

Bachelor's Thesis in Games Engineering

Complex Interaction Mechanisms for Spectator Integration in Games

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Komplexe Interaktionsmechaniken zur Zuschauerintegration in Spielen

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Submission Date: September 13, 2019

Eidesstattliche Erklärung

Ich versichere hiermit, dass ich diese Bachelorarbeit selbständig verfasst und nur die angegebenen Quellen und Hilfsmittel verwendet habe.

I confirm that this bachelor's thesis is my own work and I have documented all sources and material used.

Munich, September 13, 2019

VIOLA STUMPF

Abstract

This thesis examines the interaction mechanisms that can be used in games to integrate spectators on streaming platforms. The main focus is to introduce the readers to the leading question by formulating problems that can be researched in future work regarding the topic. To do that the research of psychological, social and design fields is summarized to highlight the difficulties of handling activity within a community. Furthermore, the conflict between nonlinearity in games and linearity in stories is looked at to find approaches in existing work that balance the tradeoff. The goal is to connect the different fields of study and relate them to the streaming system Twitch.tv. Game developers and researchers can use this thesis as a suggestion to deepen the approaches and formulate the leading questions in hypotheses that can be investigated, analyzed and included in projects.

Acknowledgements

I would like to thank PD Dr. rer. nat. Georg Groh for providing the topic and offering help whenever it was needed. Furthermore, Daniel Dyrda contributed to define and structure the topic as well as arranging a set of core papers. He always provided help and actively discussed the topic with me on our regular meetings.

I would also like to thank my fellow students who proofread my thesis. They stayed up late to suggest alternative formulations and correct spelling mistakes. In addition, my family supported me by adding ideas to the thesis.

Last, I would like to thank Michael Grupp for this L^AT_EX template, which made the process of adding content to the thesis a lot easier.

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1 Introduction

Twitch.tv is rapidly increasing in popularity [1] [76]. Ever since the streaming platform was founded in 2011 the numbers of users grew with each year [?] [32]. People are visiting the website to watch their favorite streamers play a game and to catch up on recent game or esport events and new game [110] [118]. The streamers range from professionals who are hired by esport teams to moderators commenting on an event and private people who can earn money by streaming content to the audience [27] [99] [26]. Not only games can be shown to the audience after Twitch introduced other genres to be shared with the audience including art streaming and a format where the streamer focuses on chatting with the viewers [31]. People can support the streamers by donating to them or subscribing on a monthly base [26].

By joining and watching a stream the viewers interact with the streamers and with other viewers by writing in a chat. This interaction eventually creates communities that each have their own dynamics based on the viewers' and streamer's perceptions and ideals [76]. Apart from gaming Twitch has become a social experience where groups emerge out of similar interests and goals. Due to the rising popularity they can vary heavily in their sizes to the point that there are so many people in one community that the chat equals a waterfall of text and a "roar of the crowd" [76, p.7]. Twitch, in fact, has become so popular that developers think of possibilities to include the audience in the games that are played on the platform [16]. For example, "Darwin Project" (2018) is a Battle Royale game in which the players are fighting against each other to the last man standing [122]. The game introduced a Twitch extension on which the viewers of a stream can vote to give benefits and punishments to certain players. "Ultimate Chicken Horse" (2016) is a multiplayer party game in which the players need to succeed in a level they can alternate with the objects they get each round, thus making it harder or easier to finish the level [64]. The Twitch integration allows the viewers to vote on which objects the players get to chose from each round. Furthermore, in "Domina" (2017) the viewers can choose to boo or to applause their favorite champion [57].

This thesis deals with the question how games achieve to integrate the spectators of Twitch. Therefore, a model is built throughout the pages that describes the relation between the viewers, Twitch and the streamer by sketching the structure of Twitch.tv. The viewers and the streamer are looked at as two actors with different tasks, rights and positions. To further lay out the possibilities of payment the rules of subscriptions and follows are explained.

The model of the correlation between the actors first appears in the second subsection to explain and understand the interaction between each actor. The motivation of both the viewers and the streamer play a role when thinking about the continuous usage of Twitch and it is interesting to see how the motivation to watch other people play games mirror the motivations to use the television, the radio or the newspaper. After looking at the different viewing behaviors regarding the time linearity of a streaming session the idea of a community is described by showing the evolution of communities from local groups to online networks. It is looked at the requirements of active communities as well as how

they are established in games and what impact they have on the players' lives outside of the game. At last, communities are referred back to Twitch and an approach pins down the requirements that the streamer communities need to get and stay active.

The second chapter gives an overview of story-based games and their design. To do that a general idea of stories is established. The motivation to play games is listed to show parallels in the social component of gaming and engaging in a community as well as establishing an understanding of the need to have an impact of the game's environments. The next part discusses how a game can be classified to structure the information that a game offers and to focus on the story component. In addition, it is referred to the existing interaction between the players in the game and how it affects them outside of the game. Next, this thesis focuses on the integration of stories in a game. To do that, the linear structures of stories are explained to continue to the problems that emerge when a story is integrated into a game. It is also looked at the hero's journey, a structure that describes the journey of a protagonist in movies, books and other media [47]. The interactivity in games is established with a tradeoff between stories and games, for example by using decision trees or Procedural Content Generation.

At last, the problems that were established in the last two chapters are highlighted in the third chapter. It gives an overview of possible approaches to integrate the community into a game and simultaneously points towards possibilities to include the approaches in future research. Again the focus lies on the collective input and story creation by showing the possible variations of how custom input and stories can be integrated into a game and what borders have to be regarded.

2 Communities and groups on Twitch

Communities have long been a part of society [108]. They help to organize memberships, interests and the survival of humankind by forming networks in which the individual can rely on help and understanding. With globalization the communities changed and communication spread to other media including fax, telephone and smartphone. When the computer became part of an industrialized household chatrooms rose in their popularity and people began forming relationships outside of the region or country borders. The interactivity between people and the communities itself began to change and evolve with technology. [108] Simultaneously computer games were introduced. Today, communities can be found in online games and on live streaming services where people can watch others play video games [110]. What are those streaming services and how can they be described? Why do they attract viewers and broadcasters alike? What are communities, how did they evolve and what does an active community look like? In advance to suggesting game concepts that foster interactivity, those questions have to be answered understanding interactivity and the idea of being part of a community.

2.1 Twitch: A streaming system

Before focusing on Twitch, it is important to understand the concept of live streaming. Twitch is one of the websites that offer the opportunity to broadcast content to an audience, all of them sharing the same patterns and goals. In the following, Twitch is described as a platform that connects the broadcaster and the audience actively with each other which is emphasized by the layout of the website. After that, the audience and the broadcasters are described as independent entities before linking them together in the sole activity of streaming. This builds a solid base for concentrating on the interaction between the two actors after that.

2.1.1 What is live streaming?

According to Recktenwald, online live streaming defines the activity to record and broadcast live content to a certain audience on websites and media devices connected to a transmission canal, e.g. the Internet. Servers allow a large number of users to watch the stream depending on the workload of the connections. [110, p.1]

Before Twitch.tv was established as a website for streaming video games and events, live streaming websites were used by camgirls [114]. The idea of broadcasting live to a wide range of people became popular when the Internet became a tool in the daily life in the 90's. Not only television programs used live streaming but radio stations began broadcasting their content online as well. The concept was established when the Internet bandwidth grew and the range of the connection to the Internet increased and covered landscapes outside of big cities. Today, live streaming is performing as well as the transmission of television to the extent that people include watching live streams on their

computer in their everyday lives. [110, p.1]

Recktenwald argues that live streaming platforms follow the same pattern with three actors being connected to each other: The Broadcaster, the audience and the streaming platform [110, p.1]. There is a limited number of broadcasters who decide which content is streamed on which channel. The audience absorbs the content and reacts to it, deciding which stream they want to watch. Therefore, streaming is described as an activity that links the other actors by the helps of a website hosting the stream. [110]

2.1.2 What is Twitch?

Twitch.tv is a streaming platform that is famous for live broadcasting video gaming content [31]. After being launched by the founders of justin.tv in 2011 it has become one of the biggest game streaming platforms, supporting and collaborating with e-sports, a format in which players compete against each other on a professional level [7][110]. Partnerships with e-sport celebrities and teams allow Twitch to broadcast e-sport related content to the audience that are interested in compete formats. In 2014, Twitch was bought by Amazon for 970 million dollars and is therefore part of Amazon's market economy and income [2].

Apart from e-sports events, Twitch notes streamers from all over the world streaming their content and creating their own community [25]. People come together not only to watch teams competing against each other, but to interact at the different channels and chat with each other while watching the streams. By recording and streaming the content that the broadcaster produces and the audience reacts to Twitch follows the pattern of other live streaming platforms and links the broadcaster and the audience with each other. But in contrast to radio streaming websites where only the broadcaster can directly address the listeners, the communication on Twitch is bidirectional because the audience can actively engage with the streamer. To facilitate the interaction with the website, games that are treated in one channel are used to organize the content and the channels making it easier for the audience to filter the streaming offers based on their interests. Video gaming is not the only category that is streamed on Twitch. There is a genre called "just chatting" in which the streamer focuses on talking with the audience, answers questions and actively includes the viewers in the stream. Streamers can also get creative and monitor themselves while drawing in the genre "Art". Twitch is frequently streaming the recorded videos of Bob Ross. [31] [110]

The popularity of Twitch is still rising. In December 2018 there was an average of 868 million monthly visits on the website which has been increased to 944,5 million in July 2019 [11]. 355 billion minutes have been watched in 2018 and people spent around 95 minutes on Twitch per day [1]. This gain of viewers can be observed since the founding year 2011 and every year is having significantly more viewers than the last. There is a high probability that the trend will likely maintain in the future.

As of August 2019 19.69% of the Twitch users come from the United States which leads to an American majority on the servers [10]. Besides, people from Russia, the UK, Brazil and Germany contribute to the community in significant parts [25]. Some people use Twitch because the website is able to provide e-sport content but other non-competing games are watched as well.

With Twitch being a toll-free platform the majority of users do not pay to watch their favorite streamer although there are benefits that can be earned by spending money on the platform or on the streamer. People can donate money to the streamer or they can subscribe on a monthly base. The method of payment on the website will be explained

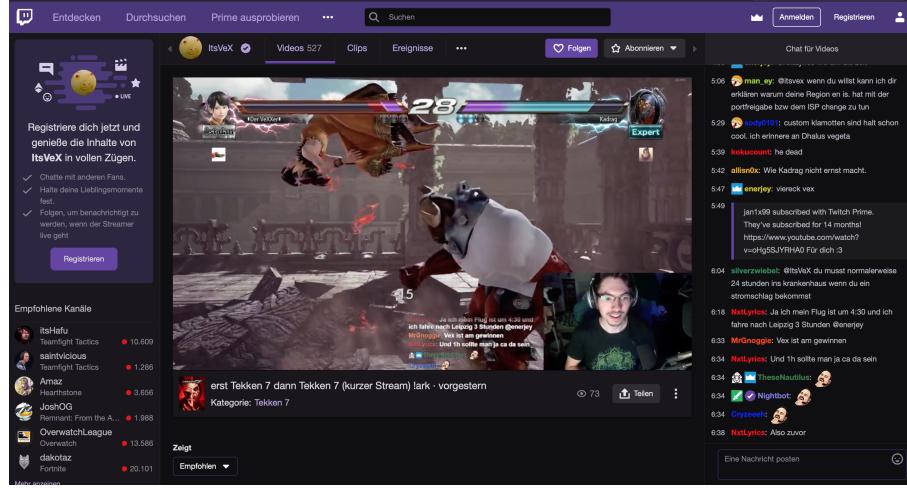


Figure 2.1: A screenshot of a stream from ItsVex [21] on the german Twitch site by an unregistered user. The stream window is shown in the middle of the screen, the chat is to the right and the left bar shows a notification to register as well as streamer that are currently streaming. This stream was not live because the red circle next to the streamer's name is missing. Instead this is a part of a recorded session in the video section. [31]

in the section that describes how people can subscribe to streamer (2.1.6).

2.1.3 Layout of Twitch

On a streaming platform three entities are constantly in relation to each other: The audience, the video and the broadcaster [110]. Twitch as a game streaming platform embraces the concept of one broadcaster streaming his content using video footage. This is shown in the layout of Twitch in Fig.2.1. To examine the layout Fig.2.2 illustrates the division of the screen in its main parts. Therefore, the stream is the main focus on the website being located in the center. The broadcaster can decide which desktop they want to record and whether a webcam will be used to record the streamer. The majority of streamers decide to record the window with the desired content and the webcam footage is placed in one of the corners in varying sizes. The viewer's chat can be shown in the stream as well.

Left of the stream there is a vertical bar in which the user can navigate between broadcasters that are currently streaming based on the interests of the user. On the right side a chat window is shown. The viewers that write in the chat are distinguished by their unique username and different colors for their names. Symbols like crowns or diamonds in front of the usernames symbolize the status of their membership.

The title of the stream is shown below the stream window above the category of the stream. Below that, the category tags describe the genre of the stream and the language the broadcaster speaks. A viewer count below the stream shows how many people are currently watching the stream live. Next to that, a number is shown which indicates how many people have viewed the specific stream in general including all the sessions that have been streamed. A share button allows viewers to share the stream on other platforms. Below that section, the streamer can write a description of the channel, link websites, e.g. to the streamer's merchandize, and explain the advantages of subscriptions

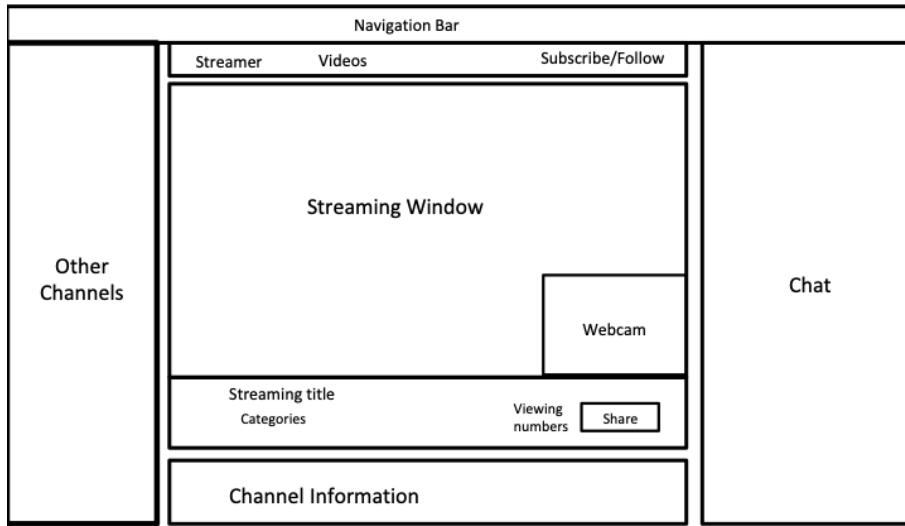


Figure 2.2: The layout of the Twitch website simplified by black boxes that highlight the division of the screen. [31]

and specified payment rules.

On top of the stream, the broadcaster's name is shown with the streamer's icon next to it. A red *live sign* indicates if a streamer is currently live streaming next to the streamer's name. In the same horizontal bar the user can click on the videos the streamer has saved to allow his viewers to catch up on his last sessions. Clips can be created by subscribers during live sessions if they want to highlight a certain part of the content or a certain reaction of the broadcaster. They are uploaded in the clips tab next to the videos. More options allow the user to see the streamer's recent activities, the number of followers and the people the streamer is following. The first purple UI button to the right allows people to follow the channel and the second button lets them subscribe.

A search bar can be found on top of the window to look for specific games or streamers. Various UI buttons can be used to register, log in and manage the user's account as well as discover the Twitch webpage and try out Twitch Prime, a subscription possibility in cooperation with Amazon Prime [2].

2.1.4 Viewer on Twitch

Describing the viewers of Twitch gives an insight on how many people are spending time on Twitch, how they are behaving and what they are watching. Over the past years the use of Twitch has been growing rapidly to the extent that the statistics at the end of the year mark a huge increase in the viewing population [4]. According to the website *BusinessOfApps*, the viewing counting the last four years has increased from 100 million monthly viewers to 15 million daily viewers which counts up to 450 to 465 monthly viewers in 2019 [3]. Statistics point out that 55% of the viewers range between 18-34 years [1]. That includes students and working adults representing consistent gamers that have

played games in the 90's and gamers new to the genre. The other 45% are split up between people under 18 or above 34 years, spreading the target groups to every age class while hinting to a slightly younger audience. The reason why the measured age is between 18-34 years may be because users at least have to be 13 years old in order to have access to Twitch. Between 13 and 18 years the user is instructed to visit the website only with a parental figure or guardian [27].

When measuring the time a game is watched on Twitch, the most popular game streamed in 2018 was Fortnite [1] [13], a competitive, comic-aesthetic and free-to-play arena game in which the player has to remain last by killing the other players [65]. Contributing to this, the streamer Ninja is the most popular streamer in August 2019 [14] [23]. His content varies around Fortnite and his viewers have been on his channel for 151.096.501 hours over 2018 [1].

Viewers can passively absorb the content that is presented or they can actively engage with other viewers and with the broadcaster. A viewer is active not only when they write in the chat but when streams are frequently watched and the website is visited regularly. [110] [75]

Moderators

Moderators are a distinct group of viewers that are promoted by the streamer who is a moderator as well. They are identified by an icon next to their chat name and they are allowed to ban or temporally timeout other viewers preventing them from disturbing the streaming atmosphere, e.g. by inpolite behavior or abusive comments. Since moderators are loyal followers that have been watching the streamer for a certain while they can facilitate the interaction between the streamer and the other viewers by hinting towards the streamer's event schedule or answering questions instead of the streamer. According to Hamilton et al., they also support the community by answering questions and relieving the streamer from the urge to answer to every viewer. For example, a new moderator can be chosen by a poll the community can vote on. [76]

2.1.5 Streamer on Twitch

With every available stream there is a streamer who is responsible for the content. The growth of Twitch is showing in the numbers of streamers with twice as many monthly streamers in 2019 than in 2017 (in 2017 there were 2 million people who streamed at least once in a month, in 2019 the number rose to 4 million) [30]. Since money can be earned the Terms of Service declare that one has to be at least 13 years old in order to create an account [27]. Everyone who has an account has the possibility to stream and build a viewerbase around the stream [31].

Apart from private people, professionals use Twitch to broadcast events and e-sport celebrities start with a large base of followers gained through e-sport events before deciding to stream their content [99, p.2]. For example, the South Korean e-sports player Faker [20] started streaming when he already had a fanbase gained through the events he participated in. Ninja, the most followed streamer on Twitch to date, also started with a professional career and played for different e-sport teams before he started streaming on Twitch [23].

Overall, streamers can broadcast any type of content that does not offend Twitch's Terms of Service but they are mostly viewed for one specific type of content, for example one

particular game or their unique way to interact with the audience [118]. 62.9 % of the streams are in english which also refers to the biggest streamer group being situated in the USA [1].

Game genres can help the viewers find the content they are interested in but the structure of the stream itself is more important to convince the people to stay [119]. In other words, genres can be seen as a framework that wraps around the content types which are divided into competitive gameplay, casual stream structures and talkshows. Competitive streams are defined by streamers and e-sport professionals engaging into scenarios in which they concentrate on the game to maximize their performance. Casual gameplay shows a looser structure and streamers react to the audience in a frequent time window. Talk shows are included in events and represent professionals talking about a game-related topic and actively engaging with the audience. They aim at the enjoyment of the users, planning breaks and underlining their program with humor or events that keep the viewer's attention on track. [119]

2.1.6 Subscriptions on Twitch

A user can support the streamer they are watching by subscribing to the channel. One does not necessarily have to subscribe in order to watch the stream but benefits can be earned [31]. In the following, the process of following and subscribing to a channel or streamer is described. Furthermore, their difference is stated and the benefits of a subscription are listed.

On Twitch, following differs from subscribing to a streamer hinted at by the UI with two different buttons 2.2. If a viewer follows the streamer the channel will be added to the user's follow list that is displayed on the start screen. Whenever the followed streamer is broadcasting the channel will be shown on the screen to facilitate the navigation between the preferred content. This option is free and can be done by any user that is registered. [31]

Subscribing, on the other hand, includes monthly payment that supports the streamer and its income [26]. By spending money the viewer gains benefits including special emoticons that can be used not only in the streamer's chat but in other Twitch chatrooms as well. The more subscribers a streamer has the more emoticons they can create and add for their viewers making it more rewardable to subscribe to a streamer with more subscribers. [8] [31]

Furthermore, badges that are displayed in the streamer's chatroom right next to the name and icon of the viewer distinguish between subscribers and non-subscribers rewarding the subscribers with a status they can decorate themselves with [76]. By customizing the badge streamers can distinguish between new subscribers and veteran subscribers changing the look of their badges. This can increase the reward to subscribe for a longer timespan [76]. To support long-lasting subscriptions notifications pop up in the stream when the subscriber shares their subscription. In the notifications it is shown for how many months they have repeatedly subscribed. A customized text that is sent with the notification can give a personal note to the notification since it is often read out loud by the streamer before they thank the subscriber and react to the text. Twitch partners and affiliates also have the opportunity to create a chatroom exclusively for their subscribers. In addition to that, subscribers can be freed from advertisements because the streamer can customize which viewer group is affected by them. Subscribers can also clip parts of the stream and upload them to the clip section. [76] [26]

Subscriptions are important to the streamer because they are their money source. The more subscriptions streamers get monthly the more income they will have. To allow subscriptions the streamer has to be a Twitch partner or affiliate. [26]

Since 2017 there are three types of subscriptions the viewers can choose between: They can either pay 4.99\$, 9.99\$ or 24.99\$, depending on the amount they want to support the streamer with [26] [28]. The money is debited either monthly or within three or six months which is up to the subscriber's preferences. Normally the streamer gets 50 percent of the subscription fee but exceptions can occur when Twitch wants a famous streamer to stay streaming on their website, ranging the income between 60 and 100 percent of the subscription fee. [8] [26]

Twitch Prime is another method to subscribe. Since Twitch was bought by Amazon the subscription is a byproduct of a collaboration between the two companies. Twitch Prime is a premium membership if the viewer already owns Amazon Prime allowing him to watch streams without advertisements. One free subscription per month is valued 4.99\$ and can be given to any streamer. The only difference to the standard subscription method is that the Twitch Prime subscription has to be renewed every month whereas the normal subscription is done automatically until the subscriber cancels the process. [28]

2.2 A model of the correlation between the viewers, Twitch and the streamer

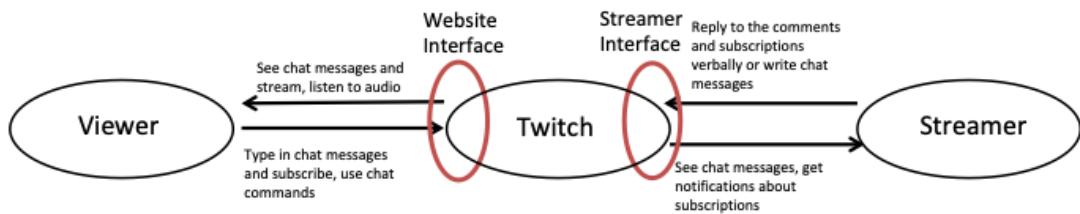


Figure 2.3: A model of the bidirectional relation between the viewers, Twitch and the streamer. For both actors Twitch serves as an interface linking the output of one actor to the input of the other actor. The viewer watches the stream produced by the streamer and reacts to the content by typing in the chat. The streamer sees the messages and reacts to them through the recorded stream. [31]

Earlier in the thesis three actors were mentioned that are connected through the activity of streaming on Twitch: The broadcaster, the audience and the streaming platform. To help understanding the relation between the three actors the interaction is displayed in a model. In fact this situation was set up in the previous paragraphs in order to connect the ideas of a strong community to the communities of Twitch.

The model in Fig.2.3 consists of three entities: the viewer, the streamer and Twitch. The

viewer and the streamer are linked by Twitch which allows them to read, type and react to messages and ingame events. In other words, Twitch is an interface for both the viewer and the streamer maximizing on facilitating the communication between both. Twitch channels the communication and simultaneously takes input from both actors to hand it over to the other actors. This is symbolized by the arrows that point towards and away from Twitch to the other actors.

The red circles symbolize the interfaces that are seen from each actor. Emphasized by the Web Interface viewers can pay focus on the stream and listen to the streamer and the music he or she can choose to share with the viewers. Therefore, the output of Twitch is simultaneously seen as the input of the viewer they can react to. On the other hand, the viewer can engage into contact by subscribing and leaving a message. Viewers can also type messages in the chat which are seen and replied to by other viewers. These actions are symbolized by the output arrow pointing from the viewer towards Twitch.

The Streamer Interface allows the streamer to view the chat. While choosing one monitor to be streamed the problem occurs that the streamer cannot open the chat on the same monitor that displays the streamed content. This leads to many streamers using a second monitor on which they can read the chat messages and maximize the interaction with the audience [110]. Furthermore, notifications will pop up if a viewer has subscribed. If the streamer is mentioned in the chat the referring messages are highlighted. [31]

The last arrow points from the streamer to the interface of Twitch and defines what non-verbal and verbal signals of the streamer are recorded by Twitch. The streamer can react to the chat and game input by communicating verbally. At the choice of the streamer this is recorded by a webcam. The chat can also be used by the streamer to notify the audience.

Channels can have moderators (called mods) that manage the chat. On one hand, they belong to the group of viewers that have permission to ban troublemakers ensuring that everyone follows the rules. On the other hand, the streamer is a moderator as well [76]. Therefore, the moderators are a distinct group that use the web interface of the viewers but take over tasks from the streamer. The new model looks like this:

Bots can also be used by the streamer that are called by chat commands to inform viewers about requested topics. For example "!uptime" shows the time the current session has been online [31].

Since the website, the viewers, the moderators and the streamer have been described as entities the interaction between viewer and streamer are now specified. After that it will be clarified what a community means, how groups come into play and how an active community can be achieved.

2.2.1 Interaction

According to Recktenwald, interaction is the key to a successfull relationship between the broadcaster and the viewers and it is done in two different ways referring to which side is looked at. While the broadcaster communicates through the webcam the viewers are able to write messages in the chat and react to the streamed video or to the words of the streamer and the messages of other users. [110]

The chart above (2.1) emphasizes the differences between the interaction of both entities.

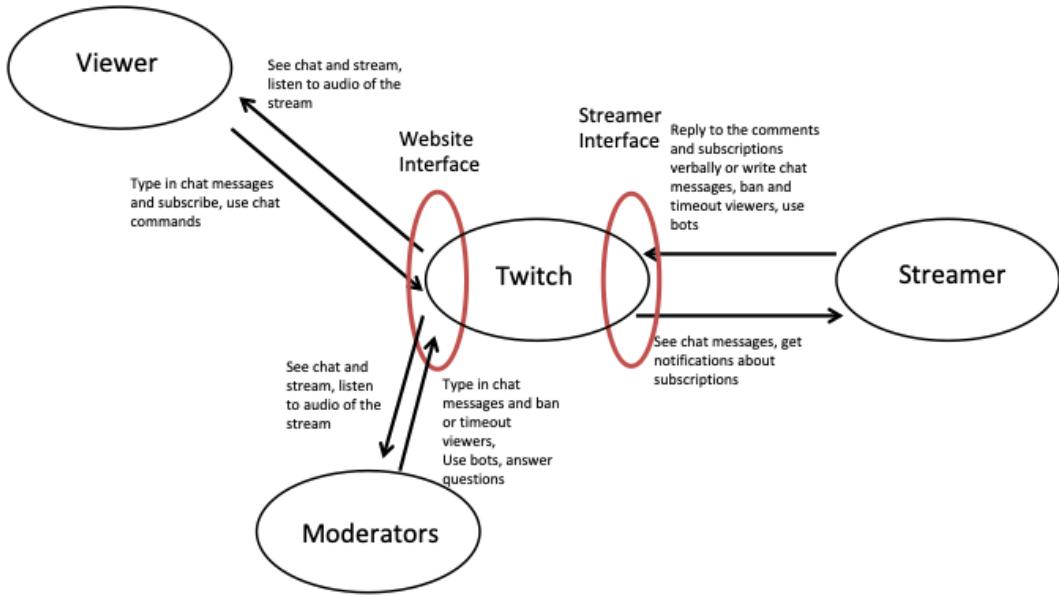


Figure 2.4: The advanced model of the bidirectional relation between the viewers, the moderators, Twitch and the streamer. The moderators have the same web interface as the viewers but they have more rights to act in the chat by banning and timeout viewers. The streamer is a moderator as well but since they have another interface they are portrayed on the other side of the model. [31]

Participant	Broadcaster	Audience
Visual field	Stream or chat	Stream and chat
Relation to activity	Player or performer	Spectator
Communicative resources	Speech and non-verbal	Messages & Emoji
Number	Individual (or limited number of people)	Unlimited

Table 2.1: Table to distinguish between the broadcaster and the audience. This was taken from Recktenwald with small adjustments [110, p.4].

First, a streamer can pay attention either to the video they are streaming or to the chat since the game is monitored with fullscreen. There are streamers that tend to use two screens to navigate between the chat and the game they are playing [110, p.4]. The viewers on the other hand can view the stream and the chat simultaneously which makes it easier for them to react to events happening in the stream. Since the broadcaster acts as a performer engaging actively in the game and giving the stream his own touch of personality the viewers are spectators watching the streamer [110, p.4]. Furthermore, the broadcaster uses speech and non-verbal signals recorded with the webcam to enhance the commentary to the video and react to the messages displayed in the chat. The viewers on the other hand type messages and use emotes, reacting to the straightforward interaction from the broadcaster with walls of texts and memeing, easily memorized and humorous forms of repeated phrases and images [110, p.4]. While there is only a limited number of broadcasters on one stream viewers can take up an unlimited number. With a large number of viewers the streamer can become overwhelmed since the chat can become fast

paced and confusing [76, p.7]. On the other hand, viewers can feel unregarded, unloved and unconsidered when the streamer does not react to them due to the amount of messages that have to be kept track on the messages they are sending while paying attention to the content. This increases the possibility that some viewers lose the motivation to write [76, p.7].

By looking at the kind of messages that are sent throughout a stream a couple of similarities can be spotted. First, chat language often includes abbreviations, repetitions and capitalization which can be reduced to the fact that people have the urge to get recognized and express emotions [110, p.9]. Recktenwald states that sentences each individual writes can look similar in context when recognizing the same stream pattern (i.e. reacting with the same emoticon or meme) but they are produced independently from each other. Furthermore, it is said that the player is only a commentator who responds to a limited number of comments. Depending on his engagement in the game that is played the streamer can look in the chat, select a message and emphasize it by responding to it. For example Bjergsen [17], a streamer of League of Legends [67], concentrates on the game events until he is dead or needs to let his champion walk a great distance, therefore being able to look in the chat shortly and react to the message that first jumps in his eye. Since the chat and the stream are not synchronized with each other the stream shows the streamer picking older messages. [110]

Furthermore, pivoting is introduced [110]. It describes a high amount of fast paced messages regarding a specific event in a stream or a specific interaction with the broadcaster concluding in so-called wall of texts or a "roar of the crowd" [76, p.7]. Since it is impossible for the streamer to answer all those messages at once (some of them being rather unimportant and only expressing feelings instead of wanting to communicate with the streamer) important messages can be swallowed by all the other messages, enhancing the feeling of being ignored by the streamer. [110] [76]

Using all that information it can be said that the broadcaster's engagement and its interaction with the chat depends heavily on in-game activities and the amount of viewers while the viewer's engagement depends on the streamer themselves and which motivation the viewer has to write in the chat. Generally, the communication of the viewers is more stable since it does not depend on ingame activities [110, p.12].

2.2.2 A typical stream state diagram

But how does the streamer struct the stream? When a user clicks on the streamer's channel what can be expected to see? After watching a couple of streamers and their recorded videos [17] [18] [19] [20] [21] [22] [23] [24] their states could be filtered and drawn into two models that explain how a stream typically looks like and what the streamer does in order to keep the stream interesting.

Regarding the sight of a viewer who visits the channel the first model divides the session in an online and an offline section. The offline state means that the streamer is currently not broadcasting any content while there is still a possibility that they are not entirely off the computer or off the website. Therefore, there is a difference between the streamer being entirely Off-Keyboard or not on the website and him or her hosting another streamer. The Off-Keyboard state is characterized by a black streaming window while hosting means that a stream of a chosen streamer is played. If users click on the stream a link directs them to the hosted streamer's channel that the users can view and engage in the chat. Without the hosting options the views on one channel would get lost

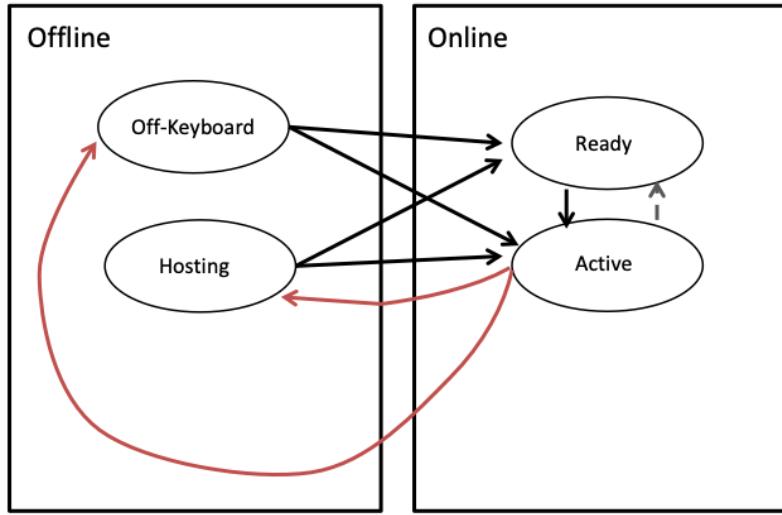


Figure 2.5: This figure shows the states a stream can be in as well as the correlation and linkage between the states. The black arrows symbolize the transitions towards an active stream while the red arrows highlight the opposite direction. The transition from an active stream to a ready stream is marked with a grey dashed arrow. [31]

since the viewers would not be passed on [31]. If a streamer is hosting another channel it shows that the streamer was online not too long ago even if no stream was started.

In either case the channel can switch to online. Ready is described as a state where the streamer is already online but not yet streaming. Viewers can start meeting and greeting each other on the chat before the stream starts. Broadcasters can become creative in the process of hinting that they will soon be streaming. For example they can pay an artist to create an engaging start screen or show a timer that counts down to the time the stream will start. E-sport channels emphasize their organized structure by showing the schedule on the stream window and bridging the waiting time with a countdown, music and highlight clips that were recorded on previous sessions [24]. Ready can also mean that the streamer is starting the stream but the webcam shows an empty seat.

After the Ready-state the stream switches to Active. A stream can also switch directly to Active which is achieved when the streamer turns on the stream suddenly and starts talking to the viewers that join the channel. The Active state means that the stream is up and the streamer is ready to engage with the viewers. In the next model the Active state is looked at in further detail.

An Active stream can switch to offline if the streamer ends the session. It can be chosen between hosting another streamer or ending the stream and letting the chat open for the viewers to say goodbye to each other. E-sport events jump back to the ready state and advertise the next event on the schedule by introducing a timer [24]. Nonetheless, the session ends when the stream jumps out of the active state. In the model, the switching is represented by the red arrows that point back to the starting point of a session allowing

the stream to become full-circle and link to the next session. The dashed arrow symbolizes the possibility that a stream can switch between active and ready. One day can contain more than one session but one session ends with the active state being switched.

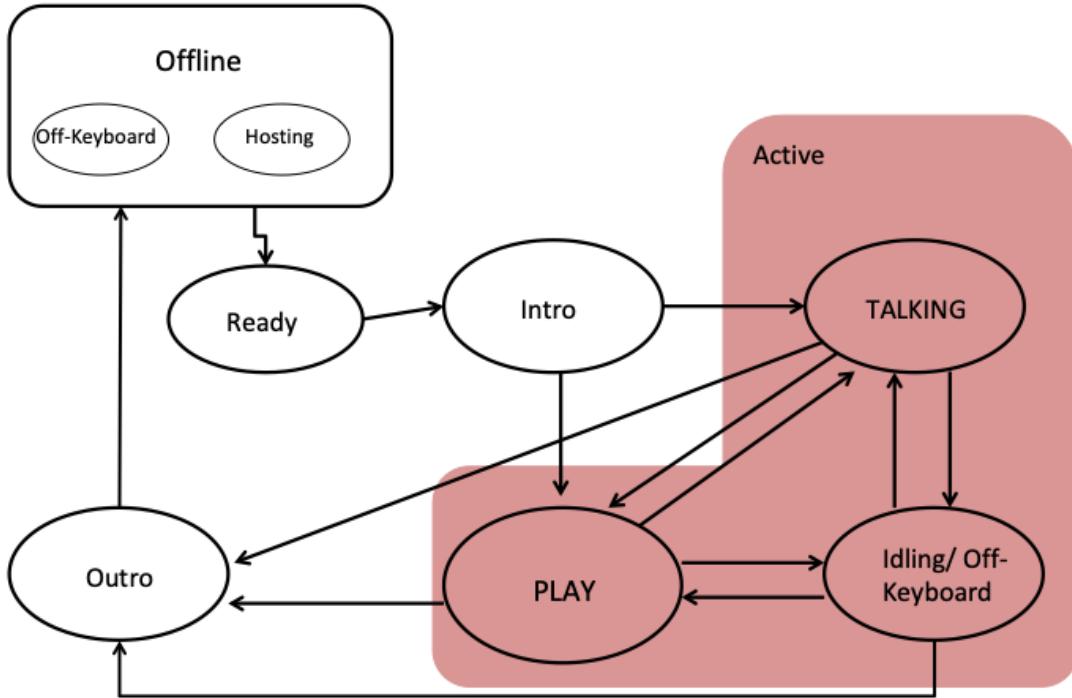


Figure 2.6: This figure shows the progress of a streaming session. The two states "Off-Keyboard" and "Hosting" from Fig.2.5 are summarized under the term offline. The ready-state and the Intro transition into the Active part of a stream session. After an Outro the stream switches back to offline. [31]

As mentioned above, the next model looks at the activities that are done in the Active state of a stream. By watching several streamers the loose structures were filtered to create a picture of how a viewer depicts one session [17] [18] [19] [20] [21] [22] [23] [24]. The model gives an overview on streaming as an activity. Before describing the model it has to be stated that there are abbreviations based on the personal preferences of each streamer. In some cases there is no Ready state or the session is ended without an outro [17]. The model tries to give an overview on how a stream is structured in general. Technical failures that can end a stream suddenly due to website or connection problems are not included since such endings of a stream are not intended.

Picking up on the previous model the default classification of a stream is declared offline. Since the focus lays on the stream being online the offline-state is marked in a black lined box that sums up the sub-states "hosting" and "Off-keyboard". Every arrow that links to one of the two sub-states is summed up in one arrow reaching from and pointing towards the offline-state.

Assuming that stream sessions are introduced with the "Ready"-state transitions are used to prepare the user for the shift towards as well as from the Active state. An intro is used by the streamers to activate the webcam, welcome the viewers, chat with them and stress

out the structure of the session [24]. From the Intro onwards the active part of the session starts. To emphasize that the three states that are considered active are summed up under a red field. The streamer can go straight to the Play state in which they focus on playing and commenting on a game. They can also start by talking to the viewers. This is done by answering to chat messages or talking about different content, e.g. the passed day, world news or an upcoming event. If the streamer tries to fulfill the needs of the viewers by doing what they suggest that is called Fanservice. In order to please the viewers the streamer talks to them about requested topics, watches suggested videos, plays music or does activities in front of the webcam that were requested by the viewers. Streamers like Ellijaz [19] prepare a whole streaming session to dedicate it to the likes of the viewers calling the session meme chat and allow the chat to submit videos or music that are played and shown during the stream.

The Idling/Off-Keyboard state sums up all the activities that do not fit in the other two categories while not disturbing the flow of an active stream. For example the streamer can leave the seat and disappear from the webcam view for a short period of time after telling the audience that he or she will return soon. A streamer can also film him- or herself doing everyday work. For example Kayceetron [22] is a streamer who records herself frequently doing sports while talking to her audience.

The arrows between the three states represent the intercorrelation between them. Every state can be replaced by one of the other two states creating a flow that is still considered active as long as there is not too much time spent on being Off-Keyboard. The streamer can decide on which activity the session should focus or if every activity is treated equally. It is important to state that every state can conclude in the transition of an outro. During said state the streamer ends the previous activities, says goodbye to the viewers and thanks them for watching the stream [21]. A hint can be given on the start and the content of the next session. Streamers have the opportunity to leave the stream open to allow the viewers to say goodbye to each other. At last, the Outro leads to the stream being turned off or to another stream being hosted.

Sjoblom et al. state that a good structure contributes to an active collaboration between the streamer and the audience. It allows more viewers to participate in the streaming sessions because they are kept up-to-date on the starting time of the following sessions. Furthermore, an organized structure facilitates the interaction between both entities because the viewers adapt to the structure and interpret some sort of habit of the repetitive pattern to the extent to feel home on the channel and in the community. [119]

2.2.3 Integrating social media

Twitch and social media websites are strongly connected to each other. This alone is proven by Ninja, the most popular streamer on Twitch as of July 2019, who has 14.2 million followers on Instagram [5]. He is posting pictures of himself and of the game "Fortnite" [65]. On Twitter he is frequently promoting his Twitch channel and notifying his followers on upcoming streams as well as chances to win prices [33].

Gaming company channels link the full schedule of the upcoming streams and events in their channel description whereas private streamers such as dakotaz, a famous Fortnite streamer, or Ninja, prefer linking their social media accounts in the description of their Twitch channel [18] [23] [24]. This facilitates the users to follow them on social media to catch up to their schedules and plans for the upcoming days, weeks or months [76]. In

addition, viewers may feel closer to streamers that share their everyday life with their community. Said streamers could feel down-to-earth and in reach of the viewers since they are present in social media sharing their life with the users. Nonetheless, it is important to mention that not all streamers link their social media accounts in their Twitch profile [21]. A possible explanation for this might be because they like to keep social media profiles and Twitch separated or they do not run an active social media account in general.

Streamers can also have a channel on "Discord" (2015) [79], a free app that allows chatting and calling each other on custom-prepared servers. Such servers can be used for Twitch communities evolving around one streamer. On Discord important information and news to the upcoming streams can be shared. Subchannels struct the server and allow the viewers to chat about different topics and categories. Pictures can be shared and voicechannels can be used by everyone to talk to each other.

2.3 Motivation

In the last sections Twitch was described as a streaming platform that forms communities. The interaction between the three main entities was introduced in models. In the following, the motivation behind two of the entities are looked at. Why is Twitch so attractive for the viewers? Why are they committing in one single streamer? And what are the reasons why a streamer continues to produce content? Such questions serve as red threads through the next section.

2.3.1 Viewer motivation

With the inclusion of the computer the exchange of information and enjoyment has become interactive since people can actively participate in Internet discussions and look up the content they are interested in [118]. Nonetheless, the reason why people read the newspaper, listen to the radio, watch TV or engage on streaming platforms has roughly stayed the same. This statement is examined in the following.

It is stated that people read the newspaper because they want to keep in touch with the happenings around the world, calm down and breathe or carry out their daily routine [38]. They want to be updated relating the news as well as be able to talk about important topics. People can shine with their knowledge that they gained with a newspaper which highlights a social aspect. [41]

Moving on, Lee and Lee identify companionship as one of the main reasons to listen to the radio. It is further said that people want the day to be summed up or they search for a mood change [38]. Harold Mendelsohn says it is important to not feel alone or bored. People listening to the radio can decide between listening to news or participating in events, e.g. gambling, and engage socially with the radio spokesman by calling the channel. [97]

Out of the two media types, the newspaper and the radio, three main motivations can be filtered: To gain knowledge and be updated about the news, to do something against boredom or include the media in the daily routine, and to engage socially.

When looking at television the motivations are enhanced. Bradley says that people watch television because of habit which contributes to the daily routine when reading newspa-

per and summing up the day when listening to the radio. Motivations like relaxation, companionship, learning and passing time are repeated whereas the motivations are complemented by arousal and escape factors. [42]

It has been analyzed by Rubin that the majority of people watch TV because of relaxation, entertainment, passing time, companionship, boredom and out of habit. Few people watch TV for arousal, social interaction or escape [112, p.41, Table]. It is assumed that people who watch TV out of habit simultaneously want to entertain themselves or escape from their everyday life [112, p.49]. Rubin argues that one uses the TV to pass time because one is entertained they are affected by the program that is offered and tend to spend more time watching than one person who passes time out of escape. The escape motivation hints to people who like to believe what is shown to them without doubting the realism of the content [112, p.47, Table]. People who watch TV because they seek information and want to learn something spent more time watching than people who watch out of habit while they have a high sense of realism [112, p.50]. The difference between information seeking and habit is that the program is watched more active because the people want to learn something out of it. According to the study of Rubin, the television is described as a medium that can be used for more entertaining purposes than watching the news, passing time out of boredom or engaging socially. [112]

By linking the viewing motivations with psychological variables a relation was introduced between the motivations and anxiety [50] [94]. According to the study that was described by Conway and Rubin, anxiety predicts the wish to enhance the status, to escape and to pass time. Creative people on the other hand tend to watch TV for relaxation and information motives while people who want to enhance their parasocial interactions watch TV because of information, entertainment, relaxation and passing time motives. Assertive people watch TV for status-enhancement. [50, p.455-457]

With that said, variables predict the different motivations and each motivation depends on another motivation to a certain degree which makes it impossible to predict which people tend to watch which content from which media [50, p.458]. The argument that younger people tend to watch television to escape and pass time and the assumption that women like to watch TV to pass time is only supported by one paper from 1991 and cannot be considered as a universal fact on which can be built upon [50, p.458]. Instead, the focus should lay on the similarities that different paper determined out of the three presented media types. A pattern forms that is continued when looking at the motivations behind using social media. [50]

Why do people like to use social media? Since the USA is the region where most viewers on Twitch come from [25] and e-sports is popular in Asia [1] it could be helpful to examine the patterns from the citizens of both regions. One paper suggested to compare undergraduates from each country to each other [83].

It is argued that the motivations to use social media can differ due to cultural circumstances since both regions represent different values and society standards. South Korea is a collectivistic culture based on confucian beliefs. Values like family, group identity and solidarity are maintained and appreciated. In contrast, the USA is known for its western and individualistic culture that believes in independence, competition and distance from group-identity. The contrast exists in other countries as well since the confucian values were spread around the asian continent and therefore lay a foundation for the asian society. Individualism on the other hand is mainly supported in the US and in Europe. This is mirrored in the habits of both region's media use. [83, p.366]

By evaluating the survey prepared for the study the first difference is noticed when it is

looked at the social media platforms that are preferred in each region. At the time of the survey (2011) the most popular Social Media Service (SMS) in the USA was Facebook. The platform was founded in 2004 and has an intuitive and direct User Interface (UI) to facilitate the use of the website [80]. In South Korea the most popular SMS is Cyworld which was founded in 2001 [78]. [83, p.366]

Five motivations regarding the use of social media could be filtered in both cultures: Seeking friends, social support, information, entertainment and convenience [83, p.368]. Apart from seeking friends and social support those motivations are also mirrored in the motivations why people watch television. Again the pattern shows: information is equivalent to being updated, seeking friends and social support appeal to the social aspect, and convenience is equal to acting out of habit. Like the name states social media focuses strongly on the social aspect unlike the newspaper that emphasizes on seeking information. [83] [41]

Kim et al. state that US students have bigger social networks than the Korean counterpart [83]. With networks that are up to five times bigger the undergraduates in the US have difficulties keeping in touch with all of the individuals in their network. Again, the western values shine through because individualism peaks in seeking entertainment out of a large pool of people. On the other hand, the eastern culture is focused on stronger bonds and families. Therefore, Koreans tend to build stronger relationships in social networks and keep their network small to maintain contact with all individuals. In South Korea the undergraduates seek social support and information instead of information out of their social media contacts. Furthermore, they tend to get into contact with relationships that already exist outside of the media platform whereas US students tend to build new relationships on social media. [83, p.370/371]

The results of the study can hint to the cultural difference between the viewers on Twitch. It is possible that US citizens are the biggest viewer group on Twitch because they are already accustomed to contact new people [83, p.371]. Another possible reason why Asian countries are not represented in a big group despite them preferring e-sports is because most of the streamers talk in English and most events happen in English [25]. Nevertheless, it is difficult to build communities across cultural beliefs and values. That is a problem that has to be overcome.

There are different suggestions on why people watch others play video games. First, Gandolfi states the three reasons Twitch streams are attractive [69]. First, it is because of the challenge. The streamer, most cases a pro gamer, performs and does not communicate more than a few phrases related to the game [110]. This behavior is often seen in Korean e-sport teams, e.g. Faker, a famous League of Legends pro-gamer, speaks rarely while playing [20]. Second, people want to exhibit the player's skill. Streams that fulfill the criteria are defined by some dialog but the focus still lays on the game itself [110]. Third and last, streams are watched because of the exchange with the streamer. In that case the game is not as important as the specific streamer who is playing the game. Those streams are focused on the talk and interaction between the streamer and the viewers instead of the game [110]. [69]

Another paper coupled the motivations behind watching others play video games with the five UG need types researched by West and Turner [127]. Those types are:

- Cognitive
- Affective
- Personal integrative

- Social integrative
- Tension release

The cognitive need type means that a person searches for information and learning, e.g. in the news. The affective need is bound to an aesthetic appeal and to emotions. People that want to fulfill the affective need tend to watch tv shows with good looking actors, e.g. sitcoms. The personal integrative need stands for strengthening ones confidence and credibility while engaging with media, and social integrative needs are satisfied by getting into contact with family, friends and building new relationships online and offline. People want to release tension both to escape life and to distract oneself through media. [118, p.3] [127]

By analyzing how many hours people have spent on Twitch and how many streamers they have watched, followed and subscribed to Sjöblom and Hamari make an assumption about the cooperation between the need types and the motivations that play a role in an active community participation [118]. According to their findings, tension release is the most important need to spend more hours on Twitch and to watch more streams. It is positively associated with following and watching streamers. Furthermore, the affective motivation positively affects the hours that streams are watched and the streamers being watched. The reason why tension release plays a more important role in the amount of hours spent on streams can be explained by the limited amount of streamers the viewers choose because they produce the content that is most enjoyable for them. Instead of watching a large number of streamers they like to stick to a few selected broadcasters which lowers the affective motivation. At the same time viewers who want to be distracted and release their tension may not care how many hours they spend on streams as long as their need is fulfilled after a certain amount of time. [118, p.6-9]

Furthermore, information seeking corresponds slightly with hours watched which means that viewers who want to learn something from the stream or gain information are more likely to spend more hours on Twitch. An explanation for that can be found in the amount of information one can get off a stream. Information can also be attained through other websites and media. Information seeking affects the number of the streamers that are watched positively as well but only in a small amount which indicates that people seek information in a smaller group of streamers rather than a large pool. It is possible that they think those streamers are the most trustworthy in spreading information. [118, p.7] Personal integrative motivations correspond negatively to hours watched. On a streaming website viewers who seek recognition might be at the wrong place because it is hard to be recognized through a chat. The size of the chat affects the streamer's capability of recognizing and interacting with individuals. Therefore, a discussion is less likely to unfold which is why people with personal integrative motivations tend to serve their need on other platforms. In contrast those people follow a larger amount of streamers which might be explained due to their interest to have a larger pool of streamers of which to choose from. [118, p.8]

Last, the social integrative motivation is supported by the hours being watched since more time spent on Twitch means more time that serves to engage in social contacts. Sjöblom and Hamari state that people with said motivation appreciate the choice to follow streamers, given the chance to filter the streamers or the community they find interesting and socially engaging. They also subscribe more frequently since the activity of supporting a streamer through a donation is positively acknowledged by the streamer and the community. Moreover, subscriber-only activities such as the subscriber chat and playing with the subscribers encourages people to spend money on their favorite streamers. Supporting someone they like positively affects them. [118, p.8/9]

To sum up the findings, the motivations to watch others play video games are justified with social aspects [118]. The needs that were analyzed can be referred back to the motivations to engage with other media [38] [41] [50] [112]. Again a social aspect plays an important role but motivations like information searching, learning and tension release are found as well. By using other social media the streamer can further enhance the motivations [76]. For example updating their status on Instagram or allowing the viewers to join a Discord channel may connect the streamer and the viewer on the social integrative and the affective motivations, thus strengthening the bond between both actors.

In the motivation of the viewers the structure of the stream itself plays an important role [119]. According to Sjöblom et al., casual streams for example correspond to affective motivations because of their loose structure and their focus on light themes. People distract themselves and can watch the stream at any time because of the simplicity of the content. The affective motivation can also come into play when a viewer leaves the stream open on one tab and listens to the streamer while working or taking care of the daily schedule. [119] This is done to foster the feeling of having company and it can be referred to people who watch television in a semi-attentive matter while following their daily schedule [40] [106].

On the other hand, competitive games are more complex and exciting because of the intense situations a viewer can experience. The escapism need is fulfilled because the viewer can sink into and concentrate on the stream. [119, p.165]

According to Sjöblom et al., information seeking is particularly present in Let's plays because of the relaxed atmosphere. The paper states that watching a streamer playing a game while chatting about topics suggested in the chat gives the vibe of sitting on a sofa with your friend. The interaction with the streamer is important for that specific motivation since viewers can ask the streamer questions about the game which fulfills the need for information. Viewers can also watch a stream because they want to figure out if the played game is worth buying. Especially if the game is expensive let's plays are important to lead to a decision about buying the game or not, again supported by the interaction with the streamer. [119, p.166]

In order to learn how to play a game Sjöblom et al. argue that streams are used to learn from more skilled and more experienced players. "How to play"-streams are primarily serving those needs since the streamer explains how the game works. Casual streams build on a relaxed atmosphere for beginners to learn a new game whereas competitive streams allow more advanced players to learn from professionals. Furthermore, viewers want to communicate with the streamer which can be achieved in flexible surroundings, e.g. in casual streams or while playing sandbox games, strengthening the social motivation. [119, p.167/168]

2.3.2 Streamer motivation

But what are the main motivations behind creating content on live streaming platforms and why do the broadcasters stay loyal to their community and continue making content? In order for a community to work both actors need to have reasons to engage with each other. One paper looks at the streamers by analyzing why they start contributing content and why they continue contributing to the platform on a long-term view [45].

According to Brundl and Hess, five motivations can influence the contribution to online

communities:

- Enjoyment
- Self expression and identity
- Information dissemination
- Monetary incentives
- Social interaction

While enjoyment and social interaction do not differ from the viewer's motivations three new motives are introduced [118]. Self expression and identity becomes important when the streamer wants to express their identity and character in the content. The stream's note and climate is based on the streamers personality which is strengthened by instant feedback from the chat. With the information dissemination motive, broadcasters want to share their knowledge and skill about certain games or topics. Monetary incentives stand for the profit one gains from using advertisements during the session or having many subscribers on Twitch. [45, p.4]

When talking about social interaction, social capital comes into play [45, p.5]. This means that individuals gain happiness and value by interacting with other individuals and forming relationships. Social capital has been introduced by Arregle et al. when talking about why people interact with each other in a social context [35]. According to Nahapiet and Goshal [98], it can be divided into a structural, relational and cognitive dimension. The structural dimension focuses on the interaction and its ties as an activity between actors while the relational dimension's main goal is to highlight the quality of the relationship between actors. Comparing both, the structural dimension promotes social capital when the streamer just interacts with the audience while the relational dimension regards the commitment it takes to contribute to an audience. The cognitive dimension is embodied by shared interpretations and visions. Since the focus lays on the broadcaster that is streaming to a community the perspective highlights one individual engaging with many. [98] [45, p.5]

Brundl and Hess argue that the amount that a broadcaster contributes depends on information dissemination and monetary incentives [45]. This means that streamers rely on spreading their knowledge to the communities while also preferring the view of being paid for it because they are getting a sort of contemplation for their efforts. This is contrary to the definition of User Generated Content which is "created outside of professional routines and practices" (Wunsch-Vincent) [137] because it highlights that profit is important to contribute content to Twitch. In addition, Commitment (the relational dimension of social capital) is also important for creating content. This may be due to the quality of the relationship the streamer shares with the community which makes him or her more willing to give the viewers what they reach for. [45, p.12/13]

The intent to continue producing content is depending on social capital. Broadcasters like to have a feedback from their viewers and engage into contact with them in either dimension. It is noted that – apart from social capital – only the enjoyment and information dissemination motivations contribute to the will to continue producing content. In contrast to the assumptions made by listing the motivations the paper further stated that the need to express themselves and to show their identity is neither important for the content creation nor for the continuation of contributing. Again the social aspect is found to be the main motivation for producing content and engaging with the community. [45, p.13]

2.4 Time entity and synchronization

Similar to the different behavior in watching television [112] viewers can have different habits when they watch streams on Twitch. Due to time shifts or planned schedules live streams cannot always be watched by every follower and subscriber at the same time the stream airs. For that reason Twitch introduced the video section that the recording of the live stream is added to after each session [31]. With that the viewers can catch up to what they have missed at the same time creating the opportunity to be able to adapt the watching hours to their own schedules. Therefore, people may not feel the need to watch the whole live stream or to watch the stream actively since they can rewatch parts of the session. Two models address the issue by highlighting the different time axes the viewers use to watch the stream.

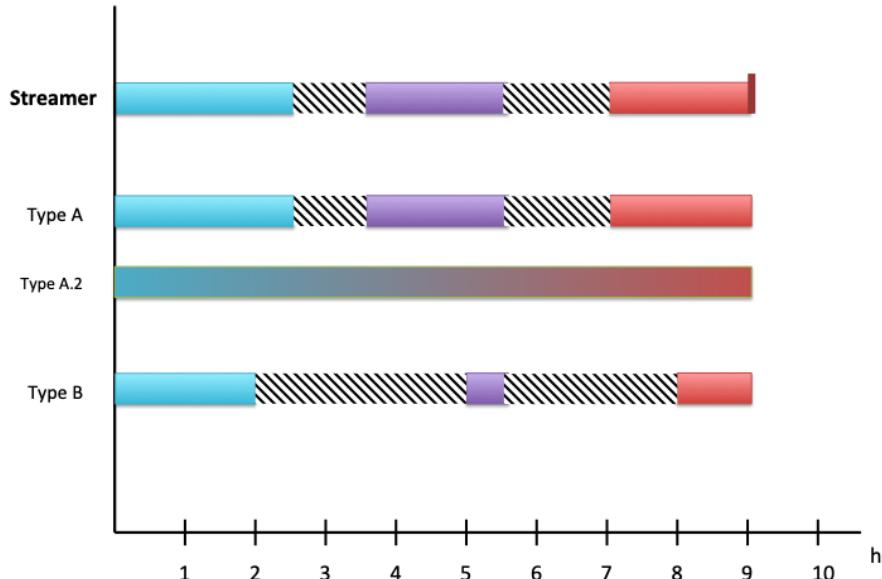


Figure 2.7: Three streaming sessions depicted over nine hours. The first is marked in blue with a break after (the dashed bar). The second is marked in purple and after a second break the third session is illustrated in red. A small bar at the end of the third session marks the end of the time frame. The viewing behavior of three viewer types is highlighted: Type A watches all sessions from start to end, type A.2 continues watching the stream during the breaks and Type B only watches parts of the stream.

Imagine having a streamer streaming for three sessions within nine hours. Session 1 is shown in blue, it lasts 2.5 hours. After that there is a break of one hour after which the streamer starts the second session lasting two hours. The third session starts after a second break of 1.5 hours and lasts 2 hours.

The first figure emphasizes the difference between people who watch all the sessions time synchronous (Type A) and people who only watch parts of the stream (Type B). An ideal viewer type would always watch the live sessions to their full extent, so in said

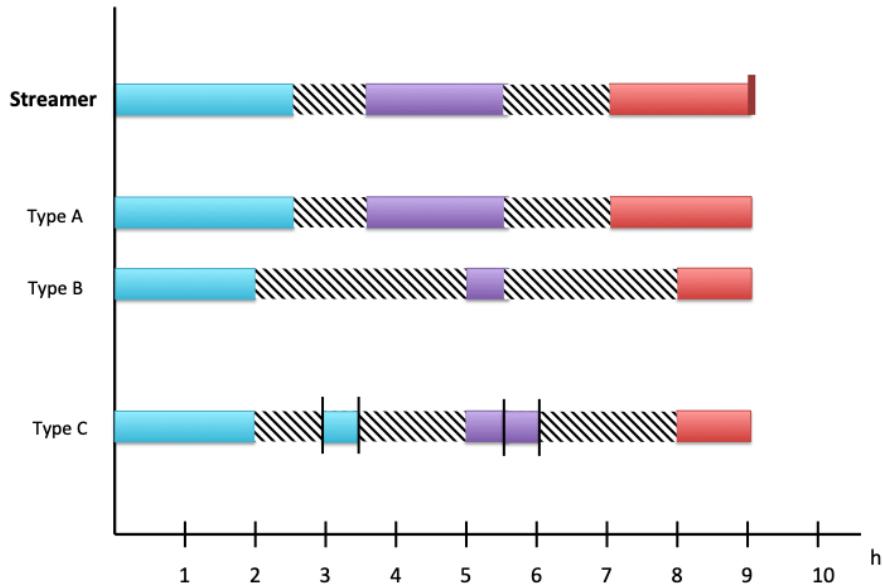


Figure 2.8: A continuation of the viewer types in Fig.2.7. Type A and B are identical. In addition Type C is watching like Type B except for the fact that the missed part of the first session is caught up on during the break between session 1 and 2. This is highlighted by two lines framing the missed out part. Type C also catches up on the second session during the break between session 2 and 3.

scenario the viewing sessions do not differ from the streaming sessions. This can even be extended to the viewer leaving the stream open during the breaks between the sessions (type A.2) which concludes in an active watching time of nine hours. In real life it is very difficult to achieve such behavior especially when the sessions span over a whole day. Most people need to work, go to school or take care of their daily schedule which makes it impossible for them to adapt their life to the streaming schedule. [1]

Instead, people can watch part of the sessions. In Fig. 2.7 Type B interrupts him or herself watching session 1 and switches the stream back on when session 2 has almost ended. The third session is also missed by an hour. This is only an example but highlights the behavior that leads to viewers missing parts of the stream. When the streamer decides to play a game that is story-heavy not all viewers might be able to catch all of the information given in the sessions. To counteract that streamers can try to mobilize as many viewers as possible at the beginning of the stream by notifying the viewers on other social media service or by using the ready-state before starting the stream 2.2. This might help reminding people of the session time but does not solve the problem of people being unable to watch all sessions. [31]

Figure 2.8 looks at the problem in a different way. Instead of splitting the viewers between those who watch all sessions and those who do not, they can be distinguished between those who watch the sessions live and those who catch up by watching records. In the example Type A and Type B are summed up and another type is introduced that follows the same pattern as Type B but instead of missing out some parts the third type

watches the missed out parts during the breaks. The recorded parts are illustrated by two black lines framing the part. Looking back at the Figure, Type C watches the whole missing part of session 1 and small part of the second session. Since the amounts of footage Type C has missed is are small the viewer can fill the missing parts in his or her head and guess what has happened during the time he or she was not able to watch the stream. If large parts have been missed the only way to catch up is by watching the recorded footage. [31]

The models illustrate the problem of not being time synchronous but they do not propose a solution. Twitch has introduced the recorded videos to facilitate the viewers to catch up on the streams and feel included but there are still people who cannot afford the time and effort to watch every session they have missed [31]. It is also possible that viewers are watching passively like people are watching TV passively [112]. In that case, information might pass over them which would otherwise be noticed. It is important to keep that problem in mind when it comes to communities and how to keep them active.

2.5 Communities

Over the last two centuries, communities changed from being local to being global. Before the industrialization communities were identified by their physical features such as their size and their location. According to Wellman et al., they were characterized by the strong-tie relationships being formed within to fullfill each other's social needs [133]. Since then, the debate about how technology transforms, weakens or enhances community has shifted many times and continued throughout the years ("The Internet weakens community" (Kraut et al.))[85] [102]). Amongst other things it is feared that weak-tie relationships, used to exchange information and get into contact with a wider range of people, replace the strong family and friendship bonds. Nowadays, the debate is as present as ever, being treated in everyday media when it comes to how relationships suffer under the addiction to social media and video games. [133, p.153]

Preece states that community can also be defined by the software [108]. They are distinguished between chat, bulletin board, listserver, UseNet News or web-based communities. These differences are helpful for those who can correlate to the concepts because of their IT knowledge. On the other hand, E-commerce entrepreneurs define communities as a place where communication software has been added, using a top-down view while not including the sensitive corner cases that cannot be considered communities even though they own a platform that supports community interaction. [108, p.3]

Apart from the different views it is agreed on one definition: Communities are used to engage into contact with other people [108] [134] [75] [76]. One can meet new people, build new relationships or forge old ones. To show another field of view communities can also enhance the homogenization of cultures and people that represent controversial mindsets can feel supported in communities that share common ground to that extent that communities can support activities that are not accepted in the society[108, p.4].

It is important to keep all the different views in mind when thinking about the communities on Twitch. The view on how community has changed over the past years is important as to how communities are shaped nowadays. In this section communities will be described offline as well as online. In the end, it will be assumed which approaches help achieving active communities.

2.5.1 A description of a community

An active community means a higher probability of active user participation [108]. By taking a look at successful communities results can be drawn and interpreted regarding the communities on Twitch. The first steps towards an active community on Twitch can be taken by learning from active communities in other fields and genres.

It is argued that sociability and usability are important to create a community [108, p.12]. Good sociability strengthens social interactions online by supporting a unified purpose, different roles and establishing rules and policies that are accepted by the community. Good usability facilitates the intuitive use of the community website by supporting dialog and social interaction, making it easy to find and read information regarding the website and facilitate navigation as well as clarify which requirements have to be met in order to use the online community. Making errors is part of an online community but in order to minimize the consequences it has to be clear how to handle those errors. [108]

This view on communities is enhanced by Gurzick and Lutters' description of community [75]. According to them, a community has to meet seven attributes or rules in order to work and satisfy the user's needs. These rules can be applied on every online community, hence on Twitch's communities as well [75, p.2]. They are explained as followed:

A community needs a purpose

Why do people need to interact in the specific community? What is the purpose of doing so? If a community wants to be successfull it has to state what differs it from others [75, p.3]. According to Gurzick and Lutters, its purpose has to be explained clearly for the users to classify the community, to know what it is about and what values it is representing [75]. Therefore the items which explain the purpose of the community have to be organized in a way that allows users to access them easily. The information has to be found on call if required to fascilate the identification process with the community. [75, p.4]

A community is constructed by its members

By allowing members to form the community based on their values and views on how a community should be they identify with the community. The rules and principles guiding the community are comprehended since they were shaped by the users. Communities constructed by its members unite groups with shared interests and common beliefs and divides them from other groups at the same time. Furthermore, it is argued that the active participation leads the members to be more active themselves. Since it is more likely for active members to recruit and motivate other members the participation is increased and the community grows. Relating back to Twitch one could assume that viewers who can actively participate and form the community of a streamer are more active as well. This can be achieved by involving them in decisions about the community such as voting on the next community moderator. [75, p.5]

A community helps to involve members

Not only the construction of the community helps building an active membership. According to Gurzick and Lutters, it is important to promote involving members in smaller aspects of the community as well, e.g. leading and supporting discussions and helping to integrate themselves with the community [75]. If there are few active members it becomes difficult to support discussions and integration because there is not much ground to build on which leaves the moderators of the community leaning on the motivation of the users. On the other hand, large communities make it hard to handle all discussions [107]. Especially on Twitch the support can only be done to a certain degree since one chat makes it difficult to manage the discussions and the behavior of the viewers. [75, p.6]

The larger the community is the more members do not feel the need to take an active part in the discussions and interactions. The activity of watching the discussions but not taking an active part in them is called lurking. It is said that nearly all users lurk from time to time since lurking allows to get a feeling of the community before actively engaging in it [75, p.9]. Sometimes the chat is too fast to follow the arguments and the content, especially in large communities, which further encourages the lurkers to continue their behavior. The anonymity within the Internet can become problematic as well when dealing with lurkers since it is very easy to hide behind a synonym and do not feel the need to communicate with others when there is no direct contact. [75, p.6]

By introducing bots that message all members on certain occasions, important notifications, changes or mentions a higher response ratio could be achieved, but this has to be treated with care since too many messages can cause the members to feel annoyed and pressed. A voting system on important decisions, e.g. ingame decisions on Twitch or new moderators, could help involving members as well since the effort is low compared to writing directly in the chat. Furthermore, moderators can be helpful to organise the discussions. To include moderators people have to be willing to take the role but upon finding them they can make more sensitive decisions than bots who are programmed to act on specific triggers. [75, p.7]

How long a community lives depends on how long the members want to be part of it [75, p.8]. Misunderstandings originating in the missing emotions and gestures when communicating over text messages can lead to the members getting irritated, feeling misunderstood and becoming less active [136]. This is a problem that every Internet community not relying on a voice chat deals with. In addition to that, a community can become stagnated when only a few members build the community and said members are absent. Relying on few members increases the dependency on those members because other members do not feel the urge to keep the community active [51]. Using moderators to keep the members involved and using rewards in form of stickers, achievements or mentions help creating an active community but do not solve every problem that occurs when people come together and engage into contact through chatrooms. The problems have to be treated with care. [75, p.9]

A community is strengthening the ideas and visions of members

According to Gurzick and Lutters, users have a virtual co-presence in communities that is shaped and formed by their online behavior as well as their own wish to present themselves in a desired way [75]. To maintain a persistent way of creating an online identity users can be labeled, for example by the nicknames they chose [92]. On Twitch the view-

ers that write in the chat are distinguished by their colored nicknames and their symbols in front of the names that highlight subscribers and moderators. In comparison to other communities people have no opportunity to identify themselves over a profile field since the descriptions below the streaming window are meant for describing the stream, hinting to social media and merchandise, presenting the streamer's schedule or explaining the rules for the chatroom [31]. The identity of the members of a community can be deepened by protocolling who did what on which chat. On Twitch the only way to identify the activity of a user is by looking recorded videos where the chat is recorded and by remembering how the specific viewer behaved. People on the Twitch communities are not recognized by their identity but by the frequency and content of their chat messages as well as their interaction with the streamer. [75, p.10]

A community links the interests of its members

As stated above, people come together in a community based on shared beliefs, visions and interests, e.g. on Twitch the viewers are interested in the game or the streamer. Sharing an equal knowledge about the content the community can build on a common ground between the members. Out of the similarities a bond can be created which fosters collective member feelings leading to an active community. Since Preece states that those feelings are built unconsciously the community actively needs to support shared traits and interests, for example by encouraging discussions about the shared content. [107] [75, p.12]

A community is credible

How is the information provided and how is it linked? Why was the system created and how is it shown to the members? According to Gurzick and Lutters, those questions are important when building a community [75]. New members need to rate the site as credible as they share content in the chatrooms which is why the reputation of the community is important for them to find themselves in a good and safe surrounding. The design and look should emphasize the credibility. On Twitch for example streamers should put effort in their channel description to embody sincerity and credibility. [75, p.14]

A community fulfills the user's expectations

When new members join the community they have expectations which can be summed up in three core parts that every system should fulfil [117]. First, the community should be consistent in their language, grammar, spelling and style. Second, it should be predictable by how responsive the system is and how fast the reactions and loading times are. Last, a system should be controllable. That means that there is a high intuition in switching between channels or chatrooms and the actions a member performs should always lead to expected results. The right behavior of a system builds a foundation to foster the other attributes. To achieve a good behavior it is important to constantly update the software of the community and test the server loads. [75, p.16]

With these attributes building the core of a community members can experience membership, influence, the fulfillment of their needs and emotional connection which is impor-

tant for the sense of community [95]. The membership is achieved by the right amount of involvement and actively participating in the community. By spending time together people become emotionally invested with the platform and with each other, since community is defined by its members. [75] [95]

2.5.2 Active communities

The seven rules and attributes lead to a stable community that can evolve in active interaction and involvement but how are active communities defined? In the following, Preece's view will be shown that tackles the concept of an active community beyond the rules of a stable community [108].

In the paper Preece states that sociability and usability are the keys to active communities [108]. Sociability is measured in the communities' purpose and the policy and values of the communities' members. The amount of members gives a hint to the activity of a community because more users generally mean that more people have the opportunity to interact with each other, thus creating more discussions and more content. An active community can also be declared by the purpose which is measured through the number of messages sent per member showing how engaged and motivated they are in forming relationships and building contacts. It can also be measured by how much conversations are happening in the community and how much content is produced defining the interactivity between each member. The policy is defined by the negative behavior of the community. Flaming, cursing and insulting occurrences can hint to community policies that are not strict enough and therefore not accepted as consequences by the members. In case of online services like ebay and renting services trustworthiness is another issue that affects the activity of a community. By allowing the members to rate on the service or on specific people not only visitors can form their own opinion on the website but the service can improve its policies. Trustworthiness can also be built by handling transactions well and by defining the steps of an online transfer. [108, p.8]

Usability is determined by how fast people can learn to use a system, how their productivity is limited by the design of the website, how satisfied the members are by using the website's services, how many information they can recall upon using the website and how many errors they make. According to Preece, this is complemented by the attribute stating that the user's expectations on the website have to be met [108]. A responsible system creates satisfaction and therefore the user can concentrate on producing content and discussions. [108, p.9/10]

Each community is unique, allows different behavior and calls upon other interests. It is argued that the side from which a community's success is measured is important because people with different background, values and goals highlight different aspects in communities. For example becoming mothers want support and empathetic comments from a family-friendly website while a teacher measures a successful learning community by how much information the students take from the website. On Twitch, it is important for the viewers to engage socially and interact with the streamer by watching them playing a game they are interested in. The motivation to actively participate in a community on Twitch is versatile but bound socially. [108, p.11]

2.6 Group constellations

A community builds upon groups that are distinguishing a community by smaller subsets [133] [77]. In order to understand communities and why people stick together it is important to know how groups work.

By definition, "A group [...] is two or more individuals who are connected by and within social relationships" [62, Ch.1, p.4]. They range from demonstrating in a huge mob for the same cause to learning together for an upcoming exam. According to Forsyth partnerships are considered groups as well [62]. The streaming communities can be considered groups since they are all bound by one leader, the streamer, and they share interaction. A community that consists of one streamer and one viewer would still share the relationship of one actor watching the other actor playing a game. [62]

As with communities, different definitions focus on different aspects of group identification with Categorization [126], Communication [63], Face-to-face [37], Interaction [131], Interdependence [89], Shared identity [43] and Structure [116] being the most important features of groups. Furthermore, Forsyth distinguishes between groups and networks [62]. People can join a network by only knowing one of the network members and forming a relationship with that person. In a group people can only join by establishing a relationship with the group as a whole entity. Talking about streaming communities, they are categorized as networks until people begin to identify themselves with the community and form a membership. Subscribing to a channel supports the feeling of being part of the content. [62]

In larger groups people are closely connected to each other. Those groups also tend to have a leader, for example streaming communities build on the streamer being a central figure and the moderators organizing the chat and allowing support to other members. The bigger the group is, the harder it is to tie everyone to each other. If there are n people there can be up to $n(n - 1)/2$ ties between them [62, Ch.1, p.5]. In most groups members are linked indirectly since a direct link would require ties in both directions. [62, Ch.1, p.5]

In communities members have the opportunity to form weak ties if they do not know each other [83]. Those are defined by people getting to know other people who normally are not in their closely knit groups. Weak ties are useful to transfer information between groups that otherwise would not have reached the group. [83] [62, Ch.1, p.5]

According to Forsyth, a group is characterized by the interaction between members, their goals, interdependence and structure. Interaction can be distinguished between task interaction which concentrates on a similar goal or task and relationship interaction which strives to support the group members [62]. Interdependence can be hierarchical (e.g. having one leader), symmetrical (e.g. each member depends on each other) or reciprocal (e.g. members depend more on certain members than on others)[62, Ch.1, p.9]. The structure describes the patterns within a group, e.g. who is talking to whom, are there roles such as a leader, follower or information seeker, and the norms of a group. Cohesiveness strives to achieve that all members are feeling as one entity [62, Ch.1, p.9]. For example the goals of a streaming community can be defined by watching the stream together, playing the game together or helping the streamer [119] [76]. The actors interact with each other by chatting, supporting the streamer and giving tips. Because each individual can reach the goals on their own interdependence does not play a big role but the stream depends on the streamer switching the stream on. On the other hand, a highly interactive game may require teamwork between streamer and viewers which creates a reciprocal surrounding. This is shown in Fig.2.9 regarding an example of one streamer and three viewers. Thus,

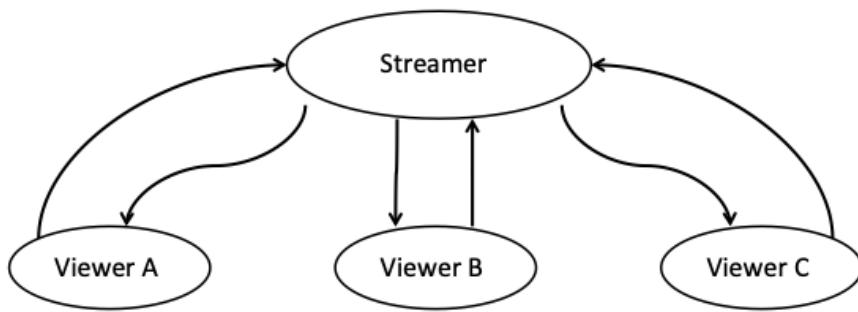


Figure 2.9: Group dynamics on a streaming platform with one streamer and three viewers. The arrows pointing away from the streamer symbolize the content that is produced and consumed by the viewers. On the other hand, the viewers are mainly communicating with the streamer (highlighted by the arrows towards the streamer). An interdependent hierarchy is created since the viewers all depend on the streamer's input but the streamer can also depend on the viewers' input.

the stream can be structured hierarchical: The streamer is the leader, moderators organize the stream and the viewers watch the streams. Norms like common terms of policy are implemented and breaking those terms will strengthen conflicts. [62, Ch.1, p.9]

Groups exist offline as well as online. Forsyth argues that there are different types of groups such as primary groups (e.g. family, long term, strong interdependencies), social groups (small groups that can be changed, often share same goal), collectives (short term, do not share much kinship/similarities, spontaneous) and social categories (e.g. belonging together through same heritage or home town, bonding through similarities) [62, Ch.1, p.11-13]. Streaming communities can be seen as social groups and some people additionally identify themselves over the term "gamer" which may be part of a social category.

In the following, the dynamics and climate of a group are highlighted and the streamer network is introduced as a form of community connecting the streams with each other.

2.6.1 Group dynamics

Lewin (1956) argues that group dynamics is a synonym to how members of a group "react to changing circumstances" (Lewin) [89]. Depending on the members the dynamics do not describe the characteristics but the inner behavior distribution of the members [62]. Therefore, groups can have a collective consciousness which helps them deciding on topics, values and special cases [62, Ch.1, p.20]. When people are judging in a group they feel less responsible about the outcome. By evolving shared norms that are adapted by each member over time said members go conform with each other and adapt "opinions, judgements and actions" [62, Ch.1, p.27]. Furthermore, group feelings are more important than individual beliefs since a group is one unit depending on the members to stick

together and overcome personal differences. With that, each group has its own strength and weaknesses depending on the constellation of its individuals. [62]

One approach by Forsyth to describe how groups change their members is to define the development of the group in five stages [62, Ch.1, p.22]. First, the orientation stage helps the members to adapt to the new group surroundings. The Conflict stage fosters challenges to the leader, arguments and leads to a first set of goals. In the structure stage the members agree on common norms and standards. The organizing of the group and the communication is improving which marks the beginning of the most productive stage: The performance stage. In the fourth stage the members work towards a shared goal by cooperating with each other. At last, the dissolution stage ends in the group being dissolved. [62, Ch.1, p.22]

Groups contribute to society [62] [133]. They have an effect on its members which can contribute them to change their attitudes [100]. People also tend to place themselves under a leader accepting his or her status, norms and rules [62]. While in a group the members are more productive but lose a sense of individual feelings. Because of that members can thrive into harsh actions. Being influenced by the group's norms the probability of an individual behaving in a way they would normally not behave increases. Bad decisions can foster by trusting in the group's consciousness or in a leader. Furthermore, groups can foster competitions to an unhealthy extent with members trying to surpass each other. [62]

2.6.2 Group climate

For a community to foster and develop healthy group climate is important [82]. Johnson et al. describe the latter by "a sense of constructive interpersonal investigation" [82, p.310]. In other words the climate influences the productivity within a group. This may also depend on the stages the group is in. If the group is in the conflict stage for example arguments and challenges will appear but that means that the group is forming and developing a healthy environment to jump to the next stage [62]. Being productive within a group simultaneously shows that the climate is healthy and positive enough for the members to produce content and work together [82].

Bad climate can occur if the previous statement about the climate cannot be fulfilled. In other words the people within a group cannot be productive anymore [82]. This may be due to increased conflict within a group [62]. When members try to surpass each other it is possible that they increase the tense atmosphere which decreases productivity. An unhealthy climate can also occur when people behave harshly because they feel supported by the group [62, Ch.1, p.26/27]. Groups who put pressure on its members foster an unhealthy climate as well. To avoid that, clear rules have to be established and support for members can be provided by older members. [62]

2.6.3 Streamer network

The communities that each consist of one streamer, the viewers and the moderators (2.2) are not the only form of community or network on Twitch. Streamers who differ in their background but share the same interest in gaming get to know each other through conventions like "TwitchCon" [29] and they are invited to the same events to the extent that they start collaborations and form a community within their work [31]. Within the streamer communities there are smaller groups that identify themselves by the same

working place, their hometown or similar games they are playing, e.g. Summoner's Inn is a german community organizing events around the game "League of Legends" [67] and uniting famous league streamers as their hosts and content producers [15]. When collaborating on live streams, streamer talk to each other over voice recording platforms such as Teamspeak [71] or Discord [79]. They also follow each other on social media accounts and pictures of the streamers show that they spend time together [5].

2.7 Communities on streams

Having summed up how communities are built, what fosters active communities and how groups play a role in the process the knowledge can be applied directly to the streaming community on Twitch. Above examples hinted at the correlations between the theory of communities and the practical example of the communities on Twitch. In the following, said communities are described regarding the background knowledge and hinting at problems that appear in the communities.

On Twitch viewers join a community because they want to learn about a specific game or they want to interact with the streamer [76] [119]. The community is formed by the streamer sharing its beliefs and structuring the stream to the extent that the personality shines through [119] [45]. Viewers contribute to the community by adapting to the policies but at the same time influencing the content and the discussions by their own visions and behavior [75] [108]. Groups and communities target people with similar interests which is why the viewers like to interact with others with similar characteristics [62] [133] [76]. On the other hand, streamers recognize that they attract people who share their character and vision [45].

When viewers start to show up regularly they become regulars who are more trusted than others and get recognized by other members [76]. For example it is said that moderators are all regulars [104].

On streams with many viewers the discussion in the chat becomes rapid and one individual has difficulties to follow the messages [76]. Furthermore, the streamer cannot interact with the community in such a way that both actors would be satisfied. The impact on the stream from the perspective of one individual becomes minimal. This can be a problem to many viewers since they want to engage with the streamer and the community. On the other hand, viewers may like being part of and hiding behind a huge crowd. [76]

Another issue that has to be dealt with is the objectification of women in the gaming branch and on the live streams. Surveys highlight that popular female streamers tend to be objectified [99]. They get more objectifying messages implying their personal, romantic life and about their appearance. One explanation could be that games are aligned with male adolescents and women in games are sexualized and objectified [55]. That tendency is slowly shifting to more diverse target groups and characters [99].

In contrast, on the channels of popular male streamers the viewers speak about game-related content suggested by the words they use. On popular female streamers' chats moderators seem to be more active and express warnings in higher frequency. This may be explained by the possibility of viewers being impolite to the female streamer or not behaving according to the rules. [99]

2.8 Towards an active community

Coming back full circle, the interaction between the three actors (the broadcaster, Twitch as the communication service and the viewers put together with the moderators) has to work out in order for a game to be enjoyed on a social level. Fig.2.3 in section 1.2 showed us that the three actors are knit and correlated to each other. Further sections introduced the ideas of communities and groups in general as well as regarding to gaming communities and interaction on Twitch. Since the games that are talked about are depending on an active participation of a viewer base it is important for the communities to be as active as possible. Therefore, a couple of suggestions are summarized to give a view on what sections it has to be worked on.

In order for a community to be successfull, content has to be provided on a regular basis [75]. By scheduling the streaming sessions in a certain time frame, e.g every second day, the viewers can prepare for the streaming sessions and include them in their daily life. Streamers who start the stream without an announcement beforehand depend on the activity of their viewers to watch at the sidebar if a streamer they like is online.

Having talked about social capital and how it helps to stay active in a streaming context [45], live streaming systems should focus on strengthening the bond between the viewers and the streamers and foster interaction. Viewers become invested with the stream and the community by spending time on the stream and chatting with others as well as engaging into contact with the streamer [45] [118]. By socializing they fulfill their needs and build social capital [45]. They influence others and are influenced by others at the same time, creating an active change and flow of values and rules within the community [62] [133] [75]. When viewers start to identify themselves by the community or the sub-groups within the community they become emotionally invested spending more time on the platform and being more willingly to engage into an interactive conversation with the streamer [69]. A friendly atmosphere fosters the feeling of being accepted and therefore the interaction and participation increases [82]. People who identify themselves with shared beliefs of the streamer tend to stay [45] [119].

Streamers can allow the viewers to participate and to be in the center of attention for a moment to strengthen the bond to the stream. This can be done by polls inside and outside of Twitch. Votes can occur due to important in-game decisions but also to decide on structural issues, e.g. which streaming content is the most fun to watch, on which evenings the majority of the viewers can watch the stream or who should be the next moderator. According to Hamilton et al., regulars and moderators feel bound to the community and help in including new members as well as motivating the community to be more active because they share insiders based on common history which has brought them close [76]. Their tasks are to greet other viewers upon entering, to answer questions and to get into contact with newcomers so that they feel welcomed and start being active. Furthermore, special moments in the stream glue people together because they saw something unusual happening in a shared moment. This further strengthens the companionship and emotional investment between the members. [76]

Large streams with large communities encounter the problem of having to many viewers for the moderators and the streamer to handle [76]. Interaction between the streamer and the viewers becomes impossible if the rate of new chat messages concludes in a wall of text [110]. Viewers who wish to interact with the streamers or moderators may feel left out. A Subscriber-Only-Chat is a possibility to increase the quality of the chat while excluding others from the chat. To balance that streamers can establish days where they

turn off the subscriber-only mode allowing members who do not subscribe to engage into contact. [76]

Overall, it is possible to design a community that can participate actively on in-game or out-game decisions. It is important to keep the problems in mind under which the sense of community is hindered. Under the right circumstances and with enough motivation a community can foster and establish a sense of membership, shared values and trustworthiness.

3 Story-based game design

3.1 Games

Games are fundamental in everyday's life. Starting with the games that are played by children to engage in sport activities, over to card games and computer games the term of playing a game is known and widespread. Therefore, many definitions and characteristics of games exist done by various people. To simplify the comprehension of games this section focuses on one book that describes games and their characteristics [113].

According to Schell, games are defined by four factors: representation, interaction, conflict and safety. [113, p.8-10]

Representation is identified as the first of the factors. Schell (2014) says that "a game is a closed formal system that subjectively represents a subset of reality" [113, p.8]. That means that a game does not complete representing reality but a part of it. This part can be connected to an emotional reality the player feels when playing a game [113, p.10]. Therefore, games differ from simulations in the fact that they do not try to depict reality but instead focus on a certain part of reality. Subjectivity and fantasy come into play when the player interprets the actions and messages in a game.

In the book, it is stated that games, challenges, puzzles and toys are distinguished by the degree of interactivity. [113, p.11-12] Puzzles, for example, do not react to the changes a player makes to the environment. They can be solved with a limited number of solutions that do not allow abbreviations from those. Schell states that stories are similar to puzzles when it comes to interactivity. Since a story is told in a linear fashion the events are structured and each event is followed by another event. A game, on the other hand, allows multiple solutions and therefore a higher interactivity by reacting to the changes made by the player. Either the system itself or the players who engage in contact adapt to the changes and create a dynamic flow of actions. Despite that, puzzles and stories can be included in sequences and as subsets of the game.

Furthermore, Schell argues that interaction creates conflict. By introducing obstacles that prevent the player from winning they engage in conflict by trying to overcome the obstacle. These conflicts can be passive in the form of challenges and puzzles or they can be dynamic and active if the game reacts to the player's input. Obstacles can be created by other players or by the system itself. [113, p.12-13]

Conflict can create the possibility to be harmed. [113, p.13-14] In the book it is stated that games can prevent the physical consequences of harm while letting the player experience the psychological consequences, thus creating a safe surrounding for the player to explore and discover the game. Being absent of harm does not mean to renounce consequences for the player's actions in the game. Instead, penalties for the loser and rewards for the winner can be introduced. In board games, for example, the losing player always loses a certain amount of dignity. By preventing the losing player from receiving rewards consequences can also be carried out, e.g. by the winner receiving money or ingame status symbols.

Games can occur in many forms. Schell describes five types of games: Board games, card games, athletic games, children's games and computer games. [113, p.7-8]

Board games consist of a set of pieces that are arranged on a board. The player focuses on moving the pieces around and explores the board, collects substances or conquers territory. Card games consist of a set of cards divided by suits and ranks. Each suit ranks in value, e.g. the French deck consists of four colors named cross, spade, heart and diamonds. Each of the colors can be ranked from ace to two. Different card games focus on other combinations of the cards and the player focuses on losing or gaining cards. Athletic games include a certain form of physical activity. The degree of interaction distinguishes between a game (e.g. a basketball game) and a challenge (e.g. a race) stating that athletic games require interaction to be declared as a game. Children's games not only provide the four factors but they foster social growth. According to Schell, the rules are simple and strengthen mental, physical and social skills [113, p.8]. For example, hide and seek requires the players to communicate with each other in order to find different hide places.

Moving forward to computer games, Schell states that they consist of a system that runs the game application. Players focus on defeating opponents that either are represented by other players or the system itself. The hand-eye coordination is strengthened since the player follows the events on the screen with the eyes and moves the player figure around with the mouse or the keyboard. By defining a set of rules games create a frame in which the player can discover and interact with the environment.

3.1.1 Game characteristics

Arsenault already hints at the difficulties to distinguish games by genres since they tend to evolutionize through the years with several subgenres being identified out of original genres [36, p.150]. It is stated that more genres submerge of older genres which means that more details will be added to the categorization. Therefore, genres offer an overview over the game types but they do not describe a game. To identify a game and distinguish a title from other games Clara Fernández-Vara introduces building blocks that lay the foundation and help identifying each game. [61, p.86-116] In the following the most common blocks are introduced and outlined to give an overview and alternative to defining games by their genre.

Number of players

The first building block described by Clara Fernández-Vara defines the number of players. It states how many players can contribute to the game and what relation they have to define the social context of the game. For example, people can engage in teams or alone. Furthermore, they can play against or collaborate with each other [61]

Digital and non-digital games declare the number of players in their physical case. Computer games can contain Multiplayer and Singleplayer elements which means that the game can be played by a single person, by multiple persons or by combining both types [61, p.88].

Rules and goals of a game

The second building block describes that each game has a set of rules defining the frame in which the player can move or act. The goals decide the destination of the player. Fernández-Vara states that the rules and the goals often are not defined explicitly. Instead, the player has to find out how the game works. To do that it is helpful to be guided by instructions the game can give, e.g. board games have an instruction sheet attached that defines the rules and the gameplay. [61, p.98]

The rules can define how the system works, e.g. how the enemies move, at which time the player is detected or how the player can interact with the NPCs. Furthermore, different play modes of the same game can have different rules. For example, "Combat" (1977) lets the player chose which types of weapons they want to use creating different game modes with the same goal. [61, p.98]

Game mechanics

According to Fernández-Vaya, this building block is related to the rules of the game since mechanics regulate the player's behavior in a less formal way than rules. [61, p.98]

Chris Crawford sees game mechanics as the verbs of the games [53]. In other words, they define what a player can do. In "Mario Bros." (1985), for example, the player can jump, run and pick up items.

The mechanics also correlate to the genres. [61, p.98] For example, a platformer game indicates that the player has to jump and run to get across the platforms. On the other hand, genres in itself can have different mechanics. For example, the party game "Mario Party"(2015) allows the player to move over a virtual board while one of the main mechanics of "Rocket League"(2015) is to drive a car.

Game spaces and fictional worlds

Fernández-Vaya states that space can define the place in which the player is moving and where the story happens, but it can also describe the possibilities where events can unfold their potential [61, p.100]. Michael Nitsche argues that the space in video games can be distinguished in five different subsets: The rule-based space (mathematical rules that define how the game works), the mediated space (presentation of the game imagery), the fictional space (the fantasy of players), the play space (the hardware) and the social space (the interaction with others) [103]. Each subset or plane can be put into relation with each other. Games differ by strengthening the ties between certain planes and weakening ties between others [103]. Enhancing the concept of Nitsche, Fernández-Vaya argues that rule-based space is in cooperation with the rules of a game. For example, the game "Galaxian" (1979) allows the player to only move the space ship on the horizontal axis creating a space that depends on the rules made by the game. The mediated space can be illustrated in two or three dimensions creating depth and the fictional space is defined by the world the game creates. [61, p.103]

In that context, a fictional world can be described as the setting of a game in which the plot unfolds and where the player can move around. Game worlds define a series of games each connected by the same world and on occasion the same characters but with different stories. Games do not need to have game worlds but they can be enhanced by them. For example, "Bioshock" (2007) introduces the player to a world rich of story [34].

On the other side it is hard to argue about a game world in "Tetris" (1987). [61, p.103-105] A world also defines the theme of the game [61, p.105]. For example, "A Plague Tale: Innocence" (2019) takes place in a dark medieval environment where the inhabitants are fighting against a rat plague. The stealth mechanics contribute to the dark tone the world hints at [121].

Game story

A story takes place in the setting of a game world. Because of its uniqueness it can distinguish a game series from another and differ between titles within one game world, hence one series. According to Fernández-Vaya, games with a less complex game world have a less complex story, e.g "Streetfighter" (1987). Again, "Tetris" (1987) is an example where it is complicated to find a story. "BioShock" (2007), on the other hand, establishes a game world and tells a story within the game world. [61, p.106]

Game communities

Apart from stories, worlds and mechanics, a game can also be defined by the communities that are forged inside and outside of the game. Within a community people can cooperate to solve quests but they can also add content to the game. [61, p.111/112] For example, "LittleBigPlanet" (2008) provides tools to exchange and share custom content [96]. Picking up on the idea of communities in Chapter One (2.5), it is important for a community to be open for newcomers. The climate of a community decides how welcome the members feel while toxicity and negative behavior influences the communities' membership (and their reputation outside of the game) in a negative way.

To sum up the approach of Fernández-Vaya, building blocks serve to identify games and distinguish them from other titles. If one looks at a game by defining each building block an image is drawn that represents the concept of the game. It has already been stated that the community can characterize a game, which concludes that the social aspect is important for a game. In the following, the players' motivations are examined to understand why people want to play games.

3.2 Motivation to play games

Computer games differ from other media like television, radio and newspaper by their degree of interactivity [74] [132]. According to Kraut et al. and Yee, players can make active decisions that are affecting the game surroundings and the story layout. Since games have to meet high technical requirements like short responsive time and high-end hardware to achieve high-performance values the cost of playing games can be high. Therefore, the motivations are important and have to be strong to keep the players overcoming financial barriers. High motivation contributes to the hours spent on games and the willingness to engage in contact with other players. [138, p.3] [85, p.138] Referring to interactive gaming on Twitch, three motivations drive people to play a game:

3.2.1 Achievement and challenge

To achieve results games want the players to engage in action, for example by game events or approaching enemies. In some cases the players are forced to act on the events (e.g. shoot at the enemies) because of the fast-paced reaction time that is required. In other cases, people can rethink their plans before engaging in action. Kraut et al. declare that the actions are intended since the player expects results from the game. Therefore, every action is defined by a goal that is intended to be achieved. [85, p.140-142]

In a long term context achievement also means to gain something from the game in the form of increasing the player's skill, showing off with the talent or understanding the game in a deeper sense to master the game mechanics [138, p.2]. By competing online against other players prizes can be won and achievements can be shown to others. Furthermore, a game can create challenges that the player wants to master. According to Kraut et al. and Csikszentmihalyi, the player will put more effort in the game itself if the reward of a challenge is satisfying. On the other hand, a game leads to frustration when it is too difficult to reach the achievements and overcome the challenge [85, p.141]. [54] [61, p.145-148].

3.2.2 Efficacy and immersion

White declares that efficacy is defined by "the satisfaction of having imposed an effect on the environment" [135]. In the context of video games, this means that the player decides how the surroundings are formed and changed. An action that is caused by the player leads to a reaction from the game creating an input-output-relation in which each action is seen as the player's action and each output is seen as the game reacting to the action. Games are defined by a high input-output-frequency since they focus on interactive behavior. Therefore, the player is an active part of the game's results. [84, p.137]

In online games and Massively Multiplayer Online Role-Playing Games (MMORPGs) people have the opportunity to discover information, lore and territory that other players have not yet discovered. [138, p.2] By creating new characters, engaging into roleplay and customize content the world and setting of the game are shaped by the player's preferences. Efficacy plays a role by individualizing the player's experience and creating immersion.

The degree of efficacy and immersion depends on the concept of a game [138]. For example, "Minecraft" (2009) allows the player to shape the world according to their needs and preferences [93]. The option to choose between building houses, digging in caves, hunting animals or exchanging goods with NPC villagers – NPC is an abbreviation for Non-Player characters whose behavior is defined by the system – can create immersion and the will to spend more hours in shaping the world and creating an individual story. Fast-paced, round-based and competitive shooters like "Counter-Strike: Global Offensive" (CS:GO) [130] on the other side leave minimal choices to explore the surroundings. In this example, the player's immersion is coupled to the fast reaction time and the player's skill to shape the playground instead of the setting.

3.2.3 Social motivations

Working in teams, forging relationships and socializing are highly interactive [138, p.2]. Games that encourage social interaction, for example by creating cooperative challenges, refer to the motivations linked to why people form communities and watch others play games (2.5, 2.3.1). Especially multiplayer and online games emphasize social components since they implement chatrooms and voicechats [138]. The teamwork component which is encouraged by the chatrooms is important for an audience to work together and achieve goals, for example to overcome obstacles or defeat enemies that are too strong to fight against on their own. Furthermore, Yee states that long-term relationships based on mutual interests can flourish by forming teams and communities ingame. [138, p.2] Twitch emphasizes socializing because the concept of the website is based on interactions between the streamer and the viewers (2.2.1). Online games can foster the relationship the two actors since both can play together in a team or against each other, thus encouraging the interaction between them [76].

3.3 Interaction in games

Games are a social experience. Different game categorizations appeal to different degrees of interactivity and social aspects but people find themselves interacting with each other during game sessions. A study in 2008 examined the player behavior and experience of US American teens between 12-17 years and highlighted that teens engage socially while playing games, experiencing pro-social and anti-social behavior. [88]

Interaction can happen in multiple ways. According to the study of Lenhart, the majority of people play games with mutual friends or contacts made on the Internet. Games can also be played with people situated in the same room. It is further said that people collect experience in both playing online as well as offline. [88]

In the following, the interaction in online games will be looked at with focus on MMORPGs to show the different possibilities of social engagement. After that, the contact outside of the game will be briefly regarded to link games back to the idea of communities.

3.3.1 Interaction in online gaming

According to Utz, four types of players emphasize on different social aspects and game-play mechanics. First, Role-players like to embody different roles. Second, those who identify themselves as Gamers like to engage in the play and focus on playing a game. Third, the Virtuels appreciate the connections made on the Internet and pursue to form relationships. They also like the thought of being in a virtual world. At last, the Sceptics do not feel affiliated with the online gaming group and spend less time on the game than the other types. The categorization is linked to the motivations to play online games. Since the majority of players describe themselves as gamers the main reasons to engage in online gaming are "curiosity, astonishment and interest" [49, p.5] as well as "attention, reasoning, creativity and problem solving" [49, p.5]. The latter is socially motivated. [128]

Games focus on different concepts, styles and mechanics [61]. In Massive Multiplayer Online Role Play Games (MMORPG), for example, social interaction is important to progress in the game and achieve story or gameplay milestones. It is said that MMORPGs are used to play a game while exploring one's own identity as well as new relationships.

[49]

Back in 2008, the survey from Lenhart et al. established a connection between online games and social interactions. According to the study, 43% of the online game players engage in groups. This could be a hint to the Multiplayer category and the social nature of online games. MMORPGs use quest systems that often need multiple players to be completed. [88] The concept of MMORPGs, on the other hand, limits the possibility to play the game in one room since the system of logging into an account requests one person sitting in front of a computer. With the idea to explore the game in a traditional sense as well as giving the opportunity to discover oneself over the customization of the content and the interaction with mutual people sharing the same interests online, social interactions outside of the game are limited. Instead, the players are communicating with other players to form teams and complete quests together. [49, p.1/2]

In the environment of MMORPGs friendships can be formed. Cole and Griffiths discovered that three-quarters of the players that participated in the survey befriended other players in the game [49, p.4]. The socializing in online games can be fostered by guilds. They strive for similar ingame goals and facilitate the organization of multiplayer quests and the splitting of the quest rewards while simultaneously creating a surrounding of understanding for people with similar characteristics and preferences. [49, p.5]

According to Cole and Griffiths, the majority of gamers believe that the MMORPG platform is positively affecting the relationships to the other players. In online communities people may communicate their beliefs and interests while not feeling judged by society. Online games can create an environment in which the players feel supported to the extent that they identify themselves with the platform. [49, p.4/5]

3.3.2 Socializing outside of the game

Apart from the online connections, games can be played in cooperation with friends and acquaintances from offline relationships. [49] In the survey from Cole and Griffiths a quarter of the contestants stated that they play online games with offline contacts like friends from outside and family. Simultaneously the survey from Lenhart et al. discovered that games are played with online and offline relationships [88]. A number of people also meet online friends outside of the game. This can be done in guild meetings, on conventions or private occasions. The friendships can be fostered outside of the game.

Playing cooperative games with a social aspect can lead to an increase in social behavior outside of the game because people learn how to lead a group and decide "whom to trust" and "whom to reject" [72, p.8] [70]. Therefore, not only social contacts are fostered outside of the game but the behavior is affected on a short-term and long-term view.

3.3.3 Summary

With that information, communities are created in a game or in the surroundings of a game. They are based on the mutual interest of a game and cross the borders between the virtual worlds and the real world. The versatility of interaction allows the game to have an impact on the player which can be seen in the numbers of players that are meeting each other outside of the game environment and the friendships that are formed in the gaming communities. Twitch communities are similar to game communities because both evolve over the concept of a game and link people together. But instead of a game that is played by all members, the viewers watch a limited numbers of streamers playing

and commenting on a game.

The next section deals with the aspect of stories. It is explained by which components stories are identified and how they can be told. Since the involvement of the Twitch viewers is important to the thesis the next section deals with interactive stories.

3.4 Story in games

Stories are part of daily life when people use them to convey experiences or information and teach behavior to children [52]. Before a story can be told an experience has to be made, either by learning from actions or by listening to other people. Costikyan argues that this experience can be made by playing games since they are included in various sets of activities. Starting from games during childhood people are familiar with processes that are similar to games, for example trying new methods to maximize a process. According to Costikyan, experimenting with structures is considered gaming. The learned content can then be wrapped up in stories to convey the information collected in the games. [52]

In computer games the developers try to tell stories with a game world the player can explore and have an impact on. According to Fernández-Vaya, this can be achieved by using embedded or emergent storytelling. [87] [61, p.107/108]

First, embedded storytelling is defined by events and plot points that are pre-determined by the storytellers. Therefore, the story's milestones are reached after a certain amount of time while quests help to lay the foundation of plot points and structure the story. Emergent storytelling, on the other hand, allows players to trigger story points by interacting with the world. For example, simulation games like "The Sims" (2000-2014) or "Civilization" (1991-2013) wait for the player to interact with objects to trigger events [61, p.108]. Game stories often combine both types of storytelling. For example, "Red Dead Redemption 2" (2018) emphasizes on the aspect of a free world. [68] In the game, the player can move around freely and discover quests while a story is provided simultaneously throughout the game. The player can decide when they want to follow the main quests.

But stories are of linear nature while the interactivity encourages games to be non-linear. This prompts Costikyan to say that it is difficult to connect both entities and create story-based games [52]. To understand that, the linearity of stories and their structures are presented and compared to the decision-heavy structure of games. After that, the hybrid forms of story-based games or game-focused stories are described and conclusions are drawn to sketch an outline of interactive games. The concept of story progression in the form of the hero's journey concludes in an approach to write and create immersive and interactive stories. The technical possibilities to use decision trees and Procedural Context Generation will be outlined in the last part.

3.4.1 Story structures

This subsection follows the descriptions of narrative structures in the paper "Story and Discourse: Narrative Structure in Fiction and Film" by Chatman [48]. Therefore, every statement represents the opinion and the findings of the author. Since this is only one opinion the section focuses on giving an overview to depict a story rather than stating a final definition.

Chatman describes a story as an abstract form that depends on the medium transporting the story, e.g. books, movies or games. Therefore, story is an object that is passed on by an expressive element. It is exchanged between a sender and a receiver mimicking the concept of communication. [48]

The audience receives the story with a literal and a figurative point of view. In other words, the literal point of view explains how the audience perceives the story with all senses and emotions whereas the figurative point of view is depicted by the audience's previous experiences and ideals that influence the perception of the story. Furthermore, the story is divided into major and minor events contributing to the overall progress of the story. According to Chatman, three fractures characterize a story: First, a story follows a protagonist or a group of protagonists. Second, the classical concept of tragedy is treated. Third, the protagonist goes through a journey and grows with the ups and downs of the story. A naive character with flaws progresses and learns something valuable along the way. Therefore, it is argued that the characters and the setting are fundamental to a story. [48]

Many authors argue that stories have a linear structure, including Chatman, Costikyan [52] and Riedl [111]. Below, linear stories are examined. The explanation of linear stories is important to understand why it is difficult to link stories with games.

Linear stories

Stories in a traditional sense are linear [52, p.1]. In other words, they have a beginning, a middle and an end. The structure of the story is defined by the author who consciously works towards a climax and a resolution. Therefore, the story is controlled. Games, on the other hand, are non-linear which allows the player to have an impact on the world, thus fostering the interactivity between the game and the player. If a story should be included in the game it creates a conflict due to the opposing natures of both fragments. [52, p.1]

Riedl states that a story included in games is often linear as well. They progress in sequences from the beginning to the end checking off one plot point after the other. This may be beneficial to the developers who can prepare an immersive story but on the other side the interactivity of changing the story's outcome is limited. Games with linear stories allow the player to interact with the game and the characters in between story knots but the overall structure is predetermined in most cases leaving little to no choice for the player. For example, the player in "Tomb Raider" (2013) can move inside limited areas and collect objects or hunt animals but the plot points are triggered on fixed points independently of the player's discoveries [60]. Waves of enemies and the unlocking of other regions are predetermined. [111, p.1]

3.4.2 Between stories and games

In an attempt to unite stories and games, Costikyan introduces hybrid-products that have been created to unite both fractions. [52] They are a combination of stories and games with each example emphasizing an individual weight of both contents. These are:

Hypertexts

Hypertexts try to merge non-linearity with stories. They consist of paragraphs with varying lengths. Sentences or words can be linked to other paragraphs that the users can decide where to continue reading. After a certain time of reading different but subsequent paragraphs the text becomes a full circle and a story is built. Hypertexts do not need to have endings and they feel interactive because the reader can decide where to read next. On the other side, the authors have difficulties to make the story effective since they cannot control the tempo and the outcome of the reading order. [52, p.2/3]

Gamebooks

In the 1980s, a book genre called "Gamebooks" was popular. The reader starts by reading the first chapter and is confronted with a decision at the end of the chapter. Depending on what the reader decides the book leads to different chapters, thus the reader feels that they have an impact on the story. This concept focuses on the freedom of the reader to decide the outcome of the story. After a deadend is reached, often depicted by the death of the book character, the reader is encouraged to begin the story again. This leads to a certain level of frustration after several deadends are reached. Besides, the layout of the books is similar to a hypertext since they follow the pattern of jumping between paragraphs according to the reader's decisions. [52, p.3]

Text adventures

On the gaming side, text adventures try to embed stories in their game concept. They work similarly to gamebooks with the difference that they react interactively to the changes the user makes to the surroundings. The software can remember the actions of the user and act depending on past decisions by opening new paths or unlocking items.

Text adventures are part of graphic adventures. Additionally the player can talk to NPCs being offered a choice of what to say. Depending on the decisions the NPCs react in different ways. Stories can also be transported by cutscenes.

Nonetheless, those games have linear stories. The player has the freedom of moving in the game but the milestones of the stories are predefined. [52, p.4]

RPGs

When talking about stories in computer games, RPGs come to mind. In comparison to graphic adventures, they allow the players to shape the story by defining the character's skillset. Therefore, RPGs are more flexible than adventures. The enemies have to be able to be defeated in numerous ways allowing the player to search for individual solutions. Furthermore, the decision in which area to go next contributes to the freedom given by the game. Nonetheless, the stories still focus on linear concepts to the extent that a structured set of obstacles has to be overcome. [52, p.5]

The family of RPGs can be expanded to paper RPGs consisting of sessions with people. [52, p.5/6] Predefined worlds and settings, e.g. Dungeon & Dragons, help the gamemaster to establish the beginning of a story by setting the world's rules and the system. The characters can be leveled up and skilled as well with the difference that the people coming together are encouraged to roleplay their characters. Since no software has to be

predetermined Costikyan argues that a story can be expanded by the gamemaster and the players dynamically, thus creating an active engagement and strong bonds to the characters and the stories. Said stories reach peaks and downs that the layout reminds the players of comic books in which the heroes go on different journeys together. Therefore, episodes are created instead of one connected story.

Taking "Horizon Zero Dawn" (2017) as an example, a Single Player game where the player follows the lead character, Alloy, to discover her heritage while defeating robot-animal-hybrids, an original story set in the future is connected to an open world. The player can move freely and decide which quests and side missions to make first to the extent that the player can decide which parts of the main story they want to focus on first. Decisions within conversations with NPCs can alter how the world and the inhabitants perceive the main character. Nonetheless, the story follows a linear pattern with a beginning, a middle and an end, each of the plot points alternating the world and the behavior of the NPCs. [66]

Having explained all the hybrids that are presented in Costikyan's paper, one realizes that a compromise has to be made to include stories in games. According to Costikyan, the hybrids that emerge from the compromise can lead to engaging games that are enjoyed by the player. [52, p.6/7]

To understand how a story is structured, their concepts need to be broken down to its core. It is important to know that stories today have the same concept as the stories that were told centuries ago to lose the fear of creating own stories. [47] At the same time every idea for a story fragment can be united with another idea, thus creating story concepts that can be worked on together.

3.4.3 Hero's journey

Every story has been told [47]. In their cores the stories that are happening around lovers, for example, are written down in the legends of Abelard and Heloise, Eros and Psyche or Medea and Jason. They embody lovers that are divided from one another, drifting apart or drown in jealousy [47, Introduction, p.18]. Therefore, stories find their concepts in mythology that origin in the same idea and structure [47, Introduction, p.20]. As an introduction to the book "The hero with a thousand faces", the title containing the correlation between the idea of heroes throughout different cultures, Campbell says that myths are expressed in stories to transfer the wish of humans to find themselves and to transfer their words to others [47, Introduction, p.24]. In myths, therefore, are heroes and heroines that represent the human nature by going through harsh times and overcome obstacles in a journey to find out where they belong and what to expect of life. They are an abstract idea that people can identify with and learn from [47, Introduction, p.24].

Continuing to the structure of a story, Campbell argues that a question is posed at the beginning of a story that is answered or worked towards through the story. The question guides the hero of the story measuring the journey's obstacles and hinting at a goal that can be reached [47, Introduction, p.25]. It defines the reason for a hero to go forward and withstand, sidestep, overcome or avoid obstacles [47, Introduction, p.26]. Throughout the journey it is possible that sacrifices have to be made and belongings have to be left behind [47, Introduction, p.25]. The heroes and heroines can be portrayed regardless of gender and being human. Instead, the quest is about the "journey of the soul" [47, Introduction, p.30] which does not differ in the kind of heroes that are going through the

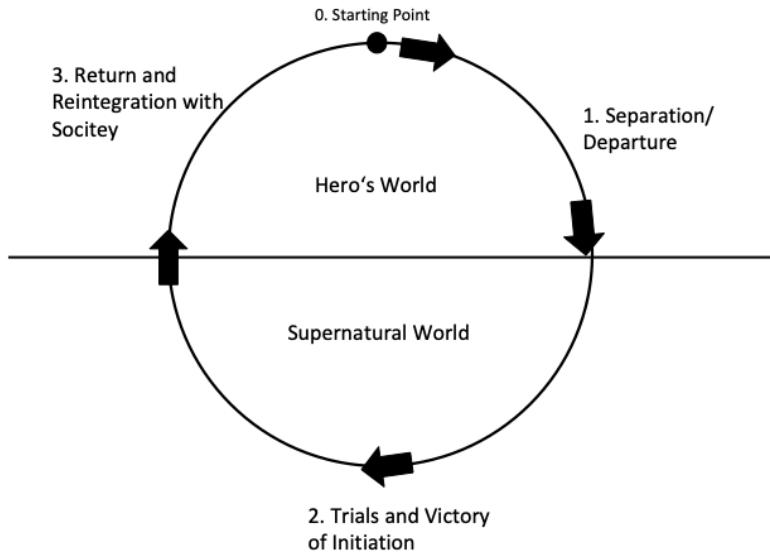


Figure 3.1: The journey of the hero symbolized by Campbell [47]. The hero starts in the hero's world (step 0) and ascends or descends into the supernatural world during the separation/departure phase (step 1). The hero goes through trials in the supernatural world to the point a value is gained (step 2). At last, the hero descends/ascends back in the hero's world to reintegrate with society (step 3).

journey.

The idea of a hero leading the story is further examined by Campbell (1949). It is stated that the hero is a concept to illustrate the journey from being a man with flaws to ascent into a more abstract and immortal being. [47, p.18] Metaphorically, the hero dies with their old beliefs and is reborn standing above their limitations. According to Toynbee, that journey is told to the audience [125].

A hero's journey begins in the hero's normal and earthly world before they go into a supernatural world [47, p.28]. With the knowledge gained from that world they return to their own world to bless the other humans. The journey in the other world and the descent to the human world is described in Fig. 3.1. It is said that the world of the hero lacks a certain quality that has to be achieved by the hero. This lack can be materialistic, e.g. a ring or book, or it is symbolic and spiritualistic, e.g. the absence of god. In that context the hero has to be victorious either with a "materialistic, microcosmic triumph" [47, p.35] or with a "world-historical, macro-cosmic triumph" [47, p.35].

As seen in Fig.3.1, the journey is divided into three steps: The "separation or departure"[47, p.34] from the hero's world, the "trials and victories of initiation"[47, p.34] during the journey in the supernatural world to the point of receiving a form of blessing, and the "return and reintegration with society"[47, p.34] back in the hero's world. Each step is divided into subsections.

Separation or Departure

A journey begins with the departure and therefore with the "Call to Adventure"[47, p.45]. Campbell describes that a coincidence happens that changes the surroundings of the hero. [47, p.46] A first call is made that pulls the hero in situations that they cannot understand. For example, "The Princess and the Frog" creates an entry to the journey by the disappearance of the golden ball.

The "Refusal of the Call"[47, p.54] turns the adventure into a negative journey. By refusing the call the hero becomes the victim that needs to be saved.[47, p.54] For example, a Persian myth states that a city was "enstoned in stone" because the citizens did not accept the call of Allah [46]. If the hero does not refuse the call they meet a figure that provides a "supernatural aid"[47, p.63]. In "Aschenputtel"(1868), for example, a fairy godmother uses a spell to transform the female hero into a princess with glass slippers, thus allowing her to go to the ball where the prince is waiting.

Upon the departure the hero has to cross the first threshold.[47, p.71] This is a symbol for leaving the known surroundings and entering the unknown world. According to Campbell, a "threshold guardian"[47, p.71] has to be overcome. For example, the angel that guards the gate to the paradise in the bible prevents Adam and Eva to leave their known world, the paradise. Instead of conquering into the unknown, the hero can also be devoured by the magic world taking the free will of pursuing the adventure [47, p.83]. In "Moby Dick"(1851), for example, the hero Ishmael is swallowed by a whale where the journey starts at the beginning of the story [9].

Trials and victories of Initiation

After the departure the Initiation begins. [47, p.89-159] In the supernatural world the hero has to withstand a series of trials. For example, Herakles has to fulfill twelve tasks in order to redeem himself.

Having succeeded in all the tasks, the hero has to overcome the last test. This can happen in the form of meeting a goddess that is manifested in a woman. Upon succeeding in the task the hero receives enlightenment, love and success is seen as the "mastery of life"[47, p.111]. If the hero is a heroine then she is victorious if she finds the values in herself [47, p.100, p. 109]. For example, the princess in "The princess in the frog" overcomes her restraint and throws the frog towards the wall upon which it transforms into a prince and they get married [73].

Contradicting to the idea of a goddess, the woman can play the role of a temptress as well. Since women are personifications of life in myths the turning of a woman to a temptress symbolizes the own demons that have to be overcome. [47, p.112] For example, the crew of Odysseus has to withstand the call of the sirens on their journey.

Having spoken about the women, a father figure can be introduced as well. [47, p.116-137] Campbell argues that the hero seeks comfort in the figure of a mother because the father has a terrifying nature. Throughout the journey the hero has to accept the interdependency of both the father and the mother at some point to reach balance and overcome the fear of the father [47, p.120]. This is done by beating the father figure, persuading him or gaining his approval. As an example Luke Skywalker defeats his father Darth Vader to reconcile with him in the end [91].

The "Apotheosis"[47, p.138-158] is introduced as the step before the last and most difficult task. By ascending from a human understanding it is possible that the hero begins to see the world on a celestial level. In religion, for example, the hero figures, e.g. Buddha or

Moses, reach a higher understanding of the world before reaching the point to gain the essential knowledge.

In the last test the hero gains the "Ultimate Boon" [47, p.159-178]. With the succession of the task the hero completes the reasons for the journey. For example, Frodo destroys the ring (Lord of the Rings)[124] and Moses leads his people through the sea to the land of milk and honey (Moses). The journey reaches an ending point and the quest is completed. [47, p.179]

Return and Reintegration with Society

Upon the initiation, the return follows. The hero can decide to refuse the return. Doing that, the hero settles in the magical world or dies. [47, p.179] For example, Aladdin stays in the palace and marries princess Jasmine instead of going back to the streets [56]. The hero can also be brought back by the help of supernatural beings called "The magic flight" [47, p.182]. This can be an adventurous and dangerous journey. For example, Dorothy in the "Wizard of Oz"(1900) is brought back with the help of a witch after overcoming a set of tasks with her friends [39].

If the hero cannot return alone, the world has the possibility to force them to return. [47, p.192] For example, the grown up children in "The Lion, the Witch and the Wardrobe"(1950) are reminded of an old memory by approaching a streetlamp in the middle of the forest [90]. Discovering the area around the forest they happen to stumble across the wardrobe that brings them back to their own world.

Since the magical world and the known world are often the same deviated in two different realities the hero has to accept the worlds as one entity with all its imperfections [47, p.204]. On the other hand, a hero does not have to leave the magical world. Instead, they can become the "master of two worlds"[47, p.212] jumping between both entities. An avatar in the tv series "Avatar:The last Airbender"(2005-2008), for example, has to master all four elements to become a bridge to both the human and the spirit world [101].

By learning from the journey, the hero becomes fearless of death. [47, p.225] They acknowledge that the universe has an order which every creature has to follow. Therefore, the hero gains the "freedom to live" [47, p.225]. An epilogue ends the hero's journey, e.g. by the reign of Aragorn (Lord of the Rings, 1950), the transformation of the Little Mermaid to seafoam (1837) or by Luke becoming one with the force (Star Wars, 1977-1983).

The hero's journey is a framework for stories that others can identify with since they subconsciously recognize the story patterns [47]. Nonetheless, it is important to tell the story in an immersive and interesting way. Some people including Lawrence [86] and Sova [120] suggest possibilities to facilitate the writing of a story alone or in a group improving the process of writing a story.

3.4.4 Interactive storytelling

Chris Crawford, a game designer, sees interactive stories in games as the result of decisions evolving around the player. [53] It is stated that every scene is created by the player. Therefore, Crawford and Bruckman propose a solution to combine both fragments, thus making a story interactive: A "storyspace" [44] or "storyworld" [53]. Defining interactive storytelling begins with understanding the idea of said storyworld, which allows the player to have impact on the world by making decisions and solving quests [53]. By

making the story non-linear, the actor has the possibility to move inside the storyspace and design parts of the story [44]. According to Bruckman, this method increases the interaction and the freedom to decide the story's direction. One negative aspect includes the storyteller who loses control over the story's impact and over the information perceived by the actor. To prevent that, the system can stop the player to reach story points before fulfilling others. [44, p.9] For example, the beginning of the story in "Horizon Zero Dawn" (2017) only continues if the player has spoken to an important shaman woman [66].

Organizing the availability of plot points is called temporal mapping. According to Bruckman, this can be combined with spatial mapping. The latter is defined as the player's freedom to move around in the setting with few limitations. [44, p.9] For example, the rich world of "Horizon Zero Dawn" (2017) is unlocked bit by bit following the plot points. With that, the player can enjoy the freedom to discover the available areas but only to the extent the story allows [66].

To sum up, interactivity can be increased by deciding on a trade-off between linear stories and non-linear interactivity [52]. To maximize the immersion a player feels by playing a game the stories can be loosened up in a storyworld [44] [53]. Decisions made by the player ultimately distinguish games from movies [52].

After defining interactive games and immersive stories, the focus shifts to the background of decision making and system-based decision making. The "broomstick approach" and decision trees can be used to break a story in decision points and increase the interactivity [44, p.4]. Below, the general structure of decision trees is explained proposing an approach to entrust decisions to the player or to an audience. After that, a short introduction to Procedurally Content Generation (PCG) is given to show an alternative of creating stories based on a system instead of people. The technical background will only be hinted at since the thesis focuses on social integration and the interaction within a community.

3.4.5 Decision trees

Decision trees can help to split the story in multiple endings [44]. Each knot of the tree symbolizes a decision made by the player and the branches lead to other knots depending on the decision. The more decisions are made the more endings are possible. Branches can also be united to decrease the number of endings emerging from the decisions. [109] A decision tree begins with a root illustrating the beginning of the decision sequence. This can be an event that happens independently from the player's choices or it can already state the made decision and the player's actions respectively.

Fig. 3.2 shows the first possibility. In the fictional example the player is presented with the setting that they are interrogating a suspect in a crime scene. The three branches going from the root are marked with three decisions that can be made. Either the player decides to approach the suspect in a friendly matter but they can also decide to shout at the suspect or lie about the facts to get a confession. Each of the decisions leads to events that are illustrated by a knot. In case the player decided to be friendly the suspect warms up and gets talkative. Shouting at the suspect leads to him being frightened and lying about the facts gets him suspicious. The tree can be continued by branches and knots each representing decisions and events. This can be done until an end state is reached (e.g. the suspect confesses) and the sequence ends.

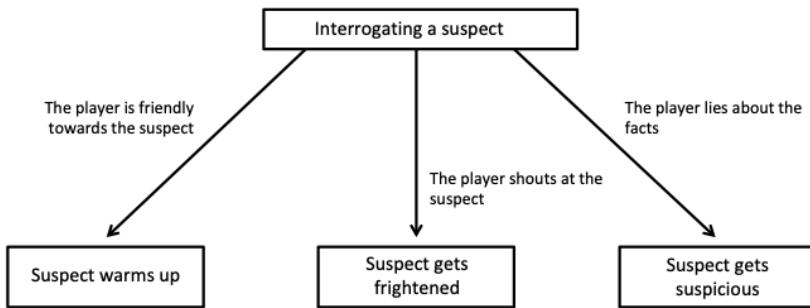


Figure 3.2: A simple decision tree with one root and three knots that symbolize the possible outcomes of a scene. In this example, one can choose between three variations to handle the situation of interrogating a suspect. Each variation leads to one possible reaction to the action that has been chosen.

The other figure (Fig. 3.3) is an example of a sequence in the game "Detroit: Become Human" (2018) [58]. This game is set in the near future in Detroit where humanoid robots are popular in ever yday's housecare, maintenance and recently in crime-solving. The player plays three main characters that bring the story forward. One is confronted in numerous situations to make decisions and find clues that affect the continuation of the story and lead to multiple endings.

The sequence shows the decision tree of the first scene. In that scene, the player embodies the android Connor and is instructed to save a hostage from being threatened by another android that became deviant. The root is illustrated by the event "Mission Start" which marks the beginning of the scene. The blue path shows what decisions the player made and what events were triggered. In this example, the player chose to save a fish that was lying outside of the tank. The grey area defines the objective to search for clues that can be fulfilled by numerous activities, e.g. by investigating a cop's body or by getting to know the deviant's name. Activities and clues that were not explored are hidden behind a lock. The sequence ends after the player decides to go outside. A checkpoint is indicated by the arrows pointing towards the big events that are triggered when the player confronts the deviant. From that forward the player is instructed to negotiate with the deviant. Each of the decisions made in that area influence the outcome of the scene. In this example, the player chose options that led to the deviant jumping with the hostage. The ending is marked by the end of the path showing that the player failed to reach the deviant in time. The yellow symbols mark the decisions that have an impact on the plot after the sequence.

Both examples show a linear approach to stories since the sequences have a beginning, a middle and an end. Nonetheless, non-linear sections are integrated into the sequence of "Detroit: Become Human" (2018) by the grey areas that leave the player the choice on what to investigate in which order. The story becomes linear when the player triggers an action that leads out of the grey area, e.g. going outside on the roof to confront the deviant.

Decision trees can be designed up to the author's choice [109]. To make it readable and understandable the decisions should be marked either by knots or by the branches. By using decision trees the player has the freedom to decide between limited choices. The



Figure 3.3: A decision tree implemented in the game "Detroit: Become Human". By accessing the tree through the game menu the player sees which paths they have taken during the scene. The blue knots and paths show what decisions the player has made and what options have been discovered throughout the scene. The grey knots symbolize paths and endings that the player has not discovered.

possibility to move around freely and decide what to do next can only be fulfilled to an extent that does not threaten the storyline but it loosens up the otherwise linear structure of a story.

3.4.6 PCG (procedural content generation)

The explanations in this section derive from two papers written by Togelius et al. and Valls et al. [123] [129]. The first paper written by Togelius et al. (2011) introduces the concept of Procedural Content Generation and explains common advantages and usages [123]. The second paper deals with the method of creating maps out of story point inputs [129]. Both intend to give an insight in a system-based game design that can be considered instead of people creating stories. At last, this section does not deal with the impact on or inclusion of communities.

Togelius et al. describe Procedural Content Generation (PCG) as the process of "creating game content automatically, through algorithmic means" [123, p.1]. With that, artists are replaced by a system that designs the game world. By using a seed that often is partly random the created content tries to avoid pattern recognition. Apart from the behavior of NPCs, every content that influences the game can be processed by a machine, e.g. landscapes, trees, levels and stories. Doing that, PCG not only allows to save memory by hiding the details of the content until it is relevant for the gameplay but it also saves resources by decreasing the workload of the artists. Parameters that influence not only the occurrence and the position of the predesigned artifacts, but their structure as well can create versatile landscapes and objects. The possibility of creating large worlds with only a few parameters increases the replay value of a game. Therefore, the fun can be enhanced. [123]

Furthermore, PCG might use content generation for the creation of new game mechanics. The sole process of modifying game content can be used as a mechanic to actively allow players to alter the world. [123] In "The Sims" (2000 - 2014), for example, people can place multiple objects of the same type in the game world and modify their colors [59].

In the context of creating stories with PCG, Valls et al. introduced an approach to transform stories into maps. [129] These maps construct a level or space in which stories can be told. They are created out of stories and therefore constrain them since the space on the map is limited.

The process of creating a map begins with designing a set of stories by accepting input that consists of:

- A list of symbols (e.g. tree, house, walk, maid etc.) that play a role in the story
- A list of locations that are part of the symbols (e.g. house)
- The player who is part of the symbols as well
- The starting point of the story represented by an initial state in form of a set of tuples clarifying the relations of the symbols important for the start (e.g. walk(maid, house))
- A set of goals that define the ending condition of the story.
- Plot points that happen throughout the story. They consist of the preconditions and the consequences that affect the story. They are formed in tuples as well.

The input is examined regarding the quality of the story. Therefore, the stories with no goals or missing requirements are left out.

Having found all possible stories with the given input the stories are transformed into a graph. [129, p.3] A breath-first search algorithm checks the stories for a state that is reached after all goals of the story are fulfilled. If the story meets the requirement it is added to the stories with a solution.

The stories' quality is determined by five requirements:

- The thought flow: Examines if the progress of the story leads logically from one state and plot point to another
- Activity flow: A story has to trigger events after a certain amount of time. This prevents the player from running around with nothing happening-
- Manipulation: The story should emphasize the choices of the player instead of limiting them.
- Intensity: By introducing an intensity value for each plot point and comparing them to the intensity values of a classical drama the player's enjoyment can be measured.
- Action consistency: The story should avoid repeating action sequences.
- Length: Introducing the ideal length of a story the stories are examined regarding the abbreviation of their length.

After filtering the stories each solution is represented in an undirected graph. The knots symbolize the location a player can go to and the edges allow the locations to be connected and reached by one another. [129, p.5]

This approach can be used to allow stories and plots to be created partly by a computer system and by people. It can be important when it comes to the story created in a community like Twitch.

4 Integration of viewers on Twitch

So far, the first chapter dealt with Twitch and established a correlation between the streaming website and the idea of communities and group dynamics, explaining how an active community can be built on Twitch. The second chapter dealt with the components and the structure of games. It was examined that it is important for players to be challenged, to be able to change the environment and to engage socially (3.2). Parallels to Chapter One were drawn by stating that games can foster communities to strengthen the interaction between the players. Furthermore, it has been summarized that a story builds upon a linear structure. Various methods to create an immersive and interactive story have been introduced including using decision trees and PCG (3.4.5, 3.4.6).

The information written in both chapters should serve the purpose of answering the question of this thesis: How can the audience on Twitch be integrated into a game? This thesis does not give a clear answer to the question since the scientific research in that field has yet to be improved. Instead, the following chapter serves the purpose of giving an overview of the problems and questions encountered in the other chapters. The propositions made to solve the problems do not count as scientific evidence, but encourage to discuss the topic and hint at research that has to be made in order to improve the viewer integration on streaming systems. Apart from that, this thesis focuses on the integration of story fractions and elements created in a community.

4.1 Integrate a game into a community

Before answering the question it is important to take a closer look on the question itself. By reusing the model from Chapter One (Fig.2.4) the correlation between Twitch, the streamer, its audience and the game can be illustrated. Before the model served the purpose of distinguishing between the three actors (the viewer, the moderators and the streamer) and to identify Twitch as an interface that exchanges information between the actors and displays the information on the website. This can be enhanced to include the component that was talked about in the second chapter: the game.

In Fig.4.1 the streamer interacts with the game as a player, which is indicated by the bidirectional relation between the streamer and the game. According to Fernandez-Vaya a player is defined by the interaction with the game, e.g. through the User Interface (UI), the point of view or the player's character [61, p.139]. This relation is also hinted at in Fig.2.6, where the streamer can record the screen and show the game to their audience. Twitch itself was described as an interface for both the viewers/the moderators and the streamer to connect the actors and to allow them to interact with each other (2.1). A game has the opportunity to interact with the services that are offered by Twitch to allow the website's integration, e.g. by accessing the user's data to identify them in a game [16]. On the other hand the integration of Twitch is not mandatory, which is why the one-sided relation is illustrated by a dashed arrow pointing from the game towards Twitch.

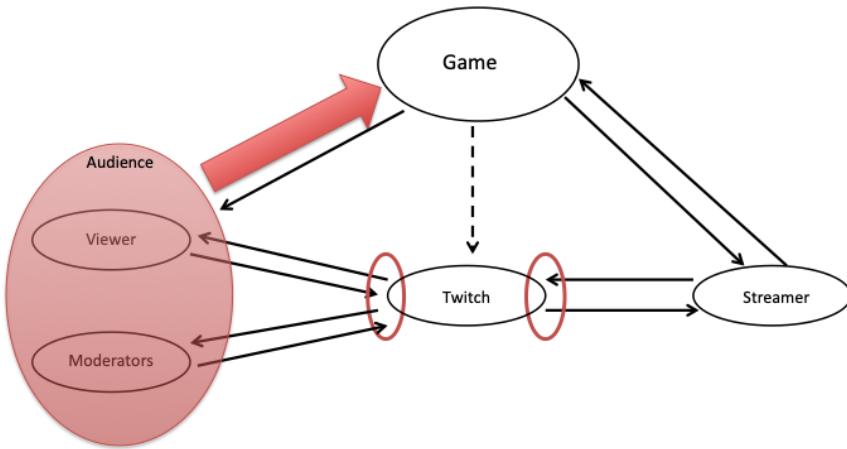


Figure 4.1: The advanced model taken from Chapter One (Fig.2.4) and enhanced by the gaming component. In this case, the moderators (excluding the streamer) and the viewers are summarized under the term "Audience". The goal is to find a way to integrate the audience into the game. Simultaneously the game influences the audience. The bidirectional relation between the game and the streamer (who is a player) is shown by two arrows pointing to each actor. A dashed arrow symbolizes the possibility for games to integrate Twitch plugins and allow the audience to interact with the game through Twitch.

To answer the question on how the audience can be integrated into a game four actors are expected: the game, the streamer, Twitch and the viewers. This also means that the moderators, which play a role in the model from Chapter One (Fig.2.4), do not contribute in the integration process as a sole actor. In the context of this question moderators are not considered differently from viewers as their ability to ban and timeout members of the audience does not contribute to answering the question. For that reason, the moderators and the viewers are summarized under the term "Audience". In Fig.4.1 this is highlighted by a red oval that encloses both actors.

From the audience onwards a red arrow points to the game. This illustrates the goal of this thesis: Establishing a connection between both actors. Examples from existing games that integrate Twitch show that the audience can be included as players who interact with the game directly through the UI, the point of view directed by a camera field or through the character model [61, p.139/140]. For example the game "Darwin Project" (2018) allows people to enter the game as spectators and vote on which area is closed next and which character gets to benefit from certain loot [122]. Another game called "Domina" (2017) allows the audience to represent the spectators who cheer or boo on the champions [57]. To represent the bidirectional relation emerging from the audience in the role of players, an arrow points from the game towards the audience.

4.1.1 Integrating the community

The following discussion emerges around the possibilities to integrate the audience into the game. The direct way describes the arrow from the audience to the game and con-

siders the audience as players who can manipulate the surroundings and the progress of the game. Different games approach this step in different ways. For example there are Jackbox Games (1989 - today), a collection of mini games played in parties and groups [81]. At least one player has to own the app to host the party room and stream the game. The other players can access the game on the Jackbox website by entering the code of the party room and their name. While the streamer broadcasts the questions and the content to Twitch or to another streaming site, the viewers can give their input on the website [6]. Viewers can also be included as players on games that do not have a direct integration of Twitch. For example "Minecraft" (2009) is a game that allows people to play together in one world and on one server. By owning the app the streamer can share their server identification and the server's password with the viewers to allow them to enter the world as players themselves [93]. Streamers can also decide to play online games with their viewers, e.g. "League of Legends" (2011) or "CS:GO" (2012). To do that, a limited number of viewers is chosen to play with or against the streamer in the same game. This requires the viewers to have the app of the game and an account. Sometimes they have to be placed in a similar rank to the streamer in order to be allowed to play with them [67].

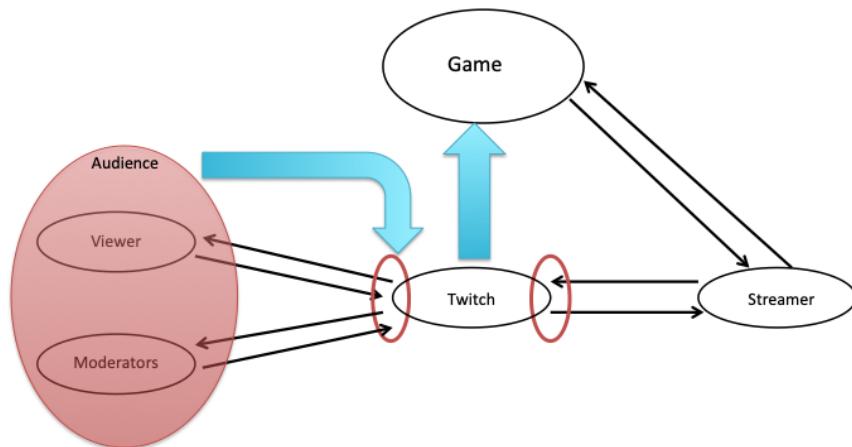


Figure 4.2: This model shows the possibility for the audience to interact with the game through Twitch. By accessing the Twitch interface the audience may influence the game through the website.

Apart from the approach to establish a direct connection between the audience and the game, the viewers can also interact with the game through another actor within the model (Fig.4.2), thus they influence the game in an indirect way. Fig.4.1 shows Twitch as the only actor that is in direct relation to the audience, which indicates that the game can use Twitch as a mediator to establish the audience's integration. In Fig.4.2 the input given by the audience to the game is illustrated with two blue arrows: The first connects the audience with the web interface of Twitch and the second proceeds from Twitch to the game. In other words the game uses Twitch as an interface to communicate with the audience instead of expecting the audience to download the app or visit a website outside of Twitch.

For example the game "Ultimate Chicken Horse" (2016) features a party mode where the players of the game have to reach a flag by including items they can choose from a set

of objects. After every player has died or reached the flag the next item can be chosen to make the level easier or more difficult. The Twitch integration allows the streamers to let their viewers vote on which items will appear as options to choose from. To do that, the streamer has to connect their account with the game. Afterwards the viewers can type the keyword of their preferred item in the Twitch chat, which can also be made visible in the game itself. [64]

Another example is "Darwin Project" (2018), a survival game in which the players have to battle each other in an arena composed of limited areas. To get an advantage they can loot treasures and collect weapons as well as defensive items. A narrator can decide on certain ingame developments, e.g. the closing of one area, manhunts on players or advantages and disadvantages given to the individuals. The Twitch chat is integrated by a voting system that influences the director's choices. This is done by an extension of Twitch that integrates the game into the Twitch interface. On the mobile version of Twitch a puzzle icon appears next to the chat icon that can be clicked. By doing this the viewers can vote on which zone is closed next and which players get benefits or disadvantages. [122]

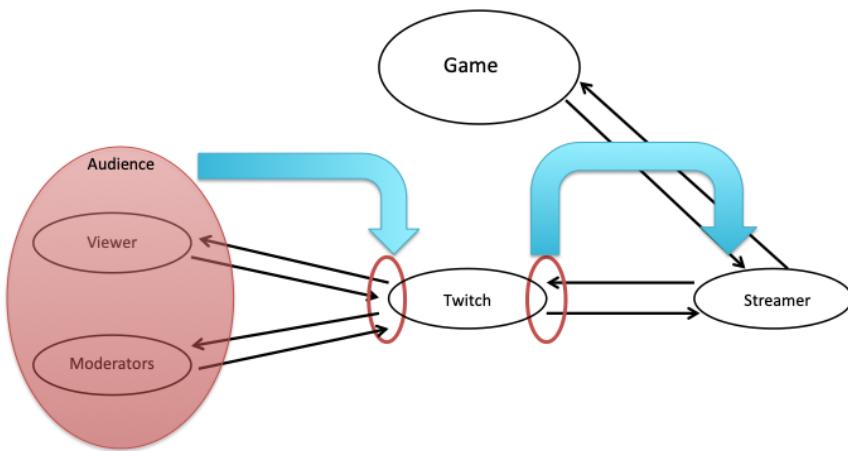


Figure 4.3: This model shows the possibility for the audience to interact with the game through the streamer. The audience can communicate to the streamer by using the chat. The streamer can include the input of the audience while playing the game.

The audience may also be integrated by the streamer directly without the use of a game interface. Fig.4.3 shows the transfer of the audience's input through Twitch to the streamer. For example this can be established with games that do not have an integrated Twitch extension or a mod. Instead, the streamer can decide to integrate the audience by including them in the decision process of a game. In "Detroit: Become Human" (2018) for example the streamer can ask the audience of their most liked dialogue option and the audience then participating/answering in the chat. Furthermore, a poll may be used to organize the answers in the chat. This limits the decisions that can be made, but may facilitate the overview of the answers. [58]

4.1.2 Problems encountered

Online communities and networks have their flaws [76] [99]. While establishing relationships and groups based on the members' interest outside of local communities their activity depends on dynamic aspects that vary depending on the surroundings and the circumstances a community builds upon [107] [75]. These problems were already hinted at in the first chapter (2). In the following, they are listed again to clarify their significance to communities and to emphasize their importance regarding the integration of the audience in games. The goal is to lead the question of this thesis back to the difficulties that have to be regarded when a game wants to integrate a community.

Varying community size

In Chapter One it was talked about the problem that large Twitch communities make it difficult for the streamer to react to every single message (2.2.1). A "roar of the crowd" [76, p.7] leads to a one-sided conversation. In Twitch communities that produce those walls of text an individual can feel left out because one message does not have a large impact on the community or on the streamer (2.2.1). This problem also limits the possibility of letting the chat decide on the actions that the streamer should do. For example, the streamer can ask which item should be bought, but the amount of messages makes it difficult to focus on one single message. Instead, the majority of opinions might be taken into consideration and one individual may be ignored. Furthermore, a large community may also hinder the integration of the audience in a technical way. For example, a large audience may strain the servers of the game or create conflicts if the game's environment has limited space.

On the other hand, small communities encounter the problem of stagnation [75]. If only a few members build the community, people might not be interested in joining the community. Referring to Twitch and to game communities, some games may need a minimum number of players that may not be reached if only a few viewers are willing to be integrated into the game.

For further statements it has to be researched to what extent the size of a community can have an impact on the game, its dynamic and the activity of a community regarding the number of viewers. Large communities can be looked at to prove or falsify the consideration that messages of individuals do not have a high impact on the streamer's question and decision. Furthermore, the technical barriers of games can be taken into consideration to formulate the ideal size of a community.

Time synchronization

The second problem that was addressed is the time synchronization. In other words viewers have different habits watching streams. This ranges from people who watch every live session from start to end to people who only watch parts of the sessions. Those sessions can be caught up on by watching the videos that were saved on Twitch. (2.1) Viewers with different habits can make it difficult to rely on their attention and knowledge of the past streaming sessions. A story-focused game that is played over several streaming sessions for example relies on decisions made in the past, but not every viewer may connect the current decisions with the past ones since they have not caught up to

the sessions.

To prevent a divergence of the viewing habits a streamer might notify the audience about upcoming live sessions in the current session or on the channel's description if the sessions are based on a regular weekly schedule. Social media can also be used to inform the viewers about the schedule. (2.2.3)

Furthermore, the streamer may keep the audience updated on the ingame events summarizing them during the streaming session or on the channel's description. It might also be possible for the game to allow the audience to view the milestones already reached in the game. Researches and user studies on the different habits to watch a stream and how to integrate a story focused game into Twitch may help to prevent the time synchronization problem in future works.

Cultural borders

Furthermore, cultural differences pose a problem in communities. In this thesis the American and Korean culture was examined and distinguished by their different beliefs in a community (2.3.1). It was also stated that most streams are in english and the most viewers are from the USA [1].

To further understand the impact of languages on streams research can focus on analyzing the cultures separately. The idea about the difficulties between two cultural perceptions may transfer to streaming communities. On the other hand, research can also refute the statement and prove that Twitch lowers the cultural borders. In either way it would be interesting to see how people from different timezones and cultures can be integrated into one community.

Group climate

As stated in Chapter One, a healthy group climate is essential for a working community to foster teamwork and productivity (2.6.2). A bad climate, e.g. consisting of toxic behavior, can harm a group and the community's atmosphere to the extent that it will harm the activity.

A game that is fun for all participants including the audience may prevent toxicity in the group's collaboration and in competitive scenarios. Therefore, research may also investigate the group dynamics in Twitch communities and what impact they have on streaming environments.

4.2 Creating story fractions together

Chapter Two dealt with the definition and clusterization of games as well as with the motivation to play games and interact with others. Stories in games were treated as a difficulty since their linearity complements with the non-linearity of interactive games. Tradeoffs between games and stories were introduced to find a balance between both components and a couple of existing solutions were presented to include stories in games, including decision trees and PCG (3.4.5, 3.4.6). Furthermore, Crawford and Bruckman stated that a "storyworld" or "story space" could help making the story more interactive, thus distinguishing games from movies [44] [53]. Those worlds or places help the story

to loosen up and allow interaction between the game and the players.

Apart from decisions that can be made to manipulate the game's progress or the streamer's behavior, the audience may also be integrated by including custom content or building a collective storytelling experience. In other words, it can be looked at how people can add content to the game and create and alternate the stories that are told in a game. In the following, a guide is introduced that helps people to improve each other's storytelling. An outlook will put this guide into the context of gaming environments. In addition, an approach to add custom stories with PCG is described regarding the creation of story maps [129]. Again, these solutions and approaches are presented to give an overview on the topic. Further research may focus on the social and immersive benefits collective storytelling may bring to the audience.

4.2.1 Writing an immersive story

Immersive storytelling can be interactive [86]. Lawrence defines stories as the enclosing of events that can benefit from a collective storytelling since working together in a team increases the story's details. In the scenario of Twitch the actors consist of one storyteller and the audience who ask questions, but it can also include a team creating one story and its fragments together. By working together benefits and risks emerge. A risk could be losing one's reputation by wanting to tell a daring story. This hinders the writer to take risks in the storytelling, thus leading to a flat and one dimensional story. When writing in a group, the dynamics further allow people to hide behind others with more authority or reputation to take the risk in telling stories. Therefore, it is important to encourage the members to contribute to the story, for example by frequently praising their work. [86, p.2]

Furthermore, Lawrence (1999) adds that the story becomes more relatable if the main protagonists have their faults. By setting the first stepping stone and overcoming the fear of making heroes imperfect, other storywriters may follow the idea of creating a more immersive story. [86, p.3]

Therefore, the writing of a story can be a collective activity. Not only different ideas come from different people increasing the details of the story, but each individual can be strengthened in their ideas by sharing similar motivations with other storytellers [86]. This can also be referred back to the group dynamic explained in chapter One (2.6.1). In a group a collective mind is created that allows the group members to feel strengthened and encouraged. This is important in a community since it builds on groups and their dynamics. [62].

The phenomenon that people hide behind authority figures or leaders can also be observed in group dynamics. As said in Chapter One people tend to place themselves under a leader adapting their attitudes and allowing them to have a higher impact on the community [62]. These leader positions may be filled by the streamer, who naturally takes a higher position than the rest of the viewers since they provide the stream and differ from the viewers in their input (the chat, the game) and their output (voice, non-verbal) (2.1). A moderator may also establish leader qualities since they have more rights than a regular viewer on the chat [76]. A viewer that is very active in the chat or in the group process of creating content together has more attention than other viewers because of the amount of messages and content that is produced, thus they can develop leader qualities as well [62].



Figure 4.4: A storyboard that describes the process of the UPA submission to show the simplicity of the pictures. Derived from Sova [120].

Storyboards

Storyboards can help to illustrate a story and catch its idea. [120, p.2] A storyboard consists of a limited numbers of pictures that each show a certain frame of the story. The combination of the pictures yield a coherent scene or the whole story. The drawings themselves can be simple as long as they convey the message, as shown in Fig. 4.4. By using storyboards ideas can be illustrated and shown to a multilanguage audience since the absence of speech allows everyone to comprehend a story.

Storyboards also facilitate the feedback of the audience since the pictures can be understood faster than a combination of words and phrases [120, p.2]. Pictures help to illustrate a problem or a scene [120, p.7]. Different levels of detail allow the storyteller to convey the ideas on different levels. If a story is in its planning and the surroundings are not as important as the plot of the storyboard, it is recommended to use a lower level of detail and draw stick figures instead of polished human models [120, p.6].

4.2.2 Variations of custom input

The audience may interact with the game by adding content to the world. This may be used to influence the game environment, the setting, the characters, the gameplay or the story. Examples of games like "The Sims" (2000) and "LittleBigPlanet" (2008) allow the players to add static gameplay content to the game. In "The Sims" (2000) for example people can mod the game by creating specific clothes, new built houses or by alternating the characters' behavior in script modes [59].

White stated that having an impact on the game's world and environment is a component to foster the player's motivation. With this in mind, it may be desirable for the player to be able to create content that influences the game world [135]. In "The Sims" franchise (2000 - today) the custom content can be downloaded on manual pages and included in a Mod folder. Other games may allow the user to upload their content on an official site or in the game directly so that the content can be downloaded in the game itself. Research could also search for possibilities to include the process of uploading in Twitch. To do that it can be evaluated to which amount the game wants the player to get creative and upload content. There also may be tradeoffs that might come into play. For example the game may need to allow a high variation in their input if the player is encouraged to add

content. On the other hand, limiting the amount of content a player can put in may limit their freedom and choice.

4.2.3 Story creation

Storywriting is a special form of content creation that manipulates the progress of the game [52] [61] [52]. In Chapter Two different approaches to create a story have been presented. For example the hero's journey marked the different steps a story can progress into. Furthermore, decision trees can help to structure a story and create a bridge between nonlinear games and linear stories. Different achievable endings can help to increase the interaction with a game [44].

A collective storytelling experience may help to foster group dynamics and the involvement of members in a community. Research may find a way to include the stories in a game. For example they could be put in manually. Another possibility is to use Procedural Content Generation (PCG) to manage story input and map them to a game [129]. As hinted at in Chapter Two, a story can be transformed into a map (3.4.6). To do that, a program takes a limited number of input variables and uses an algorithm to sort them. By considering that the community has the opportunity to create story fractions and put them together in the program. This might require predetermined variables that hinder and limit the creative process of writing a story. To determine the usefulness this approach has to be tested in a Twitch environment.

5 Related Work

Research can be found in each field that was presented. They are not directly contributing to answer the leading question to integrate the audience in a game, but they enhance the concept of streaming, online communities, game design and stories in games. In the following, each research and work is described shortly to give an overview on the continuations and enhancements of each field.

Twitch

Since Twitch.tv was founded in 2011 the research regarding the streaming platform is relatively new compared to the research done to understand communities or stories in general [7]. One of the most recent researches referred to in this thesis is published by Reckenwald. The author developed a technique to track and analyze the chat messages on Twitch. With this technique it is possible to look at the microlevel communication between the viewers and the streamer. This research provides fundamentals to understand the layout of Twitch and the streamer's difficulties to play and simultaneously watch the stream. It also hints at the states a stream can be in and at the differences between a streamer and the viewers. [110]

Hamilton et al. stated earlier that streams provide a place to socialize with others [76]. Live streams are inbetween the definition of hot and cold media as described by Oldenburg showing that they create a bridge between spectating and participating to the degree that both media types are represented in the streaming components [104]. Therefore, streaming sites represent a third place on which people can socialize based on shared interests. Furthermore, the idea was established that the size of a community matters in terms of including individuals, especially regarding large communities unintentionally disregarding individual viewers. This paper places a good overview on the chat situation on Twitch and treats topics (e.g. the size of a community) that are picked up and continued regarding the surrounding of game integration. [76]

Communities

Communities are part of society [134] [133]. To highlight the processes that were evolutionized over time Wellman et al. lead a discussion about the impact the Internet has on local communities and networks. Studies were made in the USA to prove the thesis that the Internet does not strengthen or weaken, but instead transforms communities. This basis can be built upon by looking at work that enhances Wellman's thesis and describes the fundamentals of a community. [133]

The guidelines and characteristics that were introduced to define communities are derived from Gurzick et al. [75]. An online community called "Fieldtrip" served as their research subject. The website allows students to discuss and upload selfmade movie se-

quences. With that, eight guidelines were defined that describe communities as well as their goals and their risks. They further enhance the ideas of Wellman et al. and define online communities in detail. Since the research includes videos as discussion material within the community, the findings of the research can be compared to other communities that deal with media usage and discussions around the topic, e.g. Twitch and other live streaming platforms. [75]

A study that looked at the messages written in Twitch chats compared the indirect statements of the messages and discovered that viewers of female streamers talk about different points than viewers of male streamers. This topic does not directly contribute to the integration of viewers in a game, but it can show how gendered conversation can affect communities. [99]

Related to this topic, Paaßen shows a controversial side of video games: The male and female stereotypes in games [105]. The paper states that games are still associated with a male stereotype that varies according to the definition of a gamer. The argument that women are left out on the process of creating video games and that the players feel to fit in the definition of a gamer done by the industry can also be referred to the marginalization of women on Twitch. [105]

Communities and networks consist of groups [133] [77]. In order to understand groups and the processes that take place in each group Forsyth defines groups, their characteristics, different types of groups and five stages that a group transitions to [62]. The results and definitions are summaries and continuations of existing research. While hierarchical structures are illustrated to highlight the interdependencies within a group the stages transition from group finding to the identification within a group, the confrontation and productive phase to the dissolution of the group. These stages are important to understand the productivity within a group and to relate the group dynamics back to the collective creation of content that can be added to a game. [62]

Game Design

In the past years many games have been developed and many approaches have been made to create a game concept [61]. The book of Fernández-Vaya describes how games can be categorized and how they can be analyzed, thus giving an introduction of the characteristics of a game. The latter ranges from the number of players to the communities that all contribute to form a gaming experience. Not only does this book provide a starting point to analyze games, but it also allows readers to understand the design concepts behind a game. This can be further used to understand how stories work in games and how players feel included by the gameplay. [61]

Stories in Games

With the idea that stories are linear, it is difficult to come up with a connection to non-linear games [52]. One possible approach is to make stories non-linear as well. This can be done by using a storyspace and giving one scene multiple endings. Bruckman describes the process to leave certain decisions to the reader by making story points optional and mixing their order. To allow the reader to alternate the story a sense of interactivity is created. Furthermore, the terms of spatial and temporal mapping are introduced and put into context of Mystery Train Interactive, a movie that consists of three stories connected by the mapping components. It looks at the layers that can be manipulated in the media

and what consequences the manipulation may have on the viewers. This research does not contribute directly to the integration in games but it highlights the use of interactive components in movies. This can be linked with the integration of nonlinear stories in games. [44]

To understand how stories work it is also important to look at the book "The hero's journey" [47]. This book is fundamental to the explanation to how heroes have been substantial in stories for the last decades. The message of this book is to look at the similarities between the stories of each culture and to discover the characteristics that a story with a hero or heroine builds upon.

6 Conclusion

The last chapters dealt with the introduction of Twitch.tv as a streaming platform that cultivates online communities. Those communities were described to depend on the active participation of the audience while the streamer can strengthen the activity of their community by structuring the streaming sessions or connecting social media to the streaming platform. Groups are an important part of communities and the group's dynamics as well as the climate affects the activity of a community. Games were introduced to increase the interaction of the player with the game's environment. According to their nonlinear nature they have problems including linear stories. Therefore, approaches were introduced that use tradeoffs to balance the difficulties, including text adventures, RPGs and the use of decision trees or PCG. The last chapter summarized the problems that were encountered during the process of connecting games and communities to the surroundings of Twitch which concludes in the leading question: How can spectators of streaming platforms be integrated into game mechanics?

This question was not answered but instead it was hinted at approaches that may solve the problems. For once, the size of the community is essential in an active participation with being too large affects feelings of being left out and communities that are too small may conclude in stagnation. Therefore, the games that integrate Twitch have to decide on which size to focus on or with all benefits and disadvantages or how to allow a dynamic user participation. Furthermore, viewers may have different habits of watching a stream in which order that may conclude in different knowledges of the game. This can affect story-focused games that build on the viewer's knowledge. Cultural borders are present in online communities, thus Twitch may come across the problem of including different people with ideals and goals. The climate of a group may be important to prevent toxicity and provide a productive surrounding.

Furthermore, the thesis focused on the integration of custom input, especially story fragments. After stating that stories can also be created in a group and therefore foster the productivity and activity within a community custom input can be included by using game exclusive uploading tools or by deciding on a method to integrate these tools into the interface of Twitch. Stories can be created and uploaded manually or by using the approach of transforming story points into maps via PCG.

The goal of this thesis was to introduce the topic of spectator integration in games and to come up with abstract questions, problems and approaches to allow said integration. These suggestions can be further investigated in future work that deals with the problem to integrate spectators into a game through the interface of a streaming platform.

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