obvious, not analysing the choices made causes the spaces to lose weight and validity	Space Design	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
31	***Affordances***		Train the player througout the levels what certain shapes mean	Shape and Geometry Design, Player Expectation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
32	***Affordances***	*Oh, there are a lot of boxes here, which insinuates something*	Prop placement in the scene can be used to explain what is happening in said scene	Prop Placement, Space Design	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
33	***Affordances***	*A platform that is so not so obvious, but obvious enough that tells the player "If I go there then there might be a secret"*	People are curious by nature, if a player notices a shape, like a platform, that they recognise and its obscured, then they will be curious to check it out	Player Curiosity, Player Expectation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
34	***Affordances***		If you want to make the players NOT go somewhere, the designers can make the area "not so flat, make it more bevelled.	Terrain Design	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
35	***Example of a scene setup***	***An example of 2 similar balcony scenes in looks*** ***The route you don't want the player to take: ....***			
36	***Example of a scene setup***	*...No contrasting light source...*	If everything blends together, then nothing sticks out	Contrast, Light Source	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
37	***Example of a scene setup***	*...nothing that looks like a challenge for the player...*	An area with no challenges might seem boring to some players, it repells players in a sense	Player Challenging (Path of Resistance)	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
38	***Example of a scene setup***	*...Running there and back, there is nothing communicated to the player that this area is worth the while for them*	<-- Quote, if there is nothing that tells the player that this a point of interest, then the player will just ignore it	Player Expectation, Player Contract	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
39	***Example of a scene setup***	***The route you want the player to take: ....***			[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
40	***Example of a scene setup***	*...Sun is landing very bright on the edge, but looks natural...*	Bright light sources are an effective way to highlight areas of interest	Contrast, Light Source	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
41	***Example of a scene setup***	*...very contrasting...*	Contrast makes things stand out more	Contrast	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
42	***Example of a scene setup***	*...There is also a small gap, an easy jump, it is not going to challenge the player, but it is a small obstacle that is being put there...*	Even a small interaction is a type of interaction, even if its not that challenging, it will be enough to attract the players to do it	Player Challenging	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast

Figure 66: Observations of the industry practitioner's individual interview.

	A	B	C	D	E
1	**Topic**	**Quotes**	**Observations**	**Code**	**Speaker Role**
43	***Example of a scene setup***	*...When the player gets to the balcony, it becomes clear to see that there is not a way forward there, but that gets the player to be like "Well if I jump over this obstacle, then there might be something over there" which there is, and they are rewarded*	<--Quote, Reward the players if they pick up on the designers clues	Player Expectation, Player Contract	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
44	***Example of a scene setup***		When using natural sunlight keep track of the current time of day and aim the rays accordingly, some shifts in degree is possible and will not be noticed.	Light Source, Realism	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
45	***Micro-Shapes***	*If I want a player to move along a certain route where there aren't any big walls or cliffs, then we could make a small slope that turns the route into something like a pathway even though that space wouldn't have a pathway*	Use the terrain as a way to guide the players	Terrain Design, Pathways	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
46	***Micro-Shapes***	*Players always looking for these flat surfaces*	<--Quote	Terrain Design, Pathways	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
47	***Micro-Shapes***	*Use movements to attract attention, no need for bigger movement, they can be small movements that also can be a good way of telling a story, ex a smoke from a cigarette showing that someone was there*	Movements in a static frame is a very good way to attract the players attention	Attention Through Movement	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
48	***Micro-Shapes***	*A lot of players know what to expect so they aren't looking actively throughout the space because it needs to come to them naturally, so you need to use big strokes to lead the players*	Players that are used to gaming might not be actively looking throughout the game space, thats why the designer need to make leads and objects of interest more clear for them so they can be noticed	Bigger Strokes, Higher Visibility	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
49	***Micro-Shapes***	*Find a way to instinctively allow the player to differentiate between objects they can interact with and not, that's why contrast is so important*	<-- Quote	Player Expectation, Contrast	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
50	***Elden Ring***		Elden Ring isn't using the same traditional method to guide the player; they use things like the position of the enemies to make players explore spaces	Enemy Placement	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
51	***Elden Ring***		When talking to character, you are always in a safe space	Breathing Space	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
52	***Elden Ring***		Using vague dialogue and make it open for interpretation	Vagueness, Player Interpretation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
53	***Elden Ring***		Enemies are full of life, they have very good animation and feel very alive. Their models, animations, posture, attacks and placement in the game can be used to tell a story	Enemies, Enemy Placement, Enemy Animation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
54	***Elden Ring***	*Video games is the only medium where we have the element of interaction for telling a story and making experiences feels elevated that you don't get listening to a song or watching a movie.* *Developer that don't use that to their advantage are not getting the best possible game they can get out of the experience they want to create*	Video games have the advantage over both movies and music don't, it combines both visual and auditive cue but also adds player interaction to the mix. Developer and Designers should make sure to use all 3 elements to create the best experience possible.	Interactive Media Advantage, Interactive Audiovisual Cohesion	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
55	***Elden Ring***	*A player can see elements on the screen, hear sound cues in the environment, but most importantly, a player can interact with the environment.* *As soon as you disconnect these 3 elements from each other, not using them together to communicate what you want to communicate, then you are weakening the experience that you could've made.*	- // -	Interactive Audiovisual Cohesion	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
56	***Elden Ring***	*In an idle state, enemies have movement, and movement is a way to attract the player's attention*	Further emphasizing the effect of movement on attracting attention.	Attention Through Movement, Animation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
57	***Elden Ring***	*Putting a lot of contrasting objects that aren't the enemies, then the player will have a really hard time knowing what they are supposed to look at*	Not having clear indications of what is important for the moment can lead to confusion and frustration, it works against Game/Level Design, those 2 points always needs to work together for a good player experience	Highlight Important Factors, Harmony In Design	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
58	***Target Audience***	*Types of players that is going to play the games is answered by game design, preferably in the early stages of the project*	<-- Quote	Player Types	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
59	***Target Audience***	*Understanding what type of games we are making and for who*	Understanding what type of players will be playing the games will allow the developers and designers to make better design choices	Player Types	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
60	***Target Audience***	*Know the type of game you are making and tailor the storytelling based on it*	Are we making it serious? Are we making it cartoony? Are we making it gritty? Are we implementing humour? Once a contract has been established, stick to it until the end	Player Types, Player Contract	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
61	***Target Audience***	*Get to know your audience*	Who are they? Are they susceptible to jokes or are they more serious? After audience has been established, tailor the game around them	Player Types	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
62	***Target Audience***		If there is a franchise of the game in development, designers should use whatever has been built in the previous game, master it and find a way to elevate it for the newer games.	Master and Refine	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
63	***Sound Design***		Music changing in tone leads to different interpretation of the sequence	Player Interpretation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
64	***Sound Design***		Last of us had a cinematic approach to the game, characters had their own theme songs that lead to player knowing which character is presented based on the theme songs	Personalised Theme Song, Character Recognition	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
65	***Sound Design***		Music is heavily used in combat encounters, combat music, that is both to elevate the action sequence and to tell the player that a combat sequence is ensuing	Thematic Music	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
66	***Sound Design***	*Silence is an effective way to build suspension*	Silence or lack of music or sound effects can be a very effective way in building suspension...	Suspension, Silence	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
67	***Sound Design***	*I haven't heard a single SFX in the last like 5 minutes, I think I'm on the wrong path*	...and can be a very subtle way to guide the player	Player Guidance, Silence	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
68	***Sound Design***	*This doesn't feel as interactive*	Limiting interactivity and stimulation in an area will cause the player to be bored or dissatisfied with it, that can be used to lead them away from it and to go somewhere else	Player Expectation, Player Guidance, Limiting Interactivity, Limiting Stimulants	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
69	***Psychology***	*Game designers are manipulators*	Game development and design at its core is a bunch of smoke and mirrors, an illusion where we put our players in to explore and enjoy	Player Manipulation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
70	***Psychology***	*Make players feel like they are in charge, but they should never be in charge, only the illusion that they are in charge*	<-- Quote	Player Manipulation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
71	***Psychology***		Level capping, or more so the lack of, is a way that can be used to guide the player. If the player gets beaten by higher level enemies, then they know that they shouldn't be in that area yet...	Level Capping Areas	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
72	***Psychology***		... is also a way to not force the player in a direction while making them feel that they still have a choice	Player's Freedom	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast
73	***Psychology***	*Not all things are about players being in control, but rather players thinking they are in control, and when they don't feel like they are in control, that should be, sparking, conversations themselves about* *"Why am I doing this? why is my character doing this?"* *If you can feel a that the answer to those questions the same, if you can make those 2 match, then you have something that can be really powerful in terms of storytelling*		Questioning Player Actions, Character Motivation	[D] 3D Environment Artist, Set Dresser, Previous Music Enthusiast

Figure 66: Observations of the industry practitioner's individual interview. (Continued)

Appendix K Raw Data Points for Bioshock: Remastered

Environmental Setups

ID	Observations and Screenshots
1	 - Lots of objects, details - Spotlight effect, other places relatively dark - More objects means loot - Can see someone died, had time to make makeshift grave - 2 paths - one leading to main path progression, other to this grave - a dead end
2	 - Dark, not very visible other than the doors - acted as "spotlight"/sign - Can still see blood smears and traces on corpses - Clearly very gory, attracted my eye with all the blood - Somebody did a lotta damage to these people - maybe ill encounter it too?
3	 - Corpse with money - loot - Spotlight attracting attention - Bent over register - wants the money? - How did he die?
4	 - First little sister encounter - spotlight at a distance - Easily hear her speaking, though atlas also speaking at the same time - Enemy? Dont know, doesnt look like - atlas explains

Figure 67: Raw Datapoints for Bioshock: Remastered.

5

- Again corpse over register, looks like splicers killed them on the way through
- Glint of money + eve, amount of props, details and light drew me here
- Blood splatter seen far away
- Emissive nature of loot attracts eye

6

- Clearly crushed by pillar
- Although dark, forced to pass through this corridor, and thus catches attention
- Who made the pillar fall though?

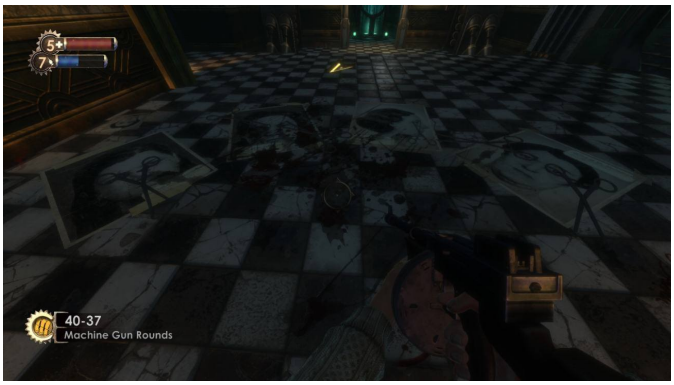
7

- Immediate attention grabber - must go through this door to reach goal, framed
- Amount of details, lighting, gore and text on ground catch attention
- These images not shown before this area - very new
- Gore makes me on high alert - who did this? They must be near
- Why did they do this?

8

- These texts written in blood all over the area - foreshadows what is going to happen
- Victims who wrote this? But why? Either brainwashed or written by the villain
- Not much light, and many similar texts throughout area

Raw Datapoints for Bioshock: Remastered. (Continued)

9	 - From believing adam good to warnings - somethings wrong, dont know what - Stronger lighting, larger/longer words - harsher and more attention grabbing - Need to know whats going on - Strangely black on floor not strong contrast - why? Hastily written? No time?
10	 - Very dark, but clearly arranged in a pattern - Scripted scene occurs before this, must pass through here - Why arranged like this? - Some form of pursuit of beauty, deranged

11	 - Many details, loot - Secret / must work to reach this area - must be some form of reward - Looking for code to safe - Safe code beside coffin - Ornate, obvious coffin - for who? - Portrait of person, probably coffin for him - Corpse on ground - why?
12	 - Spotlight, corpse and gore and loot - Reason to move in to get loot - Motifs - scissors seen in images now pinned on corpse - feeling like getting closer to something, just as bloody

Raw Datapoints for Bioshock: Remastered. (Continued)

13

- Stands out not only because of spotlight effect, but uprightness of corpse
- Wheelchair not often seen
- Normally setups often have blood and gore, not this
- Looking at poster trying to relate to corpse - cosmetics? beauty?

14

- Linking ideas from poster to here - asymmetry as perfection? What part?
- Deranged nature of doctor/whoever did this
- Brighter light shown on this picture why

15

- Man made. More gore, spotlight, can only walk towards pillar
- Symmetrical view - i simply looked up after exiting bathysphere
- Gore definitely catches eye

15a

- Smuggler shows why was hanged
- Can loot, thus move closer and investigate
- Particularly bloody though - why
- Clearly tortured badly

Raw Datapoints for Bioshock: Remastered. (Continued)

15b	 - Bible? Cross related to how he is crucified like jesus - Religion? - Many letters, unknown why
16	 - No spotlight, red stands out - is the gun thing of a little sister - Blood trails from the concrete lets us guess little sister crushed and killed by falling concrete, crawling out - wheres the corpse?

17	 - Corridor leads eye to the end - other than windows, nowhere to look - Contrast between mossy green and orange fire - cold to warm feeling draws attention - Shadow clearly shows some ones there - probably foe, be on guard - Quest Arrow pointing directly forward - must move forward
18	 - Electricity - new type of spotlight - Again similar crucifixion pose - Many details, want to enter to investigate - have been seeing a lot of red lately - Bright flashes - uncomfortable to eye, want to look away - More importantly, probably theres some good loot because its barred and hard to enter

Raw Datapoints for Bioshock: Remastered. (Continued)

18a

- Voice recording and object descriptions show what happened - torture
- Again bible motif, film motifs
- Loot!

19

- More blood, spotlight, corpse
- In front of a door, after opening - cannot miss
- Blood trails from top - hinting something from the ceiling?

20

- Spotlight on sign, showing where to go
- Never seen such clear signs before in other areas, why?

21

- bible/religion motif again
- Clearly used them to smuggle, according to object name
- A mess - taken out, boxes on floor all over the place - scuffle?

Raw Datapoints for Bioshock: Remastered. (Continued)

22	 - God rays strong spotlight effect - Crumbling pillars, probably loot there - Strange - no death
23	 - Many props/details - again religion and letters - Clear lighting - “Somethings here” - dont care why yet

23a	 - More letters here - breadcrumbs? - Light peeking from crumbly wall - something must be there - Wall can probably be broken
23b	 - Letters again on floor, probably where originated - Sound recording and props give idea what happened

Raw Datapoints for Bioshock: Remastered. (Continued)

23c	 - More letters - with god ray spotlights shining on them - Evidence - police raided smugglers? - All bible books out now - searched through - Hand print sign on all the smuggler boxes - another motif
23d	 - Splicer sings “Jesus loves me …. For the bible tells me so” as you near - More letters! - Stronger lighting - Feeling of nearing objective as we can see interrogation room sign - more details are happening - heightened awareness

23e	 - Glowing quest object - Detective board, clearly this sullivan has been investigating smugglers and is part of some detective team - Splicer in adjacent room not only for photo tutorial, also probably used as test subject - Trail of letters lead to camera - but why the trail in the first place?
24	 - Electricity flashing ttracts eye in dark place - See splicer on ceiling, disappearing - Scare - heightened awareness, preparation to fight - Look for where the enemy is

Raw Datapoints for Bioshock: Remastered. (Continued)

25	 - Room has warm lighting compared to cold sea - attracting attention there - want to go there - How to enter room though?
25a	 - Blood trails and gore catch attention, but trails lead to somewhere - Breadcrumbs to behind the boxes

25b	 - Find opening behind boxes,definitely go inside to check - “Ooooo a secret place” - Warm Lighting contrasting with jade easily attracted me
25c	 - Loot, much gore inside - turret clearly killed them in sleep somehow - mattress, corpse posed as crawling towards opening - Turret attacks you as you enter too - Sudden darkness as lights turn off after you enter - heightened awareness as you hear enemies outside

Raw Datapoints for Bioshock: Remastered. (Continued)

26

- Chained corpse - new pose
- Much blood, but red lighting - something is special here
- Why chained to bed?
- Splicer attacks you when you enter room - were they related to chained corpse?
- Obvious white spotlight on corpse contrasted with red makes me look at corpse first

27

- Peculiar room - even though no strong spotlight, TV as primary lighting attracts eye
- Needed to hack/enter code to enter this room - must be something here

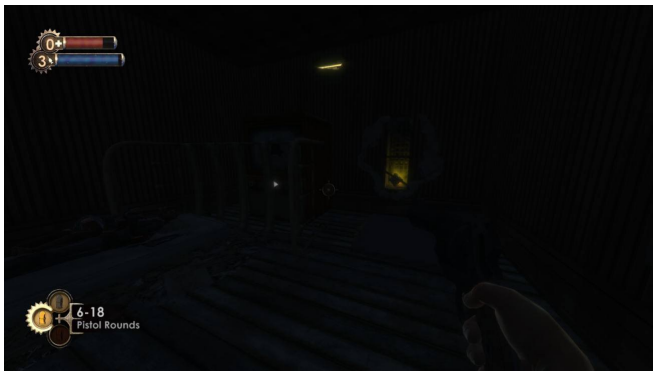
27a

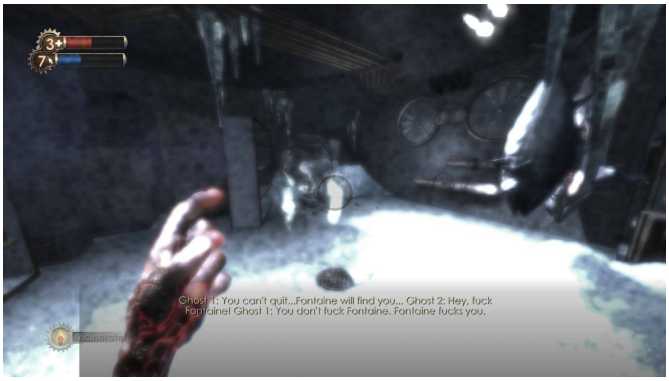
- Closer inspection - loot - not much
- Crooked poster, kind of broken wall - probably something behind - how to access?

27b

- Strongest lighting here, with reflective surfaces etc
- Pills beside couple - clearly some sort of drug overdose suicide
- Sound recording shows why they decided to suicide - found daughter as little sister

Raw Datapoints for Bioshock: Remastered. (Continued)

27c	 - All lights turn off after listening to recording, heightened awareness - somethings wrong or coming - Last time lighting was gone, enemies appeared - probably enemies here too - After all enemies are killed, poster falls to reveal a safe
28	 - Torture? Prisoners? - Clearly something being written as warning - This is after you kill the mini boss - same area - Bullet holes and casings - shot dead? - Tricked somehow - what kind of person was the boss?

29	 - Scripted "flashback events" - showing characters from the past in same area - Aware that i am generally safe in these "cutscenes", focus on dialogue rather than environment - Heightened awareness of characters though
30	 - Ive seen that hand somewhere - the smuggler boxes now on a flag - I must be in the smugglers den - Not strong lighting - shady, discreet feeling

Raw Datapoints for Bioshock: Remastered. (Continued)

31	 - Corpse again - many alcohol on him and around - did he drink to death?
31a	 - Definitely been drinking - Fully loaded alcohol when looting him

32	 - Small hole with loot - Light just happens to shine on the spot, contrasting with in the darkness - Just in range to be picked up - Why there? I don't know
32a	 - Right after explosion of bathysphere of atlas's family - Emotional scene, interesting in that you see how corpses/environmental storytelling are made in real time - Burned and crushed

Raw Datapoints for Bioshock: Remastered. (Continued)

33	 - Small signs point to where doors lead - Bright red emissive lighting attracting eye - Happens to be where atlas tells you to go - confirms is correct direction
34	 - Much loot, coffin with person inside - Rather than lighting, the open door leading to this room attracted attention - generally functional doors are closed, but this one was open already - Simple corridor leading to cache - Smugglers motif suggesting this is where they hid weapon supplies

35	
	- From a small starting area opening up to this
	  - God rays and greenery not seen before this level
	  - Creates sense of awe, larger than it is
	  - As if in greenhouse
	  - Lighting shining directly on greener areas, creating greater contrast
	- Generally increases sense of exploration - greater awareness of environment in beginning

36	 - Table on top of hill - Clearly rolled down hill - But howd she die on such a shallow hill - explosion?

Raw Datapoints for Bioshock: Remastered. (Continued)

37

- Cry for help
- If no subtitles, would not have know was splicer
- Attracted me, as many enemies immediately are hostile and do not call for help
- Heightened cautiousness

38

- Another shadow - clearly enemy
- When approached, disappear
- Heightened cautiousness - but looking for enemy instead of environment
- Darkness other than signposting and enemy shadow - quick to see

39

- Clear spotlight
- details, loot, and weird antler toy thing - new motif
- Shadow in the back makes it a bit ominous

40

- Atlas - person you are talking to
- Something fishy
- Foreshadowing narrative
- Accept and move on - nothing to do

Raw Datapoints for Bioshock: Remastered. (Continued)

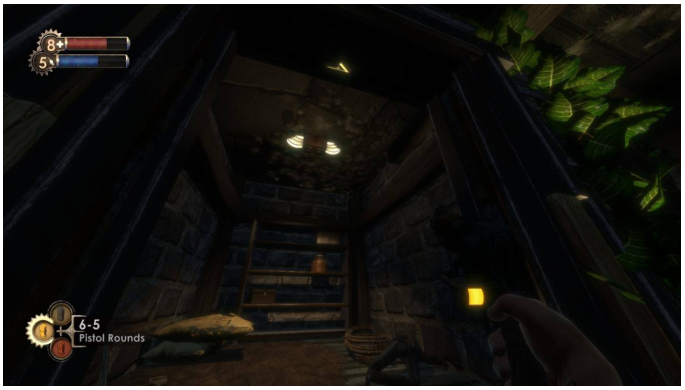
41

- Why are we seeing these posters only here though?
- We know this is a vacation place from the posters put above - what to gain here?

42

- Music can be heard coming from these speakers even from outside, a few rooms far away - getting louder as you get closer - very high class hotel waltzy music
- This must be the main chamber/room if the music is here

43



- I first noticed something different with ceiling - cracked?, many patches
- Weird - looked like mold, not normal ceiling
- Looks like a store room
- Needed hacking to get in - spent effort

43a

- Look down, Noose, see rope tied to corpse
- Why did he die? No idea
- Loot around him, but thats it

Raw Datapoints for Bioshock: Remastered. (Continued)

44

- How did he get buried
- Maybe someone was trying to bury him instead?

45

- Clear sign
- Looks like something is here
- Turns out main quest needs you to go here later

46

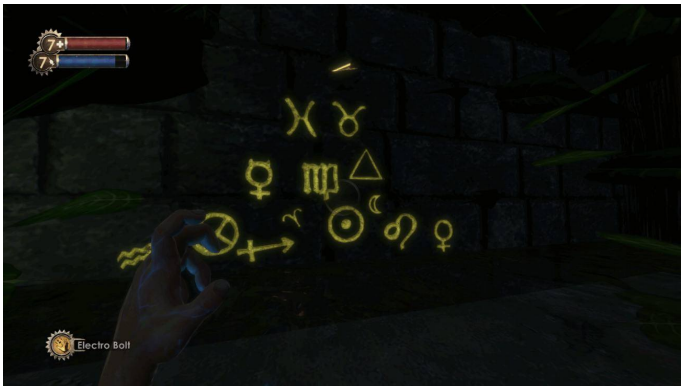
- Clearly crawled a distance from blood trails
- From who? Who killed him?
- Some baddie must be coming from there
- Did it? Not really - at least, not a super strong miniboss

47

- Glyphs hidden behind bush - what does it mean?
- Saw before, common motif for something - but for what?

Raw Datapoints for Bioshock: Remastered. (Continued)

47a



- Looks like some egyptian hieroglyph?
- Cannot translate - nothing to
- Appeared in the creepy splicer cult cave too

48

- In game explanation by atlas about posters - trustworthy?
- Triggered when entering level - more aware of environment if not seen first - what is he talking about? What kind of things is he mentioning?
- Then notice the posters and signs, doubting identity of atlas

49

- What a funny position to die in
- Looks like a doctor or something

50

- How the hell this dude die when inventing stuff
- Putting corpses for sake of putting corpses? Probably not, but nothing else to go on
- Ignore quickly

Raw Datapoints for Bioshock: Remastered. (Continued)

51

- Decaying world
- Dont see broken vending machines often - attracted because loot and is strong lighting
- Not much else - oh hey loot

52

- Red lighting - signifies something important is here
- First time pass through, nothing much to loot - other than sound recording which hints at what kind of special flowers are there
- Second time pass - turns out is part of main quest

53

- Warm lantern lighting contrasted in dark background easily attracted me
- Slumped over - carried lantern?
- Audio recording doesnt really explain much either

54

- Interesting - have not seen handbags often
- Whats in the handbag?
- Died over gene bank - overdose?

Raw Datapoints for Bioshock: Remastered. (Continued)

55

- Dead cat with blood - different corpse type, cat more emotional - something special
- How die?
- Blood trails to overturned box - was cat inside? Crushed by falling box?
- No loot made me focus more on environment
- Until… end of corridor - separated from death setup

56

- Altar like thing at the end - soft lighting, but one way corridor makes me look towards it
- Scarecrow things - all over the place, creepy atmosphere with jade green lighting

56a

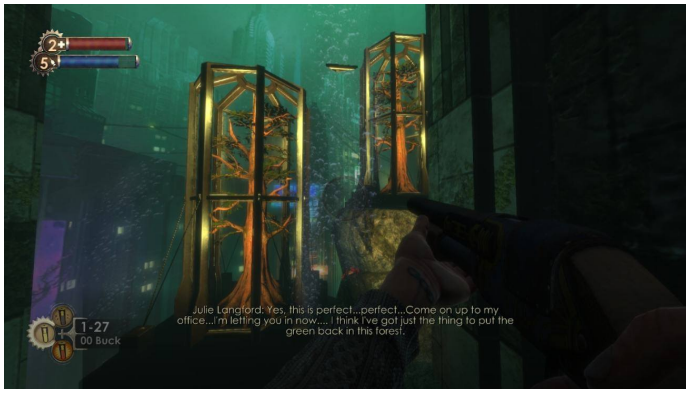
- Always wine on these tables - offering?
- Blood this time - sacrifice?
- Round Stones enhance feeling of religious altar

Raw Datapoints for Bioshock: Remastered. (Continued)

57	 - More glyphs - still dont know what mean - Emissive lighting and its shapes makes it very catch my eye

58	 - See person running out in flames, die in front of you - What happened here - On high alert - some enemy nearby - indeed there were, but nothing special

Raw Datapoints for Bioshock: Remastered. (Continued)

59	 - Big posters, grandiose, lavish - Like vacation place, well lit, many colors - Different to the run down, breaking apart, contrasting with other places - Still breaking down here, however - except hints at what it was before	60a	 - Under the stage, can find corpse with blood - Made me wonder, but not necessarily look for it - Only encountered because exploring in general - Made connection because was close in time and space
60	 - Notice blood on sack - very used to corpse existing too - where is the corpse? - No trails, no loot	61	 - Interesting view - trees under water, illuminated with warm lights contrasting with sea - attracts my attention because never really seen this before

Raw Datapoints for Bioshock: Remastered. (Continued)

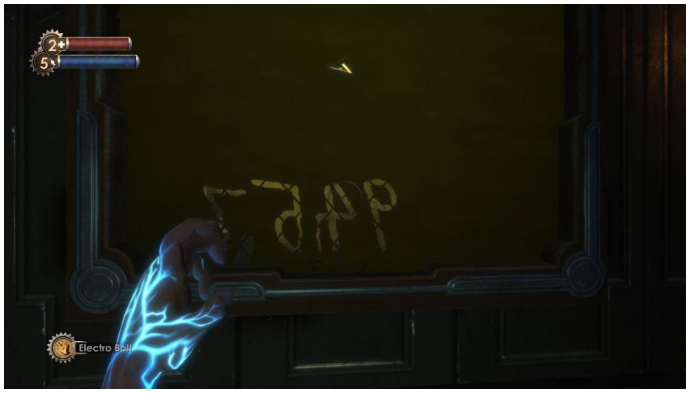
62

- Bright sign catches eye, in front of you when you open door
- Sign tells me where i am
- I dont really care though

63

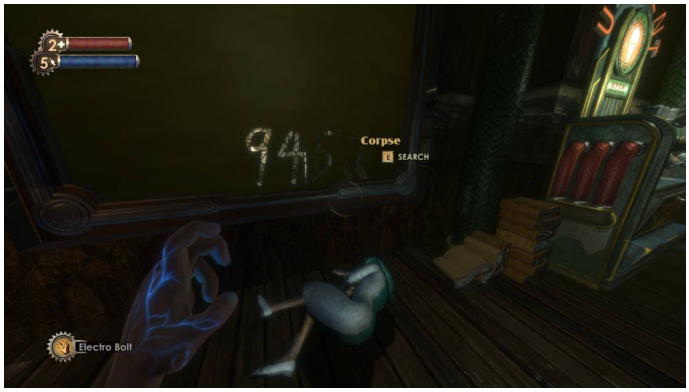
- Not sure why there is a corpse here
- Maybe because the turrets are meant to protect Langford
- But there's loot!

64



- Watching someone die in real time, again
- Watching her write on window in real time, creating ES in real time

64a



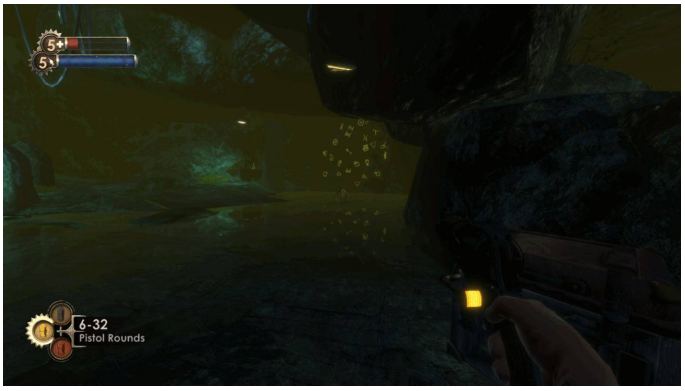
- Entering room, try to see the face of this person you were supposed to deliver thing to
- Clearly she spent long time here, books piled up, messy work desk

Raw Datapoints for Bioshock: Remastered. (Continued)

65

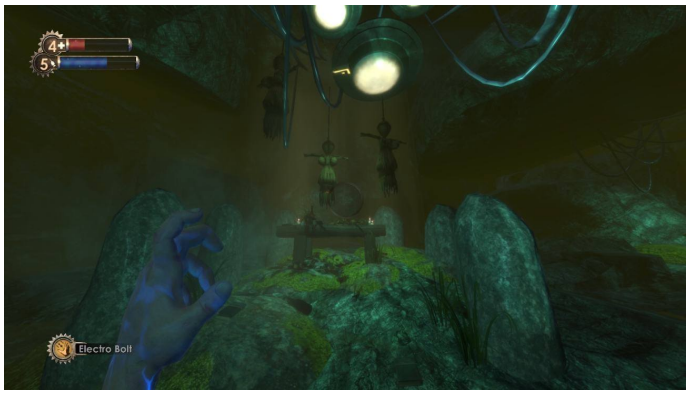
- More light
- Glowing object - clear loot
- Busy scene - somebody important just died, waw
- Places of interest with more light - chemical thrower my current goal, im guessing i need to return to the console later on

66



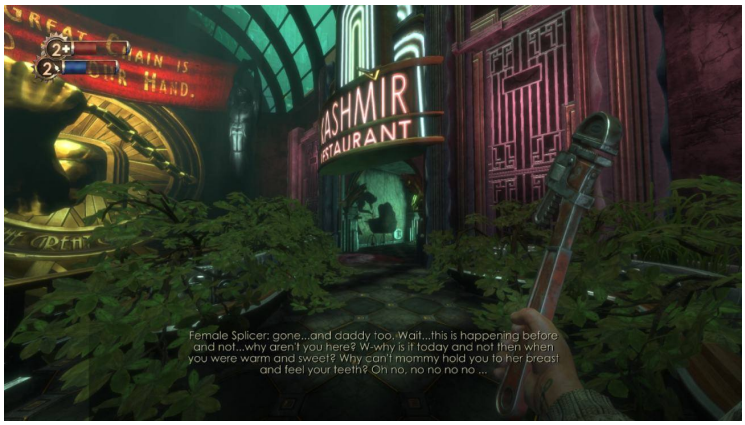
- Glyphs - emissive, can see it far away
- What does it mean? No idea

67



- Scarecrow motif - lighting almost spotlight
- Dangling like hanging
- Ominous again - heightened awareness, probably enemies nearby
- Ritual table - clearly something like that

68



Raw Datapoints for Bioshock: Remastered. (Continued)

69	

Raw Datapoints for Bioshock: Remastered. (Continued)

Appendix L Raw Datapoints for Fallout: New Vegas

Fallout: New Vegas

Fallout NV is an open world game that allows you to go anywhere at any time. Due to that amount of freedom given the player, the game relies heavily on camera compositions and landmarks to guide the player to their target destination.

Disclaimer: FNV is a game that has a quest marker showing the destination to the player's current objective, throughout the game i ignored that marker and attempted to navigate based the props provided

1. Starter Area

At the start of the game and as soon as the player leaves the building they spawn in, this is the first view they are presented with. Immediately our eyes are drawn to 2 locations: A water tower on top of the hill, and a giant cross down the road.

Already in this first screen shot we can see multiple uses of environmental awareness techniques:

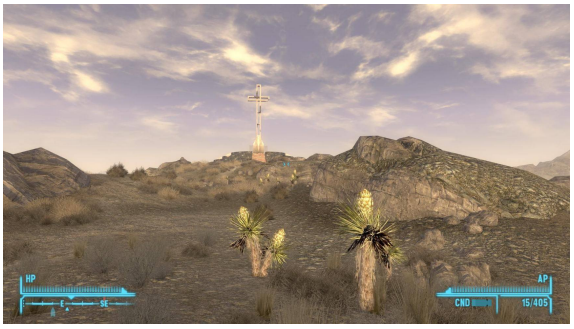
- Camera Composition:
  - The player is positioned on top of a small hill creating making use of all 3 sight angles:
    - Low Angle: In the distance due to the height of the hill, a top down view is created showing a wider view of the town and a cross landmark in the distance giving the player a future destination.
    - High Angle: The hill the player on is medium in its height, also giving the player a high angle on the water tower landmark also setting the stage for another future destination.
    - Flat Angle: The town is aligned with the viewpoint of the player showing the town the player is in, centered around the 2 key building. The use of the flat angle here is used to highlight the 2 landmarks in the distance.
- Color Contrast: Same color palette, 1 building different
- Object Contrast: Smaller buildings in view, bigger landmarks in the background

Figure 68: Raw Datapoints for Fallout: New Vegas.

2. Water Tower

- Low Angle: Vantage point
- Multiple cities in the distance
- On the way up a top down view on the cross landmark
- Signs warning the player from proceeding

3. Cross Landmark



- High Contrast: Cross always dominant view
- Flat Angle
- Another vantage point, this time wider view
- Multiple locations in sight allows for player to plan travel

- A danger, don’t cross sign in view warning player not to cross in a straight line, very dangerous monsters this early in the game

4. Current Objective and Destination: Primm

Primm - Based on NPC dialogue Prim is a city with a giant roller coaster.

- Composition:
    - Another low angle view with a roller coaster in the background- might be Primm?
    - Curved Lines: Smoothing out the sharp drop in landscape
- LoD Contrast: Low detailed bg, more details focused on the city

5. Road to Primm

- Signs on the road confirming that player is on the right track to Primm
- Sign foreshadowing what to expect in the city: Casino and an Crime Couple Exhibition

- More signs cementing current destination and leading the player

6. Vikki & Vance Casino - Primm

- Payout from previous foreshadowing
- Car in focus in the center of the room, lighting on top highlighting it
- Mise en Scêne:
    - Car with bullet holes tying up to the couple's cause of death
    - A broken weapon display case in front of the car with visible bullet holes signifying a break-in and the theft of the murder gun

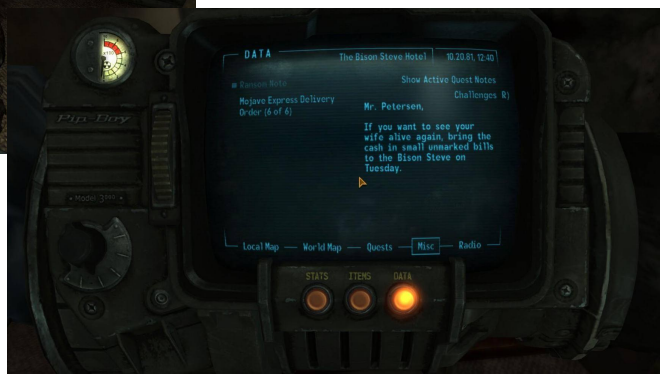
Fun fact, this is a reference to the crime duo Bonnie and Clyde and the scene of their death

7. Bison Steve Hotel - Primm

- The roller coaster building spotted previously
- Casino/Hotel/Shows
- Quest Destination

- **Prop Placement:** Alcohol and Drugs, recurring theme in this hotel

Record: Ransom note
Kidnapper asking for unmarked bills, hinting that this scene transpired pre- nuclear fallout



Male Skeleton on the ground:
Presumably Mr. Petersen

A couple of rooms away

Female Skeleton on the bed:
Presumably the kidnapped Mrs. Petersen

Skeleton in bathtub:
Presumably the kidnapper

Prop Placement: Drugs

8. Primm Sheriff's Office

- Lighting Highlighting the dead sheriff's and wife's bodies
- **Mise en Scêne:**
    - Both bodies lay dead **on the bed** with heads decapitated, hinting that they had been executed in their sleep at the same time with a blunt weapon.
    - Clean house and no signs of struggle, hinting at no force entry, and enforcing the idea that they have been assassinated
- **Prop Placement:** Sheriff's Armor next to bed and Brahmin-Skin Outfit (Wife's Clothes)

9. Mojav Outpost

- **Landmark:** Statues visible from a long distance, and Primm
- **Composition:**
  - Sharp High angle focusing the 2 statues
  - Angled Lines creating a dynamic scene
- **Prop Placement:** Vehicles all heading towards the statues, non downwards.
- **Mise en Scêne:** An escape? The statues in the distance shaking hands, in combination with the camera composition the feeling of **hope** while the vehicle's orientation might be hinting at maybe civilians escaping for their lives?

10. Novac

Town named after a broken sign

Contrast: A shop inside the T-Rex with Faa sign contrasting the background, it's both shiny and has a higher level of detail

The sign is supposed to show the clerks commitment to selling his T-Rexes and to give a sense of urgency and rarity to his props.

Prop Placement (*way too many*)**:** In the storage room to the right of the clerk, we notice a massive pile of T-Rexes both placed around the room, and inside the boxes on the left. The amount inside totals 280 T-Rexes.

- **Prop Placement:** The clerk's house, way too many T-Rexes placed around the appartement.