

**Stories around a campfire: The influence of narrative structure on the experience of a
video game and its story.**

Rick Huizinga – S2569523

Faculty of behavioral, management and social science – University of Twente

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Dr. Thomas van Rompay

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Abstract

Background: There is no right or wrong way to tell a story, but perhaps there are more and less effective ways of telling a story. Stories have been studied extensively for centuries, however their role in video games remains an elusive topic. **Aim:** To explore the potential of stories in video games, this thesis seeks to answer the question of how a non-guided narrative structure in a video game influences the experience and story. To measure this experience, three concepts are central, namely a person's immersion, flow, and their emotional experience while playing the game. **Method:** A total of 32 participants played 45 minutes of *Outer Wilds* in either a guided or non-guided structure, resulting in 16 participants playing with each structure. After this, participants filled out a survey measuring the three key concepts to determine the potential effects of the narrative structure. To explore this topic further, short interviews were conducted as well. **Results:** The findings of this study seem to confirm the suggested effects of narrative structure on the levels of immersion and flow which participants experienced, with a non-guided structure leading to higher levels of both. The emotional experience remains unaffected though, which lends itself well to further research. Furthermore, the combined data suggests a link between the effectiveness of a story depending on the narrative structure, whereby a non-guided structure may be more effective for the medium of video games. **Conclusion:** The results of this study will be helpful in stimulating research on storytelling in video games and further improving the effectiveness of stories in video games to come, as it gives insights in what should be focus areas when both making and marketing video games and their stories.

Key words: Video games, Narrative structure, Immersion, Flow, Storytelling, Story

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Before bedtime a parent reads their kids a book to have them sleep better. Before heading to bed themselves, the adults may watch a movie or series to entertain them before sleeping as well. Teenagers and young adults perhaps play video games with their friends or alone, not always to the benefit of their sleep schedule, but one thing remains the same for all three evening routines. Everyone enjoys a good story or playing something to pass the time, escape and immerse themselves in a different world, and feel more in charge than in their real life sometimes (Raney & Bryant, 2019). Video games used to be only the entertainment factor in their 'early' days, with extremely popular games such as Doom or the (Super) Mario series focusing more on gameplay and level design than an interesting story. With the progression of modern day technology however, every form of storytelling has seen massive influence from the introduction of Kindles and Audiobooks to realistic CGI and an unmatched level of development to the possibilities of video games. This research concerns just that, video games, and their hidden secrets of storytelling which set them apart from reading a book or watching a movie.

Video games are set apart by the possibility for the audience to actively engage with the content of the story to some extent (Klimmt & Possler, 2019). Some games make use of this feature more extensively than others, and not all video games lay their focus on building narratives for their players to follow. What stems from this engagement, however, are endless possibilities for creatively telling stories through interactive audio-visual experiences which was until very recently almost impossible to achieve with any form of media. This research strives to uncover and explore one structure of storytelling in video games and how it differs from the mainstream structure of linear narratives in media.

The narrative structure in question is a non-linear narrative, also referred to as the 'amusement park' structure (Stone, 2019). An 'amusement park' structure entails a video game

structure wherein the player is free to go and do what they wish within the confines of the game's world, acting essentially as an amusement park would. To understand the effects of narrative structure on the experience of a game, this study aims to answer the question: How does player freedom in a video game influence the experience of a game's narrative and game experience including immersion, flow, and emotions? To answer this question the complexities of immersive storytelling and the factors which make a video game such a unique storytelling medium will be discussed in depth. Furthermore, the results of prior research will be tested through players who will be given one of two scenarios either limiting or allowing for player freedom through the introduction of a linear or non-linear narrative structure in the game *Outer Wilds*. Within this study, linearity is understood to be induced through guiding the player through a game using missions and goals which the player must complete, thus telling the story in a linear fashion, as a movie or book would (Klimmt & Possler, 2019). A non-linear structure lends itself to games wherein the game gives the player the freedom to go wherever they want at any time, allowing the player to interact with the game's story at any point, rather than being guided through it. *Outer Wilds* was chosen as it allowed for the introduction of these narrative structures, in the form of either a guided or non-guided experience, in a fictional open-world solar system filled with mystery and history for the player to pursue.

The way in which players experienced *Outer Wilds* was measured through a survey, quantifying the levels of immersion, flow, and the emotional experience after having played the game for 45 minutes. To further explore these results, as well as attempting to elaborate upon the effectiveness of the story in the game, the players were interviewed regarding their personal experience with the game during the experiment, and their personal reflection upon the aforementioned concepts, as well as their perceptions of how connected they felt to the story, the

virtual world, and its characters. These concepts will be further explored in this study and the implications these findings may have.

Theoretical framework

Conceptualising (immersive) ‘storytelling’

A concise introduction to narratology and its core concepts

Ever since the beginning of storytelling, stories have had a roughly similar structure with a beginning, middle, and end, with various takes on this structure still fitting into this rising and falling flow of a story. Traditional stories therefore take on a linear structure, wherein the concepts of fabula and syuzhet are synchronous to one another (Propp and Shklovsky, as cited in Bostan, 2022). Propp and Shklovsky (as cited in Bostan, 2022) formed these two concepts as a framework for analysis of (linear) narratives. Fabula can be summed up as the raw, thematic, content of a story, and is meant when ‘story’ is mentioned from here on. Syuzhet refers to the telling of this content, through events, conversations, and other narrative devices, which will be referred to as ‘plot’ (Ip, 2011; Bostan, 2022). Stories told in such a linear narrative are found in some of the most successful stories of history such as Shakespeare’s works, but also in modern times with the likes of the Lord of the Rings or the Dark Knight trilogy as just two examples. These stories work so well because the connection between its story and plot is maintained and well paced, and both aspects retain their own great qualities (Himeline, 2018).

The connection between story and plot is referred to as the narrative. Narrative is a part of stories which has many different definitions. Therefore, the definition of narrative in this study will be taken from a collection of prior works, and becomes, in simplified form: The overarching structure which maintains the story and plot to tell a story well (Himeline, 2018; Bizocchi, 2007). The narrative for traditional media is controlled by different actors, with largely the same role, namely the author, director, play-writer, or any other such role (Bizocchi, 2007). Due to this control over the narrative, traditional media such as books and movies aren’t regarded as

‘immersive storytelling’ media. This is due to the one-sided nature of stories in traditional media, a story is told, and a story is received.

The distinctive nature of immersive storytelling

Immersive storytelling is storytelling in which the audience is able to fully immerse themselves (Film Courage, 2022). Audiences can still immerse themselves in Movies, books, and plays, however never to the same extent as with immersive media. This comes from the necessity for the concept of ‘engagement’ to make a story an immersive experience. By fully involving the audience in the story through choices and actions, the audience will start to feel more immersed in the ongoing story and start to connect with the characters of the story on a higher level than usual with traditional media (Film Courage, 2022). As Kerrison (Film Courage, 2022) further states, immersive storytelling in its highest form is achieved through, ideally, making use of all senses of a person. Engagement with the core material, however, lays at the base of immersive storytelling, which is why solely audio-visual or written media does not reach the same levels of immersion with its audiences.

With engagement the previously established concept of ‘narrative’ may break however. This is due to the consequences of engagement giving the audience control over the narrative, allowing them to ‘change the narrative’, and the director of the story having to hand over control to the audience (Bizocchi, 2007). As previously established, narrative is the overarching force which drives story and plot to create a satisfying whole. However, by handing over control to the player and breaking the usual narrative structure, the goal of immersive storytelling is in part achieved. A video game such as *Outer Wilds* is a prime example for how breaking the usual narrative structure, and giving the player power over the narrative through choices over what to engage with in the story, could lead to an immersive experience.

The audience is not merely a receiver of the story anymore, they have become the protagonist of the story. As such, their actions directly influences how the story unfolds itself, allowing the player to more fully immerse themselves in this virtual world. This, in turn, can lead them to feel more connected to the story, the characters, and the virtual world (M. Davis, 2024; Bell, 2018; Huizinga, 1949; Csikszentmihalyi, 1990). With this understanding of immersive storytelling, there is only one medium that can consistently elevate storytelling to this level of immersion, without access to all 5 senses of a person, video games.

Video games as a storytelling medium

Engagement with interactive content and their underlying narrative structures

Video games are set apart from traditional media with one important distinction, the audience becomes an active player in the game, as opposed to a reader or viewer of the story. Games, as they were first introduced, don't all put their focus on telling a story, or even have a story, but the power of games to create stories is even then very present. Competitive games specifically often lack a story, yet the medium allows for stories of success and rivalries to bloom, as they do in areas such as sports. The focus of this study, however, is not on these games, such as Fifa, Fortnite, or Formula 1, as these do not include a story in the game itself.

Then, to what extent does engagement play an actual role in video games? Engagement for the purposes of this study is akin to interaction with a story, therefore, to what extent the player can interact and so influence the story in a video game. The interaction or engagement with a story, as stated by Raney and Bryant (2019), “facilitates enjoyment” while playing video games. Furthermore, the interaction in video games is also known as ‘player agency’, which can be relatively simply summed up as the potential influence a player holds over the game on both a local and global scale (Knoller, 2010). Games such as the aforementioned competitive games

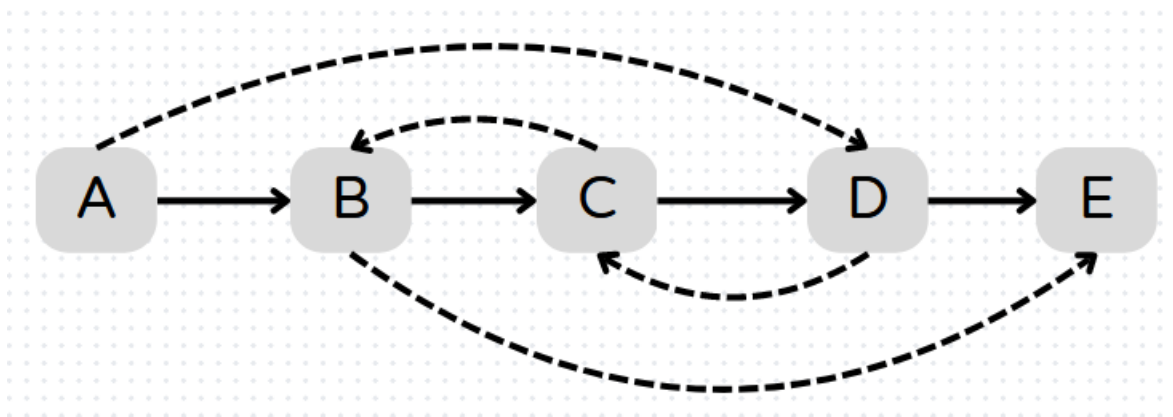
give the player local agency, whereby the player directly influences the character(s) they are playing as, however not the story or game as a whole, lacking global agency. While these games may have stories in the forms of ‘campaigns’, these are often very guided, or linear, meaning that outside of the local agency, the players will experience a lack of freedom and influence over the game. Other games outside of competitive and multiplayer games have started focusing more on telling stories however.

Games such as Firewatch have a linear story, but as M. Davis also points out, giving players choices leaves a larger impact on the player when it comes to events and the story in a game (M. Davis, 2024). Giving players the freedom to make choices and impact the narrative structure of the game, going from a linear guided experience, to a non-linear and less guided experience, gives players more agency on both a local and global level. This shift to non-linearity, as suggested by Davis, may leave a larger impact on players, potentially due to feeling more involved with the story. This is further elaborated upon by existing research, wherein its stated that interactivity and narrative engagement leads to highly enjoyable experiences (Klimmt and Possler, 2019; Raney and Bryant, 2019).

Chris Stone outlines the potential of four narrative structures in video games for telling stories. These are the linear, ‘string of pearls’, branching, and ‘amusement park’ structures. The two structures necessary for this study, are the linear and ‘amusement park’ structure. The ‘amusement park’ refers to how a player can perceive a story as if they were walking through an amusement park. The differences between these two structures is clarified in figure 1.

Figure 1

The difference between a linear, guided structure, and a non-linear non-guided structure



Note. In a linear narrative structure (full line), the player will experience the story in the order in which events are ‘supposed’ to happen, as decided by the author of the story. This leads them from point A to E in chronological order. In a non-linear structure (dotted line), the player may decide any order of events, altering the order of the story, as shown in this figure, whereby the player chooses to follow a path of A-D-C-B-E.

The ‘amusement park’ structure in the context of this study is referred to as a non-linear narrative structure, as it gets rid of the linear, guided narrative from the linear structure (Klimmt and Possler, 2019), and instead allows the player more agency over their choices in terms of where to go in the game and how to experience the story themselves. By focusing on implementing a non-linear narrative structure, which allows the player to more actively engage with the game and its story, a game such as *Outer Wilds* can lead players to higher levels of immersion (Beachum, 2013).

Immersion through player agency

Another important factor to consider with regards to the interplay of immersion and player agency are the level of creativity player agency can introduce into a game. Creativity in the context of a game does not revolve around the creation of something, but rather the possibility of problem-solving. Problem-solving, and by extension creativity in open-world

games such as *Outer Wilds*, *The Witcher*, and *The Legend of Zelda: Breath of the Wild*, can also relate to the exploration within these games. By rewarding the player for their exploration, and urging the player to use creative approaches for exploring the virtual world, players will feel more involved with their actions. As Csikszentmihalyi notes during his studies on creativity with regards to the phenomenon of flow, a state of full immersion: “[...] when we are involved in it, we feel that we are living more fully than during the rest of our life.” (Csikszentmihalyi, 1996).

While this statement does not directly relate to video games, the essence can be extrapolated into the area of video games. When video games allow for a player to approach problems, but also exploration, with creativity, it leads to much higher enjoyment and engagement with the content of the game (Sherry, 2004, as read in Klimmt and Possler, 2019; Klimmt and Possler, 2019). Creativity in games originating from player made choices, actions, and solutions to problems makes players enjoy the game more. However, as Csikszentmihalyi (1996) also points out with regards to entering the flow state, the creativity allows players to reach higher levels of immersion on top of the enjoyment factor.

Full narrative immersion and the flow state

Gerrig and Huizinga outline immersion through the theory of ‘transportation’ (Gerrig, 1993; Huizinga, 1949). Their understanding of immersion can be translated effectively into the virtual worlds of modern games, and functions as follows: The player starts by being transported into the virtual world, being given a character to play and thus determining their role and identity in this virtual world. The identity and role the player follows is further determined by the actions of the player. Through these actions, the identity and role thus become clearer as the story and plot of the game unravel themselves. By immersing themselves in this virtual world through their

actions, they will find that the virtual environment slowly turns into a real environment in their minds (Huizinga, 1949; Ryan, 2015).

Becoming fully immersed in a game may be helped by both having a guided experience, such as in linear video games, but this may also be true for a game with more player agency and freedom. By giving the player clear goals to complete to follow the story, the player is given a purpose, which might make it easier to enter the flow state. On the other hand, it could also remind them of the fact that they are playing a game, which would take them out of the experience and their immersion, which directly influences their ability to get into their flow. A non-guided experience, however, could induce higher feelings of connectedness to the story and the virtual world due to the freedom of player actions, which in turn would lead to a more immersive and impactful experience (Green, 2019). The outcome of this heightened level of immersion is that the player enters a flow state, heightening their emotional experience and feeling more connected with the virtual world and its story (Huizinga, 1949). Another positive effect of the flow state, is that while maintaining flow while playing video games, it can lead to highly enjoyable experiences (Sherry, 2004, as read in Klimmt and Possler, 2019).

Reaching the flow state is the ultimate goal of complete immersion into a story, and with video games this is certainly achievable. To reach flow and ultimately detach oneself from external stimuli and unlock complete focus on the task at hand, in this case the video game and the story it's telling, one seems to need a clear goal and feedback to stimulate the mind and prevent it from entering its natural chaotic state, wherein distractions take over and flow is lost (Csikszentmihalyi, 1990). The goal, in any game, can be seen as clear-cut quests or missions, but also call upon the human drive to answer the questions of the unknown. In this sense, it boils down to either having a guided experience wherein the story is told through getting and

completing these missions or being able to experience the story through personal exploration, without added guidance of missions to complete.

Feedback can come from many factors, audio, visual cues, unlocks, all of which work towards granting the player a sense of progress. Combining this for gamifying a story can therefore result in more immersion, creating a more effective narrative for the player. During the experiment of the current study, players will be rewarded with a sense of progress through getting a new mission and some feedback on their progress in the linear structure. With the non-linear structure, however, this is left out, as the game will also reward the player for their exploration through some of the aforementioned feedback factors. This would suggest higher levels of flow in a linear structure, and lower levels in a non-linear structure going off the principle that a player needs a clear goal and feedback. On the other hand, a non-linear structure wherein the player is free to explore may end up allowing the player to transport themselves more easily into, and better identify with the characters of, the game.

The effects of active engagement, immersion, and flow

As Csikszentmihalyi (1996) points out, and the reason why knowledge-based games are effective for telling stories, players are “[...] motivated by the enjoyment of thinking rather than the material rewards that would be gained by it. Indeed, playing with ideas can be exhilarating.”. Feedback as a condition for reaching a flow-state can thus also come from the intrinsic joy of finding solutions to problems. In non-linear narratives there is no clearly set questline or actions for the player to perform, instead the player is given an open world upon which the player can let loose their own ideas and thoughts to better understand the world they are in. This, once more, can allow the player to enter a flow state in which they become immersed to the extent that the external and virtual world blend and external factors cease to affect the player (Huizinga, 1949;

Green, 2019). This immersion and the achieving of flow, as found by prior research, can function to heighten emotions while immersing oneself into a fictional world and engaging with it.

A heightened emotional state cannot only induce more emotions within the audience of the story, but it also feeds back into the flow state the audience, or player in the case of a video game, is in. Csikszentmihalyi (1990) defines a key emotion for the motivation of any person to perform any task, especially when engaging in leisurely activities, namely enjoyment.

“Enjoyment results when a person has not only met some prior expectation but also gone beyond what he or she has been programmed to do and achieved something unexpected. Enjoyment, in other words, is characterized by a sense of novelty or accomplishment.” Raney and Bryant (2019) further support this motivation for engaging in video games specifically for people looking for an enjoyable experience.

Excitation and desensitization

The final concept to consider while studying the effects of a game's structure regarding how it is played and how its story is told is the excitation transfer and desensitization theory. While it is prior research suggests that both excitation, and its opposite, desensitization, influence the emotional experience and enjoyment of a player, the actual scope of this effect remains relatively unexplored (Nabi, 2019).

The first concept, excitation transfer, refers to the situation wherein a player finds themselves physiologically aroused, leading to more intense emotional responses to events in the game they are playing (Nabi, 2019). While the excitation transfer theory has not been explored to its full extent, it could be useful in the context of this study, as for some players playing a game or game genre for the first time, their levels of physiological arousal may be higher due to the novelty of the experience. This may lead to more intense or higher levels of emotions,

immersion, and potentially the feeling of flow. On the opposite end of this lies the desensitization theory, wherein players who have played more games of the same type, or more games in general, may end up feeling desensitized in their experience. This would dampen the intensity of their experience (Nabi, 2019), potentially resulting in the opposite effect on the player when compared to players with less experience.

While these two theories remain relatively unexplored, they may provide useful insights into a potential moderating effect of game experience on the experience of the game *Outer Wilds* as a whole. The suggestion that players who have never played anything like *Outer Wilds* may be more excited becomes clear, however due to the likely overwhelming nature of the game at the start, this may lead to too much excitement and thus backfire on the overall experience of players. Though the interaction of overall game experience is considered for this study, it is further explored through the interviews, which allows for further interpretation of the effects of game experience on the overall experience with a new game for players.

How does player freedom in a video game influence the experience of a game's narrative and game experience including immersion, flow, and emotions?

Hypotheses:

H1: A non-guided experience, in comparison with a guided experience, in video games has a positive effect on the level of immersion during gameplay.

H2: A non-guided experience, in comparison with a guided experience, in video games has a positive effect on the level of flow during gameplay.

H3: A non-guided experience, in comparison with a guided experience, in video games has a positive effect on the emotional experience during gameplay.

H4: The experience a person has with video games as a whole has a moderating role in the relationship between the level of player freedom and the gaming experience and effectiveness of a story in a video game.

Methodology

Research design

The research design used for the purposes of determining the effectiveness of a narrative in Outer Wilds was a combination of quantitative and qualitative research following an experiment. The participants took part in an experiment in which they played the game Outer Wilds for 45 minutes. During these 45 minutes, half of the participants were asked to follow a pre-written script based on a pre-study and prior knowledge of the game's story to simulate a linear gameplay and narrative sequence. This script was narrated by the researcher to allow the player to fully engage with the game instead of needing to focus on reading a script while playing the game. This approach was chosen as it had the least impact on the immersion of the player, allowing for an unbiased study with regards to breaks, reading speed, and time spent in the game. The other half of the participants were only given instructions as an introduction, after

which they were given full freedom over how they wanted to play the game, simulating a non-linear narrative experience. During the experiment the researcher took notes to understand in which aspects the different structures of the experience influence the decision making of the player. These notes further served as a basis for questions following in the interview to be able to ask more specific questions about the gameplay. The ethics committee of the University of Twente has approved of this study with reference number 240675, on 05/06/2024.

Sample

This research had a convenience sample of $N = 32$ participants, wherein the participants had to have had some prior experience with video games. There was no established lower or higher limit to the 'gaming experience' of the convenience sample to effectively simulate the average target audience of any video game. The only strict criterium for the experiment was that participants were not to have had any exposure to Outer Wilds content which could influence their experience of the game and change the way they would play the game. The sample included $N=10$ female, $N=21$ male, and $N=1$ non-binary/ third gender. The participants originated from $N=9$ countries, with $N=14$ from the Netherlands, $N=16$ from Europe, and $N=2$ from outside of Europe. The average age in the sample was 20.8.

Measures

The experiment for this study was conducted with a 45 minute gameplay session of Outer Wilds. This game was chosen as it allowed the flexibility within the game necessary to create both a non-linear experience, as offered by the game itself, and a linear experience, through the introduction of missions to guide players through the game's story in a chronological order. During the study, the researcher observed the participants, and took notes which were used in

order to ask questions more directly related to the experience of the participants. Immediately after the gameplay session, the players were asked to fill out a survey.

In order to measure the levels of immersion, flow, and the emotional experience of participants, a survey was conducted with each participant after their gameplay session. Immersion was measured using a 7 point likert scale as provided by Tcha-Tokey et al. (2016). This scale can be found in Appendix A. The scale was modified from the original scale, to allow for outcomes related more concretely to the experience of the participants. It produced results with a Cronbach's alpha of 0.94. Flow was measured through the use of a 7 point scale introduced based on the Flow4D16 scale as provided by Tcha-Tokey et al. (2016). This scale can be found in Appendix B and was adapted to be more in line with the experience of the participants. The scale on flow presented a Cronbach's alpha of 0.67. The emotional experience of the participants was measured through two scales, Appendix C and D respectively showcase these scales, whereby positive and negative emotions were measured through direct questions. This scale was adapted from the works of Bieleke et al. (2021). For the sake of computing emotional experience as one variable, the 2 scales, measuring positive and negative experience respectively, were combined based on their means, generating one value for emotional experience per participant. The negative emotions scale had a Cronbach's alpha value of 0.73 and the positive emotions scale came in at 0.79 for its Cronbach's alpha value.

The 4 scales were all adapted to create a streamlined way for the participants to reflect on their experience, allowing them to give the most accurate answers with regards to their experience. For each of the scales, higher outcome values indicated a more intense experience with regards to that variable specifically, therefore the values of the negative emotions scale needed to be inverted.

Immediately after the survey was completed, the participants were interviewed using a semi-structured interview. The questions used for this can be found in appendix E. These interviews lasted between 8 and 13 minutes depending on the participant, with only one interview taking 20 minutes due to more in-depth insights. The interview questions were a means to exploring the overall experience the participants had with the game, as well as sketching an idea of the overall effectiveness of the story within the two separate groups. These questions were based on the findings of the theoretical framework. Furthermore, the questions were intended to allow for rather open answers to account for unforeseen outcomes and experiences which the participants wanted to share, such as specific events, emotions, or other remarks regarding their experience, to aid in exploring and uncovering unforeseen outcomes of the experiences.

The interviews were analyzed through the use of codes. Due to the explorative purpose of the interviews, an inductive procedure for creating codes was used based on the first 6 interviews. The codes stemming from these interviews were used to further code the remainder of the interviews. The initial codebook is laid out in Appendix F, wherein a definition and example is included for each code. However, as the process of coding the interviews continued, the codebook evolved and dismissed a few codes due to a lack of applicability, resulting in the final codebook as found in Appendix G.

Procedure

During the experiment, all participants were given the same level of instructions and guidance during the introductory sequence of the game. In specific terms, this meant that the players, regardless of their group, were tasked with visiting the observatory and getting to grips with the exhibitions giving background information on the virtual world. After this, the

participants were guided back to the spaceship and introduced to the mechanics of the spaceship, before the two groups' paths diverge.

The non-guided, and thus non-linear, group was given the overarching task to explore the game world and try to gain an understanding of the world, the ancient species (Nomai), and in general to explore the game's world. Beyond this point, only if the participant got into a situation wherein they were unable to continue playing did an intervention by the researcher take place. One such situation included a participant getting stuck on a planet through an unforeseen glitch in the game itself.

The guided, linear, group was given a save file which was preloaded for them when they first started the gameplay session. This was so that they could follow the missions by setting goals in the game through selecting 'previously explored' areas. These two areas were the 'Eye Signal Locator', which is where they were pointed to first, and 'escape pod 1', after arriving there they were given following missions from that point onward, for which mission markers were not needed. To aid in creating an effective experience akin to other linear video games, the script was followed, but adapted to fit with the surroundings and actions of the player, but never changed in order, type of mission, or information given by the mission itself. An example of note for this is the black hole on Brittle Hollow, which meant that given the different contexts of participants, and the potential different outcomes due to the nature of the game, the researcher needed to adapt the way in which the missions were given to the participants to not take them out of their experience. The full script can be found in Appendix H.

After the gameplay session, the participants all filled out the aforementioned survey. During this time there were no interruptions and the researcher only remained in the room to answer any questions regarding the survey. Once the survey was finished, the researcher then

proceeded to interview the participants. These interviews were audio recorded and afterwards transcribed. During the interviews, some events of the gameplay session were recounted and used as examples for relating and contextualizing certain experiences during the gameplay session.

Analysis

Following the research, the results were gathered and analysed using two methods. The data collected through the survey was analysed with the use of Rstudio and to visualize any applicable data. For writing the Rstudio script, ChatGPT was used as a generative A.I. tool for the purposes of helping the researcher with streamlining the data analysis. The interviews were transcribed using Amberscript, and refined by the researcher. The transcribed interviews were analyzed through the use of codes in Atlas.ti. The data resulting from this was used to explore the experiences of the participants as well as giving a better understanding through context of the quantitative results.

Results

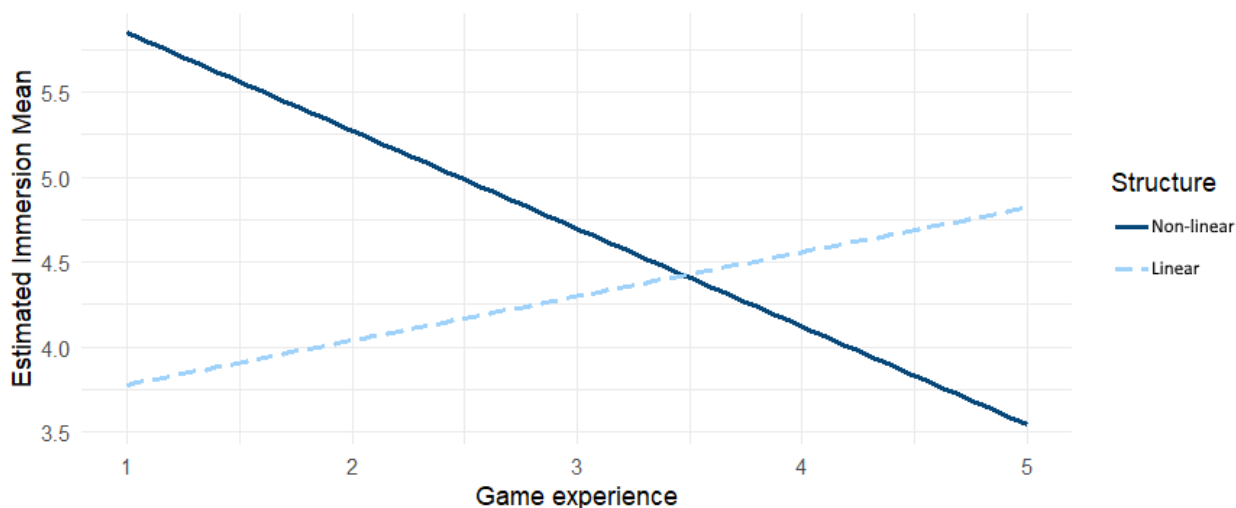
In order to answer the research question and test the hypotheses as established in the theoretical framework, an ANOVA was performed on the three scales measuring the dependent variables of immersion, flow, and emotional experience. To further explore the research question and interpret the experiences of participants, a qualitative analysis was performed based on the interviews with the participants.

Quantitative analysis of immersion

Hypothesis 1 concerns the effects of player freedom, labeled as ‘structure’, on the immersion of the participant during the gameplay session. In line with this hypothesis, a less guided structure ($M = 4.4$, $SD = 1.2$) showcased higher levels of immersion among participants than the guided structure ($M = 4.2$, $SD = 1.3$). To test whether this held true when introducing general game experience as a factor, a two-way ANOVA was performed, with immersion as the dependent variable, and structure and general game experience as the independent variables. Significant main effects were found of structure, $F(1,28) = 2.43$, $p = .02$, and general game experience, $F(1,28) = 2.08$, $p = .05$. However, against the expected outcome, the interaction effect of structure and general game experience was significant, though negative, $F(1,28) = -2.34$, $p = .03$. The effects of structure on immersion, whilst taking general game experience into account, are shown in figure 2.

Figure 2

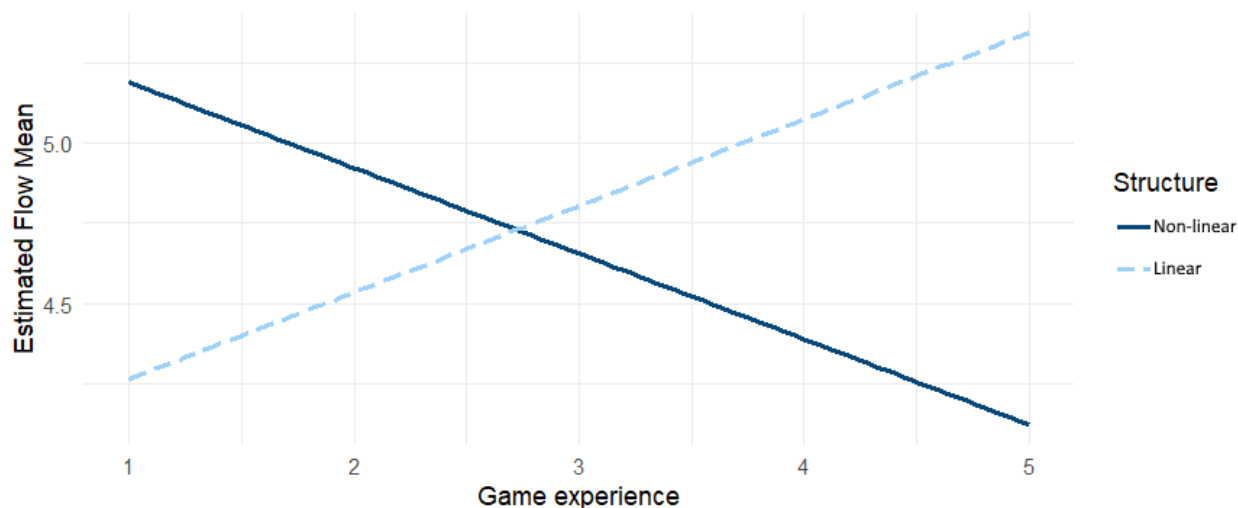
Interaction Effect of Structure on Immersion Mean



Quantitative analysis of levels of flow

To test hypothesis 2, the effects of structure on the levels of flow were studied.

Unexpectedly, a non-guided structure ($M = 4.5$, $SD = 0.8$) appears to generate lower levels of flow than a guided structure ($M = 4.7$, $SD = 0.8$) over the course of a 45 minute gameplay session. To test the effects of structure on flow, whilst taking into account the general game experience of participants, a two-way ANOVA was performed. For this two-way ANOVA, structure and general game experience served as independent variables, and flow as the dependent variable. A barely insignificant main effect of structure on flow, $F(1,28) = 1.90$, $p = .07$, was observed. The effect of general game experience, however, deemed to be significant, $F(1,28) = 2.379$, $p = .02$. Once more against expectations, the interaction effect of general game experience and structure were both negative and significant, $F(1,28) = -2.336$, $p = .03$. The effects of structure on flow, whilst taking general game experience into account, are shown in figure 3.

Figure 3*Interaction Effect of Structure on Flow Mean***Quantitative analysis of emotional experience**

The analysis of the effects of structure on the emotional experience of participants tests hypothesis 3. In doing so, it is uncovered that a non-guided experience ($M = 5.4$, $SD = 0.8$) may lead to a more intense emotional experience when compared to a more guided experience ($M = 5.3$, $SD = 0.7$). Through performing a two-way ANOVA wherein structure and general game experience acted as independent variables, and the emotional experience as the dependent variable, the effects of structure and general game experience were tested. Both structure, $F(1,28) = 0.311$, $p = .76$, and general game experience, $F(1,28) = -0.25$, $p = .80$, showed little effect, as well as very insignificant effect on the emotional experience of participants. Furthermore, the interaction effect, $F(1,28) = -0.39$, $p = .97$, also showed barely any effect, while being extremely insignificant.

Qualitative analysis key takeaways

To explore and elaborate upon the experiences of the participants, the interviews were analyzed based on the themes and trends observed during the interviews. To achieve this, experiences specifically with regards to their given narrative structure, either the guided, or non-guided experience, and their perceptions of how this influenced their experience with the game.

A trend among the majority of participants observed was that they were excited to play the game, and nearly all participants, regardless of their structure, wanted to continue playing the game if they were given the chance. As participant 12 (non-guided) stated: “I would absolutely [keep playing]. [...] There's a lot of stuff in there that I want to learn more about. So if I was given the opportunity, I would certainly continue playing.” Features and mechanics the participants mentioned with regards to their want to keep playing included, but were not limited to, the immersion they felt, their curiosity, and the overall mastery of skills as they kept playing. Participants seemed driven by their need to satisfy their curiosity and to master the skills necessary to explore the game and its story.

Though not an outcome voiced by many participants, some felt turned off by the initially difficult mechanics and overwhelming nature of the game. These feelings were further strengthened by the non-guided structure for some, as participant 22 (non-guided) explained “It made me feel exhausted. Lost. It made me search for a purpose, and because I could not figure it out, it became more frustrating.” Although this may in part be due to these participants not playing games as often, or rather playing different games and genres, or in general playing games for different reasons than uncovering mysteries, as some participants within this group also mentioned that “It's not a game I would usually play, and I didn't really enjoy finding conversations with other people. (participant 32, non-guided)”

Purpose and achievement

A major component of creating a positive experience within the game clearly deemed to be the sense of purpose and achievement participants felt as they were playing. Participants of the linear guided group had a higher sense of purpose as they were playing, which was reflected by participant 3 (guided) as they mentioned: “I’m very happy because, looking at this game and without any instructions, I wouldn’t have known where to go.” Through the interviews, it became clear that missions guiding the participant through the experience gave them enough sense of purpose and urgency to pursue the missions without getting sidetracked. This led to some participants mentioning that the completing of goals specifically felt achieving, “And then it kind of felt like, you know, you achieve an objective in the game (participant 1, guided)”. On the other hand, the achievement felt through exploration was lessened, as reflected upon by participant 5 (guided) “the game in total wasn’t really that rewarding because I felt like I really haven’t accomplished anything. I just went from place to place, but I didn’t really do something there.”

The sense of purpose participants felt in the non-guided structure showed a trend towards less sense of purpose at the beginning of the experience, however, the purpose became clearer as the participants kept playing “There was some confusion, of course, where you are a little bit doubting yourself if you’re doing the right thing, going the right path. [...] I think it did motivate me to not necessarily follow a path always, but to choose the path myself a lot. (participant 14, non-guided)”. Though this was not the case for all participants, which led some participants to not want to continue playing the game. Whereas the sense of purpose was lacking for some, the sense of achievement was made more extreme for many of the participants, “I do think that the added exploration of doing it yourself and figuring it out adds to the experience, because it’s more rewarding that way. (Participant 16, non-guided)” Once the exploration ‘clicked’ for

participants, finding new clues gave them a sense of purpose, “So again, I think it's like that balance of feeling like you're in control and feeling autonomous within that game, but also feeling a sense of, ah, this is kind of what I want to work towards. But that gives like that sense of purpose without like it being too controlling. (participant 18, non-guided)”, and due to the non-guided structure these participants mentioned feeling much more rewarded through their exploration than participants of the guided structure.

Connection and joy

An important aspect of experiencing a story and game are the connection the audience feels and how much joy they get out of the experience. Within the linear group, many participants stated to feel, to some extent, connected with the story, the characters, and the world. This was further reinforced by the interest of these players in the story as a form of progressing through the missions, as reflected upon by participant 29 (guided), “I was paying more attention to how to achieve the goal. Like I said earlier, reading everything. So I got more immersed into the story.” In part, this connection led to a rather enjoyable experience for the majority of participants within this group, however a lot of participants also noted that due to “[...] the short time playing, I didn't fully get into it. (participant 17, guided)”

The effects of a lack of time became clearer for the building of a connection for the non-guided structure, as they tended to feel lost or overwhelmed, “At first [I felt] a bit lost, a bit overwhelmed because I didn't know where to start. (participant 32, non-guided)”, and thus did not feel as connected at first. On the other hand, the participants who did get a taste of the story felt very motivated to keep exploring the game and to grow a connection with the characters and the virtual world, as stated by participant 12 (non-guided) “I think the fact that you are the person who is responsible for exploring the rest of the lore is much more interesting than getting

everything spoon fed to you”. The amount of joy in playing the game seemed to be higher among the participants of the non-guided group however, with many stating that “[...] because of that exploring element, for me, it just stimulates my brain a lot that I'm like, oh, yeah, I can try this and I can try that. And I just, I really enjoyed that. (participant 18, non-guided)”, or something akin to this. Though inconclusive, this appeared to be mainly experienced through the joy of uncovering the story's mysteries and the game's exploration, which participants noted was aided by their non-guided experience.

Freedom and restrictions

As has become clear with the previously explored themes, freedom and restrictions play a role in the experience of the participants. Although participants noted the guided structure inducing a sense of restrictions within the game, as participant 9 (guided) states feeling “A bit disappointed because I felt like there was so much more to explore. And I was curious for the different paths as well. So I felt like I was missing out [...]”, many participants appreciated the guided structure as well. This was further elaborated upon by participant 7 (guided) in stating that “[...] Instead of going wherever I wanted to, it gave me a direction to go, which isn't a bad thing, of course.” Participants within this structure further mentioned that if they were restricted further in their exploration and opportunities to try out mechanics, the structure would have become too overbearing and deteriorate the experience.

On the other side lies the non-guided structure, wherein participants were very appreciative of the non-guided and free nature of the experience within this game in general. Overall participants voiced that due to this, their experience felt more “So I think once you accept that [there is no right path] and that you don't have to follow a specific lineage, then it's very nice to have that agency over where you go from there.”, as participant 14 (non-guided) puts it. Though, this was

not experienced by everyone, with some experiencing negative feelings due to the overwhelming options, as is voiced by participant 8 (non-guided), “I would say I sometimes felt nervous because I was just like, okay, where should I land? Like, what is my instruction now? Or should I go somewhere else? So I think that kind of made me more nervous in that situation, probably because I was unsure of what to do next.” Furthermore, although the features were explained fully, some participants noted missing certain features to help make the freedom less overwhelming, such as a ship log to keep track of progress and points of interest. When asked about these features, one participant 22 (non-guided) stated: “I think I did not take it (ship log) serious in a way that like, oh, this is something important. [...] Yeah, but it's nothing that I cared about.”

An overarching theme which was observed with regards to the freedom and restrictions of both structures were the levels of stress, anxiety, and other negative feelings towards the game induced by the structure of the experience. Wherein some participants felt pressured through the inclusion of missions, such as participant 5 stating “I sometimes wanted to explore more things, but then also given the time pressure and such. I felt like I did not have enough time to explore my environment because I had to focus on tasks.” Others felt that the freedom given in the non-guided structure made them anxious and stressed by the possibilities, such as participant 24 (non-guided) stating “I mean, not just getting told to go from point A to B at some point and you just don't know really where to start. [...] So I do like that kind of thing sometimes, but it also makes it a bit overwhelming sometimes.”

Discussion

Immersion

The first step in understanding the effects of player freedom on the player's experience of a game and its story is to understand the effects this freedom has on the immersion of players. Therefore, the first question to answer is *How does player freedom influence the level of immersion experienced by a player?* Based on the outcomes of both the quantitative and qualitative analysis, and in line with the accompanying hypothesis regarding this effect, player freedom, or otherwise referred to as (narrative) structure, has a positive effect on a player's level of immersion.

From the interviews it became clear that the majority of participants felt more 'in' the game when they were given no or less guidance throughout their gameplay session. This effect is explored through the theory of 'transportation' (Huizinga, 1949), and 'identification' (Cohen et al., 2019). A possible reason for the higher levels of immersion in the non-guided structure may be due to the mention of participants feeling more involved with their actions in the game, as well as keeping the freedom of choice, while feeling the impacts and importance of decisions about where to go and what to do (Huizinga, 1949). While this showcases the theory of 'transportation' as a possible explanation of the results, identification (Cohen et al., 2019) as a theory is also interesting to explore.

This seems to be in line with the expected outcome of the experience, as was discussed with regards to the theory of 'transportation' (Huizinga, 1949). In the context of a video game such as *Outer Wilds*, by allowing the player to be on their own, the game makes it possible for the player to more easily transport themselves into this virtual world and fully immerse themselves. Furthermore, as was elaborated upon by some of the participants after the

experiment, not knowing, or not having everything explained by a third party in or outside of the game, allowed them to place themselves in the shoes of the character they were playing as. As Cohen et al. (2019) state, this adheres to the theory of identification, whereby players were able to identify with the character, as well as create their own identity in the game. As was found in this study, and which is backed up by prior research (Cohen et al., 2019; Film Courage, 2022), this allows players to immerse themselves more in the game.

However, as was mentioned throughout this research, the freedom can also create negative outcomes among players, which have been observed during the interviews. Although many participants enjoyed the freedom, some lacked a sense of purpose, which as found by Csikszentmihalyi (1990) is important for achieving higher levels of immersion. On the other hand, still with regards to the freedom, the challenges and puzzles this creates among players can also have a positive effect on their immersion (Csikszentmihalyi, 1996), as this allows player to be more creative and free while playing the game. This is in line with what has been found during this study, whereby participants seem to echo this feeling of positive influences due to being challenged into problem solving and discovery.

A rather unexpected outcome though, is the influence of general game experience on the immersion of the participants. A higher level of general game experience would seemingly translate to an easier time getting into a new game by understanding the basic mechanics from other games. This would lead to higher levels of immersion according to research in the field of flow and play (Csikszentmihalyi, 1990; Huizinga, 1949). However, as the data, as well as the interviews, showed, participants with more experience in other games tended to feel less immersed. Furthermore, the effects of a non-guided structure appeared to be negatively impacted by the general game experience of participants. This may be due to desensitization to the effects

of different structures in games, as these participants may enjoy a game or story no matter which structure they are given. However, as desensitization as a concept shows, it does lead to lower levels of immersion (Nabi, 2019), which is reflected by the given data. This idea is further strengthened by the feeling of ‘novelty’ being a factor for the willingness of some participants to actively try and immerse themselves, rather than playing the game as they usually would.

Flow

From reaching a deeper immersion another state becomes apparent, namely the flow state. The flow state is important to consider with regards to spending time in a game and its story, as reaching this flow state induces heightened emotions, deeper immersion, and an overall more positive experience with the game, as discussed with prior research (Csikszentmihalyi, 1990; Csikszentmihalyi, 1996; Bell et al., 2018; Sherry, 2004, as read in Klimmt and Possler, 2019). Combining prior knowledge with the outcomes of this study, the question of how the narrative structure and freedom influences the feeling of entering a flow state, and the effects this has on the experience of players, is answered.

As a whole, this study seems to indicate that more freedom for players of a game does not necessarily indicate higher levels of flow across all levels of general game experience. Although barely insignificant, more freedom seems to have a positive effect on the flow state of players. The same applies to players who have a higher level of general game experience, as opposed to players with less game experience. This highlights what Csikszentmihalyi (1996) has laid out with regards to creativity, by giving players the opportunity to explore and discover, the players may enter the flow state more effectively, as opposed to having the exploration and solutions to problems prompted to by missions given by a third party. It goes against the idea, however, that for reaching flow, a clear purpose or goal is necessary to achieve a certain level of flow

(Csikszentmihalyi, 1990). As observed during the interviews of this study, the setting of personal goals and creating an own purpose was seen as a positive experience for most participants in the non-guided structure, with participants of the guided structure actively seeking out and setting their own goals, with the hope of deviating from the set path. In either structure, however, the flow state was clearly observed, and this led to reportedly more positive experiences across both structures, which is in line with prior research regarding the effects of flow and deeper immersion (Sherry, 2004, as read in Klimmt and Possler, 2019; Green, 2019; Csikszentmihalyi, 1990).

Although the effects of structure alone are inconclusive, the study showed a rather interesting interaction once more between the general game experience and the effects of structure on reaching the flow state. As with regards to the level of immersion being negatively affected due to desensitization, this negative effect may apply to reaching the flow state by extension as well (Nabi, 2019), as this study potentially shows. This interaction is more extreme than in the context of immersion though, which may be explained by the flow state's necessity for immersion.

The effects of player freedom on the flow state of players appear to be highly dependent on the general game experience of players. Reportedly participants of this study stated to feel 'in the flow' more often during the interviews among the non-guided structure, however, the quantitative results show that having a clear-cut purpose from the start of the experience led to higher levels of flow. This is nuanced by the request for a longer gameplay session, however, as the flow state requires a certain level of immersion, which could indicate that although participants within the non-guided structure felt more immersed and 'in the flow' at the end of the experience, on average they may have experienced lower levels of flow. Due to the time

constraints, this could not be investigated further, however, as prior research suggests, having more control and interaction with the game seems to lead to deeper immersion and flow (Klimmt and Possler, 2019; Raney and Bryant, 2019).

Emotional experience

Perhaps at the core of an effective story and gaming experience lays the emotional experience any person has while playing the game. Whether this is expressed through joy, anger, horror, sadness, or any emotion in between, a good story generates emotions among its audience. To answer the question and test the hypothesis of how structure affects this emotional experience, both the quantitative and qualitative aspects of this study are taken into account, and elaborated upon by following the suggestions of prior research.

Although the trend observed regarding the emotional experience while playing *Outer Wilds* was positive, unlike the outcomes of immersion and flow, the emotional experience seems to not be influenced by the game's structure, nor the general game experience. The observed trend among prior research within the context of positive emotional experience and general enjoyment of a game and its story, is that interactivity with the game and narrative through player freedom leads to or facilitates higher levels of positive emotions (Raney and Bryant, 2019; Klimmt and Possler, 2019; Green, 2019).

Based on the quantitative data alone, this trend was not observed in this study, or at least not with regards to the overall structure of the game. However, within the outcomes of the qualitative side of the data, it becomes clear that although nearly everyone enjoyed the game, a clear appreciation for player freedom was noted, even among the participants of the guided structure. Furthermore, among the participants of the non-guided structure, as well as with the guided structure, a trend could be observed that the emotional experience was at least heightened

when more player freedom was introduced. This is in line with excitation theory, as for the majority of participants, the non-guided structure was a novel and exciting experience, which led to heightened emotions (Nabi, 2019). After this initial exciting phase, the heightened emotions due to interaction also became apparent in this study, as participants with more general game experience noted that the non-guided structure was their preferred structure for exploring the game and its story, as it allowed them to immerse themselves more fully in the game, its story, and its characters.

With these outcomes in mind, across the study as a whole, the consensus was that there was not enough time to fully engage on an emotional level with the content of the game. Although logical, this may have impacted the outcomes with regards to the effects of the structure on the overall emotional experience within the study's timeframe. As mentioned throughout the interviews, not a lot of emotion was felt with regards to the story or content of the game, whereby the narrative structure would have influenced the participants according to them. This would explain the lack of influence structure has on the emotional experience within this study, outside of excitation and desensitization, or the suggested results of interactivity as discussed at length throughout the theoretical framework (Nabi, 2019; Raney and Bryant, 2019; Klimmt and Possler, 2019; Green, 2019).

Limitations of the study

Any study is prone to be limited in some way or another, this study, as ambitious as it was, was also limited by multiple factors. These limitations will be discussed to guide future research in enabling them to study certain behaviours and outcomes more specifically while keeping possible limitations in mind.

When telling any story, an audience member, in the context of video games this would be the player, might just not like the themes, genre, or the way in which the story is told. Due to the selection process of participants for this experiment, these preferences were not taken into account, with the intention to create a map of the general audience of video games. This, however, hampered the effectiveness of studying how effective the story was, or how the game was experienced, as some participants were not influenced in a particular way by the narrative structure or their gaming experience, but rather by the themes, genres, and the fact that it was a game they were playing. To control for this would allow greater insight in how effective a story is when participants are already somewhat interested or invested with the story, as one would be before they intend to immerse themselves in a story on their own accord. Furthermore, setting a specific context, in order to create a consistent reception context, while keeping in mind a specific target audience, may influence the outcomes as well (Raney and Bryant, 2019).

Players of a general audience will have different expectations, prior experiences, and mechanical skills going into any game. This is due to the diversity of video game platforms and types of video games, ranging from massive multiplayer open world games on a computer to a singleplayer minimalistic farming simulator on the Nintendo Switch. Taking into account such prior experiences, as is done when targeting specific audiences for a game, could have an influence on the outcomes of a study measuring story effectiveness in a video game. Different mechanical skills and expectations can be further taken into account through options such as a short tutorial before the start of the experiment, or a printed control layout or introduction to the game's mechanics. Due to time constraints, as well as constraints within the game for the possibility of a tutorial, it was opted for this study to have a printed control layout with a short introduction to some key game-mechanics, see appendix I. It should be noted however, that most

participants never paid much attention to this, forgetting the information within the first 5 minutes of playing, and while struggling with certain mechanics forget about the printed layout to help them. Thus, this should be taken into account as a potential limitation regarding this study.

When immersing oneself in a good story, the reward of a reveal, or as a participant pointed ‘a big eureka moment’ is important for creating an effective story. Within a timespan of 45 minutes, reaching any major climax, reveal, or impactful story beats is, as was showcased by this study, very difficult. A major constraint with studying the effectiveness of any story, let alone a story which can take anywhere from 15 to 25 hours to complete, is the time participants need to immerse themselves and get emotionally invested in a story. A trend noted by participants was feeling adverse effects due to not being able to play longer to get emotionally invested, and thus wanting a linear experience to get to the end of the story faster, rather than appreciating the story at their own pace. Thus, with special regards to the emotional experience of players, more time is needed for a player to get emotionally invested in the characters and the story to be able to study the influences of a narrative structure. One way to achieve this would be the more naturalistic approach wherein participants are able to play the game at home, as they would any other game, at their own leisure, and turning the experiment into a diary study. This was infeasible given the time constraints and scope of this study, however it would generate interesting insights into how people play games and what creates effective stories when playing for an extended period of time.

The last limitation which appeared throughout multiple gameplay sessions was the presence of an observer. Unless participants were used to playing games with an observer present, they experienced feelings of being watched, judged, or pressure to perform a task well.

These feelings can be eliminated through removing the observer from the study, and instead modifying the game to create a linear and non-linear experience, as well as recording the game while a participant plays it. Once more, this was beyond the scope of this study, however it was seen as a limiting factor to the experience of some of the participants and should be taken into account when attempting to study concepts such as immersion, flow, and emotional experience in the future.

Implications

This study has shown that the ways in which stories are told vary wildly from one creator to the next, and that there are different audiences for different stories in different times and places. However, a good story presented well rarely goes unnoticed by those who are on the receiving end of it. This study was not meant as a guide for video game writers, developers, artists, or any other involved party, but rather meant to note what might be of interest to take into account when planning, creating, or even marketing a game. That narrative structure seems to have implied effects on the immersion and flow of players shows that there may be merit to creating a non-linear story over a linear story, even though when executed well, the latter can also create amazing experiences. However, as demonstrated by a seemingly null effect of narrative structure on the emotions of players, narrative structure alone won't make or break a game experience and story. There are many more factors such as the gameplay, visuals, audio, and internal story quality which all play a part in telling an effective story through a video game, all of which were not taken into account for the sake of this study. In the end, this study is not intended to create a paradigm shift in the video game industry to focus solely on non-linear narratives. There are many people who prefer a linear experience over a non-linear experience, and not all game types work with a non-linear narrative, or even any narrative at all. Games can

be perceived as art, and an artist will create what they want to communicate to the world, regardless of whether it is seen or appreciated, thus the artist will decide what's best for their story, but perhaps this study can help with this decision.

Directions for future research

Video games are not a new phenomenon anymore, with multiple generations of people now growing up in a world where video games and gamification become ever more prevalent in our daily lives. The principle of a non-linear story is not new, with 'choose-your-own-adventure' style stories having existed far before video games allowed players to interact with a story, however the potential of video games has pushed stories and interaction with stories to a new height, and research is having to catch up. While this study gives interesting insights into how narrative structures can influence the immersion and flow players feel while playing a game, neither of these interactions is conclusive in fully answering why players get immersed or feel like they are in the flow. Furthermore, this research suggests that there is next to no interaction between the narrative structure and emotional experience of players, though there were certainly emotions ranging from awe and joy to anxiety and existential crises. Emotional experience, and understanding how to influence this, is of importance to gaining an understanding of how to make effective stories, thus future research should pay close attention to accounting for the emotional experience of players, and what affects this.

Further research, as has been suggested earlier in this study, can focus on creating diary studies or other forms of experiments to generate new insights into how and why people play video games and how stories affect players of different target groups. Notions of personal identity, age, culture, and any other form of norms and values which shroud a person's self can furthermore be of interest to research in the future, as this could lead to important insights into

how to tell effective stories for specific audiences. To add to this notion, setting a specific reception context, as opted by Raney and Bryant (2019) may be important for how a game is experienced. By extension, this reception context could lead to other outcomes with regards to the influence of player freedom and structure.

Beyond exploring these possibilities, the potential for impact through a game experience on the player seems to be influenced at least partially by the structure of the game. As discussed, it appears that giving players freedom in a game in terms of exploring the game and its story allows them to immerse themselves more fully in the game and the story it's telling the player. What this study does not account for, however, are the long-term effects and effectiveness of this. As some other research has pointed out, understanding the origins and effect of parasocial relationships, and how these are affected by having more impactful decision-making may be of further interest (Cohen et al., 2019). Stemming from this then having more impactful decision-making within the narrative and game, the effects on long-lasting emotions and moods, as suggested by Nabi (2019), may also lead to intriguing outcomes.

Therefore, this study by no means has exhausted the possibilities for researching games and their narratives. Rather, it lays the foundation for a new path to follow on the road to understanding why stories grip us, and why they sometimes do not. Perhaps the way in which a story is told, around a campfire, in a comfortable chair with a book, or on the couch with a controller in hand, is just as important as the content of the story. Researching the implications of both *fabula* and *syuzhet* (Propp and Shklovsky, as cited in Bostan, 2022) within the context of video games is the next step to understanding why some stories are effective and others not, as these are the roots from which effective stories stem, and the surface of video game potential has barely been scratched with the surge in virtual reality popularity and the ever-increasing visual

and audio quality of games. Video games and the stories they tell will grow more and more complex, and it is up to the fields of narratology and ludology to bind together and keep up with this growing complexity.

Conclusion

Does the narrative structure in a video game make a difference as to how a game is experienced? Combining the findings of this study and prior research suggests that perhaps it does make a difference. As for now though, conclusive answers to the question of how exactly the experience is influenced remain unanswered. Perhaps this is due to the lack of positively received non-linear games up until recent times, however, the recent success of titles such as *Outer Wilds* bode well for the future of this unconventional narrative structure. In light of this potential future, this study serves as a good place from which to start with further research into the complexities of non-linear/ non-guided narratives in video games, and the impactful stories which can be told through such a game. What this study has brought to light is that stories told through visual, audio, and written media all still have their time and place, but that interactive media is deserving of its own spot in this list of storytelling media. People will always have their preferred genres, types of stories, media, etc. However, there was not a single person who denied the effectiveness of a story well executed within the boundaries of the game they played. Perhaps with further deep dives into the topic of narrative structures in video games we may yet come to a conclusive answer to how it influences the effectiveness of a story, but sometimes a good story is just a good story, and that can be quite a comforting thought.

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Appendix E

Semi-structured interview questions used during the interviews with participants

How did the gameplay structure (Linear/ non-linear) affect you in terms of sense of agency and freedom?

To what extent did you feel limited or free during the experiment to explore and be creative in finding solutions?

How did this limitation or freedom make you feel?

To what extent do you feel a connection with the story of the game?

How did the freedom/ guidance affect this connection for you?

To what extent do you feel that your emotions were affected by the (non-) linear narrative structure?

Follow-up question: Would you have enjoyed the experience more with clearly set goals/ missions, or (for linear participants), would you have enjoyed the experience more with a less linear and mediated experience?

This question can extend into asking about the participants' immersion levels as well, if they felt they were taken out of the immersion by the script, or rather that it helped them focus better on tasks.

Did you feel the need or want to explore?

Was the sense of achievement of the exploration affected by the structure?

Would you keep playing the game (using this ruleset)?

Are there any experiences, feelings, or anything else regarding the experiment you would like to share?

Appendix F

Original codebook including all codes

Code	Definition	Example
Achievement	Indicates a sense of achievement or reward through an action in the game.	"And then you just kind of had the feeling of that you achieved something."
At ease	Pertains to a participant feeling at ease or calm while playing the game.	"I mean, as I mentioned before, I was not so nervous and anxious about it, I was more at ease I would say."
Bored	Indicates boredom induced by the game or its structure.	"Yeah, I feel like it was pretty boring."
Confusion	Applies to feelings of confusion with regards to the game	"So at the beginning I felt disoriented and didn't know what to expect or who I was."
Connected	Implies a feeling of connection or connectedness with the world, characters, game, or story	"Yeah, without goals it's a stronger connection because I kind of make them myself. And yeah, I kind of make my own path. Yeah. So that was. Yeah. That's nice."
Control	Is mentioned with regards to struggles with the game's control system, mechanics, or other mechanical struggles.	"I think in a sense of that I also didn't like with the controlling itself, it was a bit difficult for me."
Enjoyment	Indicates feelings of joy, pleasure, or other positive emotions with regards to the game.	"Yeah, I found it really cool. I, I really liked it."
Free	Includes the mention of feelings of freedom, often with a positive connotation	"I feel pretty free to just move around and go everywhere."

Code	Definition	Example
Game appreciation	Is used with regards to the appreciation of game mechanics, visuals, or other elements	"I also thought the visuals were just very, very beautiful, and the gameplay was also very interesting and not what I otherwise have experienced. But, yeah, very, very fun and very cool things to do. And also what you said the end the the watching the, the sun become a supernova. It's just like very beautiful as well."
Game/ genre	Indicates a mismatch between participant and the game or genre.	"It's not a game I would usually play, and I didn't really enjoy finding conversations with other people."
Interested	Applies to an interest of the participant in the game and its story after playing.	"Because I find the storyline very intriguing."
Keep playing	Indicates the willingness to keep playing the game.	"If I would. Yeah, I would continue playing."
Lack of connection	Implies a lack of the previously mentioned connection.	"I would say not that much, to be honest. I'm still not quite sure if I got the whole story of it."
Lost	Feelings of being lost, overwhelmed, or confused in the virtual world.	"It made me feel exhausted. Lost. Um. It made me. Search for purpose. Um, and because I could not figure it out, it became more frustrating. Because you're searching for. well, you don't know what you're searching for."
No effect	Implies that there is no effect of structure on the game experience of the participant	"Not by the goals. Maybe more when I hit the sun twice. Maybe that took me out a little bit, but I wouldn't say by any of the goals."

Code	Definition	Example
Purpose	Indicates the feeling of having a purpose or goal to work towards.	"No, it just helped me of. Yeah. Having the the red string. Following the right path. It just helped me following the right path."
Restricted	The negative feeling of being restricted, either through missions, but also applies to too much freedom.	"So it didn't really leave me the freedom to get my own solutions."
Stop	Indicates that a participant would not like to continue playing the game.	"Yeah, that's what I thought. So based on my previous knowledge, I don't think I would finish the game."
Stress	Indicates negative emotions induced through the game with regards to anxiety, stress, or other stress-inducing feelings.	"Yeah. So in that sense I would get very frustrated and just abandon."
Time	An indicator of participants notioning the need for more time with the game to achieve measurable outcomes.	"I think if I have only another hour to play it, then I would say give me the set goals so that I can complete the story, because then I'm interested in seeing how it ends. But for gameplay wise I would prefer without because then it's more fun to find out."
Uninterested	Implies that the participant is uninterested in the game and its story.	"So I think for now, I would say no, I didn't really feel the need to explore more."

Code	Definition	Example
Unused mechanic	Is used when participants mention as 'missing a certain mechanic' for their experience to be enjoyable, after this mechanic was explained and not used.	"Yeah. Because then you would have the purpose, um, because you would assume like, oh, yeah, I need this to get to the next step. But just going to the observatory and then going back were like, okay, why did I do this now? You also did not meet any new characters or anything. Um, there was no added. It felt like there was no added value to the storytelling or to the to the development of the story."

Appendix G

Updated codebook for analysis of codes

Code	Definition	Example
Achievement	Indicates a sense of achievement or reward through an action in the game.	"And then you just kind of had the feeling of that you achieved something."
At ease	Pertains to a participant feeling at ease or calm while playing the game.	"I mean, as I mentioned before, I was not so nervous and anxious about it, I was more at ease I would say."
Connected	Implies a feeling of connection or connectedness with the world, characters, game, or story	"Yeah, without goals it's a stronger connection because I kind of make them myself. And yeah, I kind of make my own path. Yeah. So that was. Yeah. That's nice."
Control	Is mentioned with regards to struggles with the game's control system, mechanics, or other mechanical struggles.	"I think in a sense of that I also didn't like with the controlling itself, it was a bit difficult for me."
Enjoyment	Indicates feelings of joy, pleasure, or other positive emotions with regards to the game.	"Yeah, I found it really cool. I, I really liked it."
Free	Includes the mention of feelings of freedom, often with a positive connotation	"I feel pretty free to just move around and go everywhere."
Game appreciation	Is used with regards to the appreciation of game mechanics, visuals, or other elements	"I also thought the visuals were just very, very beautiful, and the gameplay was also very interesting and not what I otherwise have experienced. But, yeah, very, very fun and very cool things to do. And also what you said the end the the watching the, the sun become a supernova. It's just like very beautiful as well."

Code	Definition	Example
Game/ genre	Indicates a mismatch between participant and the game or genre.	"It's not a game I would usually play, and I didn't really enjoy finding conversations with other people."
Interested	Applies to an interest of the participant in the game and its story after playing.	"Because I find the storyline very intriguing."
Keep playing	Indicates the willingness to keep playing the game.	"If I would. Yeah, I would continue playing."
Lack of connection	Implies a lack of the previously mentioned connection.	"I would say not that much, to be honest. I'm still not quite sure if I got the whole story of it."
Lost	Feelings of being lost, overwhelmed, or confused in the virtual world.	"It made me feel exhausted. Lost. Um. It made me. Search for purpose. Um, and because I could not figure it out, it became more frustrating. Because you're searching for. well, you don't know what you're searching for."
No effect	Implies that there is no effect of structure on the game experience of the participant	"Not by the goals. Maybe more when I hit the sun twice. Maybe that took me out a little bit, but I wouldn't say by any of the goals."
Purpose	Indicates the feeling of having a purpose or goal to work towards.	"No, it just helped me of. Yeah. Having the the red string. Following the right path. It just helped me following the right path."
Restricted	The negative feeling of being restricted, either through missions, but also applies to too much freedom.	"So it didn't really leave me the freedom to get my own solutions."
Stop	Indicates that a participant would not like to continue playing the game.	"Yeah, that's what I thought. So based on my previous knowledge, I don't think I would finish the game."

Code	Definition	Example
Stress	Indicates negative emotions induced through the game with regards to anxiety, stress, or other stress-inducing feelings.	"Yeah. So in that sense I would get very frustrated and just abandon."
Time	An indicator of participants notioning the need for more time with the game to achieve measurable outcomes.	"I think if I have only another hour to play it, then I would say give me the set goals so that I can complete the story, because then I'm interested in seeing how it ends. But for gameplay wise I would prefer without because then it's more fun to find out."
Unused mechanic	Is used when participants mention as 'missing a certain mechanic' for their experience to be enjoyable, after this mechanic was explained and not used.	"Yeah. Because then you would have the purpose, um, because you would assume like, oh, yeah, I need this to get to the next step. But just going to the observatory and then going back were like, okay, why did I do this now? You also did not meet any new characters or anything. Um, there was no added. It felt like there was no added value to the storytelling or to the to the development of the story."

Appendix H

The full script

Welcome Hearthian, to Outer Wilds ventures!

It almost feels like you woke up from a dream... The only thing you can remember is that that weird statue in the observatory turned to look at you and absorb your memories or something. Definitely weird. But, no matter now, away with the marshmallows and sleep, because!

Today is the day that you get to put on your space boots and get a taste of the stars! You will be following in the footsteps of the hearthians that came before you, and whom you can still find out and about if you're lucky. Now, before you go on to explore on your own we have to make sure you get fitted nicely for your space travels and so that you don't break that dinky spaceship. How about you first shake those nerves and get yourself acquainted with your upcoming surroundings out there in space.

Mission 0-1:

There have been some discoveries of an ancient civilization in our solar system. The Nomai they are called, perhaps you'll come across some of their relics on your journey? We don't quite know or understand what they were, or what they were doing here, but their artifacts sure could lead to some interesting things. Especially now that you are the first to have a translator capable of deciphering the nomai writing! Just head to the observatory and take a look at the exhibitions there. It's just on the other side of town. Don't stick around too long, the universe won't wait forever to be explored!

Mission 2 (end of introduction):

Alright, that's enough playing around in the observatory for now. Head over to your ship on the other side of town. Just follow the signs to the launch tower, there is a handy elevator to the ship's platform there. Mark the 'eye locator' on your map using the ship log. This will come in handy later!

Mission 3:

While you're here, try to find out more about what this locator was for and where the Nomai might be. Remember the Nomai writing on the walls. Scrolls can be inserted into empty walls if you find them.

Mission 4:

Time to get off Attlerock and away from our home, timber hearth! Let's see what this solar system has got in store for us. Head over to Brittle hollow, the planet that seems to be slowly crumbling. There seem to be some promising leads. Locate the first escape pod which the Nomai used when they arrived in our system. If you can't find it, try using the ship's computer.

Mission 5:

There appears to be more to this planet than meets the eye at first... Have a look around and see where the nomai went in their escape.

Mission 6:

Good good, you didn't fall down that pesky hole. Let's see what you can find out about this 'eye of the universe', maybe the Nomai left behind some clues for you to find.

Mission 7:

Do you remember those gravity crystals that turned your stomach upside down? Perhaps we can use those to make it over to the Nomai's more permanent home on Brittle Hollow. Surely they must have left more things for us to discover about what they were.

Mission 7.5 broken bridge:

It appears the bridge is broken/ missing. Well... the only way out I see now is to try and make a leap of faith, try to avoid the black hole!

Mission 7.5, if fallen in black hole:

Ohw... that can't be good, well, now that you're here better see if you can get back, or stick around to admire the view of course.

Mission 8, once at the hanging city:

That little hike over a black hole sure is something, glad you made it to the city safely! Head over to the school or eye shrine district to find out more about the Nomai's fate and their eye of the universe before this whole planet has crumbled.

The participant will, as tested using the pre-test, have a very minimal chance of actually getting past the hanging city in terms of progress within 45 minutes. If they do end up progressing beyond the story of the hanging city, the script will loosely guide them to the hourglass twins, where, depending on their time in the loop, they will have to choose between either twin, after checking out the second escape pod.

Mission 9:

Whew, traversing a planet which is slowly crumbling sure isn't easy, perhaps you should try something a little more 'boots on the ground'. Head to the hourglass twins over close by the sun (don't fly into the sun!).

Mission 10:

The twin of interest seems to be 'ember twin', another escape pod crash landed there, where did the nomai go? And what can we do with all of this rising sand and ash?

Mission 10.5 if too late in loop:

One of the twins seems to be pouring ash onto the other, like an hourglass. The other twin seems to be pretty full of all that ash, let's try exploring the ash twin instead.

Appendix I

Game mechanics and control scheme

Control scheme and important gameplay features

- Decelerate (LT)
- Movement (Left Stick)
- Open map view (D-Pad Up)
- Open game menu (D-Pad Down)
- Accelerate + Jetpack boost (RT)
- Equip signalscope (Y)
- Cancel actions (X)
- Jump + jetpack boost (A)
- Interact/ translate (B)
- View. Press for flashlight (Right Stick)

These writings on the walls are Nomai texts. They include conversations and information about the Nomai and give us some insight into their lives! You can scan these to decipher the messages.

Gravity crystals: These crystals are a gravitational anomaly, allowing you to walk on walls!