Crossing Virtual Realms: Exploring the Social Interactions of Gaming Communities of *Animal Crossing: New Horizons* on Discord

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ABSTRACT

Animal Crossing: New Horizons (ACNH) is a social networking game that gained popularity during the COVID-19 pandemic for offering players a way to maintain social interactions and a routine in their daily lives. Players transform a deserted island into paradise by building a community filled with lively animal villagers. The game fosters exploring, decorating, and interacting with fellow players, which led to the formation of online communities surrounding ACNH, most notably on platforms such as Discord. Despite extensive research on social interactions in MMORPG's and MMOPG's, social networking games such as ACNH are less focused upon. This thesis aims to fill this gap by exploring the social interactions within the ACNH Discord community with the following research question: *How is social interaction structured and centralized within a gaming Discord community, and what are the key characteristics of the identified sub-communities?* Textual messages from the ACNH Discord's general chat channel were collected using Discord's API, from which only direct replies were selected for analysis to infer about the connections between community members. A mixed method approach was used to gain insights on both the underlying structure and the meanings of the community members' social interactions. A network analysis is used to identify central figures in the community and their social roles, as well as the sub-communities within the network. The community was found to have a small-world network with loose divisions into sub-communities. The central figures took on the roles of socializer, content generator, passive member and bridging member. The thematic analysis examines the contents of the members' messages to understand how social identity and social presence is experienced within the sub-communities. Social identity is mostly expressed through recognizing similarities in interests, preferences, and experiences in gaming. Social presence is encouraged by sharing about their real lives, such as relationships and their days' activities, and by engaging in shared actions. The findings of this thesis may offer practical suggestions for video game franchises for promoting player engagement and theoretical implications for several academic fields. However, as many components of social identity and social presence were not commonly found, follow-up research may be useful.

Qualitative interviews, for example, may provide a more thorough understanding of the community members' social interactions from their perspective.

KEYWORDS: *social interaction, gaming communities, social identity, social presence, social network*

Table of Contents

1. Introduction

1.1 Animal Crossing: New Horizons, Online Community & Social Network Game

Coinciding with the COVID-19 pandemic, the game Animal Crossing: New Horizons (ACNH) became a success as it helped players escape their locked down homes (Eadicicco, 2020; Zhu, 2020, p. 158) and connect with others (Lewis et al., 2021, p. 2). In the game, players start living on a deserted island and are given the task of transforming it into their own paradise (Nintendo Games, n.d.-a; Nintendo Games, n.d.-b). Players can achieve this by collecting, crafting, and customizing items, and then using them to decorate the island. The game also encourages exploration, as the island is full of interesting insects, sea creatures, and fossils that can be captured and added to the island's museum. Together with the player, animal characters brimming with personality live on the island and form a tight-knit community, allowing for fun interactions. In ACNH, the time and season align with real life, making checking in on the island every day an opportunity to discover something new throughout the year. During the pandemic, this also had the added benefit of providing players with an alternative social life. By playing the game, players could return to the feeling of having a normal life, including routines, social interactions, and forging connections (Eadicicco, 2020).

Figure 1.1 Video Game Title Image of *Animal Crossing: New Horizons* (ACNH)

Note. From *Nintendo Games*, n.d. (https://www.nintendo.com/us/store/products/animal-crossing-new-horizons-switch/)

As ACNH encouraged playing with others (Zhu, 2020, p. 158), online communities where players could meet each other were formed, for example on Discord. Initially, the platform was aimed at connecting friends across distances through online gaming and communicating while doing so (Discord, n.d.-a). Currently, it has expanded to 19 million active servers per week used for gaming, as well as for building communities and friendships (Discord, n.d.-a). Other common types of gaming communities are found in Massive Multiplayer Online Role-Playing Games (MMORPGs), where players express themselves using in-game avatars (Park & Chung, 2011, p. 2372). Here, players form guilds and clans that typically embody social values (Park & Chung, 2011, p. 2373) and help establish connections (Wang, 2023, p. 14). These communities can chat in-game but also use platforms such as Discord because they allow for smoother communication and gaming experiences (Wang, 2023, p. 14).

ACNH is a social network game (SNG) in which the social connections a player has online is a vital part of the gaming experience (Boudreau & Consalvo, 2015, p. 78). Through its functionalities, the game fosters player interaction and brings people together (MacDonald, 2020). Players are stimulated to play together to share or trade items, to show off and gain inspiration from island decorations or to simply hang out together. Furthermore, the game's objective is to build a community in which players need to interact and cooperate with others to achieve this goal (Nintendo Games, n.d.-a). These kinds of behaviors may also be useful for developing and maintaining the ACNH community on Discord. This is because the game's principles that foster community-building, such as being hospitable and collaborating, can apply to real-life scenarios as well (Cassol, 2021). Thus, the playing behavior needed to progress in the game may be similar to how the players interact in the online ACNH community. By observing this, it may be better understood how online gaming communities of SNGs are socially structured. More specifically, this is researched with the following research question and sub-questions:

Research Question: *How is social interaction structured and centralized within a gaming Discord community, and what are the key characteristics of the identified sub-communities?*

Sub-question 1: *Who are the central figures within the community, and what specific roles do various members play?*

Sub-question 2: *Are there distinct sub-communities within the community, and how do members express their social identity and social presence within these sub-communities?*

1.2 Academic Relevance

While MMORPGs and MMOPGs (Massively Multi-Player Online Games) have been studied for their social interactions and behaviors (Lin & Sun, 2016, p. 285; Park & Chung, 2011, p. 2372), games such as ACNH appear to be under-researched in this area. By addressing the research gap concerning social interactions in communities of SNGs, the findings of this research have theoretical implications. The popularity of ACNH during the COVID-19 pandemic has made the game a fitting phenomenon to study players' psychological well-being (Lewis et al., 2021, pp. 4-5; Yee & Sng, 2022, pp. 3-4; Zhu, 2020, p. 158) and to explore its potential for learning (Lin & Su, 2020; Villarejo-Carballido et al., 2022, p. 6). Also, previous studies in gaming communities have explored customer loyalty (Hsu & Lu, 2007, pp. 1646-1648), cooperative and competitive relationships (Yuan et al., 2007, pp. 482-483), and gamer continuance intention (Tseng et al., 2015, p. 608). Furthermore, Kobayashi (2010, pp. 560-561) and Kou et al. (2017, p. 4) took a more social approach by examining social capital and prosocial behavior through a survey and an ethnographic study, respectively. In short, earlier works show that research on online gaming communities has, so far, mostly focused on social interactions in MMORPGs and MMOPGs, other social topics or different topics entirely. Moreover, social interactions in gaming communities seem to not have been explored on both its quantitative and qualitative aspects. By approaching social interactions in the context of the SNG ACNH and its accompanying Discord community, this thesis aims to start filling this gap by conducting a network analysis on the community's structure and a thematic analysis on the contents of their interactions. This context and method offer a new perspective which can contribute to existing research. Furthermore, the results of the thesis can be used to identify potential focal areas for future research to further expand on the academic field of gaming communities.

1.3 Societal Relevance

Furthermore, the thesis provides practical recommendations for the video game industry. Video game franchises may benefit from gaining insight into how online gaming communities form and function and how players interact and play together. These communities bring players together to communicate with each other which allows them to

create a cohesive group surrounding the video game (Casaló et al., 2008, p. 32). When a lot of interaction takes place within the community, it may encourage its members' dedication to the community. This highly participative behavior of players, in turn, can foster ties between the video game franchise and its players. Here, players may feel emotionally connected and committed to the game. Another advantage of this is that when players gain enjoyment from these interactions, they may also view the game more positively (Badrinarayanan et al., 2015, p. 1050). Additionally, it was found that the more players feel part of the group, the more likely they feel loyalty towards a video game franchise and intend to continue playing the game (Hsu & Lu, 2007, pp. 1646-1648; Tseng et al., 2015, p. 608). Thus, franchises may gain advice from this thesis on how to create communities that invite its members to interact with each other, allow for enjoyful conversations, and foster group cohesion in order to develop a dedicated fanbase. Moreover, the thesis may shed light on the players' experiences and their likes and dislikes of a game (Pitta & Fowler, 2005, pp. 287-289). Video game developers can use this feedback to enhance their existing games with updates and guide the creation of new games.

1.4 Chapter Outline

This research explores the online gaming community on Discord surrounding the game ACNH. Using a network analysis, characteristics of how members are connected and communicate within the community are explored. Firstly, the central figures who are most important in a network are identified. It is then investigated what social roles they play in the community, including socializers, content generators, visitors, passive members, bridging members, and bonding members. This analysis is also used to detect sub-communities in which members cluster together into groups within the overall community to better understand the community's social structure. The thesis follows with a thematic analysis to examine the contents of the messages that community members exchange. Here, themes are identified that shed light on how members experience social identity and social presence in the community. How the themes are distributed among the sub-communities and how members express these themes is then compared and analyzed. By integrating these findings with the theory discussed in the theoretical framework, the research question is answered.

2. Theoretical Framework

2.1 Fans & Gaming Community

2.1.1 Fans & Community

As a pioneer in fandom studies, Henry Jenkins coined the term “textual poachers” to describe fans as active consumers who engage with the popular media they are interested in, as opposed to more passively consuming content (Jenkins, 1992, p. 10). Additionally, the development of new media and the Internet further encouraged fans to use and share content in multiple ways, such as music videos and digital art (Jenkins, 2006, p. 140), resulting in a more interactive relationship with media. Research commonly focuses on fans' participatory culture (Linden & Linden, 2017a, pp. 48-49), emphasizing their engagement and activity (Linden & Linden, 2017b, pp. 11-12). Fans may also be involved on an identificatory and affective level (Sandvoss et al., 2017, p. 9). In gaming, for example, studies have shown that video games may allow for identification with their characters (Hefner et al., 2007, p. 44) and elicit emotional responses in players (Lankoski, 2012, pp. 42-43).

Due to their participatory behavior and the advent of new media, fans can easily form communities online (Sandvoss et al., 2017, p. 3). New communication technologies can facilitate continuous interactions necessary for sustaining these communities (Bury, 2016, p. 633). To better understand how communities can be defined and how they operate, McMillan and Chavis (1986, pp. 9-14) identified four elements. Members have (1) a sense of belonging and (2) a feeling of influence, as they have an impact on and are impacted by the community. Furthermore, they (3) perceive that their needs of being a member are fulfilled, and (4) they feel a shared emotional connection with other members through similar experiences, time spent together, and so on. Also, in the context of video game fans, communities may be formed based on experiences of identification and cooperation (Liao et al., 2020, p. 8). When members play more games with others, they may be more inclined to identify as a group. Additionally, players who become more knowledgeable about playing cooperatively may be more likely to adhere to social norms. These, in turn, can foster commitment among players. Thus, community is a multidimensional concept and can be used for various purposes.

2.1.2 Gaming Community

Video game fans may come together online and build communities in which they can game together as well as seek interaction with other players. The importance of sociability, in gaming communities specifically, can be attributed to the motivations for playing games.

Research found that games are frequently played because of social factors, such as interactivity between players, opportunities for socializing, and forging connections with others (Cheah et al., 2021, p. 942; Dalisay et al., 2015, p. 1411; Hilgard et al., 2013, p. 8). Furthermore, gaming with others online often leads to more perceived pleasure (Ravaja, 2009, p. 281) and engagement (p. 284). Moreover, the social dimension of gaming is linked to eliciting positive emotional responses in players (p. 281). Playing games with others, whether they are friends or strangers, was found to stimulate more positive facial expressions, such as smiling, as well as fewer negative responses like frowning (p. 286). This indicates that as players compete, collaborate, or simply converse with others, it can affect their emotions. Social interactions can thus enhance the enjoyment players gain from gaming and shape their player experiences. Moreover, these interactions can contribute to a sense of connection between players, which in turn may encourage community building.

Kreijns and colleagues (2021, pp. 159-160) explain how online platforms can foster social interaction by focusing on the concepts of sociability and social space. The extent to which computer-mediated communication and electronic platforms facilitate the experience of social presence and create a social space, is termed sociability (p. 160). In other words, whether someone perceives sociability is determined by the platform and its affordances rather than the social interactions that occur. Furthermore, social space refers to a person's network of connections with others which is often nested in group structures of such as values, roles, or rules (p. 159). This means social space is a feature of a group, instead of dependent on the platform. Exploring these concepts within the concept of the game ACNH and the accompanying community, which are at the centre of the current study, the social aspects of online communities may be better understood.

Within the game ACNH and its online gaming community on Discord, sociability may be promoted through the platform's affordances for interaction. Discord offers text and voice chats to converse, friend lists, and community servers (Discord, n.d.-a), which may contribute to the sense of being in touch with others on the platform and in the game. Additionally, social space is reflected in Discord in how players can form gaming clans or guilds, which are groups who play together (Toombs et al., 2022, p. 3), or online communities within servers (Discord, n.d.-a). Here, players may build and expand on their network of relationships with others, by participating in conversations, establishing relationships, and share common interests and experiences. Also, Discord servers may strengthen the sense of a social space with roles, rules, abilities, and moderation tools (Discord, n.d.-a). Members of a server can be given roles such as staff member or moderator,

who may be given the responsibility of ensuring that the rules of the clan, guild, or community are adhered to. They may be given special abilities such as custom member access, granting them power to take control of the server when needed. Thus, online platforms such as Discord promote social player experiences by facilitating social presence through its interactive features. Furthermore, members of an online community can take on roles and responsibilities, which creates the feeling of a shared space for conversing and connecting with others.

Besides the social advantages for video game players, encouraging the formation and maintaining of online communities may be beneficial for the gaming industries as well. Through interacting with other members, players may place more trust in the community and be encouraged to participate (Casaló et al., 2008, p. 32). This may strengthen players' engagement with and commitment to game franchises (p. 32). Moreover, players having positive experiences of socializing in games can strengthen favorable attitudes towards a game (Badrinarayanan et al., 2015, p. 1050). Similar to Casaló et al.'s (2008, p. 32) findings, this makes it more likely that players will experience a sense of loyalty towards the game and continue playing in the future. Fandom communities may also provide insights into the preferences, dislikes, and behaviors of video game players (Pitta & Fowler, 2005, pp. 287-289). This information may help game developers understand what to improve and what to focus on in future products. Thus, online fandom communities may be useful for fostering brand loyalty and offering valuable feedback.

2.2 Online Community & Online Network

2.2.1 Online Network & Computer-Mediated Communication (CMC)

Online fan communities can be explained by Boyd's (2008, pp. 125-126; 2010, p. 40) definition of networked publics. Social network sites, such as Discord, create publics using networked technologies that allow individuals to gather and communicate with others from any place. While networked publics may have the same purposes and uses as other publics, the key difference is that the structure of the publics is mediated by the technologies needed to develop them. In other words, networked technologies have affordances that can shape the interactions of the publics' members. For example, online chatting enables asynchronous conversations as messages can be saved longer than possible in person. Thus, networked publics are built upon the use of Internet-supported technologies for socially interacting with others, commonly known as computer-mediated communication (CMC).

Computer-mediated communication is often used for playing video games online. Khairunisa (2020, p. 175) suggests that the use of CMC is developing a different culture of playing together online as it allows players to communicate instantaneously using text and speech. Adding CMC to online games create shared virtual environments that transform playing video games into a more social and interactive experience (Kuznekoff & Rose, 2012, p. 542). That is why CMC may foster community building for online players. Bury (2016, p. 633) states that some social networking sites are not fit for online communities as they lack the functionalities for having coherent conversations. However, communications platform Discord does have affordances that foster in-depth interactions and community-building. Features such as voice chat and text chat were found to be crucial for players to communicate while playing (Garcia, 2022, p. 9). Moreover, they may make players feel more comfortable to approach new people and promotes participating in the Discord community. This ease of interaction as well as the options to customize the server environments encourages players to contribute to their online community.

2.2.2 ACNH Discord Community & Social Network Game

While ACNH may not strictly be considered a social network game (SNG; Boudreau & Consalvo, 2015, p. 78), the accompanying Discord community may add similar social aspects to the game experience. Boudreau and Consalvo (2015, p. 78) describe SNGs as games wherein a player's online social network is important in the gameplay and that players often play asynchronously. In *Farmville*, for example, players can visit each other's farms to look around or water their crops without needing to play at the same time. While this does not necessarily aid players advance in the game, it may enhance social relations between players in which they are encouraged to help each other, for example through gifting items (Wohn et al. 2011, as cited in Boudreau & Consalvo, 2015, p. 81). Similar to social media platforms, SNGs may provide opportunities for sustaining social contacts and a feeling of connection with friends and family without directly interacting (Wen et al., 2011, p. 257).

The ACNH Discord community is an online meeting place for players to connect, share their experiences, trade items, and visit each other's islands. This may allow for social interactions alike to those found in SNGs (Boudreau & Consalvo, 2015, p. 78). While players may not be online at the same time and play directly together, they can still help each other, for example by sending gifts. This is akin to *Farmville*, where players could visit each other's farms without needing to both being there at the same time. Moreover, the online community

allows players to offer each other help and tips or to exchange items. This collaborative feature may strengthen social ties between players, mirroring Wohn et al.'s (2011, as cited in Boudreau & Consalvo, 2015, p. 81) findings. Furthermore, social connections within the Discord community may be easily maintained as synchronous interactions is not required, similar to how preserving contacts and connections works on social media platforms (Wen et al., 2011, p. 257). Thus, while ACNH may not fall under the category of SNGs, its accompanying Discord community may align with the social features of them, fostering interaction, collaboration, and a feeling of connection.

Compared to the in-game chat system of ACNH, Discord's communication features are more advanced which makes it more suitable for accompanying SNGs. In the game, players can only send textual messages to one player at a time, whereas Discord offers several chat channels in which multiple players can all chat together (Discord, n.d.-b). Moreover, these channels are organized by topic in which also images, gifs, and emojis can be shared, facilitating more focused and richer conversations. The larger scale of Discord allows players from all over the world to converse with anyone and build a community together (Discord, n.d.-a; Discord, n.d.-b). In ACNH, on the other hand, communication is limited to players who are already friends on the Nintendo Switch or have exchanged their Dodo codes, which is used to visit islands of other players. This means that players can only chat in-game with people they know or have specifically invited to their island. Thus, Discord may be a better platform for analyzing social interactions more in depth because of its practical advantages for communicating with one's online network.

Fans may form online communities and use computer-mediated communication to provide each other support and empathy, create a sense of belonging and to build a shared sense of identity (Papadakis, 2003, p. 7). Even though research on the social interactions of gaming communities seems to lack, studies have been conducted on social motivations for playing video games with others online. Research on World of Warcraft has shown that players experienced feelings of belonging within gaming communities (O'Connor et al., 2015, p. 465). Furthermore, it was found that players built online friendships, developed social identities of being part of a group, and received social support from other players. Similarly, Liu and Chang (2016, p. 911) found that video games are often played online to interact or play together with others. This may allow players to meet new friends based on their shared interest in the game and discuss the game's content with like-minded people. Since ACNH promotes making friends, visiting other islands, working together, and building a community (Zhu, 2020, p. 158), players of the game may seek similar interactions online.

Since there has been no prior research on the social interactions among players in online gaming communities, to the best of the researcher's knowledge, the current study aims to fill this gap by exploring a Discord community centered around ACNH. The game presents a fitting subject for investigation due to its social nature, involving community-building on an island, and its many features designed to encourage playing together.

2.3 Sociability in Community & Social Network

2.3.1 Social Identity in Gaming Communities

Although the social aspects of gaming are not widely researched yet (Won Jung, 2020, p. 7), similar research on online communities may provide a useful background for the current study. Fans of video games may want to belong to and participate in a community, as it can play a part in their self-identification. Social identity theory states that members may not create a perception of themselves based on their own individual traits, but instead based on the traits they have in common with fellow community members (Turner, 1982, as cited in Shen et al., 2010, p. 340). This way, belonging to a community becomes part of their identity. Shen and colleagues (2010, p. 344) found that this can also apply to online communities who communicate using text only, such as online forums and discussion groups. For members who socially identify with a community, their membership holds emotional value. That is why they are more likely to seek social interaction and share information within the community. Likewise, Chiu et al. (2015, p. 514) suggest that identification with an online community promotes supportive behavior among its members aimed at developing and maintaining the community. For example, they may offer help, provide support, or contribute knowledge (p. 505). This shows how the community can bring members enjoyment and social support which strengthens their sense of identification with the community (p. 514). In turn, this may motivate members to behave likewise and contribute to the community that way. Thus, the research by Shen et al. (2010) and Chiu et al. (2015) indicates that being part of an online community can be appealing as it may fulfil emotional and social needs, as well as shape self-identification.

Tajfel (1978, as cited in Mousavi et al., 2017, pp. 377-278) expands on this by suggesting that a social identity is formed when someone's membership of a group or community holds cognitive, emotional, and evaluative value. The cognitive component refers to perceiving members of the same group as similar to themselves, while non-members are regarded as different. Here, aligning with Turner's statements (1982, as cited in Shen et al.,

2010, p. 340), a person's self-identity may share similarities with the community identity. The emotional aspect, or affective commitment, includes the feelings someone has towards the community, such as feelings of belonging or attachment. The evaluative value describes how people feel about themselves based on the groups they belong to. For example, one might feel better about themselves because they are an important part of a particular community. Moreover, Tsai and Bagozzi (2014, p. 156) found that these three components, i.e., social identity, can encourage we-intentions, which, in turn, motivates members to contribute to their online community. These we-intentions refer to when sharing ideas or plans, for example, members may use the word "we" instead of "I" to indicate that it is an intention shared with others (p. 145). As these types of actions showcase how a person is collectively working with others, we-intentions may be an indicator for strongly identifying with the community. Thus, understanding social identities sheds light on how players regard themselves in relation to the online community of the game, feel emotionally connected to it, and how they evaluate themselves based on their membership. Furthermore, it can give insights into how players sharing intentions can affect their behavior in the community. This indicates that focusing on social identity may be of added value in exploring the social interactions within the ACNH Discord community.

2.3.2 Social Presence in Gaming Community

Another social aspect to gaming is the level of social presence that players experience. Social presence conceptualizes the feeling of being with one or multiple others (Biocca et al., 2003, as cited in Oh et al., 2018, p. 2). The concept has been extensively researched in the context of computer-mediated communication, to explore to what extent mediated environments can affect feeling present with another (Oh et al., 2018, p. 3; Poinsot et al., 2022, pp. 1-2). For example, perceiving identity cues and learning about the personality or traits of someone virtually can enhance social presence (Oh et al., 2018, pp. 23-24). This concept was found to be especially important to investigate during the lockdown regulations of the COVID-19 pandemic, for example for education, as the quality of online learning could suffer from a lack of social presence (Abaakil & Belhaj, 2023, 3587). Since the interactions within video games and Discord communities both take place on a computer of some sort, the effects on social presence may be akin to those in computer-mediated communication.

Biocca and colleagues (2003, as cited in Ekman et al., 2012, p. 330) identified three components that comprise social presence. Copresence is most similar to the aforementioned definition and refers to the feeling of being with another person, feeling as though the other can be physically sensed or imagined well. Psychological involvement describes to what extent someone is emotionally or mentally connected to another, for example understanding each other's feelings. And behavioral involvement focuses on how people's actions are related, such as responding to each other through their actions (e.g., alternating turns while talking) or behaving similarly (e.g., dancing). The three components of social presence as described may be relevant in the context of online gaming and gaming communities on platforms such as Discord. Lin and Sun (2016, p. 285) analyzed massively multiplayer online games (MMOGs) and identified three attributes that explain how online game worlds can allow for sociability among players, in which connections can be drawn to Biocca et al.'s (2003, as cited in Ekman et al., 2012, p. 330) social presence components. Although ACNH is not a MMOG, with the accompanying Discord community it may provide similar social experiences.

Firstly, online games allow players who are not physically close in location to experience social presence by using virtual characters (or avatars) to perform actions and have agency in interacting and working together with others (Lin & Sun, 2016, pp. 285-286). Discord mirrors this co-presence (Biocca et al., 2003, as cited in Ekman et al., 2012, p. 330) by providing players a shared online space where they can communicate and connect through chat and voice channels, despite their physical distance (Discord, n.d.-a). Secondly, MMOGs create these virtual worlds that are always continuing and growing, which gives those who are playing together a shared history (p. 286). Players may then feel like they are part of the game world along with their fellow players, enhancing their experience and stimulating the sense of belonging to the same community. Similarly, Discord encourages psychological involvement (Biocca et al., 2003, as cited in Ekman et al., 2012, p. 330) as players can build emotional and mental connections through sharing experiences and understanding each other's feelings, whether through in-game interactions or through conversations on Discord channels. Finally, online games expand on other social platforms as they allow for many types of activities, such as casually playing, professional game tournaments, as well as playing alone, in a small group, or in large numbers with players all over the world in organized events (p. 286). Comparing this to Discord, behavioral involvement can be found in how players can coordinate their actions together or collaborate in an online game, for example with strategizing or taking part in group events.

In short, the concept of social presence as described by Biocca and colleagues (2003, as cited in Ekman et al., 2012, p. 330) provides an interesting framework to apply to the context of online gaming and Discord gaming communities. The components can be used to investigate the social interactions and gaming experiences within communities, such as a sense of being with others, emotional connections, and collaborative behaviors.

2.3.3 Social Roles

Social interactions within the ACNH online fandom community may also be better understood by investigating how they occur. This could be achieved with a social network analysis that gives insights into how members are connected to each other (Hevey, 2018, p. 304). It may also be used to identify what social roles members can have in the community. These roles may be important, as the sociability of online gaming communities can be crucial in encouraging members to keep playing a game (Tseng et al., 2015, p. 610). Thus, insights may be gathered on how the community forms and functions, and what type of members and interactions are necessary for maintaining it.

Hsiao and Chiou (2012, p. 297) found that a member's social standing can affect their social experiences in an online gaming community. In the research, a high social standing is described as having a central position within a community, meaning that the member is connected to many others (p. 239). In this position, the member may experience more companionship with and support from other members (p. 297). This could be compared to being a central communicator in a network (Hevey, 2018, p. 311). These members are often deemed important for a network, as their many ties may impact what type of interactions take place and how the community is socially structured (Saxena et al., 2018, p. 1425). For example, it can allow them to receive resources more easily than other community members, such as help or items needed. Also, being well-connected to other members means that their interactions may have a bigger impact on the community than less connected members, as their messages reach more members (Hevey, 2018, p. 311).

Additionally, Akar and Mardikyan (2018, p. 10) identified other social roles members can have in an online community using a network analysis. Most community members could be divided into the following four categories: socializers, content generators, visitors, and passive members. Socializers are most similar to central communicators, as they send many messages, introduce topics of conversation, and encourage other members to engage. Following the socializers, the content generators participate most in the community. Visitors

and passive members, on the other hand, are decreasingly active with fewer logins, topics initiated, and interactions. Akar and Mardikyan (2018, pp. 12-13) found that socializers and content generators are the most important members in a community, as they have more influence over a network through receiving information and reaching other members more easily. They highlight how these members are needed to facilitate smooth flows of information throughout the community, as their absence could cause disruption (p. 13).

Akar and Mardikyan's (2018, pp 12-13) findings appear consistent with Hevey's (2018, p. 311) description of being a central communicator within a network, which emphasizes the importance of being well-connected. However, the research interestingly reveals that visitors have more relationships in the community than socializers (p. 13). Although visitors are less active in opening and adding to conversations, these members may contribute to the process of sharing information within the community as well. These members act as a bridge between various parts of a network, thereby connecting sub-communities that are otherwise separate in a network (Hevey, 2018, p. 319). This way, they facilitate the sharing of information among more community members (Saxena et al., 2018, p. 1430). Thus, whereas central communicators may have more control over the flow of information in the network, bridging members/visitors may encourage the exchanging of diverse information and new ideas between distinct groups through their connections (Olievera and Gama, 2012, p. 110).

Shen and colleagues (2014) expand on the concept of bridging in their research on the social capital of players in online gaming. They suggest that the two types of social capital bonding and bridging (Putnam, 2001, as cited in Shen et al., 2014, p. 460) closely resemble the network structures closure and brokerage (Burt, 2005, as cited in Shen et al., 2014, p. 460). Bridging, or brokerage, occurs when a member connects with groups that, otherwise, would not be connected in the network (p. 462). Within this structure, members tend to be more different from each other, meaning that they will more likely be exposed to diverse information and ideas (p. 463). In contrast, bonding, or closure, refers to connecting with others in a group who are all linked to each other as well (p. 463). The members in these groups are often more similar, and thus typically less diverse in their views and knowledge. Shen et al. (2014, p. 473) found that members with high levels of brokerage/bridging, performed better in the game as they had more access to various kinds of information from their network. High closure/bonding scores, on the other hand, resulted in more trust and solidarity between the members, as their groups are closely connected and are consistently exposed to familiar information and opinions. This research shows how members could have

different roles, which may affect the social structure of a community. For instance, bridging roles could bring more diversity to online gaming communities, whereas bonding roles allow for more closely linked groups.

To sum up, exploring the social roles that are present within an online ACNH fandom community may offer valuable insights into how social networks develop and how interactions take place. By conducting a network analysis, the connections between community members and their roles within the community may be better understood. For example, previous research has shown how members such as socializers may play a vital role in facilitating conversations and easy flow of information. These, in turn, can impact how the community is socially structured. Furthermore, members with bonding and bridging roles may promote solidarity and diversity within the online community. A more thorough understanding of how social networks form and function in online gaming communities, such as the ACNH fandom, may provide useful theoretical and practical implications for fostering and sustaining engaging online communities.

3. Research Design and Methods

3.1 Research Approach

To answer the research question *How is social interaction structured and centralized within a gaming Discord community, and what are the key characteristics of the identified sub-communities?* a mixed method was applied. Through a combination of a qualitative and quantitative method, a more thorough understanding (Tashakkori & Teddlie, 2009, pp. 286-287) of social interactions within online gaming communities can be gained. A mixed method has often been used in research conducting a social network analysis (SNA) as it sheds light on both the structure behind and the actual meanings of the social interactions between actors in a network (Crossley, 2010, p. 31; Edwards, 2010, p. 19). For example, in Crossley's (2008, pp. 491-494) research on group dynamics in a health club, network measures were used to detect key figures of the club who played a brokerage role between two sub-groups. This was then complemented with the ethnographic data of this study to interpret what having this role means (pp. 494-497). The research design of this thesis loosely follows this study by combining a network analysis with a thematic analysis. The network analysis was used to identify the central figures of the ACNH community and to measure other properties that help understand how the community's social interactions are structured. Following, the thematic analysis was conducted to provide an in-depth understanding of the meanings of the community's interactions (Ang, 2011, p. 343; Braun & Clarke, 2008, pp. 79, 83). By using both analyses, both the quantitative and qualitative aspects were investigated, providing a well-rounded exploration of how community members interact and are connected, what roles they play in the community, and the meanings of their interactions.

3.1.1 Network Analysis

A network analysis was conducted to answer sub-question 1: *Who are the central figures within the community, and what specific roles do various members play?* Previous research has used a network analysis to explore the interactions between players in guilds of MMOGs (Massively Multiplayer Online Games) (Ang, 2011, pp. 343-344). In a group or community, each member is connected to one or more others through their interactions (Marin & Wellman, 2014, p. 12). A network analysis can identify patterns in these connections and can estimate the structure of the community's network using nodes and edges (Hevey, 2018, pp. 301, 305). Here, nodes are the community members and edges are the connections between them: their interactions. These patterns can shed light on the themes

the community members discuss, with whom they converse, and how often these conversations occur. More specifically, network properties such as in-degree, out-degree centrality, strength, closeness, betweenness, and clustering (Hevey, 2018, pp. 311-313) allow for a quantitative approach to analyzing a community's network structure. In this thesis, these properties were used to explore how social interactions are structured and to identify the central members of the network. The structure was further explored by detecting sub-communities in which members tend to cluster together in groups. Based on the detected network structure and the themes identified in the subsequent thematic analysis, the social roles the central members play in the community were analyzed. This way, light may be shed upon how and to what extent social interactions within the ACNH community may be impacted by its most important members.

3.1.2 Thematic Analysis

After analyzing the ACNH community's network structure and identifying social roles within it using a network analysis, a thematic analysis was employed to discover the main themes of conversations among community members. This analysis was used to answer sub-question 2: *Are there distinct sub-communities within the community, and how do members express their social identity and social presence within these sub-communities?* Initially, the research design of the current study included conducting topic modeling to identify key topics in the data. However, after preprocessing the data for analysis, it was anticipated that the data would not yield many meaningful results when applying topic modeling. As a thematic analysis can find hidden themes within data (Braun & Clarke, 2008, p. 79), this analysis was chosen instead. A thematic analysis has been used in previous research to explore social interactions among MMOGs players (Ang, 2011, p. 343). Similarly, this thesis followed their deductive approach to thematic analysis by deriving themes from previous research. Themes relating to social identity and social presence within online communities were based on studies described in the theoretical framework and the operationalization. Through this qualitative method, a richer thematic understanding can be gained (Braun & Clarke, 2008, p. 83) about the conversation themes and how members express social identity and social presence in the ACNH community. This allows for a better understanding of the meanings behind the members' interactions and for an exploration of to what extent members identify with the community and feel present in it.

3.2 Case Description

The case central to this study is that of ACNH (https://discord.com/invite/acnh), the largest Discord server for the game with 40,000 members online daily. The game ACNH was found to be relevant to explore social interactions as it promotes playing with others and collaboration (Nintendo Games, n.d.-a). By visiting other islands, players can acquire more in-game items through cataloguing new items and by trading with others. Moreover, the game rewards players for such activities with Nook Miles which can be exchanged for rare items, upgrades, and other in-game benefits. With the accompanying Discord community, the sociability of the game is further facilitated. The features of the platform encourage communication by providing the community members with topic-based channels to interact during and outside of playing together (Discord, n.d.-b). This way, players can find others to play together, share information, and help each other. Previous research on the social aspects of gaming (Won Jung, 2020, p. 7) and the social interactions among players in online gaming communities seem to currently lack. This proves, together with the aforementioned reasons, the relevancy of selecting this case for the thesis.

The ACNH Discord server offers voice channels for players to talk, as well as many textual chats for purposes such as activities within the server, game help, and trading. The chat channels '#general' and '#acnh-chat' were found to be the most active on the server, with approximately 50 messages sent an hour. The '#acnh-chat' is used for discourse topics directly related to the game. In the '#general' channel, on the other hand, members are free to interact as they wish as long as they adhere to the server rules, such as being nice and respectful and refraining from spamming and advertising. Since the general chat channel allows for both game-related and non-game-related topics of conversation, the messages from this channel were deemed most useful for analyzing social identity, social presence, and social roles, and were thus selected for this thesis. In this channel, members can interact through text messages, (Discord) emojis, and images. These can be sent undirected in the chat or can be directed to another member using reply mentions. Besides regular members, admins and bot moderators are active in the server to ensure the server works as intended and to offer assistance when needed.

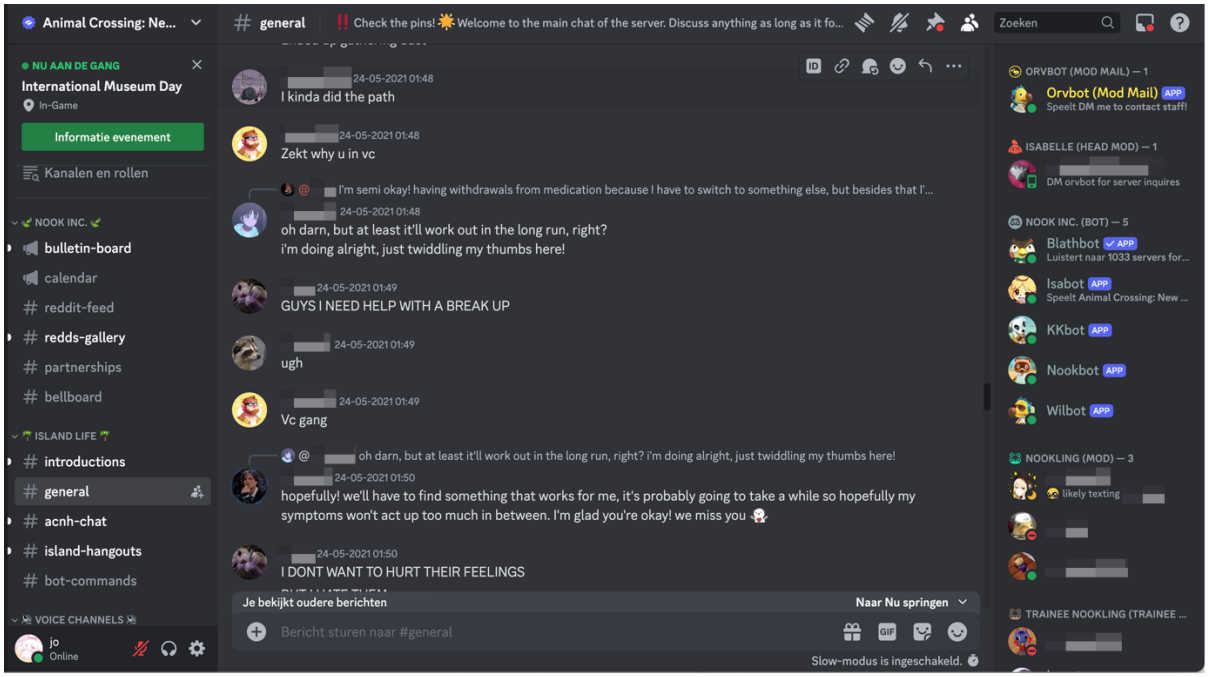


Figure 3.1 General Chat of *Animal Crossing: New Horizons* Discord Server

3.3 Sample

Chat messages that were sent in the general channel between May 23, 2020, and May 31, 2020, were sampled for this study. ACNH gained a lot of popularity during the lockdowns of the COVID-19 pandemic (Eadicicco, 2020) and offered an online alternative for social interaction (Lewis et al., 2021). According to WHO's COVID-19 response timeline, the outbreak of COVID-19 was announced in January 2020, and the timeline was last updated in March 2022 (World Health Organization, 2022). The game was released on March 20, 2020 (Nintendo, n.d.) and became one of the best-selling Nintendo Switch games in May 2020, with over 13 million copies sold worldwide (GameCentral, 2020). Thus, a week in May 2020 was randomly selected to gather chat messages from. This way, the chosen time frame allowed for insights on how ACNH players interacted in the Discord community when the game was played most. From this week, 19.498 messages were collected which far succeeded the minimum sample size mentioned in the methodological guidelines for this thesis. To ensure that the amount of data could be analyzed in this study within the time constraints, it was decided to not gather messages for longer than this one week.

3.4 Data Collection & Preprocessing

Before starting the data collection, permission was given by the Discord server's staff to use the data. Firstly, the textual messages sent in the chat channels and related information

(e.g., username, timestamp, avatar, attachments) were extracted using Python's request module and get method, and Discord's API (Discord Developer Portal, n.d.). From all the messages, only direct replies were selected as they were expected to better showcase how members interact with each other and how they are connected than undirected messages. Following, Python was used to convert the data into a data frame with only the relevant information in a Jupyter Notebook. The edge data frame consisted of (1) the username of the sender of the message, (2) the username of the receiver of the message, (3) the message content, and (4) the timestamp of when the message was sent. The usernames were later anonymized in this study to maintain the privacy of the Discord users. This data frame was saved into a csv file to maintain the table structure and was loaded into RStudio to prepare the data for analysis.

Using the programming language R, the data was preprocessed to improve the quality of the data analysis, which included the following steps. The csv file was first printed as a table in RStudio and consisted of 19.498 entries. After removing all the "Deleted User"'s, 16.134 entries were left. Then, duplicate data were deleted which resulted in 12.747 entries. Finally, self-sending messages, meaning when a user sends a message to themselves, were removed. Ultimately, the cleaned edge table contained 12.616 entries. The data was then prepared for the network analysis. Firstly, the edge weights were determined by counting the number of occurrences that each unique pair of nodes send messages to each other, and this was added as a column to the edge table. Based on this, a node table was created that contains all the user ID's and their node degrees and consisted of 1.229 entries. The node degrees were calculated by how many connections (or messages) a node has. Lastly, both tables were used to calculate the edge contributions. This determines to what extent each edge contributes to the network and is measured by summing the degrees of the nodes the edge connects. This is then added as the final column to the edge table. See Appendix A for examples of the edge table and the node table in RStudio.

3.6 Operationalization and Data Analysis

3.6.1 Network Analysis

Firstly, a network analysis was conducted to answer sub-question 1 on identifying central members and social roles within the community. The programming software RStudio was first used to visualize the network by creating a graph. As the large amount of the data made the graph hard to read, only a selection was used for the network analysis. When

calculating the skewness of the data distribution, it showed that the data was positively skewed (0.79), implying that many members send few messages, and few members are sending many messages compared to the rest in the Discord channel. This was further proven by visualizing the distribution of edge contribution in the network with a histogram, as can be seen in Appendix B. A previous study conducting a social network analysis selected only active members to explore the network's characteristics and messages within the online community (Pfeil & Zaphiris, 2009, p. 1143). This approach was followed by basing activeness in the community on the edge contribution value. Thus, only edges that contribute more to the network than the mean edge contribution of 622.58 (*SD* = 495.98) were selected for further analysis.

The network structure was firstly explored by calculating the graph density, which measures how many edges are in the graph compared to the maximum number of edges that is possible (Tran, 2019, p. 33). This value ranges from 0 to 1, in which being closer to 0 means that the network is sparse, and closer to 1 means that the network is dense. In a dense network, members send each other many messages, while in a sparse network, members are less connected.

Then, the mean distance was calculated, which measures the shortest paths between pairs of nodes in a network (West, 2001, p. 134). When this value is low, it can imply a small-world effect (de-Marcos et al., 2016, p. 317). A small-world network is characterized by having a few connections that create short connection paths between any two nodes, even when they are far apart in the network (p. 319). This means that the average path length between two nodes is relatively short, even when the network itself is large. This allows them to be resilient and adapt easily to change, as the network stays well-connected even if some nodes or connections are missing or disrupted. Besides a small path length, a small-world network often has a high local clustering coefficient (Langer et al., 2013, p. 1). Here, nodes tend to be well-connected to nearby nodes, forming clusters within a network (Epskamp, 2014; Langer et al., 2013, p. 1).

The clustering coefficients indicate to what extent a node is part of a group of nodes (Tran, 2019, p. 32; Wasserman & Faust, 1994b, p. 245). These properties give indications whether one big community or several smaller communities can be found and how nodes are connected to each other. Local clustering measures the extent to which nodes that are nearby are connected to each other (Epskamp, 2014). This measure can also shed light on redundancy. When nodes have high local clustering, nearby nodes are all well connected. Thus, in case one connection is disrupted, there are many other routes (connections)

available. This means that eliminating a node will likely not affect the network structure, similarly to a small-world network. Additionally, global clustering measures the extent to which all nodes in the network tend to cluster together, rather than an individual node.

Degree centralization of a graph measures to what extent a network is dominated by one or a few nodes (Tran, 2019, p. 32; Wasserman & Faust, 1994a, p. 180). It is calculated by how much nodes in a network differ in the number of connections they have. This value ranges from 0-1 in which a lower value means all nodes have a similar number of connections, while a higher value indicates one or a few nodes have more connections compared to others in the network. To adjust the score to fit within this range, the degree centralization was normalized (Oldham et al., 2019, p. 18; Taba et al., 2019, p. 4). This was measured by dividing the degree centrality score by the total number of nodes minus one.

Centrality measures can be used to identify important nodes in a network (Epskamp, 2014). Degree centrality of a node counts the number of connections a node has (Epskamp, 2014; Csardi, n.d.-b). Betweenness centrality refers to nodes that are on the shortest route connecting pairs or groups of other nodes in the network (Epskamp, 2014; Freeman, 1979, as cited in Csardi, n.d.-c). These nodes act as bridges between nodes that are otherwise not connected. Closeness centrality measures the distance between a node to others in the network, where nodes with higher closeness centrality are close to others and generally reach them easily (Epskamp, 2014; Freeman, 1979, as cited in Csardi, n.d.-a).

All measures mentioned above were used to analyze the network structure and identify central figures within the ACNH community. The social roles the central figures play were operationalized as follows:

3.6.1.1 Social Roles. As explained by multiple researchers in section 2.3 of the theoretical framework, members can take on several social roles in an online community (Akar & Mardikyan, 2018, pp. 12-13; Hevey, 2018, p. 311, 319; Hsiao & Chiou, 2012, p. 239, 297; Shen et al., 2014, p. 460, 462, 463, 473). Based on this, the following roles were used to operationalize the concept of social roles. Socializers share a lot of messages, introduce conversation topics, and motivate others to interact (Akar & Mardikyan, 2018, p. 10). Content generators, visitors, and passive members show decreasingly participative behavior. Based on these behaviors, degree centrality measures were used to determine the members' social roles (Fisher et al., 2006, as cited in Forestier et al., 2012, p. 126). As socializers are most active, they are most likely to have many incoming and outgoing connections. In other words, socializers both send and receive many messages. Content

generators mostly send messages, meaning that they have many outgoing connections. Passive members, on the other hand, tend to receive more from members than to send which points towards relatively many incoming connections. Finally, visitors are not as active as socializers and content generators but do connect far away members in the network similar to bridging members. Thus, visitors may have little difference in the number of incoming and outgoing connections, yet participate less compared to socializers.

By examining the ratio of the incoming and outgoing connections, in which the sum of the in-degree and the out-degree value of a node is divided by the out-degree value, social roles were assigned to the members. When the result is around 1, it means that most connections are outgoing and points towards the social role of content generator. A result around 2 indicates a similar number of ingoing and outgoing connections, meaning that the member is a socializer. Results much greater than 2 shows that the member has more incoming connections compared to outgoing connections, which is classified as a passive member. Visitors, similarly to socializers, are balanced in their ingoing and outgoing connections but differ by having less connections overall.

Furthermore, bridging members (Shen et al., 2014, p. 462) form a connection between sub-groups that are otherwise separate in the network by being part of both or multiple of them. They generally connect community members that are different from each other and allow for sharing more diverse information (Shen et al., 2014, p. 463). This type of member was identified by measuring their betweenness centrality (Epskamp, 2014; Freeman, 1979, as cited in Csardi, n.d.-c). Bonding members connect to others in the community that are usually similar and are tightly knit within their sub-group (p. 462) which allows for more solidarity and trust yet less diverse knowledge and ideas (p. 473). The closeness centrality measure (Epskamp, 2014; Freeman, 1979, as cited in Csardi, n.d.-c) was used to find these members.

Besides identifying key figures in the network, sub-communities were identified in to explore how the sub-communities compare in how themes are distributed and observed for sub-question 2. Using RStudio, sub-communities in a graph were detected based on short random walks (Pons & Latapy, 2006, pp. 194-196). These random walks consist of the steps taken by a walker starting from a node and moving to a randomly selected node nearby, and this is calculated for each node in the graph. This measures the probability that two nodes are part of the same sub-community based on how often the random walks pass these nodes. Nodes that are visited together more often are more likely to belong to the same sub-community. This is then used to determine the distance between the nodes, in which nodes

with a similar probability are more likely to be close to each other, and those with dissimilar probability are farther away from each other. Nodes that are close are then clustered together into sub-communities. Within these sub-communities, nodes are more densely connected to each other than to other nodes in the graph.

Modularity was measured to see to what extent the graph is divided into sub-communities (Clauset et al., 2004, p. 2; Tran, 2019, p. 32). Low modularity implies that sub-communities are not well-defined, while high modularity indicates good divisions of sub-communities in a network. The value ranges from 0-1 in which values above 0.3 are an indicator of a strong community structure in a network. Following, characteristics of the detected sub-communities were analyzed. These include which nodes belong to which subcommunity, how many nodes are in each sub-community, and which nodes are most central (based on degree centrality) within each sub-community. The latter was visualized in a graph.

3.6.2 Thematic Analysis

After identifying the ACNH community's network structure, exploring its properties and the social roles that emerged, and detecting sub-communities using a network analysis, a thematic analysis was conducted to identify patterns in the chat messages of the community (Braun & Clarke, 2008, p. 79). To answer sub-question 2, the analysis discovered themes in what type of social interactions that took place and showcased how members may experience social identity and social presence within the community. For each sub-community, it was analyzed how the themes show how social identity and social presence are expressed, and this was compared to the others. Braun and Clarke (2008, p. 82) describe a theme as something that represents an important aspect of the data that relates to the research question. More specifically, a theme is either a recurring pattern or of significance in the data. These themes were identified using the coding software ATLAS.ti and followed the three coding phases open coding, axial coding, and selective coding, as follows from Boeije (2010, pp. 96-115). Firstly, the dataset was scanned through to become more familiar with the data and, while considering the theoretical concepts of sub-question 2 to take note of initial impressions of possible themes. The concepts were operationalized as follows:

3.6.2.2 Social Identity. As explained in section 2.1.3 of the theoretical framework in more detail, a social identity forms when being part of a community or group becomes part of

how a person identifies themselves (Turner, 1982, as cited in Shen et al., 2010, p. 340). Social identity may be recognized through its three components (Tajfel, 1978, as cited in Mousavi et al., 2017, pp. 377-378), which is used to operationalize the concept in this study. Respectively, the cognitive, affective, and evaluative components refer to recognizing similarities between oneself and fellow community members while perceiving differences with non-members, feeling attached and like one belongs to a community, and assessing oneself more favorably because they are a valuable member of a group or community. These are based on the scales of Bergami and Bagozzi (2000, p. 565) and Bagozzi and Lee (2002, pp. 235-236), as used in the questionnaire of Tsai and Bagozzi's (2014, p. 152) research. However, as these personal experiences may not easily be captured by this research design, social identity will also be explored by its potential pro-social effects on community members' behavior. Members with a strong social identity may exhibit behavior that benefits the community and its members, such as offering help, providing support and guidance, sharing knowledge, and encouraging others (Chiu et al., 2015, p. 505, 506, 514.

3.6.2.3 Social Presence. Social presence is operationalized as experiencing the feeling of being together with another individual or multiple individuals, which is based on research by Biocca and colleagues (2003, as cited in Oh et al., 2018, p. 2). The concept consists of the following three components that can be used to identify social presence in the community members' interactions. Copresence refers to feeling as though one is together with someone else, in a way that they can vividly imagine or physically sense the presence of the other (Biocca et al., 2003, as cited in Ekman et al., 2012, p. 330). Experiencing an emotional or mental connection to another person, such as understanding the other's emotions and feelings, is termed psychological involvement. Finally, behavioral involvement describes the extent to which persons' actions and behavior are connected. Two persons may use their actions to react to each other, such as conversing by alternating who is talking and who is listening, or to correspond their actions, which is used in dancing, for example.

Open coding continued by fragmenting each chat message in meaningful units and assigning them one or multiple codes. These codes were based on the operationalization of the theoretical concepts described above. Codes were only assigned when they were deemed relevant for answering sub-question 2. Here, the researcher aimed to be flexible rather than follow rigid rules in judging the relevancy of the codes for the study and what counts as a theme (Braun & Clarke, p. 82). In the open coding phase, messages were coded until row

3353 of the dataset. At this point, the sample size met the methodological guidelines and the coding reached saturation, with no new relevant codes emerging from the data.

During axial coding, connections between codes were identified to create themes and sub-themes in the data. Sub-themes that fit the same dimension were compiled together and formed a theme. For example, the theme “talk about real life” consisted of the sub-themes “work life”, “high school/homework”, “daily activities/currently doing”, “personal stories/memories” and “personality/opinions”. Furthermore, the main themes and how they are related were determined during selective coding. Here, the data was connected to previous research by ensuring that all the codes were assigned to the pre-determined themes and sub-themes that followed from the operationalization of the theoretical concepts. The themes and sub-themes were then reviewed to confirm that all coded units assigned together fit each other and the (sub-)theme accurately. During the entire process, the researcher often revisited earlier coding phases to ensure that all messages were coded similarly. The coding is visualized in a coding tree based on examples in Boeije (2010, p. 103, 110) which can be found in Appendix C.

The thematic analysis continued with cleaning the data by converting all the letters to lowercase and by deleting punctuation. Then, word clouds were created for each sub-community to give an overview of the mostly used words. Initially, the most common words in these word clouds were stop words, such as “i”, “the”, “and” and “my”. Using the list of common stop words in English included in the tm package of R, these words, as well as other frequently used non-meaningful words, were removed to create word clouds with words that hold more meaning. The next step included reviewing the coded units from the axial coding phase to find patterns in the words that were used in a theme. In RStudio, these words were used in a function to ascribe themes to the rest of the dataset. For example, “thank you”, “thanks”, “thank”, “ty”, “thankyou” and “thx” were indicators for the theme Gratitude. Finally, to what extent the themes are present in each sub-community is visualized to analyze how themes are distributed across the sub-communities.

The full analysis process is summarized and visualized in the following flow chart:

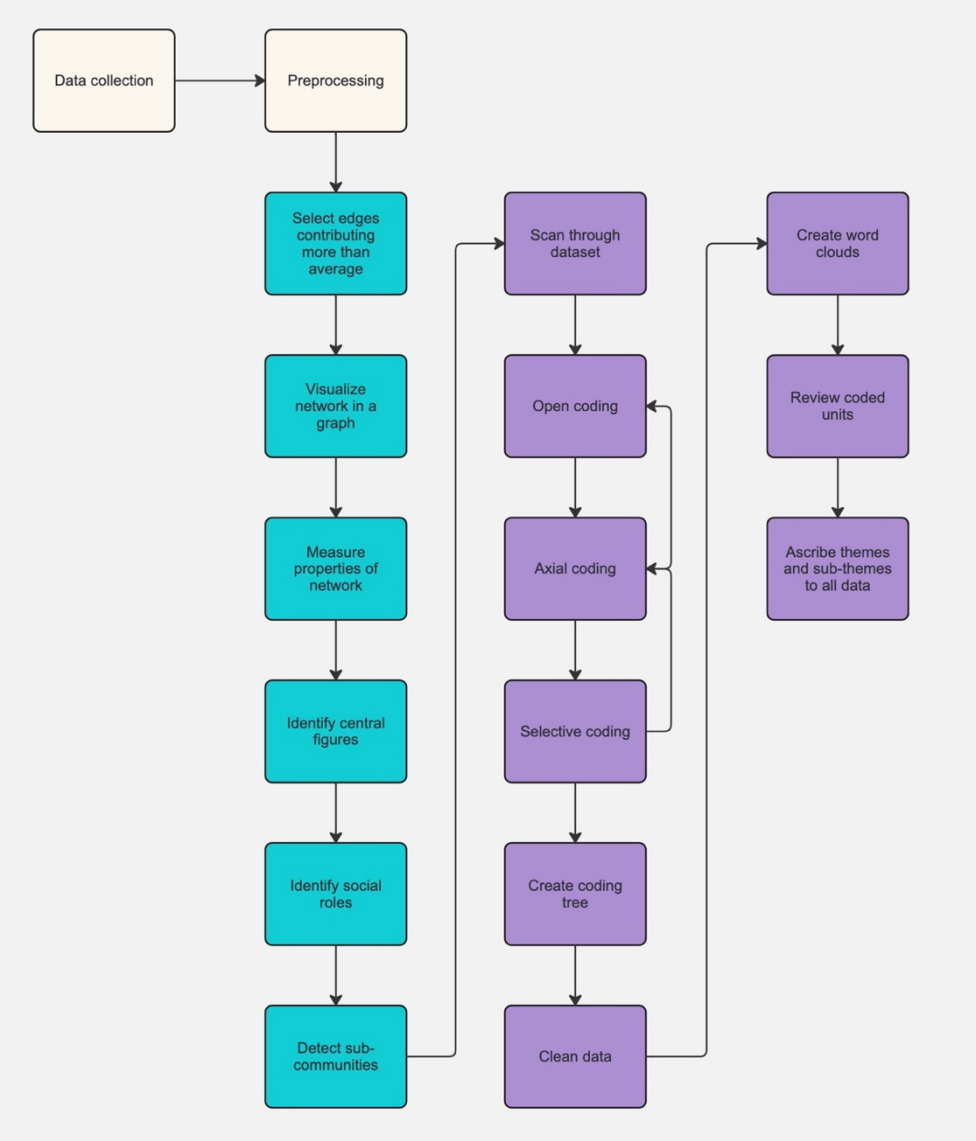


Figure 3.2 Flow Chart of Analysis Process

Note. The network analysis is represented with the blue boxes and the thematic analysis is represented with the purple boxes.

3.7 Research Ethics, Validity & Reliability

When gathering the data, it was ensured there were no ethical violations by taking the following steps. Before collecting the messages of the ACNH chat channel, the staff of the Discord channel was asked for permission to use the data. Here, the staff was informed about the researcher being a student from Erasmus University Rotterdam who is preparing their master's thesis. The researcher gave a short description about the thesis and the research goals, including what types of data would be gathered. Here, it was emphasized that the data would be handled carefully, meaning that the data would be anonymized and only be

accessible to the researcher, their supervisor, and their second reader. This way, the data could not be used to trace the community members' identities, thereby protecting their privacy. It was also mentioned that the data would only be used for the purposes of this thesis and that, to the extent of the researcher's knowledge, using the data would not cause any possible harm or discomfort to the ACNH community members.

Conducting the research for this thesis was ensured to be valid and reliable with the following approach. A detailed description of how the data was collected, analyzed and interpreted was given to make the research trustworthy and transferable to similar studies. Here, the research design was based on previous studies that are alike to this thesis so that the methods were used before and proven to be successful for examining these research topics. Additionally, clear explanations of the theoretical background and operationalization of the research question's concepts were provided to show the thesis explores what it was intended to explore. Also, information, such as the case that was used and the decisions made due to time and resource constraints, was given based on which judgments can be made on to what extent comparable studies may lead to similar results using the current thesis' research method. With these steps, the thesis aimed for validity.

The reliability was maintained by providing enough information about the steps taken in the research method of the thesis. Also, a coding tree was provided for the thematic analysis which shows how the messages of the ACNH chat channel were coded for social identity and social presence. These instructions are given in detail so that when the coding is conducted by another coder, the results would be the same. Furthermore, the thesis clearly describes the case that was selected. This explains how the context in which the research was conducted could affect the results. For example, the chat messages were collected for a week in May 2020, which was during the COVID-19 pandemic. As the thesis examines social interactions, community members may have different experiences while having lockdowns and other safety measures that limit (physical) contact than before or after the pandemic. Thus, while the same method for coding may be applied, the time of study may allow for different results.

4. Results

This chapter includes the results which are used to answer the research question: *How is social interaction structured and centralized within a gaming Discord community, and what are the key characteristics of the identified sub-communities?* Firstly, a network analysis was used to reveal how messages are exchanged in online ACNH community on Discord. It identified four central figures, their different social roles, and three sub-communities. Furthermore, themes of social identity and social presence in the community members' social interactions were found by conducting a thematic analysis. The main themes for sub-community 1 are building interpersonal connections, helping each other, and ACNH and community, the main theme for sub-community 2 is building interpersonal connections, and the main themes for sub-community 3 are building interpersonal connections and ACNH and community. The sub-communities were analyzed on how the members express social identity and social presence differently in these themes. In discussing the results, connections were drawn to previous literature discussed in the theoretical framework section.

4.1 Network Structure, Central Figures & Social Roles

4.1.1 Network Structure and Characteristics

To determine which members are the most important and to identify social roles within the community, various measures were conducted to shed light on the community's network structure. By selecting the edges that contribute more to the network compared to the average, the network was analyzed based on its most active members (Pfeil & Zaphiris, 2009, p. 1143).

The graph density was calculated to determine how sparse or dense the network is (Tran, 2019, p. 33). With a range from 0 to 1, a graph density of 0.02 reveals that there was a relatively small number of edges compared to the maximum possible number of edges. This implies that members of the community generally are less connected and send each other few messages. A previous study explains that fans, of for example a video game, are characterized by their participatory behavior which can result in forming communities with other fans online (Sandvoss et al., 2017, p. 3). Furthermore, a main motivator for playing video games are social factors, such as being able to interact while playing, socializing with others and building connections (Cheah et al., 2021, p. 942; Dalisay et al., 2015, p. 1411; Hilgard et al., 2013, p. 8). That is why the gaming community having a sparse network seems contradictory to these findings. However, nuance could be added to the finding of a sparse

network by taking into consideration the quite large number of members in this community. The graph density value indicates that the members relatively have few connections, yet this does not mean that there may be nodes or groups of nodes that have more connections. These nodes or groups could be messaging with many others, while most of the nodes message with only a few, the latter explaining the sparse network.

Moreover, the average path length between any two nodes in the network suggests that the community is well-connected. The low value of 2.58 reveals a small-world network in which it takes an average of 2.58 steps to connect any two members in the community (de-Marcos et al., 2016, p. 317). Even when the nodes are far in distance from each other in the network, they can easily reach each other (p. 319). This means that members can quickly and easily interact with anyone in the community. Furthermore, a small-world network implies the network is sturdy even in times of change (p. 319). If any nodes or edges fall away, the network will stay intact as nodes have many alternative routes to reach others, due to being relatively closely connected. The average local clustering coefficient of 0.88 is also an indicator of a small-world network (Langer et al., 2013, p. 1). High local clustering shows that nodes nearby in a network tend to be well-connected to each other and form clusters together (Epskamp, 2014; Langer et al., 2013, p. 1). This most likely means that members frequently message each other within these clusters. However, the global clustering coefficient of 0.05 indicates that the overall network is not strongly clustered (Epskamp, 2014), meaning that there most likely are not a lot of clusters.

This well-connectedness of small-world networks may be beneficial for online gaming communities, as being able to interact in shared virtual environments can make playing video games a more social activity (Kuznekoff & Rose, 2012, p. 542). Video games are often played for their opportunities to socialize as this can foster feelings of belonging to a gaming community, socially supporting other players and building friendships (O'Connor et al., 2015, p. 465). Thus, the close connections between members in this small-world network can encourage social interaction in the gaming community which in turn can create more enjoyable player experiences (Ravaja, 2009, p. 281, 284, 286).

Furthermore, the network was analyzed on how much it is dominated by single or a few nodes. The degree centralization measured how the degrees of nodes are distributed in a network, more specifically to what extent only a few members have many connections in comparison to others in the community (Tran, 2019, p. 32; Wasserman & Faust, 1994a, p. 180). This was then normalized (Oldham et al., 2019, p. 18; Taba et al., 2019, p. 4) and resulted in a score of 0.002. With a range of 0-1, this lower score indicates that all nodes in

the network rarely differ in the number of connections they have. It suggests that social interactions between community members may not be affected by a few members with more connections than most. This is in contrast with previous research which highlights the importance of having many connections in comparison to most others in the community, as it may bring benefits such as receiving support, easy access to help and being in an influential position (Hevey, 2018, p. 311; Hsiao and Chiou, 2012, p. 297; Saxena et al., 2018, p. 1425).

This difference could be explained by the social nature of the network. The ACNH Discord community that was studied may be socially structured in a way that does not encourage centralization. For example, the community may focus on collaboration between members in which the number of connections members have is similar. Instead of having a few members impacting the social interactions, the community could thrive on the input of most or all members. In these environments, members can be encouraged to collaborate by providing others help and advice or gifting each other items (Boudreau & Consalvo, 2015, p. 78; Wohn et al. 2011, as cited in Boudreau & Consalvo, 2015, p. 81). Furthermore, members of online communities are often supportive and empathetic towards fellow members (Papadakis, 2003, p. 7). This collaborative focus may fit communities surrounding ACNH as the game supports forging friendships and working together (Zhu, 2020, p. 158).

4.1.2 Central Figures and Social Roles within Community

Centrality measures were conducted to find the central figures in the network (Epskamp, 2014). The values of the degree centrality, betweenness centrality and the closeness centrality of the four most important nodes of the network can be found in Table 4.1. The most central nodes and their centrality scores are also visualized in Graph 4.1.

Table 4.1: Centrality Scores of Central Figures in the Network

Node (anonymized)	*Degree centrality*	*Betweenness centrality*	*Closeness centrality*
Node A	898	46917.46	0.00127
Node B	1101	53283.57	0.00122
Node C	1127	32615.65	0.00121
Node D	836	31955.12	0.00119

Graph 4.1: Central Figures in the Network with Centrality Scores

Interestingly, there is not one node that is most central in all three measures. Node C is found to be one of the most important nodes in the network as it has the most connections in comparison to the rest of the network (Epskamp, 2014; Csardi, n.d.-b). When focusing on which nodes form bridges between nodes and groups of nodes that are otherwise not connected, node B is deemed most important (Epskamp, 2014; Freeman, 1979, as cited in Csardi, n.d.-c). The closeness centrality determines nodes' importance to a network by how close by a node is to other nodes and therefore finds node A most important (Epskamp, 2014; Freeman, 1979, as cited in Csardi, n.d.-a). While node D does not have the highest score in any of the three measures, it still scores relatively high in comparison to the rest of the network and thus identified as a central figure.

Node A is found to have a socializer role (Akar & Mardikyan, 2018, p. 10). This member joined Discord in September 2020, but no information could be gathered on when they became a member the ACNH community. Along with the other central figures, they are a regular member. Node A has a ratio of 2.427 in which they are part of 898 interactions,

being the sender of 370 messages and the receiver of 528 messages. This member often starts conversations by greeting others or by sharing statements that invite other members to respond (Akar & Mardikyan, 2018, p. 10). On their message “i pulled a muscle” for example, another member responds by checking whether node A is okay, which then turns into a conversation about how they feel, going to the doctor, allergies, food, and opinions on pizza toppings. Or with the message “Who's your guys favorite villager”, multiple members reply with their preferences and converse about the game’s characters. By introducing these topics of conversation surrounding their personal life or ACNH, and maintaining the conversation by responding to others, node A stimulates fellow members to interact (Akar & Mardikyan, 2018, p. 10). Through this active behavior, their messages may reach more members which can make them more impactful in the community compared to members that contribute less (Hevey, 2018, p. 311).

As socializers both send and receive many messages, they most likely have an advantageous position in the community in which they receive more amiable and supportive messages (Hsiao and Chiou, 2012, p. 297) and can easily be offered items or help from other members (Saxena et al., 2018, p. 1425). For example, with questions such as “Whats your fave animal btw?” interest is shown in node A and in the message “YAY WINGMAN TIME”, a fellow community member is excited to help node A with setting up a date. Interestingly, besides being on the receiving end, this member is also often involved in providing encouragement or resources. With the message “I hope it goes well!” for instance node A shows support and in “Should I buy Left 4 Dead 1 and 2” and “Can I go on someone’s island to get new fruit?” they are asked for advice and in-game items. Thus, while node A’s social role of socializer aligns with previous research, it also adds on to it by showing how socializers do not only enjoy the benefits of having a high social standing, but also use their many connections to help fellow community members. An explanation for this could be that socializers have positive experiences in the ACNH community from receiving support and help, which can encourage them to return these favors by aiding and encouraging others as well.

Furthermore, node D is identified as a content generator when exploring the social roles of the central figures in the network. This member started on Discord in September 2017, and it is unknown when they joined the ACNH server. They are a regular member in the community, meaning that they are not part of the Discord server staff nor were given an influential role such as an admin or moderator. Instead, their importance to the community may result from their role as content generator who are characterized by actively participating

in conversations (Akar & Mardikyan, 2018, p. 10). This member has a total of 836 connections, of which 269 are incoming and 567 outgoing, resulting in a ratio of 1.47. It means that node D mostly sends many messages rather than receives them.

This member does not often start conversations by bringing up conversation topics but does generate content by participating in many conversations and inviting others to engage (Akar & Mardikyan, 2018, p. 10). In these conversations, they share about their personal lives which encourages other members to respond, for example in “im getting two tattoos in the summer and im so excited” and “i worked out this morning, my cat judged me as i did”. Their many connections can give them influence over what interactions occur between nodes, allowing them to easily receive help and items (Saxena et al., 2018, p. 1425) and support and companionship (Hsiao & Chiou, 2012, p. 297) from fellow members, although to lesser extent than socializers. Yet, node D rarely does so which can be explained by the fact that they do not tend to ask for any resources from others. In other words, while they have access to it, they simply may not make use of it. Also, while some friendliness can be found in the messages, as node D is called “bestie” and some hold relatively long conversations with them, the messages are not explicitly encouraging or amiable. This could be because node D converses with a lot of different community members, which may make it harder to build a close relationship and share these kinds of messages. Additionally, as they are a content generator and not a socializer, they are more likely to provide resources and support more than receive it, as they typically send more messages. For example, node D is supportive with the messages “i hope you learned to love yourself” and “YAY CONGRATULATIONS !!!”.

Finally, nodes B and C have the social role of a passive member (Akar & Mardikyan, 2018, p. 10). This is surprising, as these members generally receive more messages than they send, but still are the most central figures in the network. Members who are more participative and have many connections, such as socializers and content generators, often have a central position and influence the social interactions in the community (Akar and Mardikyan, 2018, pp. 12-13; Hevey, 2018, p. 311; Hsiao and Chiou, 2012, p. 239). Yet, nodes B and C seem to have this impact without contributing much to conversations. They receive many messages instead, showing that many members want to converse with them.

Node B joined Discord in April 2018, yet it could not be found when they became a member of the ACNH server. This member has 1101 connections, of which 715 ingoing and 386 outgoing, which leads to a ratio of 2.85. Node C created their Discord account in January 2017 and their profile, again, did not show when they joined the server. This member has the most connections of the four central figures with 1130 in total. With being the sender of 392

and the receiver of 735 messages, the ratio is 2.88. These members do not tend to initiate conversations and generally do not generate as many messages as other members (Akar & Mardikyan, 2018, p. 10). Instead, they may participate by responding to others. For example, three members were talking about how much they paid for their Nintendo Switch and which deals they got in which node B joins the conversation with their own experiences. Similarly, node C tends to take part in conversations instead of starting them and is often invited to respond with messages such as "HI [username node C]. IM DECORATING MY ISLAND" and "[username node C] what is Sherb talking about?".

Although passive members do not have as much control over the social interactions in the community as socializers and content generators (Akar & Mardikyan, 2018, p. 10), they may still be important members. As two central figures in the network play the role of passive members, it may indicate that the number of messages that are sent does not necessarily dictate the importance a member has in the community. Nodes B and C have more connections overall than the other central figures, which could mean that their importance lies in connecting community members instead of solely generating messages. With the highest betweenness centrality score of the four central figures, node B more likely (and node C to a lesser extent) connects nodes or groups of nodes in the network that are otherwise not connected (Akar & Mardikyan, 2018, p. 10, 13; Hevey, 2018, p. 319; Shen et al., 2014, p. 462). By forming the bridge between members who may be different or far away from each other, information may be shared among more members (Saxena et al., 2018, p. 1430). This may give all members of a community access to a wider variety of resources (Olievera and Gama, 2012, p. 110), such as information on how to progress in the game or game items, which can help members perform better in the game (Shen et al., 2014, p. 473). Also, the community can benefit from this supportive behavior, as it may strengthen social ties between its members (Boudreau & Consalvo, 2015, p. 78; Wohn et al., 2011, as cited in Boudreau & Consalvo, 2015, p. 81). Additionally, it is important to note that although visitors can act similar to bridging members, these members are not categorized as visitors as there is a large difference in how many ingoing and outgoing connections they have. None of the central figures are found to play the social role of visitors.

As all four central figures of the network have quite high betweenness centrality scores, it is unlikely that any of these nodes take on the social role of bonding members. Contrary to bridging members, bonding members are part of a group in which everyone is linked to each other (Burt, 2005, as cited in Shen et al., 2014, p. 463). They tend to be similar and share the same type of knowledge and opinions. This can bring them closer and foster

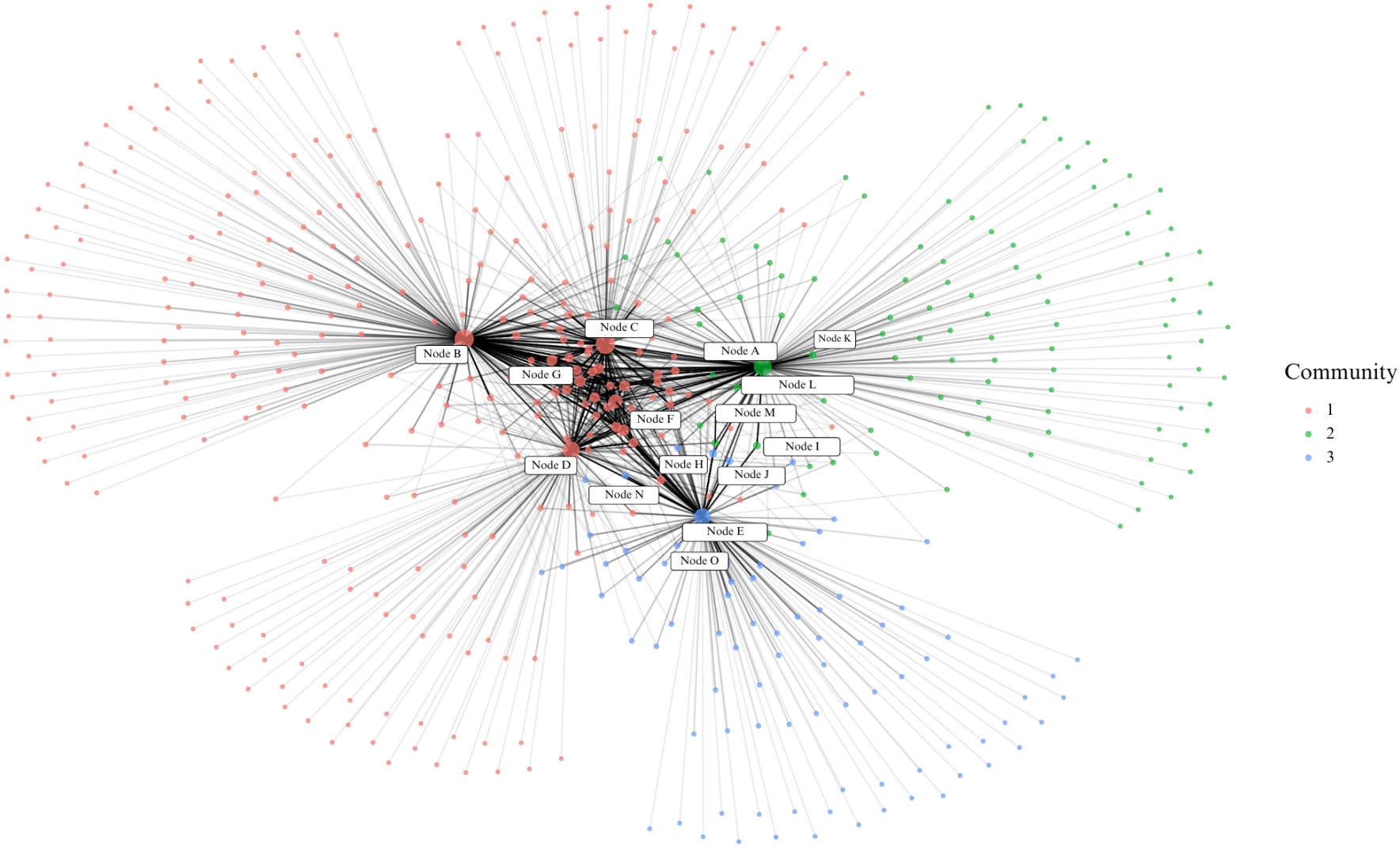
feelings of solidarity and trust. The lack of bridging members in the identified central nodes of the network may indicate that the community is quite diverse in views, ideas, and knowledge, thereby preventing the formation of similar, closely linked groups. Another explanation could be the nodes' closeness centrality. As the nodes do not reach all the other nodes in the network easily, it may be harder to bond with others.

4.2 Sub-communities and Social Identity and Social Presence Expression

4.2.1 Detecting Sub-communities & Characteristics

Three sub-communities were detected in the community, an overview of which can be found in Appendix D. In measuring modularity, the score of 0.217 suggests that sub-communities exist, but they are not particularly distinct in the network (Clauset et al., 2004, p. 2; Tran, 2019, p. 32). As mentioned before, this can be explained by the collaborative nature of the ACNH community. Working together and participation from all its members may be favored, which prevents them from forming well-defined sub-communities. Thus, members of these sub-communities are more connected to each other than to nodes outside their sub-community (Pons & Latapy, 2006, pp. 194-196), yet the difference is most likely not very large.

In each sub-community, the ten percent of nodes with the highest degree centrality were identified. These nodes, their degree centrality scores and which community they belong to is visualized in a graph, as can be seen in Graph 4.2.



Graph 4.2: Central Nodes in the Network with Centrality Scores

The nodes in Graph 4.2 are visualized as colored dots. The size of the dot represents the degree centrality of the node, in other words, how many connections this member has. As can be seen from the degree centrality scores in Table 4.2 and the size of the dots in Graph 4.2, sub-community 1 has the most members which many connections, followed by sub-community 2, and sub-community 3 has the least. The black lines represent the edges, or the messages or connections, between the nodes. The denser the lines are between the nodes, the more messages are exchanged between them. Graph 4.2 shows how in sub-community 1, members seem to be more connected to each other than in sub-community 2 and 3. Furthermore, the visualization also suggests a similar pattern as was identified by measuring the modularity of the graph. While sub-community 1 may be most well-connected, Graph 4.2 also shows that members from different sub-communities are connected as well. Aligning with the modularity of the graph, sub-communities can be present in the community, but they are not strongly divided from each other. Instead, many connections seem to exist between members from all sub-communities.

As shown in Graph 4.2, the sub-communities differ in their structure regarding the central nodes. Sub-community 1 seems to have three nodes around which all other nodes lay: nodes B, C, and D. These three nodes are quite close to each other in distance and may share many connections to the same nodes or nodes nearby. Also, they are connected to many nodes that lay further away from the central nodes in the graph, which do not have many connections themselves. This indicates that the central nodes connect all the nodes in sub-community 1. Similarly, both sub-community 2 and 3 seem to have one central node which brings all the nodes in their sub-community together. Thus, conversations taking place in the sub-communities may be mostly affected by these central members.

4.2.2 Word Clouds of Sub-communities

To explore how the three sub-communities differ in their social interactions, a word cloud containing the most frequently used words was created for each sub-community. The word clouds for sub-community 1, 2 and 3 can be found in Figure 4.1, 4.2, and 4.3, respectively.

Figure 4.1 Word Cloud of Sub-community 1

Figure 4.2 Word Cloud of Sub-community 2

Figure 4.3 Word Cloud of Sub-community 3

When comparing the words in the sub-communities, it can be seen from the size of the word clouds that in sub-community 1 there seems to be used a larger variety of words. This could be due to the number of members, as sub-community 1 is larger than sub-community 2 and 3. In all three sub-communities, words such as “people” and “guys” are frequently used. This may suggest that when members send messages, they often direct them to many, if not all, members of the community. While messages can be exchanged by two or a few members, members also wish to interact with many other community members. Additionally, members of sub-community 2 seem to use the word “friends” more frequently in comparison to the other sub-communities, which can indicate that these members feel close to each other. However, it could also indicate that these members talk more about their friends instead of calling others so. Finally, it is noticeable that all sub-communities use the words “good” and two of them “love” which points towards positive conversations and emotions shared between sub-community members. This is also indicated by the words “cool” and “pog” in sub-community 2, the latter being slang often used online to express excitement, intrigue, happiness, or shock.

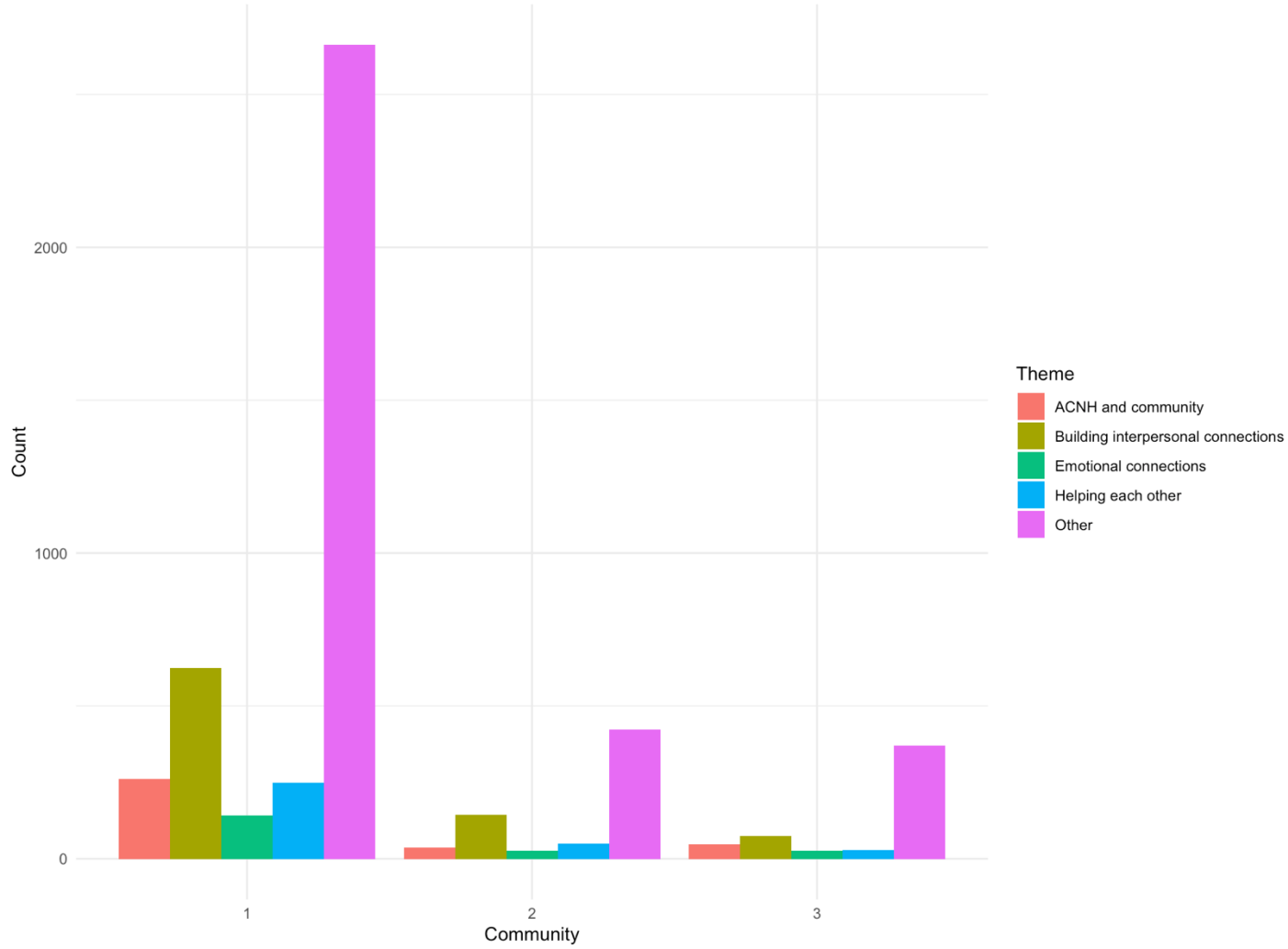
Furthermore, all three sub-communities seem to discuss the game ACNH which becomes apparent from the use of the game-related words such as “play”, “game”, “animal”, “crossing”, “island” and “bells”. While the first few words speak for themselves, the last two

are also indicative of the game since it revolves around building a community on a deserted island and bells are the game's currency. The sub-communities also include common words relating to the real life and other interests of the members. For example, word "game", "play" and "switch" could also be used to talk about other games besides ACNH that the members are playing. Thus, both conversations surrounding and outside ACNH occur in all sub-communities.

4.2.2 Distribution of Themes across Sub-communities

This section describes which themes are present in the sub-communities and how social identity and social presence can be observed. It explores how the sub-communities differ in how the themes are distributed and how members express social identity and social presence differently. The main themes for sub-community 1 are building interpersonal connections, helping each other, and ACNH and community, the main theme for sub-community 2 is building interpersonal connections, and the main themes for sub-community 3 are building interpersonal connections and ACNH and community. Although the main themes overlap, how these are recognized in the messages can differ per sub-community, which is expanded upon in discussing the results.

The distribution of the themes per sub-community is visualized in Graph 4.3. As can be seen in the graph, "Other" occurs the most in all three sub-communities, which refers to messages that did not express anything relevant for studying social identity or social presence. Therefore, it will not be mentioned any further in discussing the results.



Graph 4.3: Distribution of Themes across Sub-communities

4.2.2.1 Themes in Sub-community 1. The most common theme in sub-community 1 is building interpersonal connections. This is expressed, among other ways, through addressing each other as friends. Rather than calling other members by their name, for example, words such as “friend” and “bestie” may indicate that there is a certain closeness or relationship other than fellow community member between them. For instance, the message “I'm not going anywhere my friend” shows that there exists trust between these members. Furthermore, members may grow closer as many compliments are given in these sub-communities. These compliments are often about members’ profile pictures, for example: “your pfp is awesome” and “Your picture is the hedgehog pokemon and I love it”. Also, members may build connections by talking about other hobbies in the community. As members learn more about others’ interests or find out they have some in common, they may feel closer to them. In sub-community 1, members share a lot of messages about games, such as “do i get pokemon snap or miitopia for my bday” and “What game you got? :o”. Here, members give advice or talk about their experiences with playing games other than ACNH. The expressions of this theme may be recognized as the cognitive component of social identity (Tajfel, 1978, as cited in Mousavi et al., 2017, pp. 377-378). In getting to know each other through exchanging messages, members may view each other as friends and discovering similarities in interests such as games other than ACNH, they may feel more alike to their fellow sub-community members. When members relate more to others, they may also identify more with the sub-community.

Following, messages in which members help each other are often found in sub-community 1. In this theme, members seek and offer help, advice or resources both related to the game ACNH and other topics. Most frequently, members are explaining problems they have and asking for advice, such as “Idk how to get the path” in which they seek game-related help or “Is there a separate text channel for questions?” asking about the Discord server. While some questions arise on other topics, members are mostly looking for advice on how the game works, how to progress in the game, and on how the Discord server works. Interestingly, there are very few messages found in sub-community 1 in which help is offered. Although many members seek tips or advice, the number of messages show that it may be rarely given. Similarly, messages asking for resources such as game-related items and more prevalent than messages providing them. These types of messages can be used to determine to what extent pro-social effects on behavior as found by Chiu and colleagues (2015, p. 505, 506, 514) are present in sub-community 1. As members do not commonly offer aid or resources, they most likely do not strongly identify with the sub-community. This is

why they may not be encouraged to exhibit behavior that can benefit the community, which could be an explanation on why help is often sought yet not given in this sub-community.

Furthermore, the theme ACNH and community seems to be as frequently present in sub-community 1 as the theme helping each other. Most commonly, the members exchange messages about the game such as “this game is so addicting but the fishing part is getting on my last nerves”, “I just realized I didn’t go to the able sisters today to get a new outfit” and “I’m so close to 1 million bells!”. In contrast to the theme of helping each other, this theme may be an indicator for pro-social effects on behavior from the sub-community members (Chiu et al., 2015, pp. 505-506). As the members share the experiences they had in the game and the progress they have made, information is exchanged that members can learn from and to which members may relate to. Moreover, the messages on progress can show others what is possible in ACNH which can be an encouragement to achieve similar goals. While members may not often answer to direct questions for help of advice, they do tend to share helpful and supportive messages relating to ACNH. This shows that the members may socially identify with the sub-community as they aim to benefit it and its members by taking part in these pro-social actions (Chiu et al., 2015, p. 505, 506, 514).

Additionally, the members in sub-community 1 express emotional connections as well but to a lesser extent than the three former themes. In many messages, members are talking about how they are feeling which may elicit empathic or relatable responses. For example, one member shares “I had the side effects this morning now I’m feeling a some what fine” to which another responds with “aw I'm really glad you're feeling better!”. By knowing that there are people whom they can share their feelings with, and possibly gaining support from them or learning that others can relate to them, the sub-community may be an understanding space. This way, members may be emotionally involved with each other in the sub-community which can be an indicator for the psychological involvement aspect of social presence (Biocca et al., 2003, as cited in Ekman et al., 2012, p. 330). This means that the members of sub-community 1 may experience feeling as if they are together, because they understand each other’s emotional states.

4.2.2.2 Themes in Sub-community 2. The main theme found in sub-community 2 is building interpersonal connections. This is mainly shown in members talking about other games than ACNH in their messages. They typically share what game they are currently playing and discuss game preferences and experiences of playing a game. Examples of messages include: “But I mainly just play animal crossing and stardew”, “I JUST GOT MY

FIRST BLACK LONG IN ANIMAL JAM IVE BEEN PLAYING THIS GAME SINCE I WAS 9" and "I'm playing miitopia rn". By discussing other games, the members might recognize shared interests in gaming beyond ACNH which can strengthen their sense of social identity with the sub-community in terms of its cognitive component (Tajfel, 1978, as cited in Mousavi et al., 2017, pp. 377-278). In discovering that others like similar types of games or gaming experiences, members may perceive fellow sub-community members as akin to them. This way, a person's social identity may be created based on traits shared with members of the sub-community, as follows from social identity theory (Turner, 1982, as cited in Shen et al., 2010, p. 340). In other words, being part of the sub-community becomes integrated into their identity.

Also, building interpersonal connections is recognized in sub-community 2 in messages about the members' real lives. In these messages, they talk about aspects of their lives, what their day is like or what they are currently doing. The aspects members mostly converse about are romantic relationships, current relationship status and sexual orientation, as can be seen in "Maybe at my new school since they have an lqbtqia+ club I'll find a girlfriend there", "I'm a lesbian" and "I am painfully single", for example. These messages give fellow members a peek into what their lives are like. As they share more about themselves, it may be easier for to imagine or understand what type of persons they are and what experiences they have had (Oh et al., 2018, pp. 23-24). This way, copresence may be facilitated in which members can feel the presence of others (Biocca et al., 2003, as cited in Ekman et al., 2012, p. 330).

Although it is not frequently found, helping each other is the next most common theme in sub-community 2. In the majority of the messages under this theme, members seek help or advice that does not relate to the game ACNH. For example, members may have gaming-related technical difficulties, "Please help it keeps repeating nintendo switch online" for example, or are dealing with problems in their lives, such as "Anyone here know how to fall asleep after being on your phone for who knows how long and with out making any noise?". While the latter member was given advice by others with the messages "Yes just talk until you get tired is what I do find fun online things and get tired", "Warm milk and a warm blankie" and "Only thing I can think of is clorophorm", most members do not receive any help. As identifying with a community can stimulate a pro-social effect on behavior such as offering assistance or guidance, these findings may indicate that the members of sub-community 2 do not experience a strong sense of social identity within the sub-community (Chiu et al., 2015, p. 505, 506, 514). However, it is important to note that both offering help

and asking for help are rarely found in the messages. Thus, it may not be the case that they are unwilling to offer help or advice but rather that sub-community 2 does not necessarily have a strong focus on helping each other. Instead, it can have other community purposes that may stimulate their identification with the sub-community.

Furthermore, the theme ACNH and community compromises a small part of the messages sent in sub-community 2. In these messages, the members mostly discuss the game ACNH in general, as exemplified by “yeah, bet you when i have like 10 ish million bells it will just get more boring, really hope nintendo adds more things to do in animal crossing” where the member hopes the gameplay will be expanded and “then why is it missing so much content from new leaf” in which the member discusses that they find ACNH to have different or less content than Animal Crossing New Leaf, a previous game from the same franchise. Additionally, some messages are about the progress the members have made in the game, for example in the island decoration: “How's your island coming along have u been playing” and “i havent played in two days and i just renovated it”. As they share about their thoughts on and experiences of playing the game, the members may recognize common interests and alike opinions, the latter describing the cognitive component of social identity. As members perceive similarities between each other, they may socially identify with the sub-community (Tajfel, 1978, as cited in Mousavi et al., 2017, pp. 377-278). Yet, since ACNH and community is not a common theme, the social identity the members experience in sub-community 2 may not be very strong. It may indicate that having similar interests ACNH-wise, is not enough for members to create their social identity based on what they have in common with fellow community members (Turner, 1982, as cited in Shen et al., 2010, p. 340).

Finally, emotional connections is one of the less commonly found themes of sub-community 2. Members often express emotions, share fears and concerns or express frustration in their messages, for example “Pain everything's glitching”, “I think I'm going to cry” and “My house creeks when it's completely silent and it scares me so bad”. In doing so, other members are open about their emotional states, which can stimulate understanding in fellow sub-community members. As described by the psychological involvement component of social presence, being emotionally connected with others, or psychologically involved in another way, can give the feeling of being together with another or multiple others (Biocca et al., 2003, as cited in Ekman et al., 2012, p. 330). Since messages expressing emotional connections are rarely found in sub-community 2, it suggests that its members do not strongly

experience a sense of social presence in terms of mental or emotional connections with others.

4.2.2.3 Themes in Sub-community 3. Similarly to the other two sub-communities, building interpersonal connections is the most common theme that is found. This theme is expressed through the member's actions and behaviors. The members frequently make use of single asterisks at the beginning and end of their messages to italicize the text they send, which can indicate that their message is an action they are performing, for example "*ignores your existence*", "*spontaneously changes hair color*" and "*gives hugs back*". In doing so, the members correspond their actions, for example when two members are play fighting over milk with the following messages: "*steals milk* MINE NOW", "MY MILK", and "*yoink*". This is an example of behavioral involvement which is a component of social presence (Biocca et al., 2003, as cited in Ekman et al., 2012, p. 330). As both members engage in this shared activity, these interactions can foster the feeling of being together even though they are not physically in the same space.

Additionally, the theme building interpersonal connections is found in members discussing their real lives. In most messages, the members share details about their lives, such as the pets they have, such as "I have two dogs and a cat", and what country they are from, for example in "I'm from France" and "Is anyone Italian like me?". Or they are about what their days look like: "I woke up early the other day and made coffee and shit for my dad and stepmom. felt really productive tbh", "I'll have an exam tomorrow" and "Is anyone at work and currently bored? I am". These messages allow fellow members to learn more about what type of persons they are, which in turn, can make it easier to picture these people, their personalities, and their lives in their head (Oh et al., 2018, pp. 23-24). This can be recognized as copresence which describes that being able to imagine or physically sense someone else can give members the feeling of being together with one another (Biocca et al., 2003, as cited in Ekman et al., 2012, p. 330). In other words, sharing about their lives can make it more likely that members are able to sense each other's presence even though they are not physically together.

Following building interpersonal connections, the theme ACNH and community is most present in sub-community 3. More specifically, many members discuss the ACNH community and the Discord server. In messages such as "The acnh Community is just so cool" and "I searched up animal crossing discord 2 days ago and this is my first server i actually chat in", members compliment and show appreciation for the ACNH community and

Discord server. Members also express interest in the server by asking questions about its functions, such as “How do you get the nook miles ticket holder role?”, and by suggesting ideas, for example “We can make temp voice chat channels for hosting in game events but can we make temporary text channels? So we need not to use dm's?”. Additionally, experiences of playing the game are shared and what features members would like to add to ACNH, such as “They really need to add a patch where we can buy multiples especially when it comes to NMTs” and “kinda wish villgaers could come inside your house-“. These messages show that the members are invested in the community and ACNH which could be an indicator for the affective component of social identity (Tajfel, 1978, as cited in Mousavi et al., 2017, pp. 377-278). Appreciating, wanting to know more about, and aiming to improve the ACNH Discord community shows the members may want to belong and feel committed to it.

Following, helping each other is one of the two smaller themes of sub-community 3. Messages that fall under this theme typically include questions about how features in ACNH work or are used to ask for game-related items. Examples are “How do I get a villager to get a bubble? I have multiple villagers I wanna move out” and “sorry i keep asking u guys buttttt can anyone share any diys for basic tools ? all i have is the flimsy ones and they do not last long ToT”. Although not all questions are answered, some members do receive the help or items they seek, such as “terraform a platform thing, then like search up a pattern similar to the bridge then slap it on there ig” in which the member gives instructions on how decorating works in the game. These types of interactions are recognized as a type of pro-social effect on the members’ behaviors (Chiu et al., 2015, p. 505, 506, 514). As members who socially identify with a community tend to take part in actions that contribute to the well-being of the community and its members, such as helping each other, it may indicate that the members identify with the sub-community. However, as the theme is not often found and as there are more messages looking for help and items than messages offering them, the social identity members experience may not be strong.

Emotional connections is the least common theme found in sub-community 3. This theme mostly consists of messages in which members express being grateful. Messages such as “tysm i drew it myself!” and “nah i’ve got one already but ty !” are typically given in response to compliments and after being given help, advice, explanations, or game-related items. Other common messages are supportive, such as “that’s good <3333” and “dm me if u need to talk / vent here for u”. By expressing their gratefulness and supportiveness, it shows that members recognize and respond to the feelings of others. For example, in thanking others

for their compliments or help, the members show appreciation for their efforts. In doing so, emotional bonds between the members may be strengthened. This sharing, recognizing, and responding to the emotional states of members suggest that they are involved in and understanding of each other's feelings. This can be recognized as the psychological involvement component of social presence, in which being mentally involved, such as understanding emotions, can contribute to the feeling of being together with others (Biocca et al., 2003, as cited in Ekman et al., 2012, p. 330). However, the lack of messages fitting this theme indicate that members generally have few or weaker emotional connections, meaning that they most likely do not have a strong sense of social presence in sub-community 3.

4.2.2.4 Social Identity and Social Presence in Summary. In sub-community 1 and 2, the cognitive component of social identity is expressed through building interpersonal connections. In sub-community 1, this included members considering each other friends, sharing compliments, and talking about games, and similarly in sub-community 2, members bonding over discussing games other than ACNH that they share interests in. Additionally, the cognitive component is also identified in the theme ACNH and community in sub-community 2 as members found commonalities in their discussions of ACNH and the progress they made in the game, yet this theme is not commonly found in sub-community 2. Furthermore, pro-social behavior because of strongly identifying socially with a community could be found in the theme helping each other in all three sub-communities. Although members often seek help and items, they rarely offer it, which suggest a weak social identity. In sub-community 1, however, members share about their gameplay experiences and progress they made in ACNH which are found to be informative, helpful, or supportive for other members. Finally, the affective component of social identity is solely found in sub-community 3, in the theme ACNH and community. By appreciating and showing interest in the community and Discord server, members show that they feel attached to the community. This suggests that, overall, members tend to socially identify with an online gaming community mostly on a cognitive level, when they converse about common interests in gaming.

The component psychological involvement of social presence is found in all three sub-communities under the theme emotional connections. In sub-community 1 and 2, members are open about their feelings which encourages others to empathize with them and understand their emotions, thereby forging connections. This theme is rarely found in sub-community 2, indicating a low level of social presence experienced by its members. In sub-

community 3, members share grateful and supportive messages in which they recognize and understand the emotions of others, and this theme is, likewise, not commonly found. Additionally, copresence was identified in the theme building interpersonal connections, in sub-community 2 and 3. While in both the members share about their real lives, they differ in the conversation topics as sub-community 2 members tend to focus on romantic relationships and sexual orientation, members of sub-community 3 describe details of their lives and what their days look like. Finally, members of sub-community 3 seem to be behaviorally involved with each other as they use their messages to perform actions together. Considering all these findings, social presence may be facilitated in online gaming communities by learning about members' real lives and engaging in shared actions.

5. Conclusion

5.1 Summary

The current study aims to answer the research question: *How is social interaction structured and centralized within a gaming Discord community, and what are the key characteristics of the identified sub-communities?* Using a network analysis, the community was found to have a small-world network in which members can easily reach and interact with anyone in the community, thereby fostering conversations and more enjoyable player experiences (Ravaja, 2009, p. 281, 284, 286). However, it was also found that the network is sparse, meaning that members generally send each other few messages. This is in contrast with previous research which highlights how communities are formed because of the participative behavior of fans (Sandvoss et al., 2017, p. 3) and the social motivations for playing games, such as being able to converse while playing and opportunities to socialize and build connections (Cheah et al., 2021, p. 942; Dalisay et al., 2015, p. 1411; Hilgard et al., 2013, p. 8). This suggests that motivations to play games may differ from motivations to join an online gaming community. Furthermore, messages in the community were found to not be centralized around a few members, who are often found to be important as they can affect and steer social interactions in the community (Saxena et al., 2018, p. 1425). This may point towards a more collaborative community in which all members contribute and are equally connected. Here, members may be encouraged to help, support and empathize with each other (Boudreau & Consalvo, 2015, p. 78; Wohn et al. 2011, as cited in Boudreau & Consalvo, 2015, p. 81; Papadakis, 2003, p. 7) which aligns with ACNH's encouragement of building friendships and working together.

Additionally, one of the central figures in the network plays the social role of socializer (Akar & Mardikyan, 2018, p. 10) by sharing about their personal lives or ACNH and by maintaining conversations. Through their many ties, they tend to receive more support and gain access to more resources (Hsiao and Chiou, 2012, p. 297; Saxena et al., 2018, p. 1425) as well as offer this to others. This finding expands on previous research by suggesting that socializers do not only use their high social standing for their personal benefit, but for helping community members as well. Another central figure is a content generator who is similar to socializers yet tend to send more messages than receive them. In doing so, they were found to be generally more helpful by providing support and resources. Surprisingly, the remaining two central figures are passive members who have an impactful position in the community despite them being considered less important than more participative members in

previous research (Akar and Mardikyan, 2018, pp. 12-13; Hevey, 2018, p. 311; Hsiao and Chiou, 2012, p. 239). Instead of exerting influence through sending many messages, they may be bridging members who connect otherwise unconnected members (Akar & Mardikyan, 2018, p. 10, 13; Hevey, 2018, p. 319; Shen et al., 2014, p. 462). This allows for the sharing of more varied information (Olievera and Gama, 2012, p. 110) among more members (Saxena et al., 2018, p. 1430), which can help members progress in the game (Shen et al., 2014, p. 473) and build relationships between members (Boudreau & Consalvo, 2015, p. 78; Wohn et al., 2011, as cited in Boudreau & Consalvo, 2015, p. 81).

Although the network does not have a very distinct sub-community structure, three sub-communities were detected (Clauset et al., 2004, p. 2; Tran, 2019, p. 32). After conducting a thematic analysis, it was explored how the themes were distributed among these sub-communities to compare them in terms of social identity and social presence experienced by its members. Social identity is most often experienced on a cognitive level. As members talk about shared interests, preferences, and experiences in gaming, they recognize similarities based on which their self-identification can be created (Tajfel, 1978, as cited in Mousavi et al., 2017, pp. 377-278; Turner, 1982, as cited in Shen et al., 2010, p. 340). Furthermore, social presence is stimulated when members can talk about their real lives which allows them to learn about each other, and when members perform actions in which they are given the feeling of engaging in an activity together (Biocca and colleagues (2003, as cited in Ekman et al., 2012, p. 330; Oh et al., 2018, pp. 23-24).

5.2 Theoretical and Practical Implications

As social interactions in online gaming communities currently seems to be an understudied subject, this study aims to start filling this gap. Using theories on computer-mediated communication, (online) communities, social networks, social identity and social presence, the study attempts to place these academic fields in a new context. The results may offer theoretical implications on how a community's social network is structured, showcasing that a community may not necessarily need to be centralized around one or a few members who affect social interactions (Saxena et al., 2018, p. 1425), for example. Instead, it may shed light on other types of social structures, such as a collaboration-focused community. Additionally, this study may contribute to scholarly works on virtual alternatives to social interaction in times when physical contact and conversations were limited during the COVID-19 pandemic. The game ACNH rose in popularity when it was released in the

beginning of the pandemic, introducing its players to a new virtual world while they were at home in lockdown (Eadicicco, 2020; Zhu, 2020, p. 158). In studying the game's accompanying Discord community, it was found how and to what extent experiences of social presence and social identity may be established in online environments. Although Discord is a popular platform for conversing while playing online and other collaborative or community-related activities with 19 million active servers per week (Discord, n.d.-a), not all themes of social identity and social presence were commonly found which suggests that certain social experiences may not be easily replicated virtually. The rapid development of new technologies, such as virtual reality, augmented reality and the metaverse, however, may bring about change and offer new ways of interacting online.

The study also provides practical implications that can be of use for the video game industry. By learning about how social interactions in gaming communities are structured and what various social roles its members play in the communities, video game franchises may create their own online communities in which players can be brought together. By analyzing how social identity and social presence can be stimulated in communities, insights may be given in how members interact with the game and fellow players. This way, franchises may learn how to employ central figures to share information and stimulate interaction, tailor content to the interests within the sub-communities, and foster a sense of belonging to the community. Using this study's findings, video game franchises may form active gaming communities in which players may be more engaged with and committed to the game franchise (Casaló et al., 2008, p. 32) and encourage favorable attitudes and loyalty towards the game (Badrinarayanan et al., 2015, p. 1050).

5.3 Limitations and Suggestions for Future Research

The current study explored members' experiences of social identity and social presence by analyzing their messages. This was based on earlier studies that show that sociability is an important aspect of playing video games (Cheah et al., 2021, p. 942; Dalisay et al., 2015, p. 1411; Hilgard et al., 2013, p. 8) and that platforms such as Discord can facilitate social interactions online (Kreijns et al., 2021, pp. 159-160). Also, social identity has been studied within communities or groups (Turner, 1982, as cited in Shen et al., 2010, p. 340) and social presence has been explored in the context of computer-mediated communication (Khairunisa, 2020, p. 175; Oh et al., 2018, p. 3; Poinsot et al., 2022, pp. 1-2), proving their relevancy for the current study. As many themes of social identity and social

presence were found but rarely occurred, future research may be needed to provide more insights into these concepts. The results of this study may be enriched with follow-up research that dives deeper into the members' experiences in the community. By conducting interviews with the members for example, light may be shed on experiences of social identity and social presence that members may not express in the messages they send in the community. Social interactions within online gaming communities may thus be better understood by approaching it from different points of view.

Furthermore, this study focused on textual conversations to explore social interactions and social structures within online communities. Besides chat channels, the Discord ACNH community also provides voice channels in which members can converse while playing by calling or video calling (Discord, n.d.-a). Due to time and resource constraints, the thematic analysis was solely conducted on the members' chat messages. Future research could provide a more holistic view on social interactions in online gaming communities by exploring the voice channels as well. These forms of communication may allow for different experiences of social identity and social presence, which could contribute to the findings of the current study. This way, all aspects of computer-mediated communication may be shed light upon, which could enrich its academic field.

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Appendix A: Examples of Edge Table and Node Table in RStudio

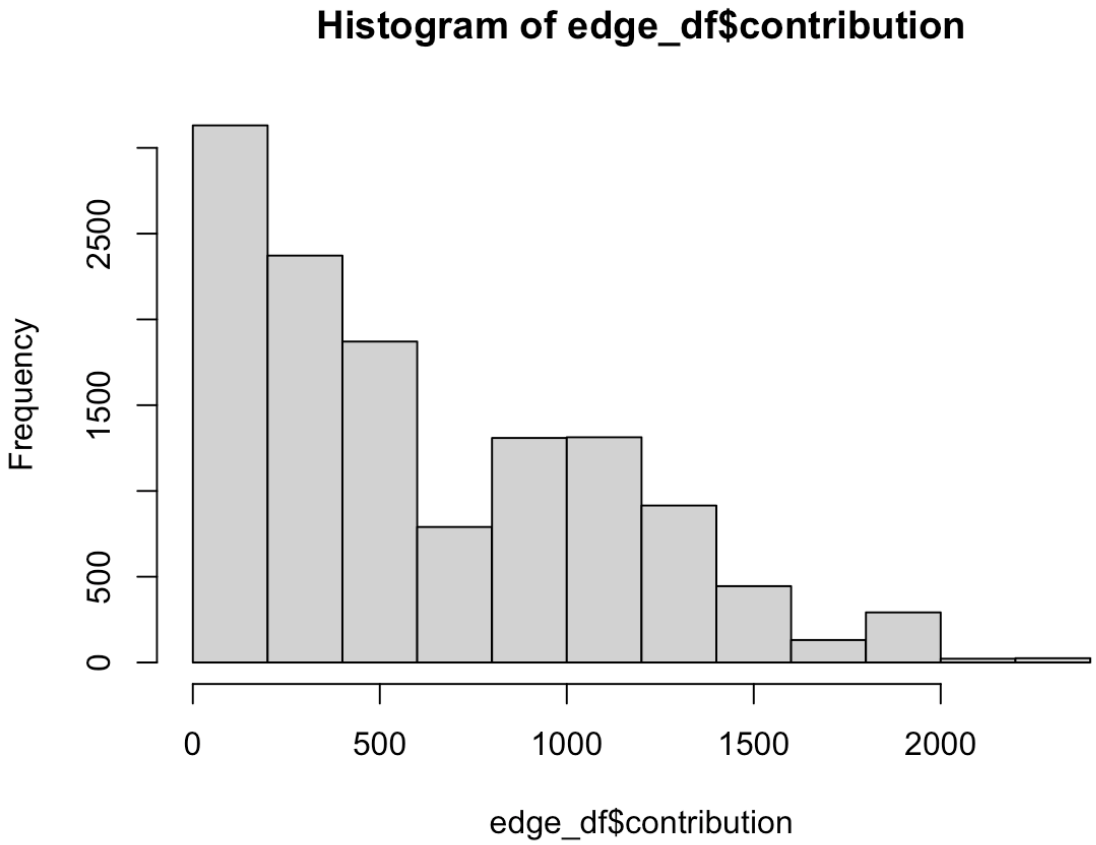
Edge Table

	from	to	text	time	occurences	contribution
1	[redacted]	[redacted]	Raymond	2021-05-23T22:10:54.329000+00:00	2	434
2	[redacted]	[redacted]	anyone here want sandy, kidd, axel, and Katt	2021-05-23T22:10:43.456000+00:00	2	434
3	[redacted]	[redacted]	hIS NAME IS RESETTI	2021-05-23T22:09:59.895000+00:00	1	491
4	[redacted]	[redacted]	Pay me bells or lose your cells. -Thomas Nook. Do th...	2021-05-23T22:09:50.191000+00:00	12	828
5	[redacted]	[redacted]	Are you talking about mine? If so, thank you! <:lollyh...	2021-05-23T22:09:55.774000+00:00	4	352
6	[redacted]	[redacted]	I'm just curious can people check my mutual servers I...	2021-05-23T22:09:24.817000+00:00	1	369
7	[redacted]	[redacted]	Ooo I like the pfp	2021-05-23T22:08:57.738000+00:00	4	352
8	[redacted]	[redacted]	Nintendogs + cats not being on switch is a literal *cri...	2021-05-23T22:08:23.209000+00:00	2	247
9	[redacted]	[redacted]	Nintendogs + cats not being on switch is a literal *cri...	2021-05-23T22:08:23.209000+00:00	2	235
10	[redacted]	[redacted]	dint remind me of tomodachi life i might cry	2021-05-23T22:07:42.748000+00:00	1	168
11	[redacted]	[redacted]	Miitopia is not like Tomodachi Life. Two completely di...	2021-05-23T22:07:24.445000+00:00	2	247
12	[redacted]	[redacted]	Do you guys wanna see something CURSED	2021-05-23T22:07:24.197000+00:00	3	47
13	[redacted]	[redacted]	Hi Alyssa!	2021-05-23T22:06:31.314000+00:00	3	47
14	[redacted]	[redacted]	is miitopia something like tomodachi life?	2021-05-23T22:06:35.088000+00:00	1	26
15	[redacted]	[redacted]	well, for the past few days I have been finding paw pri...	2021-05-23T22:06:14.667000+00:00	2	497
16	[redacted]	[redacted]	Hi friends	2021-05-23T22:04:29.071000+00:00	3	47
17	[redacted]	[redacted]	That is Zhongli killing me.	2021-05-23T22:05:06.937000+00:00	2	497

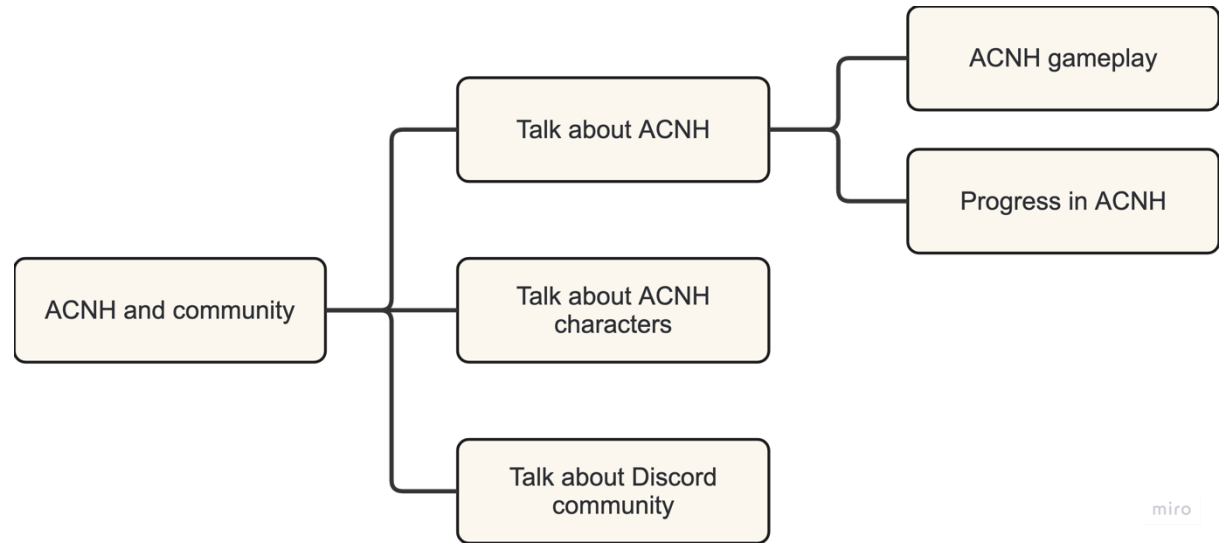
Node Table

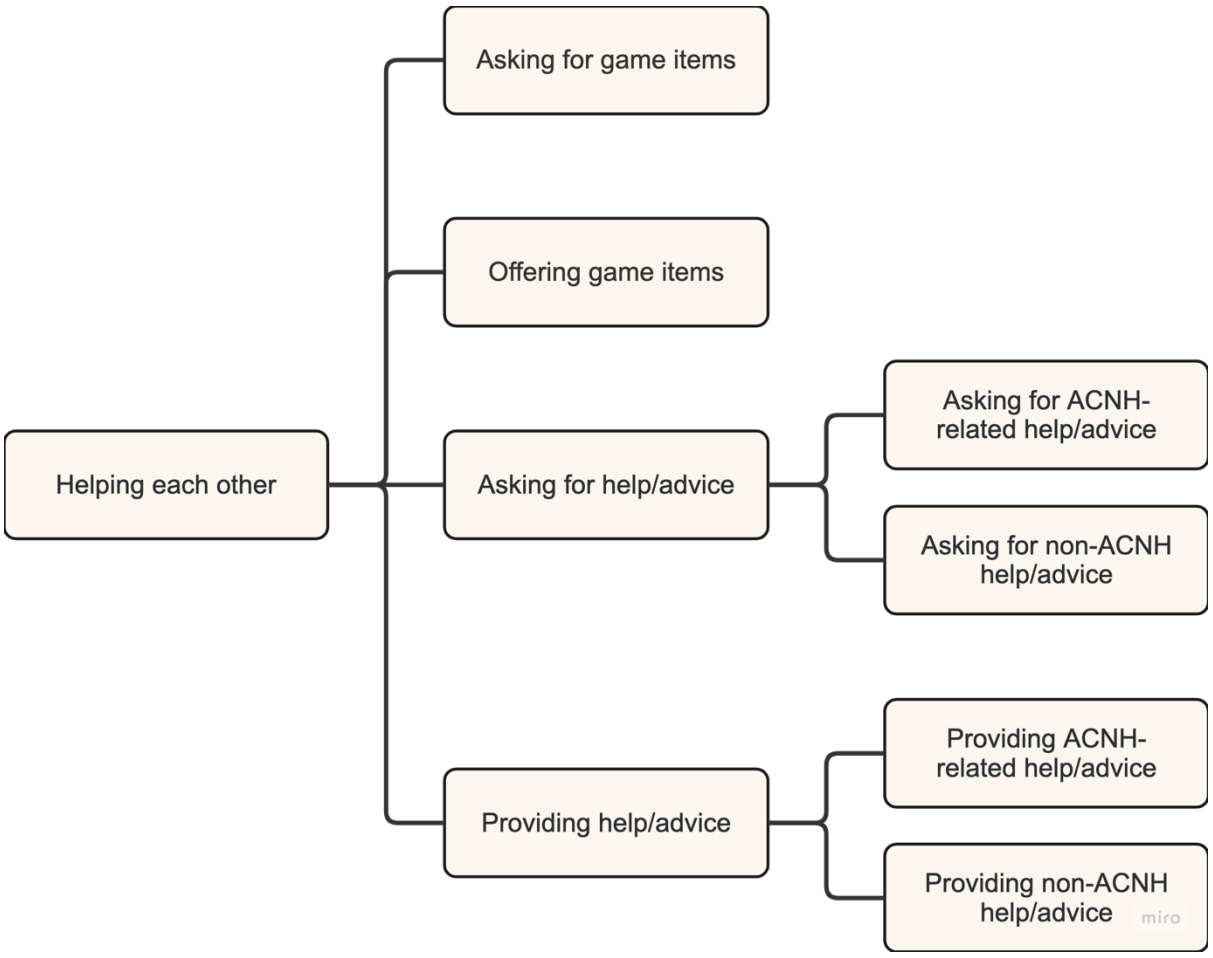
	id	dgree
1	[redacted]	3
2	[redacted]	2
3	[redacted]	4
4	[redacted]	69
5	[redacted]	24
6	[redacted]	2
7	[redacted]	2
8	[redacted]	1
9	[redacted]	1
10	[redacted]	8
11	[redacted]	1
12	[redacted]	2
13	[redacted]	15
14	[redacted]	7
15	[redacted]	2

Appendix B: Histogram of Distribution of Edge Contribution in the Network

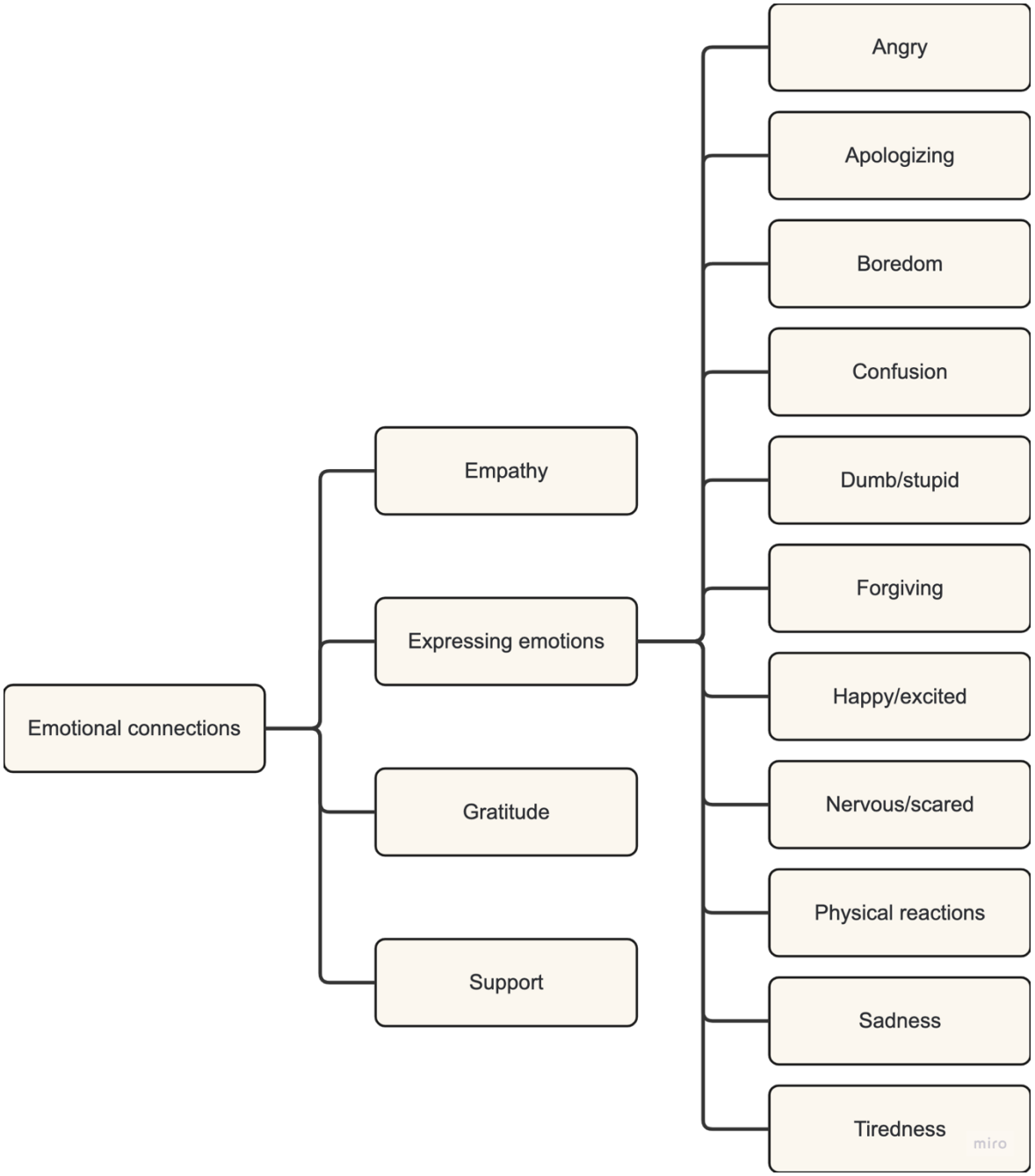


Appendix C: Coding Tree






Building interpersonal connections
Asking to play ACNH
Compliments
Friendships
Calling others friends
Asking to become friends
Greetings and goodbyes
Greetings
Goodbyes
Jokes
Performing actions
Singing songs
Talk about other games
Talk about other hobbies
Talk about real life
Real life
Relationships
Sexuality
Identity
miro


Emotional connections
Empathy
Expressing emotions
Gratitude
Support
Angry
Apologizing
Boredom
Confusion
Dumb/stupid
Forgiving
Happy/excited
Nervous/scared
Physical reactions
Sadness
Tiredness
miro

Appendix D: Overview of Sub-communities

Table: Number of Members per Sub-community

Sub-community 1	*Sub-community 2*	*Sub-community 3*
294	110	82

Appendix E: Declaration Page: Use of Generative AI Tools in Thesis

Student Information
Name: Joëla Blom
Student ID: 704659
Course Name: Master Thesis CM5000
Supervisor Name: dr. J. Muraro - Kim
Date: 27 June 2024

Declaration:

Acknowledgment of Generative AI Tools
I acknowledge that I am aware of the existence and functionality of generative artificial intelligence (AI) tools, which are capable of producing content such as text, images, and other creative works autonomously.

GenAI use would include, but not limited to:
- Generated content (e.g., ChatGPT, Quillbot) limited strictly to content that is not assessed (e.g., thesis title).
- Writing improvements, including grammar and spelling corrections (e.g., Grammarly)
- Language translation (e.g., DeepL), without generative AI alterations/improvements.
- Research task assistance (e.g., finding survey scales, qualitative coding verification, debugging code)
- Using GenAI as a search engine tool to find academic articles or books (e.g.,

☒ I declare that I have used generative AI tools, specifically ChatGPT and Wordvice AI, in the process of creating parts or components of my thesis. The purpose of using these tools was to aid in generating content or assisting with specific aspects of thesis work.

Extent of AI Usage
☒ I confirm that while I utilized generative AI tools to aid in content creation, the majority of the intellectual effort, creative input, and decision-making involved in completing the thesis were undertaken by me. I have enclosed the prompts/logging of the GenAI tool use in an appendix.

Ethical and Academic Integrity
☒ I understand the ethical implications and academic integrity concerns related to the use of AI tools in coursework. I assure that the AI-generated content was used responsibly, and any content derived from these tools has been appropriately cited and attributed according to the

☐ I declare that I have NOT used any generative AI tools and that the assignment concerned is my original work.

Signature:

Date of Signature: 27 June 2024

guidelines provided by the instructor and the course. I have taken necessary steps to distinguish between my original work and the AI-generated contributions. Any direct quotations, paraphrased content, or other forms of AI-generated material have been properly referenced in accordance with academic conventions.

By signing this declaration, I affirm that this declaration is accurate and truthful. I take full responsibility for the integrity of my assignment and am prepared to discuss and explain the role of generative AI tools in my creative process if required by the instructor or the Examination Board. I further affirm that I have used generative AI tools in accordance with ethical standards and academic integrity expectations.

Signature:

Date of Signature: 27 June 2024

AI Prompts used

Prompt 1:

“Please explain why this code does not work to retrieve only messages that are direct replies and the original messages? and why it does not include the username of the original message, the content of the original message, the username of the reply and the content of the reply?

```
def retrieve_messages(channelid):
    headers = {
        'authorization':
'NzI1NzU0OTUxNzUzNzkzNjE4.GfYQbv.8WL6NgcIon5w9wlrPFLwn7Pnh8RaGfUNb2Qc
c8'
    }
    r = requests.get(f'https://discord.com/api/v9/channels/{channelid}/messages',
headers=headers)
    jsonn = json.loads(r.text)
    for value in jsonn:
        #check if the message is a reply
        if 'referenced_message' in value:
            #return information about original message
            original_message_username = value['referenced_message']['username']
            original_message_content = value['referenced_message']['content']
            #return information about reply
            reply_username = value['username']
            reply_content = value['content']
            #print
```

```
        print(f"Original message by {original_message_username}:
{original_message_content}")
        print(f"Reply by {reply_username}: {reply_content}\n")
retrieve_messages('538938170822230026')"
```

Answer 1:
The code did not work as I did not access the data correctly. I thought the username and content were nested within "referenced_message", but it turns out that they are nested within "author".

Prompt 2:
"how to make lists of two of the output"

Answer 2:
Create a list to store pairs of messages. Create pairs with the keys the original message and the reply message.

Prompt 3:
"why does this code not work to retrieve chat messages from a certain time frame?
import requests import json import time def retrieve_messages_in_timeframe(channel_id, start_timestamp, end_timestamp): headers = { 'authorization': 'NzI1NzU0OTUxNzUzNzkzNjE4.GfYQbv.8WL6NgcIon5w9wlrPFLwn7Pnh8RaGfUNb2Qcc8', } # Convert start and end timestamps to Discord snowflake IDs start_snowflake = int(start_timestamp * 1000) << 22 end_snowflake = int(end_timestamp * 1000) << 22 # Retrieve messages from Discord API using 'before' and 'after' parameters r = requests.get(f'https://discord.com/api/v9/channels/{channel_id}/messages?before={end_snowflake}&after={start_snowflake}', headers=headers) json_data = json.loads(r.text) # Filter messages based on timestamps message_pairs = [] for message in json_data: timestamp = int(time.mktime(time.strptime(message['timestamp'], '%Y-%m-%dT%H:%M:%S.%f%z'))) if start_timestamp <= timestamp <= end_timestamp and 'referenced_message' in message: # Extract information about original message original_message_username = message['referenced_message']['author']['username'] original_message_content = message['referenced_message']['content'] # Extract information about reply reply_username = message['author']['username'] reply_content = message['content'] # Add the pair to the list message_pairs.append((original_message_username, original_message_content, reply_username, reply_content)) return message_pairs # Example usage start_timestamp = int(time.mktime(time.strptime('2024-04-01T00:00:00.000Z', '%Y-%m-%dT%H:%M:%S.%fZ'))) end_timestamp = int(time.mktime(time.strptime('2024-04-15T00:00:00.000Z', '%Y-%m-%dT%H:%M:%S.%fZ'))) channel_id = '538938170822230026' message_pairs = retrieve_messages_in_timeframe(channel_id, start_timestamp, end_timestamp) print(message_pairs)"

Answer 3:
The timestamp was not correctly converted to the Discord Snowflake ID. Instead, it must be converted to a Unix timestamp.

Prompt 4:
"what does this error message mean: Error in degree_centralization/(n - 1) : non-numeric argument to binary operator"

Answer 4:
The value of degree_centralization was not numeric which is why it could not be used in the division (n – 1). The degree_centralization must be converted to numeric before applying division.

Prompt 5:
Using ChatGPT, Wordvice AI and SpellBoy for grammar and spelling corrections.