EXPLORING SOCIAL ROLES IN TWITCH CHATROOMS

by

Qingheng Zhou

A Thesis

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Master of Science

Department of Computer Graphics Technology

West Lafayette, Indiana

December 2019

THE PURDUE UNIVERSITY GRADUATE SCHOOL
STATEMENT OF COMMITTEE APPROVAL

Dr. Colin M. Gray, Chair
Department of Computer Graphic Technology
Dr. Austin L. Toombs
Department of Computer Graphic Technology
Prof. Daniel Triplett
Department of Computer Graphic Technology

Approved by:

Prof. Nicoletta Adamo
Graduate Program Chair

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Author: Zhou, Qingheng. MS
Institution: Purdue University
Degree Received: December 2019
Title: Exploring Social Roles in Twitch Chatrooms
Major Professor: Dr. Colin M. Gray

With the popularity of the gaming industry, game streaming appeared and became a global phenomenon with high participation in recent years. Game streaming platforms such as Twitch had millions of active users participated in the community by watching and chatting. Yet there was lack of investigation about how chat behaviors connected with the overall participation in game streaming community. This study aims to describe and analyze the roles taken on by viewers as they engaged in chat while watching game streaming and identify how these roles influenced participation. I designed a qualitative study with online observations on several Twitch channels streaming Overwatch. By analyzing the chatlogs collected, I identified four social roles among chatters: Lurker, Troll, Collaborator, and Moderator. A discourse analysis was applied to further investigate the interactions among these roles and how they shape the conversation in chatrooms. With these findings, I generated a four-role model that specific for chatters in Twitch personal channels. Limitations of this study and suggestions for future research were also provided.

CHAPTER 1. INTRODUCTION

Due to the popularity of the gaming industry, games and game technologies have had an increasing impact on our lives (Bergeron, 2006; Gee, 2003). According to a 2017 report concerning the global games market (Newzoo, 2017), the population of gamers had reached 2.2 billion, which was more than half of the world's online population (Miniwatts Marketing Group, 2018). These gamers played, learned and practiced gaming skills, and built social relationships with other gamers. Many of them not only played for fun, but some also made careers as professional gamers or video game casters for eSports (Ottelin, 2015; Pellicone, 2016). Although gamers are no longer a minority of the online population, there have been increasing opportunities for the public, especially non-gamers, to understand the gamers' world. Similar to traditional sports, there are eSport events all around the world, and people are attracted to these events. For example, during the final match of the 2018 Championship of League of Legends, there were 200 million global watchers at the same time (EsportsCharts, 2018). In the same year, eSports were featured at the Asian Games as a first-time demonstration of these sports. During this time, the eSport communities were also fighting for Olympic recognition (IOC NEWS, 2018). Although debates continue about whether video game competitions could be considered as Olympic sports, games and the gaming community have been slowly changing the public's stereotypes through growing of social engagement (Lifecourse Associates, 2014).

The attitudes of academic researchers toward video games have also changed over time. In the 1990s and the early 2000s, researchers were focused on the adverse effects of playing video games, especially on aggression and violent behaviors (Anderson & Bushman, 2001; Anderson & Dill, 2000; Funk, Buchman, Jenks, & Bechtoldt, 2003; Irwin & Gross, 1995). Since 2010, the concept of gamification was adopted and became increasingly popular (Alexander,

2016, p. 31), and accordingly, research topics shifted from video game violence to the potential benefits of video gaming. The rise of interest in gaming, game elements, and design principles led to the application of these principles to other contexts to increase user experience and engagement.

Because of the popularity of gaming and the support of modern technology, a new phenomenon called "game streaming" has appeared. Game streaming is online live streaming of video games; it provides a virtual space for gamers to broadcast their live gaming experiences, watch the game-related streaming of others, and talk about video games. Game streaming sites have become an essential platform for gamers to interact with each other. Twitch, one of the most popular game streaming sites, had 20 million global viewers in 2012. In 2013, the number increased to 45 million, and in 2016, Twitch claimed that there were more than 100 million active users each month ("Audience | Twitch Advertising," 2016). Game streaming created a new means of participating and has played a significant role in the growth of the gamer population (Edge, 2013). The popularity of this phenomenon had gained attention not only from gamers but also from game companies. Many eSport events provided official live streaming channels online. For instance, Battle.net, the official online platform developed by Blizzard Entertainment, added an official streaming feature in January 2018. It allowed users to stream Blizzard games on Facebook without third-party software (Blizzard, 2018). With the quickly growing population of users, game streaming became a global phenomenon (Wingfield, 2014). While Twitch users were primarily in North America and European (Kaytoue, Silva, Cerf, Meira Jr., & Raïssi, 2012), there were many game streaming platforms in other countries, such as DouyuTV in China and AfreecaTV in South Korea.

Due to its popularity, game streaming had also gained attention from academic researchers. Several recent studies were conducted on different aspects of online game streaming communities. These studies included a focus on the media forms of game streaming (Hamilton, Garretson, & Kerne, 2014, p. 1) and technological issues relating to game streaming servers, such as reducing latency (Pan, Bartram, & Neustaedter, 2016; Pires & Simon, 2015). There are also studies on user groups, models, behaviors, and motivation (Jia, Shen, Epema, & Iosup, 2016; Lessel, Mauderer, Wolff, & Krüger, 2017; Smith, Obrist, & Wright, 2013; Hamilton et al., 2014; Hu, Zhang, & Wang, 2017; Sj, Oblom, & Hamari, 2016). These studies provide a foundation to identify the social roles of text-based embedded chatroom interactions in shaping the overall streaming experience. Previous studies addressed interactions focused on consuming video, but there had been little investigation of the behavior patterns in chatrooms as well as the impacts of chatting.

1.1 Research Purpose

The Twitch website displayed the claimed: “With chat built into every stream, you don’t just watch on Twitch, you’re a part of the show. From classic TV show marathons to eSports tournaments …it’s probably live on Twitch right now” (Twitch, 2018). In this study, I focused on the interactions among viewers in text-based chatrooms, identified the social roles that chatting activity played in building Twitch as an active, lasting, and productive online community, and considered how the findings might apply to design similar online communities.

Chatting within the community was the second most common user activity, eclipsed only by watching live streaming (emilygera, 2014). Hamilton, Garretson, and Kerne (2014) described the form of game streaming as a combination of “low-fidelity chatroom and high-fidelity video”

(p. 1315). The chat room has become one of the core elements of the user experience that facilitates user communication. To better understand the game streaming phenomenon and the sociotechnical characteristics of game streaming communities, it was important for researchers to explore the interactions occurring in the embedded chatrooms.

The purpose of this study was to describe and analyze patterns of chat behavior among game streaming viewers and identify the social roles assumed by viewers during chatting. Based on these findings, I describe the affordances of game streaming systems as an interconnected socio-technical system, specifically focusing on how chat behaviors shape the user experience.

1.2 Theoretical Framework

To study the participation patterns as well as social roles that the chatters take on in Twitch chatrooms, I utilized two theoretical frameworks: the reader-to-leader framework from Preece and Sheneiderman (2009) and the nine personas of game spectators from Cheung and Huang (2011). The former provided perspectives on the social roles in most technology-mediated social engagement and how these roles relate to community formation. The latter provided a better understanding of the roles specific to online game streaming.

1.2.1 The Reader-to-Leader Framework

The reader-to-leader framework (Preece & Shneiderman, 2009) is well-known and widely-used to study computer-mediated communication (CMC). Preece and Shneiderman (2009) specified users' technology-mediated social participation as four roles: reader, contributor, collaborator, and leader. These authors did not define these four roles defined as counterparts; these roles have a progressive relationship as in increasing participation. For each role in the framework, the

researchers provided descriptions of the associated behavior patterns. They also discussed the possible factors that motivated users to move toward higher participation levels.

There were two main reasons to use the reader-to-leader framework to analyze activity in the Twitch community. First, Twitch is an online platform built from game streaming technology. Second, it has been shown that that Twitch was a community that fostered sociability (Hamilton et al., 2014), and defined game streaming as a global social pheromone (Hu et al., 2017). Therefore, Twitch was considered as technology-mediated social participation.

Because the purpose of this study was to identify user roles and behaviors of the Twitch community, a framework concerning roles and behaviors in online communities was helpful to understand and analyze the data. Also, because Preece and Shneiderman (2009) created this framework by studying different types of online social activities, including Facebook, Amazon, and others; therefore, this framework appears to have high generalizability. Game streaming communities are online communities that include social activities which are likely to fit into this framework.

1.2.2 The nine personas of game spectators

Cheung and Huang (2011) proposed the nine personas of game spectators model. They focused on the game spectating stories collected online, including users' experiences when spectating online and watching matches in a physical stadium. Using these stories, they generated nine types of spectators: the bystander, the curious, the inspired, the pupil, the unsatisfied, the entertained, the assistant, the commentator, and the crowd. These personas are not mutually exclusive, and a spectator can assume more than one persona.

This nine-persona model has been applied in several studies related to game streaming (e.g., Lessel et al., 2017). In the game streaming community, the watching of streaming is one of

the main activities which define game spectating behavior. Compared to the reader-to-leader framework, this nine-persona model is a relatively new model and has not been fully explored. Also, there are questions the remain to answer regarding the model; for example, are there relationships among these personas? Do users change their personas? When and how? As opposed to the reader-to-leader model, Cheung and Huang (2011) have used nine personas instead of the four main stages of reader-to-leader to categorize users; the nine personas could provide more detail when describing game spectating participation.

1.3 Research Questions

Data were collected from chatrooms in Twitch channels that stream the game Overwatch. Twitch is one of the largest streaming sites, and it has a global impact (Olejniczak, 2015). Twitch is a popular streaming platform with large numbers of streamers and viewers every day. As of February 2019, there are 4,449,155 active streaming channels. Twitch is also highly accessible; membership for Twitch is free with a registered account, and the platform is well-supported by APIs and other third-party integrations. In a pilot study, channels were included from streaming the game Overwatch and based on these initial findings, Twitch was chosen for the study.

Based on the purpose of the study, I devised the following research questions:

RQ1: What roles do chatters take on in the chatrooms of channels streaming Overwatch?

RQ2: How do these roles shape the conversation in each channel as a distinct space?

1.4 Contribution to the Field

Although there are existing studies about game spectator's motivations, the results from the current study outcomes have some differences and conflicts. In this study, the contrasts among

the results of other studies were examined as well as models and roles suggested from the data I collected for this study. Second, among the social roles identified in previous studies, there is a lack of investigation on the shaping effects of these roles on the broader community. In this study, the investigation focused on how these roles shaped the conversation. Finally, other study results showed outcomes that were a list of roles or categories, and the relationships among the people who were categorized to create these roles have not been fully explored. In this study, the gap was addressed by connecting user roles with participation levels to identify factors that may motivate users' shifts between different levels.

1.5 Limitations

There were several possible limitations in this study, primarily related to the research scope. First, this study concerned only one game streaming community, and one game streamed through the platform. There are many well-known streaming platforms other than Twitch, such as AfreecaTV and YouTube gaming. However, due to the limited time to finish this study, the focus was limited to one community. Twitch was considered as a representative for three main reasons. First, it is one of the most populated game streaming platforms, with more than 100 million monthly users (Freitas, 2017). Second, Twitch is a platform that has global influence and support for multiple languages. Third, it also has a strong influence on the game industry. Twitch is the official streaming platform for many eSports events, such as the BlizzCon. The study included only channels that stream Overwatch. While Twitch was positioned as a representative type of game streaming community, there are numerous game streaming channels available, including eSports, speed runs, and casual play (Churchill & Xu, 2016; Gandolfi, 2016; Pellicone, 2016). Because eSport games remain the most popular category, one of these competitive games was a logical

choice from which to sample. Based on data retrieved by a Twitch API called TwitchTracker (https://twitchtracker.com/), there are over 1,000 active channels streaming on Overwatch each month. The goal was to collect rich data from these channels.

CHAPTER 2. REVIEW OF LITERATURE

2.1 The Twitch Community

Twitch has become the most popular game streaming platform around the world. Approximately 9.7 million visitors gather in this community every day, and according to Twitch usage statistics, most users were ages 16 to 34 (Lifecourse Associates, 2014), including many students and early-stage professionals. They will become the primary workforce in society in a few years. However, there have been very few studies conducted on this group, and these are mainly qualitative studies.

Due to its popularity, game streaming has gained attention from academic researchers. Several recent studies concerning online game streaming communities included Twitch, YouTube Gaming, and DouyuTV, among others. Some researchers have described live streaming as a combination of "high-fidelity computer graphics and video with low-fidelity text-based communication channels" (Hamilton et al., 2014, p. 1). Some have focused on the technology perspectives by exploring latency issues and information overload of the streaming system (Pan et al., 2016; Pires & Simon, 2015). Others have concentrated on the reflective relationships among game streaming and game design (Deng, Cuadrado, Tyson, & Uhlig, 2015; Seering et al., 2017) and user models as well as the interactions between audience and streamers (Jia et al., 2016; Lessel et al., 2017; Smith et al., 2013). Categories of game streaming activities have been developed (Churchill & Xu, 2016; Gandolfi, 2016; Pellicone, 2016), including attempts to identify the motivations why people want to watch game streaming (Hamilton et al., 2014; Hu et al., 2017; Sj et al., 2016). These studies provide a substantial foundation for the present study.

In 2012, the first study on online game streaming was conducted. The goal was to create a first characterization of the online game streaming community. In this study, Kaytoue, Meira Jr., and Raïssi (2012) investigated the number of viewers of every Twitch stream in 102 days. The results were that users were more active on weekends and during eSport events. Based on the users' reported time zone information, they also found Twitch has a global user following, although, most of the streams came from North American and Europe (Kaytoue et al., 2012). In this study, they only considered English channels. Because game streaming is a worldwide phenomenon, there are researchers in other countries who have studied game streaming platforms in other languages. For example, Hu, Zhang, and Wang(2017) watched user behavior and employed social identity theory to explain users' continuity when streaming. They conducted a survey study with 412 participants on two Chinese streaming platforms and found that the broadcaster identity and user group identification have positive associations with watching intentions. The influence of user group identification was more significant for game streaming than talent show streaming.

In 2014, Hamilton et al. (2014) presented a two-year ethnographic study of users on the Twitch live streaming channels. In this paper, they identified Twitch as a "Third Place" (Hamilton et al., 2014). They described some characteristics of this third place, such as fostering sociability and regular users, to study the social activities and regulars in Twitch streaming. They also bring out many interesting issues and concepts, such as the information overload in chatrooms, the importance of interaction among streamers and viewers, and the relationship between eSports and live streaming. However, the participants in this interview study were all streamers and stream moderators. Most Twitch users are neither streamers nor moderators; thus, added studies from the viewers' perspective are needed.

2.2 Social Roles in Online Communities

Social roles can be defined as "sets of activities performed by individuals" (Kou, Gray, Toombs, & Adams, 2018, p. 5). Social roles are essential elements in discovering the social structure and user behaviors in online communities. For example, Fisher, Smith, and Wessler (2006) studied the social roles in Usenet Newsgroups to understand the dynamics and patterns of this community. In 2011, a group of researchers studied Wikipedia by identifying four social roles of editors: substantive experts, technical editors, vandal fighters, and social networkers (Welser et al., 2011). Social roles in other online communities, such as Reddit, online blogs, and multiple online role-playing games have been studied (Ang & Zaphiris, 2010; Arazy, Ortega, Nov, Yeo, & Balila, 2015; Buntain & Golbeck, 2014; Gliwa, Zygmunt, & Koźlak, 2013). There are two main types of roles in the Twitch community: streamers and viewers. However, a detailed examination of viewer groups showed there might be more roles relating to different spectating motivations and behaviors.

Competitive gaming is the most popular category of game streaming. In several previous studies about game spectating activities, researchers found that users shared some similar patterns with traditional sports, especially for eSports (Jenny, Manning, Keiper, & Olrich, 2016; Lee & Schoenstedt, 2011). In Cheung and Huang's (2011) study about game spectating in StarCraft, which is a real-time strategy game owned by Blizzard Entertainment, they presented the reasons why people watch eSports by describing nine personas: the bystander, the curios, the inspired, the pupil, the unsatisfied, the entertained, the assistant, the commentator, and the crowd. Seering et al. (2017) examined game spectating motivations in the Twitch community. The researchers identified five roles: solipsists, trolls, helpers, power-seekers, and collaborators. When comparing the five roles model from Seering with the nine personas model from Cheung and

Huang (Table 1), I found several differences as well as similarities. In the five roles framework, helpers were different from collaborators. Helpers are an audience who aid the streamers to achieve the streamer's goals, while collaborators are an audience who achieve their own goals through collaborating with the streamer as well as other audience members. Therefore, helpers were closer to a persona called the assistant and collaborators resembled the crowd. The authors explained power-seekers as an audience who "participated with the sole focus of having [an] impact on the game, whether the impact they had was helpful or harmful to the streamer." In Twitch game streaming channels, there were viewers who fit the concept of power seekers. In Karhulahti's (2016) study of troll behaviors in personal game streaming, results showed that one of the motivations behind trolling was seeking for power to influence the channel. Another type of power seeker on the Twitch channel was the moderator. Wohn (2019) studied moderators on Twitch channels found that some participants became moderators because they enjoyed the power of enforcing community standards and punishing bad behaviors. There were other potential roles that participated in Twitch channels, such as lurkers who "represents a legitimate form of peripheral participation" (p.9) by lurking (Ramirez, Saucerman, & Dietmeier, 2014).

Table 1 Comparison of the nine-persona model and five roles

9 personas	Five roles	Main Behaviors
The Bystander		Watching, chatting to ask questions from an outsider perspective
The Curious		Watching, focusing on knowledge-gaps about the game
The Inspired		After spectating, eager to play the game himself/herself
The Pupil	Solipsists	Watching or chatting, learning how to play
The Unsatisfied	Trolls	Chatting, seeing the act of spectating as a weaker substitute for the activity he or she would rather do, or even bullying or playfully harassing the streamer
The Entertained		Feeling satisfied in watching
The Assistant	Helpers	Chatting, to help the streamer achieve the goal
	Power Seekers	Chatting, seeking for individual impact on the game
The Commentator		Chatting, providing a running commentary of the game
The Crowd	Collaborators	Collaborated with other audience participants, enjoy watching as a group

Trolling is a frequent phenomenon in CMC. In Claire's (2010) study about online impoliteness, a result was that online trolling was more common than offline because "CMC users can exercise aggression against other real humans, with little risk of being identified … ." (p. 238). Trolls referred to people who intend to provoke others, including breaking the rules on purpose and sending offensive chats online. In game streaming communities, trolls did not collaborate with streamers and other viewers. According to Karhulahti's (2016) work, there were three motivations for viewers to participate in personal streaming where trolls were active. First, the viewers often found that something unexpected happened when trolls were active; this is called dramatic development. Second, because dramatic developments could be driven by trolling, trolls feel power when affecting users' activities on the channel. Third, these dramatic developments tend to attract more viewers and play an essential role in shaping conversations in the chatroom.

To stop trolls from sending offensive posts and spam which can detract from conversations, some users worked as moderators and helped the streamer uphold rules in the

channel. Wohn (2019) interviewed 20 people who moderated for Twitch personal game streaming channels. In this study, there were different styles of moderating found, and four moderator roles described: the helping hand, the justice enforcer, the surveillance unit, and the conversationalist. Some moderators experienced difficulties in the job, including dealing with harmful contents as well as managing the relationship with streamers.

2.3 Outsider to Insider

Seabrook (1998) used an active and humorous first-personal narrative to share a personal journey from an "outsider" to "old hand" in an online community called the WELL. Seabrook did this work 20 years ago, and more recently, users do not need a guidebook about online use. However, researchers continue to explore the outsider to "insider" transition, especially in the context of users engaging in a new online community.

The membership lifecycle model is defined by member movement towards community engagement (Kim & Jo, 2000; Lave & Wenger, 1991). Members of an online community start as "peripheral," which is an outsider role, and later break into the space to become a novice. With more participation in the community, some become regular users or "insiders", and become leaders who uphold the policies and rules. In the end, some of them become elders who leave the community for new relationships in other communities. They become outbound again.

Another model that widely used for studying online participation is the reader-to-leader framework as presented by Preece and Shneiderman (2009). This framework includes that social media users start by *reading and browsing*. While most users might turn away, some users might decide to come back for a third or fourth time before beginning to *contribute* in ways such as giving a rating on products or adding pictures on a website. With more participation, they might

progress in communicating and interacting with others on that media, which is the next level called *collaborating*. At last, some of them may take on *leadership* roles, like mentoring newcomers and upholding policies. These roles are categorized into four stages: reader, contributor, collaborator, and leader. Different from the membership cycle model, the reader-to-leader framework does not include a stage to describe the movement of elders to outsiders. Instead, according to the model, real participation does not always follow the stages sequentially. They might skip stages, stay within a stage, and fall back to previous stages. Another important concept from this framework is that the number of users tends to decrease when moving to the next stage of participation (Figure 1). Eventually, only fraction users become leaders in online communities.

The reader-to-leader model includes factors that may influence reading, contributing, collaborating, and leadership. These factors concern usability and sociability perspectives. Because usability factors are related to interface and feature design of social media applications, the focus of this study was on the sociability factors, which are directly related to participation motivations.

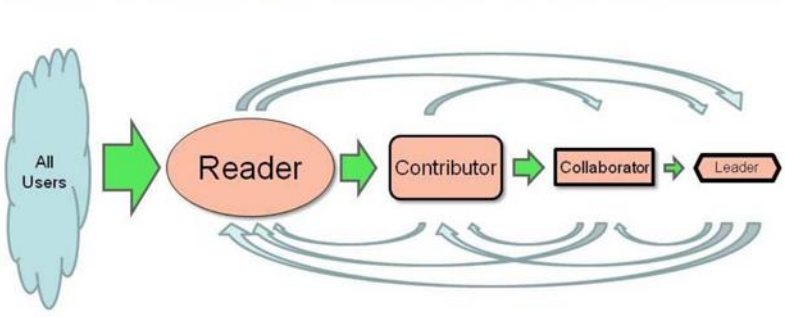


Figure 1 The Reader-to-Leader Framework: Motivating technology-mediated social participation.

Generated by Preece and Shneiderman (2009, p. 16)

CHAPTER 3. METHOD

3.1 Introduction

The purpose of this study was to describe and analyze the roles taken on by viewers as they engaged in chat while watching game streaming and identify how these roles influenced participation. To address this research goal, I used an interpretive qualitative research approach to answer the following research questions:

RQ1: What roles did chatters take on in the chatrooms of channels streaming Overwatch?
RQ2: How did these roles shape the conversation in each channel as a distinct space?

In designing a qualitative study to answer these research questions, online observations on several Twitch channels with streaming on Overwatch were the focus. The data collected included chatlogs, observation notes, and video recordings. A thematic analysis approach and discourse analysis were applied to analyze the data. To describe the approach, a brief overview of a previous pilot study follows.

3.2 Pilot Study

To obtain a better understanding of the Twitch community, as well as the streaming and gaming culture, the researcher conducted an online ethnographic study in 2017. Over two years, the researcher continuously participated in several Twitch game streaming channels and became one of the regulars in this community. Using long-term participation, the researched gained insights concerning user experience, social norms, and community

culture. The study led to some interesting findings and built a knowledge base for this thesis project.

In 2017, when visiting the Twitch website for the first time, I was an outsider and self-identified as a gamer; I knew most of the games played by streamers. Users of these channels spoke and typed in English, and although I recognized words, I was often unsure of the intended meaning and could not understand the content of the chat. There were many questions in my mind, and this interfered with focus on understanding. The first step was watching game streaming purposely with regular participation in this community. For the pilot study, a goal was to understand the online game streaming culture in the Twitch community as guided by three research questions:

RQ1: What is the social structure of the Twitch community?

RQ2: What are the regular activities?

RQ3: What are the motivations of watching game streaming?

To answer these questions, interviews and online observations were conducted on Twitch. Using seven observation sessions and four text-based online interviews, the data were collected and thematic analysis used to discover characteristics of the participants, their activities, and why they engaged in game streaming on Twitch.

The results contained two primary social role holders in the Twitch community: the streamer, the host of a live streaming channel, and the viewer, who was also known as the audience of game streaming. The relationship between streamer and viewer appeared different from the host and audience relationship on traditional television. In traditional

television, the host has more power than the audience because television content is decided before broadcasting. The audience can accept or change to another channel but had less power in deciding the content. Alternatively, in live streaming channels on Twitch, streamers and viewers had greater equality for decision-making than might be found when viewing television. Streamers and viewers interacted with each other during streaming, and sometimes even made decisions together. Through broadcasting, the streamer could convey to the audience game techniques and strategies, passion for gaming, and self-identification as a streamer or a professional player. Streamers could teach the viewers not only in words but also by providing themselves as examples. Game streaming had the power to influence viewers to become streamers or start a game-related career, such as a professional competitive gamer. While viewers made choices, streamers tended to adjust their streaming contents to fit viewers' interests. Each channel has an embedded chatroom, and viewers were not just watching, they used the chatrooms to discuss with others to become part of the streaming experience. Some viewers used other features and spent money on subscriptions and donations to influence the channel as well as make themselves stand out from the crowd.

The chatroom serves not only for viewers to interact with streamers but also the place for interactions among viewers. At the beginning of the study, the chatroom appeared to be confusing. The content seemed to be full of meaningless words and emoticons. The chats moved so fast that many messages went unread. The volume of text in the chatroom led to cognitive overload when I tried to watch the game content on the screen, listen to the casters, and read the discussions in the chat room at the same time. This experience led to a question: do they intend to communicate with each other in the chatroom, or do they send

chats for fun? Both purposes were pertinent. Some people enjoyed an environment where everyone shared a passion for gaming and discussed game content and strategy with others. They knew they are not alone. Others enjoyed the unique Twitch culture. They used the memes and emoticons as a Twitch language that was hard for outsiders to understand. People have different motivations to take part on Twitch, and these motivations have not been fully explored.

3.3 Research Context

The research context for this study was the chatroom embedded in live streaming channels on Twitch (www.twitch.tv).

3.3.1 Twitch Streaming Channel

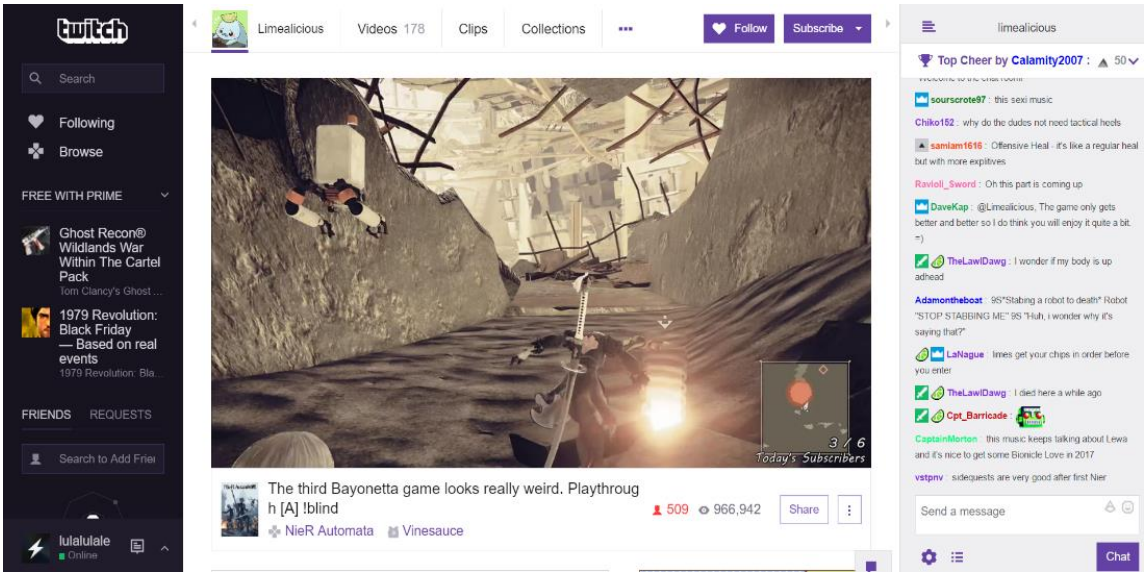


Figure 2 Sample of a Twitch game streaming channel interface.

Viewers and streamer interact through the live streaming (middle) and the embedded chatroom (right).

A typical live stream channel on Twitch included three sections from left to right: the menu section, the main section with live streaming video, and an embedded chatroom. The left-hand section with a deep purple background is the menu bar, showing user's account information, friends, and recommended channels. The chatroom on the right side is a place for viewers to communicate with the streamer or other viewers. The menu bar and chatrooms are stable.

The main section, which is the middle of the page with a white background, can be scrolled to see more information about this channel. In the main section, the top area displays the name of streamer with a profile picture, the number of videos uploaded, and two buttons, one for following this channel and another for subscribing. In the center, there is a live streaming video. Most streamers provide their first-person perspective gaming screen here. Some streamers also set a small window in the corner to show their face and emotions through webcam. The text in black below the video is the name of this channel. The words below it in purple are the name of the game that is playing, and community, if the channel has one. The right side displayed the current number of viewers and the number of total views. By scrolling down, more information about this channel can be seen, such as an introduction by the streamer, social media links, devices and setup information, chatroom rules, and instruction for donations.

3.3.2 The Embedded Chatroom

In this section, details about the embedded chatroom are given. In each channel, Twitch offers an internet relay chat (IRC) interface for chat functionality. A channel can have multiple chat rooms, which can be previewed and have distinct permissions for joining;

e.g., general, moderators-only or subscribers-only (“Chatbots & IRC | Twitch Developers,” n.d.). There are five main features (Figure 3).

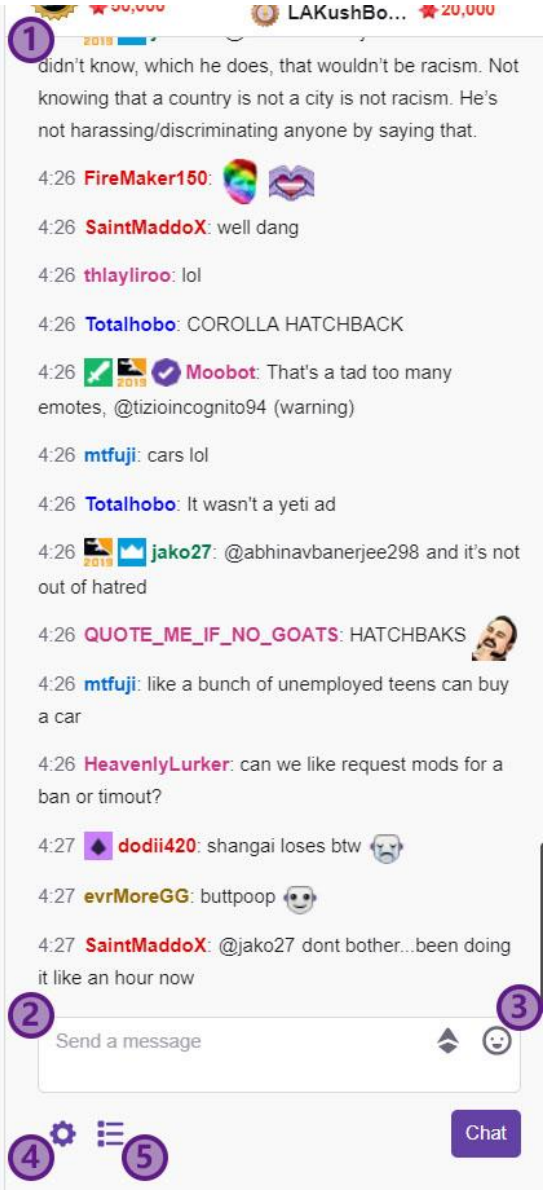


Figure 3 The interface of the embedded chatroom in a Twitch channel.

A chatroom has 5 main features: group chat, chat field, emoticon button, settings, and viewer list.

First, the group chat. For each chat, the number 4:26 in front is a timestamp. The text in different colors describes the username. The black text after each username is the messages users sent. When new text appears, old chats push to the top of the screen. As the total chats exceed the ability of the chatroom, the oldest chats are deleted first. Second, there is the chat field where viewers can type messages. Third, the emoticon button shows a list of emoticons available. When users finish typing and adding emoticons, they send a message by clicking the purple chat button on the bottom right to reveal the message to all chatters. Fourth is the setting button, where users can customize chatroom settings, such as name color. The fifth is the button to show a full list of viewers.

3.4 Data Collection

3.4.1 Sampling Approach

Channels streaming the game Overwatch on Twitch were selected as the focus for this study. The Twitch website sorted channels by game categories. It was easy to filter channels by game. Considering the time and effort, the researcher could not become familiar with all the game contents and game culture because of the thousands of games that were streaming at the same time. Therefore, one game was chosen because the researcher had prior knowledge of it, and the scope of the study could be reduced.

There were two main reasons for selecting Overwatch. First, Overwatch had a relatively large and stable viewership on Twitch, which created opportunities to collect rich data. After its release by Blizzard Entertainment in 2016, Overwatch gained much attention. In current announcements, the claim was to have over 40 million players (Carpenter, 2018). The game also featured with a series of worldwide eSport competitions, such as annual World Cup Championship and Overwatch League. These events were live streaming on

Twitch and attracted a large audience. The latest statistics on TwitchTracker.com, a website dedicated to tracking real-time data of Twitch channels, promoted the popularity of Overwatch on Twitch. It showed that Overwatch was ranked sixth among the most-watched games, with an average of 40 thousand viewers. The competitors, Fortnite and Apex Legends, were ranked second with 134 thousand viewers and fourteenth with 14 thousand viewers, respectively. Second, the researcher had prior knowledge of Overwatch, and this allowed no need for extra time to learn a new game.

I used a purposeful sampling strategy for data collection. The first stage consisted of randomly browsing several channels that streaming Overwatch on Twitch. Based on this experience from the pilot study, and as guided by the research purpose, I designed four inclusion criteria for sampling: 1) English only channels. These criteria were chosen because English was the primary language used on Twitch. From the previous study, it was found that most of the Twitch channel streaming was from North American and Europe (Kaytoue et al., 2012). Due to language limitations, I could only understand chats in English and Mandarin. 2) Only personal streaming channels. In the pilot study, I identified three types of channels on Twitch. Each of these had different contents and different methods for viewers to interact. Compared to eSports channels and talk shows, personal streaming had definite advantages regarding the number of channels. 3) Only channels with less than 5 thousand viewers. Some channels were extremely popular and had 5 thousand, 10 thousand, or as many as 30 thousand viewers at the same time. Based on the pilot study information, the chatrooms in these channels usually contained subscribers-only mode or followers-only mode, which might result in different chat patterns. Also, with the massive

numbers of viewers, there were the many simultaneous conversations were hard to manage. 4) Only channels that have a stable schedule and regularly streaming Overwatch.

At the second stage, among the Twitch channels that met the criteria, I selected 13 channels using a maximum variation sampling strategy. There were five dimensions of variation: channel size (more than 1,000 viewers; 100 to 1,000 viewers; less than 100 viewers), streaming day (weekdays or weekend), streaming time (morning, afternoon, or night), gender of streamer (male, female, or others), and rank in the game (gold, plat, diamond, master, grandmaster). This stage included taking brief notes during observations, identified some exciting conversations, patterns, or phenomenon in chatrooms.

In the third stage, five Twitch channels were selected based on observations and notes. These channels had either frequent interactions between streamer and chatters, rich conversations in the chatrooms, or some emergent phenomenon to explore more deeply. For each of these channels, I conducted two to three additional data-collecting sessions. In each session, I observed the start of queuing activity from the streamer for a game of Overwatch, the ongoing play, and the ending of games. The data collected included screen recording videos, chatlogs in the chatroom, and observation notes. Because there were differences in the streamers' rank and the game modes in which they played, the duration of each observation session varied between 8 and 33 minutes. The time for data collecting depended on the channels' streaming schedule.

3.4.2 Data Collecting Instruments

Chatlogs was collected using a software called TC. The application was designed explicitly for Twitch; it facilitates chat logging, downloading data into files and tracking basic data

from multiple streaming channels, including channel status, total live time, viewer number, and maximum viewer number.

From the pilot study, the results suggested that chats in many channels flowed quickly and became hard to read, especially in popular channels with many viewers. Even using switch off for automatic scroll up options, there was a limited number of messages shown in a chatroom. Often, viewers sent new chats and old chats disappeared quickly before being read. Therefore, the plan was to capture chat history through the Twitch API or third-party software. There are several software and plug-ins developed with the function of logging chats so that streamers can reply to chats later, and viewers can keep their conversations. Three of these tools were investigated for use: Twitch-chat-downloader, TC, and Chatty.

The API Twitch-chat-downloader did not have a graphic user interface. The command prompt in the Windows operating system was used to control it. Based on testing, the API only logged chats into a .txt file. In the original chats in channels, there were many symbols and emotes. These graphic features did not display correctly in the .txt file. Therefore, some other software applications investigated were TC and Chatty. These had similar interfaces and functions. Both displayed chats with timestamps. When using this software, icons and emotes displayed correctly. Also, both presented basic statistics about channel viewers. However, there were two differences between TC and Chatty. First, TC only displayed the number of current viewers, but Chatty provided the number of viewers with a scatter plot. The scatter plot display demonstrated the changing number of viewers during observations and facilitated understanding of the trends. However, TC was more convenient for data storage than Chatty. As these software applications did not have a

function for outputting the chatlogs into files, copying and pasting of the data into google documents was used for storage. When copying and pasting them, the emotes copied from TC chatlogs remained as pictures, but the emotes copied from Chatty became text (Figure 4). A focus for this study did not include the changing number of viewers during streaming, TC was the primary tool for collecting the chatlog data.

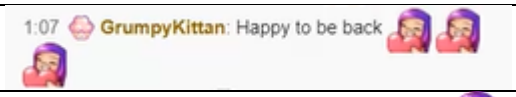
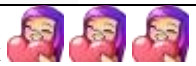
Original chat	
Copied from TC	1:07 GrumpyKittan: Happy to be back 
Copied from Chatty	13:07 **GrumpyKittan:** Happy to be back [cuppLove] [cuppLove] [cuppLove]

Figure 4 Comparison of the chatlog copied from TC and Chatty

During the observations using Chatty for logging the chats, the focus was on the connections between streaming and chatting. Several questions emerged: How did the conversation start? How did the topic change? Was the topic related to the content of streaming or not? How did the chatters interact with the streamer? To facilitate note-taking, the researcher structured the process of field noting into three sections: basic information, description, and reflection. Detailed information about each section was listed, as shown in Table 2. The screen recording of the Twitch channel with chatroom was made while collecting chatlogs. To explore questions about the chat or the streaming during analysis, I went back to re-watch the screen recording. Videos were recorded through a screen recording software called OBS Studio.

Table 2 Structure of Observation Notes

Section	Content
Basic information	Basic information about the channel was used to collect the demographics of members. These are captured in the channel webpage, including: ◆ Name of the channel ◆ Streamer and his/her introduction ◆ Number of viewers ◆ Number of followers ◆ List of moderators and staffs in channel ◆ Chat rules ◆ Date and time for observation
Description	During observations, notes were taken on paper. When the observation was finished, the notes were converted into descriptive language and stored in Google Documents. Descriptions of the channel focused on the conversations: How did the conversation start? What topics were they? Who involved in the conversation?
Reflection	After completing the description, a reflection section was provided. The reflection included the researcher's interpretations and thoughts about the observation. If there was any word or concept (like a meme) appears in the chatroom, but the researcher did not understand it (or not sure if understand it correctly), an official explanation or definition would be quoted. The researcher's thoughts and feelings would also be written down to better noticed and reduced personal bias.

3.4.3 Process and Data Storage

For this study, the data corpus included chatlogs, observation notes, and video recordings. They were stored on a personal computer with a password. A backup copy was created on Google Drive. Only the researcher had the only access to the primary data.

3.5 Data Analysis

3.5.1 Thematic Analysis

To answer research question one, which was identifying social roles in the Twitch chatrooms, I conducted a thematic analysis at a semantic level with the data collected. Thematic analysis was one of the most common and powerful ways of analyzing qualitative data. For this study, the analysis process was based on Braun and Clarke's (2006) phases of thematic analysis. The thematic analysis was an inductive approach, which is also known as a bottom-up method. There were six steps in the analysis process.

3.5.1.1 Step 1: Choosing the data set

The researcher conducted 12 data collecting sessions using five Twitch streaming channels as the data corpus. For the five channels that were selected as sample, they had differences in streamer's gender, channel size, and game rank (showed in Table 3). The duration of each session and the number of chats collected were different, due to the number of viewers, the streamers' rank, and the game modes they played. For better analysis, a competitive game was selected from each channel to build the data set for thematic analysis. Overwatch has three main game modes, the quick play (casual mode), the competitive play (ranked mode), and various arcade modes changing daily and weekly. The competitive feature was an essential element in Overwatch. Most Overwatch eSports competitions apply the rules in the competitive mode. In-game, the competitive mode measured gamers' skill levels with a ranking system. Similar to the ranking system in other competitive games, such as League of Legends, rank tiers from low to high were bronze, silver, gold, platinum, diamond, master, and grandmaster.

Table 3 Information from five sample channels

ID	Gender	Viewer Count	Rank	Game Length(min)	Chatter Count	Chat Count
Streamer1	Female	150-190	Diamond	14	28	118
Streamer2	Male	1900-2200	Grandmaster	22	145	370
Streamer3	Female	20-40	Gold	23	13	72
Streamer4	Male	400-500	Grandmaster	17	44	232
Streamer5	Female	30-50	Platinum	8	15	72
Total				84	245	864

3.5.1.2 Step 2: Becoming familiar with the data

After identifying the data set for analysis, the chatlogs documents, observation notes, and video recordings were reviewed several times. During reading and re-reading, I took notes of impressions and questions about the data contents. This process increased familiarity with the data in preparation for the coding.

Before coding, I transcribed all chatlogs into spreadsheets. Chatlogs from same data collection session were recorded in one google sheet. The chats were logged by sequentially by timestamp. The transcription process included the removal of information concerning user identity, such as usernames or names of streamers. Because spreadsheets did not support emotes within the text, the name of emotes replaced the picture. Also, some typing errors were removed. There were two examples of transcriptions in Figure 5. These two examples were not in the data corpus for this study.

Data item	Transcription		
	Timestamp	Name	Chat
11:01  Twitch Prime Marirs: @sina why your always so cringe dude 	11:01	Marris	*@streamer* Why you are always so cringe dude *[FeelsWeirdMan]*
9:25 tanimal: If your Reinhardt, which is the guy with the sheild, use speed boost or speed fo get him out of trouble	9:25	Tanimal	If your (team has a) Reinhardt, which is the guy with the *shield*, use speed boost or speed *to* get him out of trouble

Figure 5 Two examples of data transcription

3.5.1.3 Step 3: Generating initial codes

After becoming familiar with the data set through transcription, the resulting google spreadsheet contained 864 chats on five sheets. The initial plan was to use each chat as a data item to conduct analysis. The transcription of each chat would be an initial code. However, in early analysis, the information from codes appeared as ambiguous, and the large number of codes created difficulties in the analysis. For example, in a randomly picked a chat, a heart emote could be a friendly signal. However, it was unclear if the user was showing love for the streamer, greeting other people in the chatroom, or sending the heart to a specific chatter. Giving roles based on a single chat without context was infeasible.

Therefore, the strategy became to sort the chats by username. Using all five channels, a list of 251 usernames emerged, including chatbots and 245 chatters. For each chatter, there was a review of the chats that specific users sent and the conversation they jointed. I used the descriptions of user behaviors and characteristics to compile the findings and the descriptions as the initial codes for the thematic analysis.

3.5.1.4 Step 4: Generating themes

There were 245 codes resulting from the analysis. Each was put on a sticky note, moved them around the wall, tried to organize them into theme-piles. After combing the data, backward and forward several times, the first list with five groups emerged (Version 1 in Figure 6): moderators (chatters that dealt with trolling and rule-breaking behaviors), trolls (chatters that trolled or broke rules), quiet chatters (chatters that only chatted once or twice), social talkers (chatters that actively social with others in the channel), and gamers (chatters that actively talked about game contents). However, there was a set of codes that did not fit well into any group. Some of the users' responses that contained these codes suggested the participants played multiple roles or changed roles quickly during conversation.

The results led to the generation of a list of candidate themes: moderators, lurkers, social talkers, gamers, and trolls. Under social talkers, there were two sub-themes: big fans (chatters that focus on interacting with the streamer) and gregarious chatters (chatters that focus on socializing with other chatters). With these candidate themes, I created a frame to document the description of each theme as well as some typical chats as examples.

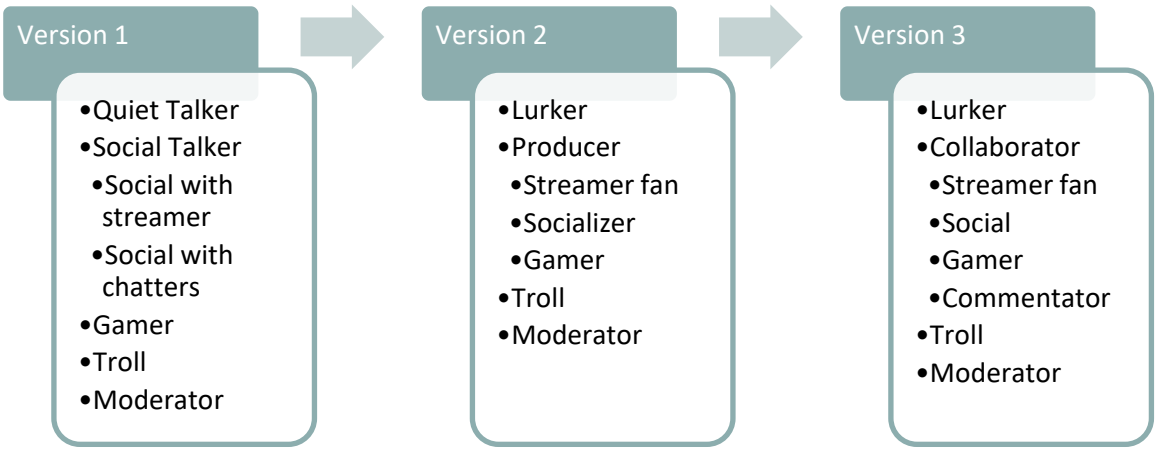


Figure 6 A diagram about the evolution of roles

3.5.1.5 Step 5: Reviewing themes

After the themes were reviewed and discussed with the advisor, we agreed that some of these themes should be reframed to be parallel with relationships: people who talked a lot to other chatters, those who talked a lot to the streamer, and those who talked a lot about game contents should all be talkers or producers. With the revised themes, I developed a new frame (Version 2 in Figure 6), with a brief description, some typical behaviors, as well as several examples for each theme (Table 4). During analyzing, I also took notes about some unusual or random interactions among chatters, which I might investigate the meanings behind these chats later.

Table 4 Revised list of themes: Lurker, Producer, Troll, and Moderator.

Three sub-themes in Producer: Streamer fan, Socializer, and Game contents.

Themes		Descriptions
Lurker		Chatters that only appeared once or twice in the chatlog
Producer	Streamer fan	Chatters that most time interacted with the streamer e.g. "*@streamer When you going to Ohio so we could maybe meet up and hang*"
	Socializer	gregarious chatters that social a lot with other chatters e.g. "*@thegoose nice! I have a 2 yr and 6 yr old, and me and the 6yr have just started field hockey together!*"
	Game contents	Chatters that most time discussed about the game Overwatch e.g. "*the enemy mei (player) is good*" (Mei is a character in Overwatch)
Troll		Chatters that provoke others by sending offensive chats or breaking rules on purpose
Moderator		Chatters that moderate the chatroom by stopping trolling and rule breaking

Additional reviewing and refining were "at the level of the coded data extracts"(Braun & Clarke, 2006, p. 91). At this point, the chatter descriptions connected well with the themes and the chat logs were then reread for "a coherent pattern" with the themes. The themes were a frame for the reevaluating the results by reviewing each chatter's chats again for fit into one or more of the themes.

As I reviewed the themes by putting them back with the original chats, several problems appeared. First, the lurker appeared as related to the number of chats, rather than chat contents or motivations (i.e., the lurker might exhibit the same dimensions as compared to other themes). However, some chatters might happen to chat less than usual during a specific observation period. Second, the discussions about game contents could including several aspects. In Table 4, the example chat "the enemy Mei is good" (Mei is a

character in Overwatch) appeared to be a chatter commentating about the ongoing competitive game streamer was playing. When another chatter said "If I play dps, I always play symmetra" (Symmetra is a character in Overwatch), he was also discussed about game contents. However, he was talking about his previous gaming experience in Overwatch. He indicated himself as an Overwatch gamer, instead of commentator. Third, a need emerged for a new category for chatters who were playing only with mod commands. After reviewing the reader to leader framework and the definitions of social roles, the themes were re-created: lurker, trolls, collaborators, and moderators (Version 3 in Figure 6). The structure became consistent through a re-evaluation of the themes.

3.5.1.6 Step 6: Defining themes and creating a thematic map

After reviewing and refining the themes several times, a finalized list of four main themes emerged. The themes suggest four chatter roles: lurker, trolls, collaborators, and moderators. Under the collaborator theme, another thematic analysis revealed the sub-themes of socializer, gamer, commentator, and streamer fans. Using these roles, a thematic map emerged. I selected a brief definition and an example of the data for each role and computed statistics concerning the number of chatters in each role type.

3.6 Discourse Analysis

For research question two, how the roles shape the conversation, I conducted a discourse analysis to find the answer. Discourse analysis was an approach to analyze "how language, both spoken and written, enacts social and cultural perspectives and identities" (Gee, 2011, pt. foreword). I selected several pieces of conversations from the chatlog as typical cases. This case study included a detailed examination of the participants' discourse. The focus

was on the identities that the chatters assumed, and the relationships enacted with other users in the channel, as well as how they connected through the chats.

The conversations selected were from two channels. For each of these, an introduction was developed that included the atmosphere, norms, and chat rules. Through this process, these conversations become categorized as stories. For each story, the chatlog is represented as a conversation with explanations about the content in the channel. Also, the role each of each chatter in a conversation emerged from the thematic analysis, leading to the findings from the discourse, including chatters' identities, the relationships between them, and their interactions.

3.7 Validity

The concept of validity is different in qualitative research when compared to quantitative research. Several other concepts have been proposed to replace the word validity in qualitative studies, such as trustworthiness, authenticity, and quality (Denzin & Lincoln, 2011; Maxwell, 2013; Patton, 2014). For this proposal, by validity, the researcher means "the correctness and credibility" of this research (Maxwell, 2013, p. 122).

3.7.1 Validity Threats

One of the validity threats I wish to address in this proposal is researcher bias. The researcher bias can include the subjectivity of the researcher. Maxwell (2013) suggested that qualitative researchers "explain possible bias and how to deal with it" (Maxwell, 2013, p. 124) in the research plan. Hence, in section 3.8.2 researcher positionality, I explain my personal interests, research background, and possible researcher bias in the analysis.

During the participatory observation, I recorded suspected researcher subjectivity, such as interpretations and thoughts, in the observation notes.

Another possible threat to validity threat is reactivity. Reactivity is “the influence of [the] researcher on the setting”(Maxwell, 2013, p. 124). In qualitative research, it is unlikely that all reactivity can be prevented. For example, in the pilot study, when I joined a Twitch streaming channel, even though I did not type anything, the streamer noticed and greeted. Fortunately, compared to the interviewer, an observer has less influence in participant observation studies (Maxwell, 2013). To reduce the validity threat from reactivity, I avoided unusual behaviors, such as breaking the chat rules on purpose. Also, I recorded those influences and interactions in the observation notes.

3.7.2 Researcher Positionality

In qualitative research, the researcher is the instrument that guides and shapes data collection, analysis, and interpretation (Maxwell, 2013). As the researcher, I identify as a gamer and have strong interests in gaming. I chose the online game streaming as a research area for three reasons. First, I have a personal interest in gaming, and the topic is central to gaming. Second, as a gamer, I have some similarities with members in the Twitch community, such as a passion for gaming. Third, Twitch is a game streaming platform that is relatively new. I had watched game streaming before, but on other game streaming platforms in Chinese, which is the researcher’s first language. Therefore, the distance supports curiosity and detachment for the investigator as an outsider.

Though game streaming is an interesting topic to explore, I have identified several areas of sensitivity. First, based on previous studies, Twitch is a platform that engages users across the globe (Kaytoue et al., 2012). Based on language ability, I can only understand

Twitch channels in English, Mandarin, and Cantonese. Second, I bring to this study specific personal feelings and emotions which impact the approach to data collection. When observing a game stream, am I conducting the study, or watching for fun (Boellstorff, Nardi, Pearce, & Taylor, 2012)? From a digital ethnographic perspective, I determined that I am doing both. On the one hand, watching game streaming is serious. It is a data collection method that aided answering specific research questions. Alternatively, if I enjoy and deeply understand the streaming context, then can I could understand the game streaming culture from a participant's perspective.

3.8 Ethical Considerations

This study involved human participates; therefore, IRB approval was obtained before the start of data collection. However, there was a question concerning whether streamers and viewers should know the researcher's identity and that research was being conducted requiring that consent be obtained. The researcher considered these ethical issues. For example, Sudweeks and Rafaeli (1996) considered conversations in public chatrooms as personal but not private. Paccagnella (2006) used ethnographic approaches in online research and commented that "Conversation on publicly accessible IRC channels . . . are instead public acts deliberately intended for public consumption." (p.84) Therefore, I considered the content in Twitch chatrooms as public discourse. However, all personal and sensitive information was removed from the data during analysis. The usernames of streamers and viewers did not appear in this final paper.

CHAPTER 4. FINDINGS

4.1 Social Roles

From the thematic analysis, four social roles emerged as an answer to research question one: What roles do chatters take on in the chatrooms of channels streaming Overwatch. These were the lurker, troll, collaborator, and moderator. Under the collaborator, there were four sub-themes: social, streamer fans, commentators, and gamers. A thematic map was generated from the analysis.

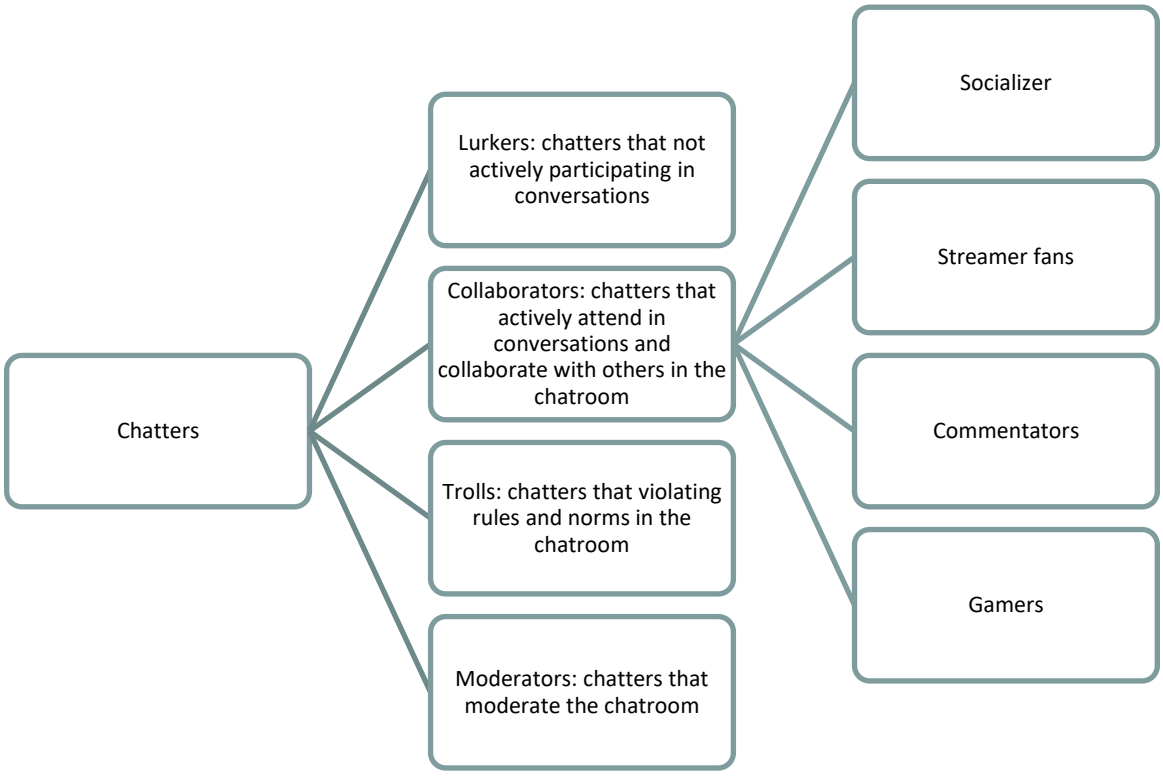


Figure 7 The thematic map for social roles of chatters in Twitch channels

Statistical analysis showed the frequency of appearance of each chatter role. In the sample collected, there was a total of 253 chatters, excluding chatbots. The majority of chatters were collaborators (51.0%) and lurkers (40.3%, Table 4).

Table 5 Chatters in Each Role by Channels

	Channel1	Channel2	Channel3	Channel4	Channel5	Total
Lurker	8	70	2	9	5	94(37.2%)
Troll	1	8	0	2	1	12(4.7%)
Collaborator	18	68	10	33	8	137(54.2%)
Moderator	1	7	1	0	1	10(4.0%)
Total	28	153	13	44	15	253

4.1.1 Lurker

This type of chatter focused on the watching experience, rather than chatting. The lurker chatter was not purely a reader who only browsed and watched. They did appear and chat in the chatroom but were an infrequent user, usually only visiting once or twice. They were not active in discussions and spent most time lurking.

Chat excerpt 1:

*Chatter1 (Landon*****): hello everyone*

*Chatter2 (Pjev*****): hi landon* 

During analysis, many chatters talked less than three times. At first, they appeared as quiet and untalkative chatters. However, the number of chats was not the critical point because two or three chats did not make a significant difference. For example, two chats did not necessarily fit the untalkative category, but if there are more than two, then the user appears as a talkative person. What distinguished lurkers from other types of chatters were that they were active in watching but not actively participating in the conversations. By emphasizing that they were not actively participating in the conversations, it suggests the

content of lurkers' chats were usually phatic communications, random emotes, or chatbot commands, which did not convey meaning or contain questions. For example, Chatter1 gave a general greeting to the channel (Chat excerpts 1). Another chatter greeted back, but then lurked and did not appear in the chatroom again, so the conversation did not continue.

Chat excerpt 2:

*Chatter3 (Crane*****): toritaHi*
*Chatter4 (Reina*****): Crane!*
*Chatter3 (Crane*****): hi reina*
... (more chats going on)
*Chatter3 (Crane*****): im think im sleep now. hard lurkin zzzzZZZzzz*

In some other communities, lurkers were users who read, browse, or watch without interacting. While in the Twitch community, a lurker is a chatter who watched more than chatted. In Chat excerpt 2, Chatter3 chatted at least three times in the chatroom with phatic communications. He defined his behavior as "hard lurkin." Therefore, the definition for the lurker was those who did not actively participate in conversations. That is, relative to active chatting, they spent more time watching.

Chat excerpt 3:

*Chatter5(Illi******): !song*

Some of these lurkers seemed unfamiliar with the channel. In Chat excerpt 3, a lurker used a wrong chatbot command. In some channels, the "!song" command was used to display the name of the song that was currently playing. However, Chatter5 sent this command to a channel that did not set up this feature. The streamer noticed and explained that this command was not available in the channel and Chatter5 returned to lurking and did not send any other messages.

4.1.2 Troll

Trolls were chatters who violated rules and norms in a channel using trolling behaviors. Herring (2002) described trolling as "Intentional provocation of other users." Troll performance was significant in competitive gaming as well as eSport game streaming (Karhulahti, 2016). In the Twitch community, trolling performance is usually referred to as behaviors that challenge rules or go against norms.

Chat excerpt 4:

*Chatter1 (Yass*****): try to not go Moira with Hammond mercy should be better*
*Chatter2 (Pjev*****): !backseat*
Nightbot: Try not to tell streamer how to play the game unless she directly asks chat for help. Cool? Cool.

To reduce trolling, many channels set up rules for chatrooms. There were some rules which are similar across rooms. Hate speech, spamming, harassment, or advertisement without permission were not allowed in most chatrooms. Typical rules such as these tend to be unspoken norms or in the form of broad rules statements. An example of a broad or non-specific rule might be "behave yourself." In contrast, because streamers often determined the chat rules in their channels, some rules and norms differed across rooms. For example, in some cases, streamers appreciated that chatters gave comments and advice on playing, while others did not welcome these "backseat" behaviors. Chat excerpt 4 shows a chatter telling a streamer which hero is better, and this user received a warning from the moderator.

Chat excerpt 5:

*Chatter3 (sad*****): @streamer have you ever heard of Kanye West*
*Chatter4 (raccoon*****): who the fuck is kanye west*

Allowing "backseat" behavior would not usually be an announced rule in a chat room. However, many rules did not have clear standards for application. For example,

Chatter4 was rude and unfriendly to Chatter3 (Chat excerpt 5). However, trolling behavior was subjectively determined by the streamer and moderator. In this case, Chatter4 did not get banned because the channel's rules did not indicate that friendliness was required.

Chat excerpt 6:

*Chatter5 (pietro*****): sti americani hanno il cazzetto* 😣💦
*Chatter6 (den*****): !eng @pietro*****
*Nightbot: @pietro***** please keep the chat in English. Since all chatters don't speak every other chatter's native language we'd like to be as inclusive as possible, ty! .This rule is the reason your message has been deleted. For more of the chat rules just type "/rules".*

*Chatter7 (srvr*****): being inclusive by banning foreign languages* 
*Chatter6 (den*****): just respect the rules my dude, it's that simple*
*Chatter7 (srvr*****): i respect the rules, just saying i don't understand them all* 

Some channel rules indicated that "Memeing and jokes were permitted but shouldn't take it too far." However, it is not clear what taking it "too far" means when considering rules. The line between joking and trolling was blurred. Therefore, it was likely that someone unfamiliar with a channel might break a rule accidentally during chatting; this may be why many viewers chose to lurk and observe for a time before chatting. Often when a chatter breaks the rules for the first time, the user usually receives a warning with explanations about the rule (e.g., chatter1). However, many chatters were trolling purposefully, and not because they were unfamiliar with the rules. For example, the conversation in Chat excerpt 6 occurred in an English-only channel; Chatter5 messaged the streamer in a foreign language. As a moderator, Chatter6 deleted these chats and warned chatter5about the English-only rule. In contrast, Chatter7 intervened with a position that was opposed to the rules. Chatter7 argued with the moderator and was eventually banned from the channel.

The implementation of the English-only rule was unusual because Chatter7 did not explicitly break the rule; the participant contested the rule. The conversation could be considered as a discussion about rules and norms in the channel or as a provocation to the streamer or moderator concerning chat rules and norms in the channel. The enforcement of the rule depended on how the moderator and streamer interpreted the messages.

The troll and collaborator could be considered as contributors because they both actively post chats and contribute to viewership of the channel. Compared to collaborators, the most significant difference was that trolls were not working together with the rest of the community. In this study, trolls were chatters who violated the rules and norms in the channel. Because rules and norms were different for each channel, the trolling behaviors could be interpreted differently.

4.1.3 Collaborator

Though there were trolls, the majority of chatters were usually courteous and friendly. Through chat, they assisted the streamer, helped each other, and supported the channel. These types of chatters were collaborators. These collaborators actively participated in the community and kept conversations in chatrooms flowing.

The collaborator was a broad category of participation with four sub-roles defined: commentator, streamer fans, gamer, and socializer. These roles were not mutually exclusive. A collaborator could be a commentator and streamer fan when participating on the same channel. Collaborators were the leading force in shaping the conversation, as well as growing the community.

4.1.3.1 Commentator

Similar to commentators in traditional sports competitions, this group of chatters gave real-time comments about the game during streamer's live broadcast. They described what was happening in the game, pointed out high performers, poor plays, funny moments, and some dramatic developments. For example, in Chat excerpt 7, chatters called out the nice play excitedly when streamer hit a good sleep dart (sleep dart was an ability in game that requested high aim skills).

Chat excerpt 7:
(The streamer hit a good sleep dart)
Chatter1: That SLEEP
Chatter2: DUDE HE HITS EVERY SINGLE SLEEP ON COOLDOWN DAMN

Commentary also helped other viewers know what was going on, especially those who joined the channel in the middle of a game. For example:

Chat excerpt 8:
*Chatter3 (mir*****): @streamer what???*
*Chatter4 (Reider*****): What even just happened there?*
*Chatter5 (peach*****): that torb stared into the winston'*
*Chatter5 (peach*****): s eyes and said not today*
*Chatter3 (mir*****): @peach***** and he just walked away*
*Chatter4 (Reider*****):* 

Chatter3 and other viewers noted a dramatic play by the streamer and highlighted it. Chatter4 seemed to miss the play, so Chatter5 and Chatter3 described what was happening.

4.1.3.2 Streamer fan

This group of chatters focused on interactions with the streamer. Usually, they were attracted to the channel by streamer's personalities and game skills. By participating in the streaming channel, they wanted to get closer to the streamer. They usually:

- Praise the streamer;

e.g., "your soldier is so good"

- Express their appreciation and support to the streamer;
  e.g., "Hey @streamer i was in dallas two weekends ago cheering for you"
- Curios about info out of game: hobbies, study, etc;
  e.g. "whats your favorite Food? @streamer"
- Try to establish personal connections with the streamer outside channel.
  e.g., "When are you gonna be in Ohio so we can meet and hang".

4.1.3.3 Gamer

This group of chatters was passionate about the game Overwatch. They actively participated in game-related conversations. Their typical behaviors were asking questions about game strategy or game knowledge and sharing their current gaming experiences with other gamers.

Chat excerpt 9:
(the streamer was doing placements and her game was not going well)
*Chatter6 (grump*****): sounds like my placements last night haha*
*Chatter7 (mz*****): I started doing placements, and so far 0-4. I honestly don't feel like not finishing. Comp just seems really bad at least in my world*
*Chatter8 (mag1*****): I'm 3-2 on mine. I'll finish them tonight.*
*Chatter9 (Yuri*****): I mean placements are just something to get through. You'll 90% wind up within 100 SR of where you left off no matter how good or bad you do it*

Chat excerpt 10:
(the streamer's teammate used an ability "sound barrier", which was also called "beat", to save other teammates)
*Chatter10 (congo*****): i dont usually beat during random hanzo ults, i always assume people will dodge it anyway*
*Chatter10 (congo*****): does that make me bad lol*
*Chatter11 (Dd*****): @Congo***** Depends if the other team can get out? You either waste it or save a team from wiping, tough call sometimes*

These chatters implied they were overwatch gamers. Chatter6, chatter7, chatter8, and chatter10l connected the game in a live broadcast with their playing experiences.

Although the first three chatters indicated their own game experience, Chatter10 paid more attention to game strategy in a live broadcast. There were lots of "learner" chatters similar to chatter10, especially in channels where streamers played highly ranked competitive games. By participating in game streaming, they learned and improved their gaming skills. Chatter9 and chatter11's chats showed that they were "game experts" who are familiar with Overwatch. These types of chatters often joined discussions about Overwatch, answered game-related questions, and provided suggestions for improvement.

4.1.3.4 Socializer

In each chatroom, there was a group of social and talkative people. They seemed familiar with everyone in the chatroom as well as the streamer. Their topics were about not only the channel and the streamer, but also real-life issues. These chatters replied to others frequently and started new topics confidently. These social chatters were the main force keeping the conversation flowing. They seemed regular to the channel. Most of them were facile with using Twitch emotes and channel emotes to communicate.

4.1.4 Moderator

The moderator category included all chatters who showed moderating behaviors and not only those who were officially designated as moderators (see the green sword, Figure 8). It was typical for chatters without official moderator titles to help moderate the channel.

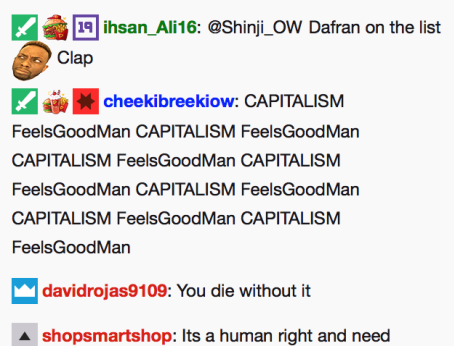


Figure 8 The moderators in chatroom.

Every official moderator of a Twitch channel would have a green sword icon in front of the username (top two chatters were moderators).

4.1.4.1 Moderating behaviors

I observed three types of common moderating behaviors:

- Upholding rules: This was the moderator's primary job. Moderators uphold rules by explaining rules, warning rule-breakers, and banning people from chats.

  moderator: I'm sorry for everyone who disagrees with the rules, but we have rules here for a reason. If you don't like them or don't agree with them the world of twitch streamers is extremely big, you can go where you feel better.

- Answering questions for the streamer: sometimes when streamers were busy with the on-going games or when there were too many chats to reply, moderators help answer questions in chats for the streamers.

- Welcoming newcomers and new subscribers: it is important to reply to people who say "hi", especially newcomers, to make them feel welcome in a channel. For relatively small channels, streamer could connect with new viewers directly. In relatively populated channels with many conversations

ongoing, streamers could not build connections with everyone. In this case, moderators and helpers greeting newcomers and cheer for new subscribers.

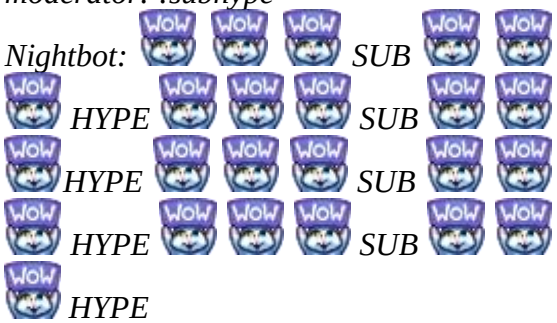
moderator: Hey if you're a new follower, thank you!!  *if you want - say hi in chat*  *we'd love to welcome you to the conversation* 

4.1.4.2 The AI moderator: chatbot

Across observations, I noticed that many channels use chatbots. Chatbots were programs developed for channels with entertainment and moderating features. There were many popular twitch chatbots, such as Nightbot and Moobots.

Initially, chatbots were developed as an effective way to manage spammers and trolls in larger channels. Therefore, the most common features for chatbots were spam filtering and troll banning. Later, they developed with more features, such as answering frequently asked questions and auto messages for promotions. In these observations, chatbots provided entertainment, which increased viewer engagement. Examples of the different features of chatbots are provided in Table 6.

Table 6 Examples of common chatbot features.

Banning rule breakers	*Chatter (as*****): imdumb.com* *Nightbot: @as***** -> Sometimes I even amaze myself. [stop posting links] [warning]*
Answering frequently asked questions	*Chatter (slv*****): !sens* *Nightbot: streamer's sens is 7.0 800 dpi and 50 scope on Ana (100% nano sens) -- He's a wrist aimer*
Sending auto messages for promotion	*Nightbot: Did you know streamer has a twitter? Follow her there to get updates on when she goes live! twitter.com/t***** - and an instagram! instagram.com/t*****"*
Welcome newcomers or new subscribers	*(a new viewer subscribed the channel)* *moderator: !subhype* *Nightbot:*  *SUB HYPE SUB HYPE SUB HYPE SUB HYPE*
Entertainments to increase viewer engagements	*(Olaf was streamer's cat)* *Chatter1: !whereisolaf* *Nightbot: Olaf is Sleeping on the couch* *Chatter2 (untitled*****): !whereisolaf* *Nightbot: Olaf is Playing Overwatch* *Chatter2 (untitled*****): nice, I hope he's T500* *Chatter3 (Anxiety*****): WHEREISOLAF GOT ADDED POG* *Chatter4 (LoL*****): @anxiety***** my favorite is the "Playing Overwatch"*  *cutest command!*

The commands for chatbots typically had a "!"in the beginning, such as "!ban". The commands used to moderator channels are called 'mod command'. The development of

chatbots made the job for moderators much more comfortable and effective, especially in channels with hundreds or thousands of chatters. However, in smaller channels, for example, with five chatters, it would be easier for the streamer to interact with viewers.

4.2 Discourse Analysis

4.2.1 Case Study 1: Channel A

Channel A was a large streaming channel on Twitch with about 2,000 viewers.

The streamer was a famous gamer, a streamer, as well as a Youtuber. In Overwatch, the streamer was in the Grandmaster tier, which indicates a top 1% level player. Many viewers were attracted to the channel due to the high performance in highly ranked competitive games. This streamer often provided educational videos and streams to teach others about game strategies and techniques in Overwatch. In this streaming channel, there were usually questions related to Overwatch gameplay, and the streamer was eager to answer. The atmosphere in this channel was more about competition than some others. There were many discussions among chatters about gaming strategies. From these discussions, arguments often emerged.

Though English was a second language for the streamer, he always spoke English during streaming. In addition, the channel had an English-only rule (Figure 9)

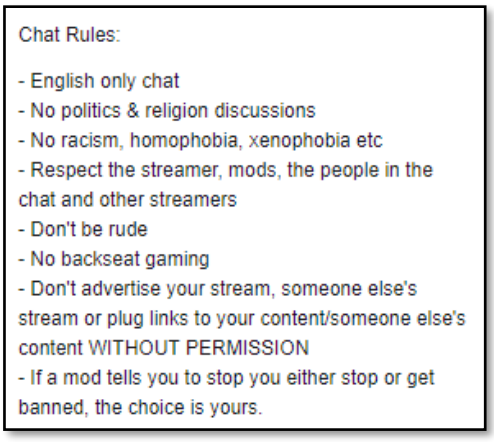


Figure 9 Chat rules in channel A

4.2.1.1 Story 1: Moderator and trolling behaviors

In an episode where the streamer was focused on a competitive game on a live broadcast, a chatter entered and sent several chats in Romanian. The moderator noticed, deleted these chats and used mod commands to display a warning message. The chatlogs were retrieved text (Chat excerpt A1). There were four participants in the conversation. To avoid using real names and usernames, the moderator is referred to as Sophia. The Romanian chatter, Peter, broke the English-only rule. Two other chatters disagreed with chat rules, and they are Sam and Matthew.

Chat excerpt A1:
Sophia 1 *1. !eng @peter* **Nightbot:** *2. @peter please keep the chat in English.* *3. Since all chatters don't speak every other chatter's native language* *4. we'd like to be as inclusive as possible, ty!*  *5. This rule is the reason your message has been deleted.* *6. For more of the chat rules just type "/rules".* **Sam 1** *7. being inclusive by banning foreign languages*  **Matthew 1** *8. @sam right lmao* **Sam 2** *9. @matthew not a big fan of the mod policies in this channel,*

10. seen a lot of weird bans and stuff lol
Sophia 2
11. @sam anlaki
Sam 3
12. ?
Sophia 3
13. just respect the rules my dude,
14. it's that simple 
Sam 4
15. i respect the rules,
16. just saying i don't understand them all 
Sophia 4
17. how do you expect us to know more than 100 languages
18. to know what to ban and not to not ban
19. when people say stupid shit online?
Sophia 5
20. inclusive by uniformity of a language
21. so more people are able to understand
Sophia 6
22. if I fucking start speaking in romanian
23. you will not feel included in the conversation
Sophia 7
24. so by that,
25. keeping in in english only,
26. it is inclusive 
Matthew 2
27. @denniedd okay
28. and every single person who speaks something other than english
29. doesn't feel included lmao
Sam 5
30. why would i expect to always feel included?
31. i dont understand every language
32. and theres nothing wrong with that lol
Sam 6
33. snowflake ass culture lol

In Chat excerpt A1 lines 1 to 6, the moderator Sophia used mod commands to display warnings as well as explaining the English-only rule. Compared with other chats, the warning had a sentence structure that was more complete. It contained full sentences, such as “Since all chatters don't speak every other chatter's native language, we'd like to be as inclusive as possible, ty!” It also used formal terms (“native language” and

"inclusive") and polite phrases ("please", "we'd like to", "ty"). One of the emotes () was used in the chat. It was a character in Overwatch with a little heart on the face. This emote was usually used as a symbol of love and friendliness.

4.2.1.1.1 Collaborations between Trolls

In Chat excerpt A1 8 line 7, Sam commented about the banning. Sam used a popular Twitch emote called "LUL" (). In the Twitch community, this emote usually used as "LOL" (laughing out loud). In this situation, Sam meant "being inclusive by banning foreign languages" was ridiculous and worthy of laughter. Another chatter, Matthew, directly replied to Sam and showed agreement. The disagreement on the English-only rule connected these two chatters. In lines 9 and 10, Sam told Matthew, "not a big fan of the mod polices [policies]" and "seen a lot of weird bans and stuff." In stating this, Sam recognized Matthew as a teammate who went with him against norms in this channel. Moreover, Sam suggested his identity as a regular in this channel ("seen a lot of …").

4.2.1.1.2 Interactions between Troll and Moderator

Though there were many other chats discussed about the live game that were not included in Chat excerpt A1; for example, Sophia noticed the alliance between Sam and Mathew and decided to take action. She tagged Sam with "anlaki", which means unlucky. This was a meme in this channel. The streamer had a robust Romanian accent in spoken English. Therefore, he usually pronounced unlucky as anlaki. The term unlucky could have multiple meanings such as "unfortunately, you did not like our rules (but rules could not be changed)," or "unfortunately, we had many weird policies (but you still need to

respect our rules).” Both phrases could be euphemisms to suggest that Sam must respect the rules.

Following the message from Sophia, Sam replied with a question mark (line 12 in Chat excerpt A1). A question mark could also be interpreted in many ways, such as expressing confusion (what happened?), doubt (really?), or indicating a question. Initially, it seemed that Sam did not understand anlaki and used “?” to express confusion. However, the message may have carried more emotion than just confusion. Because Sam was a regular on this channel, he likely knew about channel memes. However, in previous chats, Sam usually tagged the person whom he addressed and used emotes or abbreviations (such as lol, lmao) to express emotions. If he had been confused, he probably would have tagged Sophia and asked what anlaki meant. However, Sam just typed a question mark, which seemed a bit cold and distanced. The “?” likely meant, “What do you wanna say?” or “Why you tagged me?”

Even though she received a cold reply, Sophia continued speaking to Sam (line 13 and 14) using “my dude” to refer to Sam and adding a cute cat emote () in chat. With these signals, she tried to build a friendly relationship with Sam and solve the conflict. From the researcher’s perspective, this conversation about rules should stop here. First, Sophia had conveyed her point to Sam (“just respect the rules”). Second, by “simple,” she indicated that respecting rules was not hard. In addition, she ended her chats with a declarative sentence instead of an interrogative sentence. She did not require a response from Sam.

However, Sam did not want to end the conversation. Because Sophia asked him to “just respect rules,” he indicated that “i RESPECT the rules, JUST saying i DON’T

UNDERSTAND them all," with the  emote at the end. This emote was a slightly smiling face. It could be used as a happy smile, a smile but not a happy face, or a fake smile. Based on Sam's remark, it was unlikely a happy smile. Sam spoke English in chat, so he did not break the English-only rule. However, he argued about why these rules were necessary. By using himself as a bridge, he connected the previous topic respect rules to a new topic, the necessity of rules.

After the exchange, Sophia replied with a long list of chats (line 17-26) to discuss why the English-only rule was necessary and why it made the channel inclusive. Compared to her previous chats, she used language that included you and I. She also used a rhetorical question ("how do you expect us to know more than 100 languages to know what to ban …?") to communicate the statement. Also, Sophia used terms like "stupid shit" and "fucking," which revealed that Sophia typed these chats with intense emotion, such as anger. However, her logic remained clear. First, she gave reasons from the moderators' perspective (line 17-19) and the viewers' perspective (line 20-21). Then asked Sam to put himself in others' shoes ("if I … speaking in Romanian, you will not feel included ..."). Last, Sophia finished her statements with the conclusion that "English-only is inclusive" (line 24-26).

The argument continued. Matthew focused on English-only, and pointed out that people who did not speak English were not included (line 27-29). However, Sam focused on "inclusive", claimed that he did not want to feel included ("why would i expect to always feel included?"). While Matthew's chats could be considered as discussions about the rationality of rules, Sam's chats were digressive and untenable with the intention of provoking others and causing arguments. He also failed to respect the rules ("respect

others in channel" and "if a mod tells you to stop you either stop or get banned") by calling the rules "snowflake ass culture." Finally, Sophia gave up explaining rules and banned Sam. All Sam's chats became displayed as "deleted by moderator." Matthew was banned later.

4.2.1.2 Story 2: Other chatters' attitude toward trolling behaviors

After Sam was banned, Matthew continued to argue whether the English-only rule was inclusive, while Sophia was in a more reserved role in the following conversations. Other chatters in channel noticed and joined this discussion about rules (Chat excerpt A2).

Chat excerpt A2:

Star:

1. *why can't people just have common sense (: rules are rules, guys*

Noxy:

2. *@Sophia pop off on him*

dva:

3. *@Matthew Respect the stream rules*

racoon:

4. *If you don't like it go to another stream ez*

Dee:

5. *complaining about having to speak english(English) on the internet is haliarious(hilarious)*

supergamer:

6. *THE MOST SPOKEN LUAGUAGE(Language) IS MANDARIN*
7. *but most twitch users speak english(English)*

In the discussion, most chatters took the moderator's side for three main reasons. First, it was common sense to obey the chat rules in channels ("rules are rules"; "respect the stream rules"). Second, there were norms to speak English as a common language in Twitch ("complaining…speak English on the internet is hilarious"; "most Twitch users speak English"). Third, chatter always had the choice to leave ("if you don't like it go to another stream").

Sam's trolling behaviors stimulated an extended conversation concerning the chat rule. Most chatters were working as collaborators discussed the rationality of the chat rules. Some of them became moderators who upheld rules. However, there were also chatters who expected a fight. In Chat excerpt A2, line 2, a chatter asked the moderator to "pop off on him (Sam)". This chatter's behavior could be trolling that is intended to create dramatic developments and conflicts in the stream channel.

4.2.1.3 Story 3: The thank you message

In another set of observations, a chatter (Aria) subscribed to the channel with a warm message, showing appreciation to the streamer, Sophia, and the community in this stream channel (Chat excerpt A3).

Chat excerpt A3:

Aria:

Notification: Aria resubscribed with a Tier 1 sub 0 months in a row!

1. *I know I'm not the only one,*
2. *but you, Sophia, and chat really help bring some joy to my life.*
3. *I don't have the greatest of living situations,*
4. *but your stream has always make my days better.*
5. *Thank you for everything* 

Sophia:

6. !subhype

Nightbot:

7. 

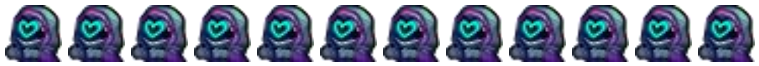
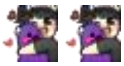
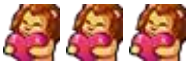
saphira:

8. 

Neko:

9.  @Aria
10. you need some hard hugs

Sophia:

11. 
iren:
12. 
dhy:
13. 
boost:
14. @Aria omggg  thats so sweet 
firelor:
15. huuug
anasa:
16. 
sadbut:
17. @Aria 

In Aria's message, she used the words you and I frequently. The first use of you (Chat excerpt A3, line 2) could be interpreted in two ways: "but you, (which is) Sophia, and chat…." or "but you (streamer), Sophia, and chat…" I prefer the second interpretation for two reasons. First, subscription messages were usually opportunities to communicate with the streamer, especially in large channels. Because in these channels, it is hard for the streamer to read and reply to every chat. However, most streamers would read the message in return to thank the subscriber. The specific channel was relatively large with about 2,000 viewers. In game streaming culture, there were norms that the streamer would read subscription messages. Second, Aria said, "your stream" (Chat excerpt A3, line 4). In the Twitch community, the owner of a stream channel is the streamer, not the moderator. Therefore, the "you" in Aria's message likely refers to the streamer and not Sophia.

However, Sophia played an essential role in this channel, and for this reason, Aria mentioned Sophia's name in the message. While greeting to everyone in a Twitch channel, chatters usually said, "Hi streamer and chats." In Aria's message, she said,

"streamer, Sophia, and chats." The streamer was not a regular chatter and played a leader role in the channel. It was typical to mention streamer separately. But I wondered why Sophia was mentioned here. Based on my observation, there were two possible reasons that Aria indicated Sophia in her message. First, Sophia could have built a personal connection with Aria. Second, Sophia was as crucial as the streamer in this community. Based on the observation, the relationship between Sophia and Aria did not appear close relative to other viewers in channel A. There were no interactions suggesting that they were close friends, or knew each other in real life. I rejected the first assessment and reconsidered Sophia's role in this channel. Because this was a large channel with a highly ranked streamer, the streamer needed to pay more attention to gameplay rather than to the chats. Therefore, moderators in this channel took on the job of monitoring the chatroom, dealing with harmful contents, and supporting the streamer and viewers, as well as maintaining the community. Sophia was one of the most active moderators in the room. She was frequently willing to answer questions and interact with other chatters in a friendly way. Sophia became a bridge to connect viewers with the community on this channel. When trolling and rule-breakers appeared, she stood strong to fight against them. Sophia was not only a chatter with the title of moderator, but she also played a leader's role in this community.

This section of the chatlog was also interesting because the chatters used many Twitch emotes. During streaming, the streamer read Aria's message and asked everyone to "give this guy some hugs!" Some chatters typed in a text to "hug" Aria (Chat excerpt A3, line 10 and 15). Most chatters used Twitch emotes to express "hug". Twitch emote was an important feature for this chatroom. Emotes were frequently used in chats as non-

verbal communications to better express emotions such as happiness, anger, confusion, or sadness. For example, the “BibleThump” emote (), which was a crying face of Isaac (a character from the video game The Binding of Isaac), was commonly used to convey the feeling of sadness. The meaning of these symbols was a vital part of the Twitch culture. Some popular emotes, such as LUL and POG, were used not only in Twitch but also in games and sometimes became an online meme. Besides the commonly used Twitch emotes, each streaming channel could design channel-specific emotes. In reviewing the chatlog, the cat emotes  (Chat excerpt A3, line 7),  (Chat excerpt A3, line 9 and 11), and Ana (a character from the video game Overwatch) emotes  (Chat excerpt A3, line 5 and 8),  (Chat excerpt A3, line13) were channel emotes from channel A. The emotes inline 16 () and line 17 () were from other channels. The Purple Heart emote () in line 12 was an emote commonly used in Twitch. It was not possible and unnecessary to learn and use all the emotes on Twitch. Most chatters were familiar with emotes and used the most common of the Twitch emotes, as well as the channel, emotes from frequently visited channels. Emotes from other channels can be understood based on similarity to Twitch. For example, most chatters in chatlog could understand  and  as “hug” and “love” because these emotes resemble “hug” and “love” emotes on this channel. The heart shapes, smiling faces, and the act of hugging are similar from channel to channel. The channel A emotes they used were different, and the emotions they conveyed were unity. It created an atmosphere of affection and togetherness in this channel.

From the chatlog sections in channel A, there were three findings. First, trolls did not collaborate with other types of chatters; however, there were collaborations between trolls. Second, moderators played the most critical role in stopping trolling. Third, trolling created conflicts, which were likely to stimulate more discussion. Fourth, most chatters in channel A stood by the moderator's side in disputes.

4.2.2 Case Study 2: Channel B

Channel B was a medium-sized channel with about 200 viewers. Compared to channel A, this channel was smaller, and the relationships between chatters were closer. The streamer did not have a ranking for game techniques as high as the streamer in channel A. However, this streamer put more effort into connecting with viewers than did the streamer in channel A. The channel B streamer aimed to create a positive and friendly community in the channel. The community called themselves the "bakery." In their channel culture, cupcakes referred to good, while muffins were bad. The streamer asked the viewers to "be sweet like cupcakes, don't be a stale muffin." The atmosphere in this channel was more relaxed than channel A. Chatters talked comfortably about the weather, shopping, and other topics related to daily life. There were also discussions related to gaming and Overwatch. However, there were fewer debates and arguments about game strategies. The streamer spoke English. Other chat rules were shown in Figure 10.

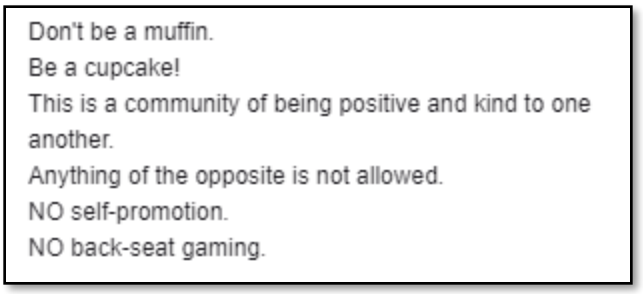


Figure 10 Chat rules in Channel B

4.2.2.1 Story 1: Greetings

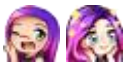
During the observations, this community was typically nice and friendly. The viewer group on this channel was relatively stable. Most chatters seemed familiar with each other and chatters actively socialized with others. In the chatlog, there were many phatic communications, such as greetings. It was typical for them to greet the streamer as well as the chat when joining the channel. These chats did not convey any meaningful information, but there were some slight differences between chatters in the ways they greeted (Chat excerpt B1).

Chat excerpt B1:

Tyler:

1. *hi @streamer*
2. *how are the games going*
3. *and/or how is you?*

Yuki:

4. *Gooood afternoon Ash and everyone* 

Olivia:

5. *Hello @streamer and bakery*

Raven:

6.  *everyone!*

David:

7. *Hey chat*

In the first greeting, Tyler tagged the streamer while greeting (Chat excerpt B1, line 1). Tyler asked about how streamer's game was going (line2). He also used "you" to indicate that he was speaking directly to the streamer (line 3). Tyler's introduction indicated he was living in the US but was born in France. English was not his first language, and he was not skilled in English. He said, "and/or how is you" instead of "and how are you." All his greeting was focusing on the streamer. He wanted to get attention and a reply from the streamer. Tyler appears to be a "streamer fan" type of chatter.

The second greeting came from Yuki (line 4). She was a regular viewer, as well as an active chatter in this channel. She greeted the streamer as well as others in the chatroom. She used a channel emote (). This emote is commonly used as "hi" or "goodbye" in the channel. Another comment worthy of attention was Yuki's referring to the streamer as "Ash," which is a short form of Ashley (streamer's real name). In contrast, most of the chatters called the streamer by her username on Twitch, Yuki might have a closer relationship with the streamer than other chatters.

Similar to Yuki, Olivia's greeting mentioned the streamer as well as the community (line 5). Olivia used the term "bakery" to refer to the community, while Yuki used "everyone." Olivia might have a stronger sense of belonging with this community than does Yuki.

Raven and David both sent a general greeting to everyone. Raven appeared multiple times in the observation sessions as a collaborator. David appeared one time and was more likely a lurker type of chatter. In Chat excerpt B1, Raven said, "hi" using the channel emote (line 6). David said, "hey chat" (line 7). This was not a negative greeting, but it was generic

and could be used in any Twitch channel. Compared to David, Raven was likely more familiar with this channel and an insider chatter.

In this story, the chatlog had many phatic communications that did not convey interpretable meanings, but these chats provided insights about the chatters, as well as insight into this chatter's relationship with the streamer and the community. Lurkers and collaborators frequently sent greetings in the chatroom, which can fill the chat space and keep the conversation flowing. However, the collaborators showed a closer relationship with others in the community as compared to the lurkers. In story two, the differences in the relational distance created a different outcome in shaping conversations.

4.2.2.2 Story 2: Phatic communication and conversations

In the chatlog, there were two sections of conversation that were interesting to compare. These chats started with Raven's initial greeting. Using the same greeting, as shown in Chat excerpt B2, the first conversation ended quickly as phatic communications, but as shown in Chat excerpt B3, the conversation became a much longer conversation.

Chat excerpt B2:
Raven: 1.  *everyone!* **Dominic:** 2. *@raven* 

Raven was a regular in this channel. Based on the roles identified for research question one, Raven was a collaborator. She was friendly and humorous. She made jokes in chat to make others laugh, which created a fun atmosphere. From her page on Twitch, she introduced herself as a college professor of digital media and culture. She streamed when she had the time. She did not keep a regular schedule of streaming.

Dominic was one of the moderators on this channel. The general atmosphere of this channel was helpful and friendly. During the observations, there were almost no rule-breakers. Therefore, observations were made about how rules were upheld. As a moderator, Dominic spent much time greeting and lurking. Long conversations between Dominic and other chatters were atypical. In four chatter roles identified in thematic analysis, Dominic was a lurker type of chatter.

Brownie was a regular to this channel and was an active and friendly chatter when replying and answering questions. Sometimes, Brownie disagreed with others in discussion but was respectful of other points of view. He explained ideas clearly and politely instead of arguing with strong emotions. In the four roles identified for chatters, he was a collaborator.

Chat excerpt B3:

Raven:

1.  *everyone!*

Brownie:

2. *Hi @raven!*
3. *How was your weekend?@raven* 

Raven:

4. *Hey @brownie .*
5. *Good!*
6. *I vegged most of the weekend*
7. *but it was much needed after the end of the semester scramble.*
8. *How was yours?*

Brownie:

9. *Great! Thanks for asking @raven.*
10. *Got a bunch of stuff done around the house,*
11. *and got some time in for relaxing as well.*
12. *Taking some time off after the semester ends?*

DarkChocolate:

13. *glad you guys had good weekends too!*

CheeseCake:

14. *@brownie@raven yall so cute* 

Raven always greeted everyone when she joined channel B. In the first conversation (Chat excerpt B2), Dominic replied to her greeting (line 2). He tagged Raven and used the channel emote to say “hi.” This was a friendly reply. However, it did not convey an actual meaning or ask a question. From this perspective, the chat Dominic sent was aimed at making sure everyone receives replies and feels welcome, which could be part of the moderator’s job. Raven, who was the receiver, did not receive a signal for further conversation or a request for an answer. Also, others in the channel did not greet back. As a result, this topic stopped here.

Similar to the chat in Chat excerpt B2, the conversation in Chat excerpt B3 started with Raven greeting with a “ hi.” Brownie replied to her greeting. Similar to Dominic, Brownie also tagged Raven and greeted back (line 2). In addition, he asked a question (“how was your weekend?”). This time, Raven received a request for an answer. Therefore, she replied and talked about her weekend. Because Raven mentioned “the end of semester,” she was likely a student or a teacher. In return, she also asked Brownie about his weekend. They began to take turns like a daily conversation. Later, other chatters joined the conversation (line 13 and 14), and it became a larger discussion group.

The conversation between Raven and Brownie was polite and relatively formal. In Twitch chatrooms, chats were usually short. Emotes and abbreviations (such as lol, lmao) were frequently used to express feelings. Raven and Brownie used long sentences with complete structures. They did not use many of emotes or abbreviations. Their conversation was of a serious tone, which differed from other chats. This could be why another chatter said they were “cute” (Chat excerpt B3, line 14). Based on these observations of the chat

style, they were not close friends. However, they both shown politeness and friendliness to keep the conversation going.

In this story, even Raven started both conversations in almost the same ways, but the results of the two conversations were different. The greetings or greeting-backs from lurker and moderator were likely a friendly signal that following the norms in Twitch chatrooms. Collaborators used greetings to build a further conversation. To shape a conversation in Twitch chatrooms, it required at least two chatters who were willing to collaborate and shape the conversation together.

CHAPTER 5. DISCUSSION

In this study, I generated a framework specific to the chatter roles in Twitch personal game streaming channels. From the online ethnography and thematic analysis, I defined the chatters as occupying four social roles: lurker, troll, collaborator, and moderator. Lurkers were chatters that chatted less than watching. Among the active chatters, most were collaborators. They socialized with other chatters and the streamer, commented about the live game, learned game knowledge and skills. However, there was a small group of chatters that did not like collaborating, and these were called trolls. They went against norms in the channel by trolling and breaking chat rules. To maintain the order in the chatroom, some chatters helped streamer set up and uphold rules. These chatters who frequently intervened in these ways were moderators.

These four social roles were specific for studying participation in chatrooms of Twitch personal game streaming channels. Compared to other existing frameworks in the field, there were commonalities as well as differences. In the following sections, I will compare the four chatter roles with Cheung and Huang's (2011) 9 personas of game spectating, as well as Preece and Shneiderman's (2009) reader to leader framework.

5.1 Comparisons with Cheung and Huang's nine personas of game spectating

In several previous studies of online game streaming, Cheung and Huang's (2011) nine personas of game spectating was used as a framework. Initially, this framework was not designed for studying online game streaming communities. In Cheung and Huang's work, they collected data from forums, such as Reddit and Blizzard Forums, rather than online game streaming sites. Only comments and posts directly related to game spectating were

collected as data. Moreover, the game spectating behaviors that they studied were online spectating and offline game spectating in stadiums of official eSport events. Therefore, the nine personas framework was not an exact fit with the situation of studying game streaming communities. Two main differences were the existence of the lurker and the moderator.

For the lurker, I defined this group as chatters that enjoyed spectating and lurking most of the time. According to the nine personas model, they had a similarly defined role called the bystander. However, the bystander referred to game spectators who had a lack of understanding of the game. These bystanders spectated from an outsider's view. From the observations of this Twitch chatroom, some lurkers only chatted once or twice because they were outsiders who had little to no knowledge about how to interact with others in the chatroom. Through watching and lurking, they were observing how others interacted to learn about the norms and rules in a channel. However, some lurkers might feel satisfied by watching the Twitch channel without chatting. There was not sufficient data from chatters' perspective about their motivations to draw firm conclusions, and this could be addressed in future studies.

For other chatter roles, the troll was similar to the persona called the unsatisfied. Other personas, such as the pupil, the commentator, and the assistant, were similar to the sub-roles under the collaborator category. However, Cheung and Huang's 9 personas did not have a persona similar to the moderator. This may be because they only collected online posts and comments about game spectating. The authors' scenario was different from that of Twitch channels. On game streaming channels on Twitch, most users were game spectating, but the topics in chatrooms were not limited to spectating. Chatters not only discussed game spectating experience and game knowledge and skills, but they also

interacted with the streamer, talked about offline life, and stopped others from sending offensive posts and spam that detracted from conversations.

Moderators were chatters that had more power to punish bad behaviors. When there were no bad behaviors, moderators could participate in the channels with other chatters sometimes as lurkers or collaborators, depending on the moderators' motivations. Wohn (2019) found similar results related to these found in the current study about Twitch moderators, in that there were different moderating styles. Some moderators did not interact with viewers; they were "watching until it is time for them to step in." Some other moderators considered "keep the chat entertaining while the streamer is focused on his game" was also part of their jobs. The former were lurkers as well as moderators. The later were collaborators as well as moderators. These roles were not exclusive, and a chatter could have more than one role in the Twitch chatrooms.

5.2 Compare with the Reader to Leader framework

Using Preece and Shneiderman's (2009) reader to leader framework, user participation in technology-mediated social platforms could be defined as having four levels: initially as a reader, moving to a contributor, progressing as a collaborator, and finally becoming a leader. Twitch is a platform combined with game streaming technology and social features like chatrooms. Chatters' participation in Twitch channels might have a pattern similar to the reader to leader framework.

In the reader to leader framework, users started with reading, browsing, and returning. In game streaming communities like Twitch, viewers often started with watching and browsing channels. The chatter type identified as lurker resembles this level of

behavior. These chatters were new to the community, and by lurking, they were observing rules, norms, behaviors, and attitudes in the channel without venturing in as an outsider. After learning during lurking, they took small steps to try safe and common behaviors, such as greetings and chatbot commands. In the study, lurkers could be either newcomers or repeat watchers. Some were satisfied with lurking and chatting once or twice. Some enjoyed being a reader or became a contributor sometimes, but not a collaborator. In Hamilton et al.'s (2014) study about Twitch, he found Twitch as a community with regulars and newcomers. The core of this community was regulars who "regularly show up, eventually become recognized community members". Every regular was once a newcomer, and newcomer became regular by visiting the place frequently and participating actively. Another study from Hu et al. (2017) of Chinese game streaming communities also found that viewer's identification from streamers and other members in the channel was positively associated with viewers continuous watching behavior intention. The identification from streamers and other members were built by regular participation and interaction in the community. I believed similar to the reader-to-leader framework, a Lurker in Twitch chatroom became Collaborator through visiting frequently, contributing and creating connections with others in the channel. However, based on the data collected for this study, I couldn't clearly indicate the transition among roles of chatters in Twitch channels. Future studies of how Twitch users change their roles during participation might open new directions and provide insights about the reader-to-leader framework could be used to study the participation in Twitch chatrooms.

Although there was some participation in Twitch chatrooms resembling the reader-to-leader framework, there were also some differences, most notably the troll. In this study,

I observed trolling behaviors in the Twitch chatrooms, including breaking rules on purpose and sending offensive chats intended to provoke others. I defined trolls as chatters that violated rules and norms of the channel. As rules and norms were different among channels, the behaviors that counted as trolling were distinct depending on the rules. There are also trolling behaviors in other technology-mediated social platforms, such as Facebook and Twitter (Hardaker, 2010). Trolling is a common phenomenon in CMC and not only in Twitch. Because trolls appear to have an important role, consideration of trolls could extend the reader-to-leader framework. In this study, trolls were contributors because they also sent chats and posted comments. However, they did not collaborate with others. Therefore, the troll's position in the reader-to-leader framework could be the same level as that of collaborators (Figure 11). The size of the rectangle boxes was related to the number of people in each role. The factors that cause users to become trolls, as well as the reasons that stimulated users to shift from trolling to other roles needs further study.

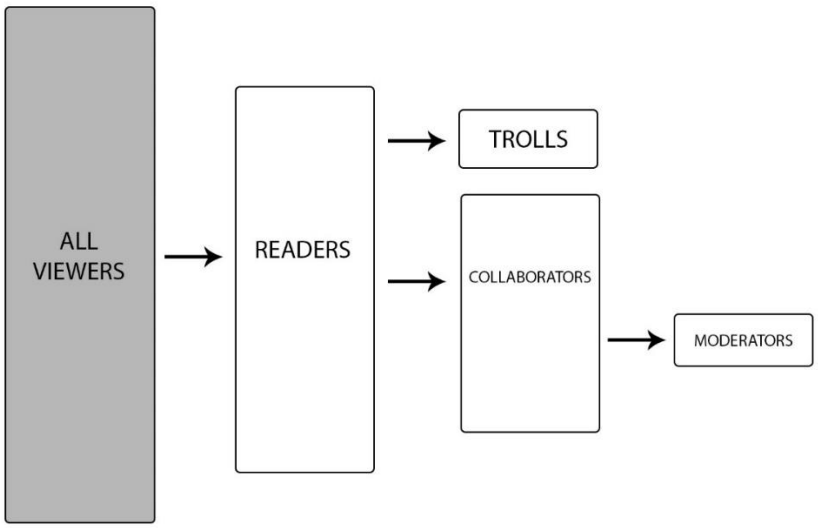


Figure 11 An extension of online participation with the role Troll.
Based on the Reader-to-Leader framework (Preece & Shneiderman, 2009).

From this study, there were four social roles for chatters: lurker, troll, collaborators, and moderators. The collaborators were the leading force in shaping conversations and keeping chats flowing. They also provided diversity in the topics for discussions. Lurkers made smaller impacts on the conversation than did collaborators. In this study, many viewers on the channel were lurkers and were not actively participating in conversations. Lurkers had the potential to transform into collaborators. However, they needed to take the first step to start chatting and creating connections with others. Therefore, it was important for the community, as well as the platform, to support opportunities and encourage lurkers to send chats. In addition, providing guidelines and educating newcomers about rules and norms could help lurkers make fewer mistakes as they continued to participate. After making mistakes and getting banned, lurkers might be less eager to continue chatting and reduce their participation.

Another important activity was reducing trolling. Trolls were actively participating in chats but also were violating the channel's rules and norms. Their behaviors were not welcomed by most of the chatters. Moderators and streamers were the primary motivators who dealt with trolling. First, it was necessary to educate moderators and streamers about how to face down trolling. For example, they could set up specific chat rules in the channel, clearly identify what would be considered as trolling. Second, they could promote common sense among members in the same community by creating norms for chatters so they would know what types of behavior were inappropriate. Therefore, when trolls appeared, the majority would stay as a group and fight against trolling.

CHAPTER 6. CONCLUSION

In this study, my goal was to describe and analyze the roles taken on by viewers as they engaged in chat while watching game streaming and identify how these roles influenced participation. Based on this research goal, I developed two research questions:

RQ1: What roles did chatters take on in the chatrooms of channels streaming Overwatch?

RQ2: How did these roles shape the conversation in each channel as a distinct space?

To answer these questions, I conducted a qualitative study with online observations on several Twitch channels with streaming on Overwatch and collected data including chatlogs, observation notes, and video recordings of streaming. With the chatlog I collected, I applied a thematic analysis at semantic level to identified four social roles among chatters in Twitch chatrooms. They were Lurker, Troll, Collaborator, and Moderator. Lurkers were chatters that focused on the watching experience, rather than chatting. Trolls were chatters who violated rules and norms in a channel using trolling behaviors. Moderators were defined as all chatters who showed moderating behaviors in the channel. Collaborators were chatters that assisted the streamer, helped each other, and supported the channel through chatting. As they usually focused on different topics, I identified four sub-roles under the Collaborator category, which were socializer, streamer fans, commentators, and gamers. Based on statistic, the majority of chatters were Collaborators and Lurkers. With these four social roles of chatters, I conducted a discourse analysis to further investigate the interactions among these roles in chatrooms and to explore how they shape the conversations in different channels. Collaborators and Lurkers were the main force to keep the conversation flowing. For Trolls, their trolling and rule-breaking behaviors usually violet the order in chatroom and made negative effects. However, sometimes their chats

also had positive effects such as creating new topics and stimulating discussions. The main job for Moderators were to help streamer moderate the channel by fighting against Trolls and supporting Lurkers and Collaborators. They also played an essential role in building chat rules and social norms in the channel. With these findings, I generated the four social role model of participations in Twitch chatrooms. Compare to Cheung and Huang's nine personas model of game spectating (Cheung & Huang, 2011), the four-role model was more specific for game streaming platforms, and indicated the role as Moderator. Compare to the reader-to-leader framework (Preece & Shneiderman, 2009), the participation in Twitch chatrooms were likely following a similar pattern: among all viewers, some of them became Lurkers by chatting once or twice but most time just watching. Then some of them participated in the chat more and more, becoming Collaborators or Trolls. Finally, some Collaborators became Moderators. I also created an extension of the reader-to-leader framework with the role Troll.

In this study, I analyzed four chatter roles by focusing on the chatters in Twitch personal channels that streaming Overwatch. For future study, I would suggest investigating other personal channels that streaming competitive games other than Overwatch to see if they show similar patterns. Beside personal streaming, it would also be important to study the chatting behaviors in other types of streaming channels, such as channels broadcasting e-Sport events.

For future study, focusing on top game streaming channels with massive amount of viewers would also be a potential direction. During this research, I noticed that there were popular game streaming channels with 10 to 30 thousand viewers at the same time. However, due to the limitation of time and energy, I selected sample channels with the

viewer count varied from 20 to 2,000 as focus. While the viewership of game streaming was still increasing, there would be more and more large channels.

Due to the limitation of data collection in this study, I didn't have data that clearly indicated the transition through which users moved from newcomer to regular member. This evolution could represent a future direction to study the transition among roles, to see if they follow a similar pattern with the reader-to-leader framework, as well as to investigate the motivations of transition.

REFERENCES

Alexander, S. (2016). The Gameful World: approaches, issues, applications. *Ergonomics*, *59*(2), 326–328. https://doi.org/10.1080/00140139.2015.1067048

Anderson, C. A., & Bushman, B. J. (2001). Effects of Violent Video Games on Aggressive Behavior, Aggressive Cognition, Aggressive Affect, Physiological Arousal, and Prosocial Behavior: A Meta-Analytic Review of the Scientific Literature. *Psychological Science*, *12*(5), 353–359. https://doi.org/10.1111/1467-9280.00366

Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology*, *78*(4), 772–790. https://doi.org/10.1037/0022-3514.78.4.772

Ang, C. S., & Zaphiris, P. (2010). SOCIAL ROLES OF PLAYERS IN MMORPG GUILDS. *Information, Communication & Society*, *13*(4), 592–614. https://doi.org/10.1080/13691180903266952

Arazy, O., Ortega, F., Nov, O., Yeo, L., & Balila, A. (2015). Functional Roles and Career Paths in Wikipedia. *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing - CSCW '15*, 1092–1105. https://doi.org/10.1145/2675133.2675257

Audience | Twitch Advertising. (2016). Retrieved May 2, 2017, from Twitch website: http://twitchadvertising.tv/audience/

Bergeron, B. (2006). *Developing serious games (game development series)*. Retrieved from http://www.citeulike.org/group/3106/article/1426623

Blizzard. (2018). Blizzard Streaming - Blizzard Support. Retrieved April 11, 2018, from https://eu.battle.net/support/en/article/133346

Boellstorff, T., Nardi, B., Pearce, C., & Taylor, T. L. (2012). *Ethnography and virtual worlds: A handbook of method*. Princeton: Princeton University Press.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Buntain, C., & Golbeck, J. (2014). Identifying social roles in reddit using network structure. *Proceedings of the 23rd International Conference on World Wide Web - WWW '14 Companion*, 615–620. https://doi.org/10.1145/2567948.2579231

Chatbots & IRC | Twitch Developers. (n.d.). Retrieved April 7, 2019, from https://dev.twitch.tv/docs/irc/#overview

Cheung, G., & Huang, J. (2011). Starcraft from the stands: understanding the game spectator. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 763–772. https://doi.org/10.1145/1978942.1979053

Churchill, B. C. B., & Xu, W. (2016). The Modem Nation: A First Study on Twitch.TV Social Structure and Player/Game Relationships. *2016 IEEE International Conferences on Big Data and Cloud Computing (BDCloud), Social Computing and Networking (SocialCom), Sustainable Computing and Communications (SustainCom) (BDCloud-SocialCom-SustainCom)*, 223–228. https://doi.org/10.1109/BDCloud-SocialCom-SustainCom.2016.43

Deng, J., Cuadrado, F., Tyson, G., & Uhlig, S. (2015). Behind the Game: Exploring the Twitch Streaming Platform. *Proceedings of the 2015 International Workshop on Network and Systems Support for Games*, 8. Retrieved from http://dl.acm.org.ezproxy.lib.purdue.edu/citation.cfm?id=2984083&CFID=959105947&CFTOKEN=92824458

Denzin, N. K., & Lincoln, Y. S. (2011). INTRODUCTION: The Discipline and Practice of Qualitative Research. In *The Sage handbook of qualitative research* (pp. 1–19). https://doi.org/10.1017/CBO9781107415324.004

Edge, N. (2013). Evolution of the gaming experience: live video streaming and the emergence of a new web community. *Elon Journal of Undergraduate Research In*. Retrieved from http://www.inquiriesjournal.com/articles/821/evolution-of-the-gaming-experience-live-video-streaming-and-the-emergence-of-a-new-web-community

emilygera. (2014). Twitch: 68 percent of users have cut back on TV - Polygon. Retrieved April 13, 2018, from Polygon website: https://www.polygon.com/2014/1/16/5314940/twitch-68-percent-of-users-have-cut-back-on-tv-because-of

EsportsCharts. (2018). Worlds 2018 — 200 million viewers at once. Retrieved from https://escharts.com/blog/worlds-2018-final

Freitas, E. (2017). Presenting the Twitch 2016 Year in Review. Retrieved August 5, 2017, from https://blog.twitch.tv/presenting-the-twitch-2016-year-in-review-b2e0cdc72f18

Funk, J. B., Buchman, D. D., Jenks, J., & Bechtoldt, H. (2003). Playing violent video games, desensitization, and moral evaluation in children. *Journal of Applied Developmental Psychology*, *24*(4), 413–436. https://doi.org/10.1016/S0193-3973(03)00073-X

Gandolfi, E. (2016). To watch or to play, it is in the game: The game culture on Twitch.tv among performers, plays and audiences. *Journal of Gaming & Virtual Worlds*, *8*(1), 63–82. https://doi.org/10.1386/jgvw.8.1.63_1

Gee, J. P. (2003). What Video Games Have to Teach Us About Learning and Literacy. *ACM Computers in Entertainment Bruer Clark Cognition and Technology Group at Vanderbilt Lave*, *1*(1). Retrieved from http://www.amazon.com/exec/obidos/ASIN/1403961697/qid=1062706188/sr=21/ref=sr_2_1

Gee, J. P. (2011). An introduction to discourse analysis: Theory and method. In *Routledge*. https://doi.org/10.1016/0346-251X(88)90022-X

Gliwa, B., Zygmunt, A., & Koźlak, J. (2013). *Analysis of Roles and Groups in Blogosphere*. https://doi.org/10.1007/978-3-319-00969-8_29

Hamilton, W. A., Garretson, O., & Kerne, A. (2014). Streaming on twitch: fostering participatory communities of play within live mixed media. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1315–1324. https://doi.org/10.1145/2556288.2557048

Hardaker, C. (2010). Trolling in asynchronous computer-mediated communication: From user discussions to academic definitions. *Journal of Politeness Research. Language, Behaviour, Culture*, Vol. 6, p. 215. https://doi.org/10.1515/jplr.2010.011

Herring, S., Job-Sluder, K., Scheckler, R., & Barab, S. (2002). Searching for safety online: Managing “trolling” in a feminist forum. *Information Society*. https://doi.org/10.1080/01972240290108186

Hu, M., Zhang, M., & Wang, Y. (2017). Why do audiences choose to keep watching on live video streaming platforms? An explanation of dual identification framework. *Computers in Human Behavior*, *75*, 594–606. https://doi.org/10.1016/j.chb.2017.06.006

IOC NEWS. (2018). Olympic Movement esports and gaming communities meet at the Esports Forum. Retrieved August 20, 2018, from IOC NEWS website: https://www.olympic.org/news/olympic-movement-esports-and-gaming-communities-meet-at-the-esports-forum

Irwin, A. R., & Gross, A. M. (1995). Cognitive tempo, violent video games, and aggressive behavior in young boys. *Journal of Family Violence*, *10*(3), 337–350. https://doi.org/10.1007/BF02110997

Jenny, S. E., Manning, R. D., Keiper, M. C., & Olrich, T. W. (2016). Virtual(ly) Athletes: Where eSports Fit Within the Definition of "Sport." *Quest*, *00*(00), 1–18. https://doi.org/10.1080/00336297.2016.1144517

Jia, A. L., Shen, S., Epema, D. H. J., & Iosup, A. (2016). When Game Becomes Life: The Creators and Spectators of Online Game Replays and Live Streaming. *ACM Transactions on Multimedia Computing, Communications, and Applications*, *12*(4), 1–24. https://doi.org/10.1145/2957750

Karhulahti, V.-M. (2016). Prank, Troll, Gross and Gore: Performance Issues in Esport Live-Streaming. *Proceedings of 1 St International Joint Conference of DiGRA and FDG*. Retrieved from https://s3.amazonaws.com/academia.edu.documents/45746453/DiGRAFDG_2016_paper_110.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1523500354&Signature=YV6JzTJhWZZtkz794h6xZTJUAtM%3D&response-content-disposition=inline%3B filename%3DPrank_Troll_Gross_and_

Kaytoue, M., Silva, A., Cerf, L., Meira Jr., W., & Raïssi, C. (2012). Watch me playing, i am a professional: a first study on video game live streaming. *Proceedings of the 21st International Conference Companion on World Wide Web*, 1181–1188. https://doi.org/10.1145/2187980.2188259

Kou, Y., Gray, C. M., Toombs, A. L., & Adams, R. S. (2018). Understanding Social Roles in an Online Community of Volatile Practice. *ACM Transactions on Social Computing*, *1*(4), 1–22. https://doi.org/10.1145/3283827

Lee, D., & Schoenstedt, L. (2011). Comparison of eSports and Traditional Sports Consumption Motives. *Lee, D., & Schoenstedt, L. J. (2011). Comparison of ESports and Traditional Sports Consumption Motives. ICHPER--SD Journal of Research in Health, Physical Education, Recreation, Sport & Dance, 6(2).*, *6*(2), 39–44.

Lessel, P., Mauderer, M., Wolff, C., & Krüger, A. (2017). Let's Play My Way: Investigating Audience Influence in User-Generated Gaming Live-Streams. *Proceedings of the 2017 ACM International Conference on Interactive Experiences for TV and Online Video*, 51–63. https://doi.org/10.1145/3077548.3077556

Lifecourse Associates. (2014). *The New Face of Gamers*. Retrieved from http://twitch.wpengine.com/wp-content/uploads/2014/06/TheNewFaceofGamers1.pdf

Maxwell, J. A. (2013). Qualitative research design: An interactive approach. In *Qualitative research design: An interactive approach* (3rd ed.). London: SAGE Publications.

Miniwatts Marketing Group. (2018). World Internet Users Statistics and 2018 World Population Stats. Retrieved April 11, 2018, from https://www.internetworldstats.com/stats.htm

Newzoo. (2017). Newzoo's 2017 Report: Insights into the $108.9Bn Global Games Market. Retrieved April 11, 2018, from https://newzoo.com/insights/articles/newzoo-2017-report-insights-into-the-108-9-billion-global-games-market/

Olejniczak, J. (2015). Redefining Community in Intercultural Context A LINGUISTIC STUDY OF LANGUAGE VARIETY USED ON TWITCH.TV: DESRIPTIVE AND CORPUS-BASED APPROACHES. *Brasov*, 21–23. Retrieved from http://www.afahc.ro/ro/rcic/2015/rcic'15/IEL/Olejniczak.pdf

Ottelin, T. (2015). *Twitch and professional gaming: Playing video games as a career? Degree Programme in Music and Media Management Business and Services Management* (Jamk University of Applied Sciences). Retrieved from https://www.theseus.fi/bitstream/handle/10024/96979/Opinnaytetyo.pdf;sequence=1

Pan, R., Bartram, L., & Neustaedter, C. (2016). TwitchViz: A Visualization Tool for Twitch Chatrooms. *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '16*, (January), 1959–1965. https://doi.org/10.1145/2851581.2892427

Patton, M. Q. (2014). Enhancing the quality and credibility of qualitative studies. In *Qualitative research & evaluation methods* (4th ed., pp. 652–743). Retrieved from https://mycourses.purdue.edu/bbcswebdav/pid-8483340-dt-content-rid-34689784_1/courses/wl_58529.201720/wl_58529.201720_ImportedContent_20170111112714/Validity Credibility Patton 4th.pdf

Pellicone, A. (2016). Performing Play: Cultural Production on Twitch.tv. *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems - CHI '16*, 244–248. https://doi.org/10.1145/2851581.2859022

Pires, K., & Simon, G. (2015). YouTube Live and Twitch: A Tour of User-Generated Live Streaming Systems. *MMSys*, 225–230. Retrieved from https://hal.archives-ouvertes.fr/hal-01185075/document

Preece, J., & Shneiderman, B. (2009). The Reader-to-Leader Framework: Motivating Technology-Mediated Social Participation. *Transactions on Human-Computer Interaction THCI AIS Transactions on Human-Computer Interaction AIS Transactions on Human-Computer Interaction*, *1*(1), 13–3213. Retrieved from http://veffort.us/wiki/images/c/cd/Preeceformativediscussion.pdf

Ramirez, D., Saucerman, J., & Dietmeier, J. (2014). Twitch Plays Pokemon: A Case Study in Big G Games. *Proc. DiGRA*, 3--12.

Seabrook, J. (1998). *Deeper: My two year odyssey in cyberspace*. Retrieved from https://dl.acm.org/citation.cfm?id=522410

Seering, J., Savage, S., Eagle, M., Churchin, J., Moeller, R., Bigham, J. P., & Hammer, J. (2017). Audience Participation Games: Blurring the Line Between Player and Spectator. *Proceedings of the 2017 Conference on Designing Interactive Systems - DIS '17*, 429–440. https://doi.org/10.1145/3064663.3064732

Sj, M., Oblom, €, & Hamari, J. (2016). *Why do people watch others play video games? An empirical study on the motivations of Twitch users*. https://doi.org/10.1016/j.chb.2016.10.019

Smith, T., Obrist, M., & Wright, P. (2013). Live-streaming changes the (video) game. *Proceedings of the 11th European Conference on Interactive TV and Video - EuroITV '13*, 131. https://doi.org/10.1145/2465958.2465971

Twitch. (2018). Twitch.tv - About. Retrieved April 8, 2018, from https://www.twitch.tv/p/about

Welser, H. T., Cosley, D., Kossinets, G., Lin, A., Dokshin, F., Gay, G., & Smith, M. (2011). Finding social roles in Wikipedia. *Proceedings of the 2011 IConference on - IConference '11*, 122–129. https://doi.org/10.1145/1940761.1940778

Wohn, D. Y. (2019). Volunteer Moderators in Twitch Micro Communities: How they Get Involved, the Roles they Play, and the Emotional Labor they Experience. *Proceedings of CHI*.