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Communication, Opponents, and Clan Performance in Online Games: A Social Network Approach

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Abstract

Online gamers form clans voluntarily to play together and to discuss their real and virtual lives. Although these clans have diverse goals, they seek to increase their rank in the game community by winning more battles. Communications among clan members and battles with other clans may influence the performance of a clan. In this study, we compared the effects of communication structure inside a clan, and battle networks among clans, with the performance of the clans. We collected battle histories, posts, and comments on clan pages from a Korean online game, and measured social network indices for communication and battle networks. Communication structures in terms of density and group degree centralization index had no significant association with clan performance. However, the centrality of clans in the battle network was positively related to the performance of the clan. If a clan had many battle opponents, the performance of the clan improved.

Introduction

MANY ONLINE GAMERS do not play games alone; they collaborate with other gamers to demolish behemoth monsters or compete with other players in groups. Although personal feelings such as interest, enjoyment, and excitement are important motivations in joining online first person shooter games (FPSGs), social interactions and competition are also important motivations to participate in such games.[1–3] Gamers form guilds or clans that are important components of online game culture; gamers mingle with other players and manage a virtual association to practice their game skills and enjoy collaborative battles against other clans.[4] For massively multiplayer online game (MMOG) players, a "sense of belonging" is a key motivation in joining a clan, as are mutually shared victories and upgrading one's own or clan's ranking or level.[2,5]

Because clans are composed of many players, roles inside clans evolve in diverse ways.[4] Some expert players show nurturing behavior toward new members of the clan, and clan members also plan their next battles collectively.[4] While some players are dedicated to managing the clan, some peripheral members simply exploit the clan's resources, such as battle tactics or guides on weapons. Clans in certain types of MMOGs can have battles against other clans and accumulate game points based on winning and the number of participating members. Game points determine the ranks of the clans, and the names of the top ranked clans are displayed on their game Web site gloriously. Thus, each clan itself has interactions with other clans to gain points or experience by engaging in battles, and players show interactive behavior within their clans. From the battle history composed of two participating clans, a battle network can be constructed using the clans as nodes that are linked if they have engaged in a battle.

According to Ang and Zaphiris,[4] previous studies have focused on "who the users are" and "what the users do" in the community. Ang and Zaphiris identified the social roles of members of a game clan based on messages on the clan community pages, but they did not analyze the effect of these communication structures on the clan's performance or investigate the clan's battle networks. MMOGs can provide a place where users can grow their leadership skills in both the virtual and real worlds.[6] However, some studies have found gaming behavior to be an escape from real life problems.[7,8] Although clans have diverse goals, clans generally want to increase their rank in their game community by winning battles. Thus, they share tips, discuss battle tactics, and arrange battles with higher ranked clans for practice. However, there have been no studies to our knowledge on the communication structures in clans, battle networks among clans, and the influences of these two factors on clan performance. Do internal

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cohesiveness or communication patterns influence performance? Do battle networks influence performance?

This study used social network analysis to investigate associations among the internal communications, battle networks, and performance of online game clans. To assess a battle network, we collected battle data for clans participating in a FPSG released in Korea, and constructed a communication network based on clan members' posts and comments on clan pages. Then, we investigated the effects of the internal communications and external battle networks of clans on the clans' performance. By investigating clans' internal communications and battle networks, we hoped to deepen our understanding of online game clan behavior.

Research Model

Guilds or clans are important sources of interaction with other players and are gaining popularity in online games. Clans in FPSGs or MMOGs are formed voluntarily by players and are managed by clan members. These are places for connecting with new people and developing a feeling of togetherness among players. Additionally, clan members acts as a team to perform tasks such as upgrading their ranking and maintaining their community. Social grouping and guild membership are favorite aspects of online game playing.[9] More than 80% of the participants in the study by Jansz and Tanis[1] belonged to clans. Being a member of a top ranked guild is a "badge of honor."[10] Clan members nurture new gamers by sharing tips and discussing tactics for future battles against other clans. While around 20% of messages in the community of World of Warcraft (WoW) relate to guild management and coordination of tasks, around 28% of messages ask for or offer help.[4] Social roles in guilds include core members who foster the community and peripheral members who use guild resources; these roles can be identified from messages within the community and compared among different guild networks.[4]

Many studies outside the digital game context have investigated relationships between communication structures inside physical teams and the teams' performance. High density teams, in which many members have ties to one another, have been found to have higher levels of information sharing and collaboration, leading to better performance.[11,12] The density of a network is the proportion of actual links in a network relative to the total number of links possible.[13] Balkundi and Harrison[11] analyzed existing studies to show that the density of ties within a team is positively related to team performance. The more members there are who are involved in exchanging advice, the more pieces of information are likely to be shared.[14] In WoW, the life span of guilds that display high levels of connection among members is longer than that of those who do not.[10] Thus, we formulate the following hypothesis:

H1: The density of a clan's communication network will be positively related to its performance.

By extensively sharing tips for game plays, individuals in a clan can improve their game skills. Thus, these improvements may have positive effects on clan performance. However, discussions and communications that are led by only a few members may have negative effects on group (clan) performance. Network centralization in social network analysis, such as the group degree centralization index, measures how unequal the individual actor centralities are.[13] The centralization of a network can be calculated as the difference between the number of links of each node divided by the maximum possible sum of differences.[13] In a centralized network, many of the links are distributed around a few nodes (members), whereas in a decentralized network there is little variation in the number of links of each node. As the centralization of a communication network increases, the likelihood of sharing experiences with other members decreases.[14,15] It has been found that decentralized communication networks are more fruitful than centralized networks.[16] Positive network externalities are possible because the value of a network among members increases as many members share their tips.[17] Centralized guilds with a few members in WoW did not survive as long as other guilds.[10] When a few members dominate communications and discussion in a clan, the chances of sharing knowledge and arranging the clan's tactics decrease. Thus, we formulate the following hypothesis:

H2: The network centralization of a clan's communication network will be negatively related to its performance.

Compared with studies on player behavior in online games, the number of studies on clan behavior is relatively small. Williams et al.[18] created a typology of guilds in WoW and noted that roughly 60% of the interviewees belonged to a social guild to interact with other players. There were diverse types of guilds, from "tree houses" for casual social interactions, such as children's play spaces, to "barracks" for managing task oriented military-style hierarchies.[18] Ducheneaut et al.[10] studied the life and death of online game guilds in WoW. They found that guilds were incredibly diverse in terms of size, motivation, and formation and were fragile social entities; the life span of many guilds was not very long. They also found that guild structure, such as size, density, and centrality, impacted the survival of guilds. Although studies on game clans have focused on internal structure, to understand clan behavior, the external networks of clans also need to be considered.

There have been many studies assessing an individual's or an organization's social network as social capital.[19–22] Social network theory explains that central positions provide greater access to and control over information. The centrality of a node in a network determines its relative importance in the network[13]; usually, nodes of greater centrality are located in central positions in network visualizations. Many studies have shown that the centrality of an actor or a team in a social network has positive effects on their performance. Bulkey and Van Alstyne[19] found that in an executive recruiter's e-mail network, centrality was significantly related to performance in both booking and billing. This relationship was also identified by Granovetter[20] in job searches, by Uzzi[22] in the garment industry, and by Burt[23] among large companies. Raz and Gloor[21] found that the number of social ties of a start-up was related to survival. This can be applied to online game clans. Because clans have diverse tactics and strategies for engaging in battles, clans located in the central positions in a battle network have greater access to such diverse strategies and tactics by experiencing battles with prominent clans. That is, if a clan has many opponent clans, this will be helpful in

Table 1. Descriptions of Battle Network Data

	Battle network
Number of clans	736
Average number of battles	177.799
Number of links (undirected)	7,642
Density (undirected)	0.028
Average number of degrees (undirected)	10.383
Average ratio of battles in the data to the total number of battles	0.1599

increasing its rank over the long term. Thus, we propose the following hypothesis regarding the centrality of a battle network and the performance of clans:

H3: The centrality of a clan in a battle network will be positively related to its performance.

Data

We collected data from a FPSG, A.V.A, which has been released in China, Japan, Korea, Taiwan, and the United States. Like other FPSGs, players in A.V.A can have missions to rescue hostages or assassinate terrorists. Players also take part in battles with other players as individuals or groups. Players can form clans, and the clans can have battles with other clans. Players ask to join a clan, and clan leaders can accept or reject the requests. The maximum number of members in one clan is 300, and a player can only be in one clan at a time. There is a posting board for clans to advertise when recruiting new members. The data collected are for Korean users and include battle histories, posts and comments on clan pages, and game performance information for clans over 6 weeks in September and October 2010. The total numbers of wins and losses, total accumulated game points, and rank in relation to other clans constitute game performance information. Game points are given to an individual after each battle based simply on winning or losing and on other considerations, such as battle type. The sum of points given to the participating members is accumulated on behalf of the clan as clan points. If a clan with many members wins a battle, then the number of points given to the clan will be higher. Rank is based on the points accumulated by the clan. Clan ranking, based on accumulated points, and weekly rankings, based on points accumulated during a week, are displayed on the game Web site. A battle history is composed of two participating clans. Additionally, the data include scrambled player identifications associated with each post on clan pages; thus, we can identify who wrote a post and who replied to the post.

Battle network

During the 6 weeks that we collected social network (battle network) data, 736 clans engaged in battles. The descriptions of the battle networks are summarized in Table 1. The average number of battles for a clan was around 178. The social network measures in Table 1 were calculated as undirected because it was not possible to distinguish between the edge (gaming together) from clan A and clan B and the edge from clan B and clan A.

Figure 1a shows a sample battle network of 183 clans from the data set, and Figure 1b magnifies part of Figure 1a to illustrate some peripheral clans. The clans located at the center of the battle network had battles with diverse clans, whereas the clans located on the outer edges of the battle network engaged in battles with fewer clans. Clans arrange their battles by contacting members of other clans informally or recruit battle opponents by posting on their game Web site.

Figure 2 shows the battle behavior of the clans. The y axis of Figure 2 is the ratio of battles engaged in with higher ranked clans, and the x axis indicates the ranking of clans. Because there are fewer higher ranked clans for the top ranked clans, which are located at the left end of the x axis, the ratios of engaging in battles with higher ranked clans are low. The ratios increase as ranks decreases and plateau at around 0.8. The fitted line on Figure 2 is from the second order polynomial regression.

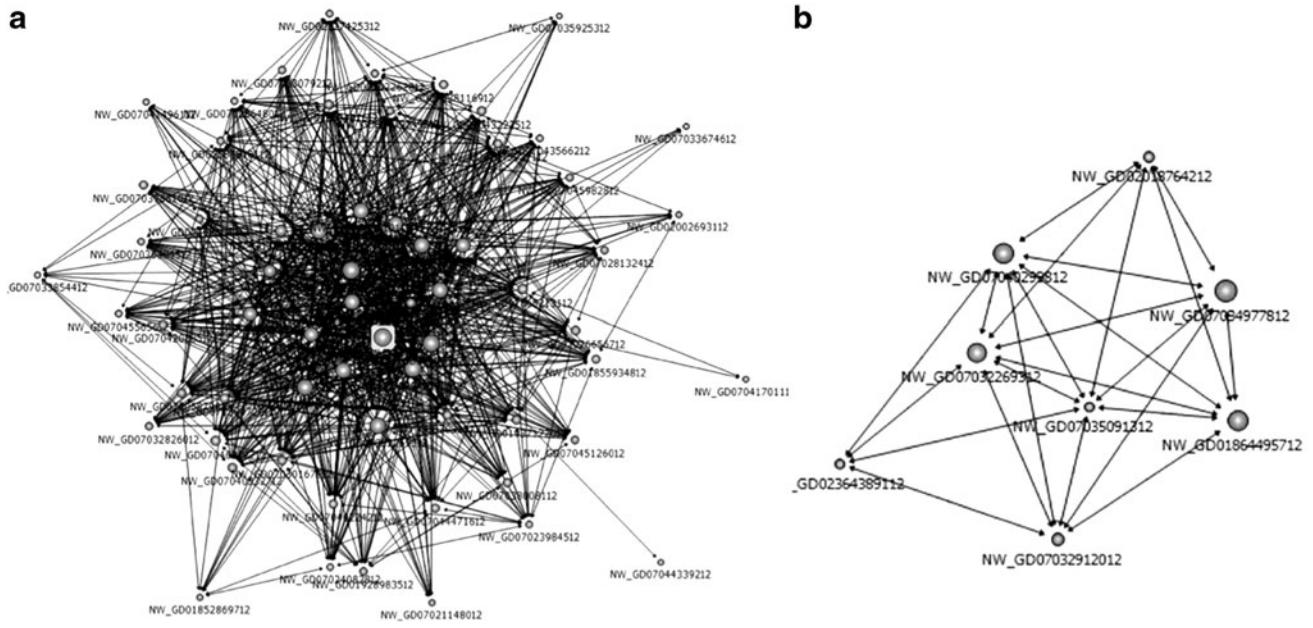

FIG. 1. **(a)** A sample battle network of 183 clans, and **(b)** a subset showing some peripheral clans in the network.

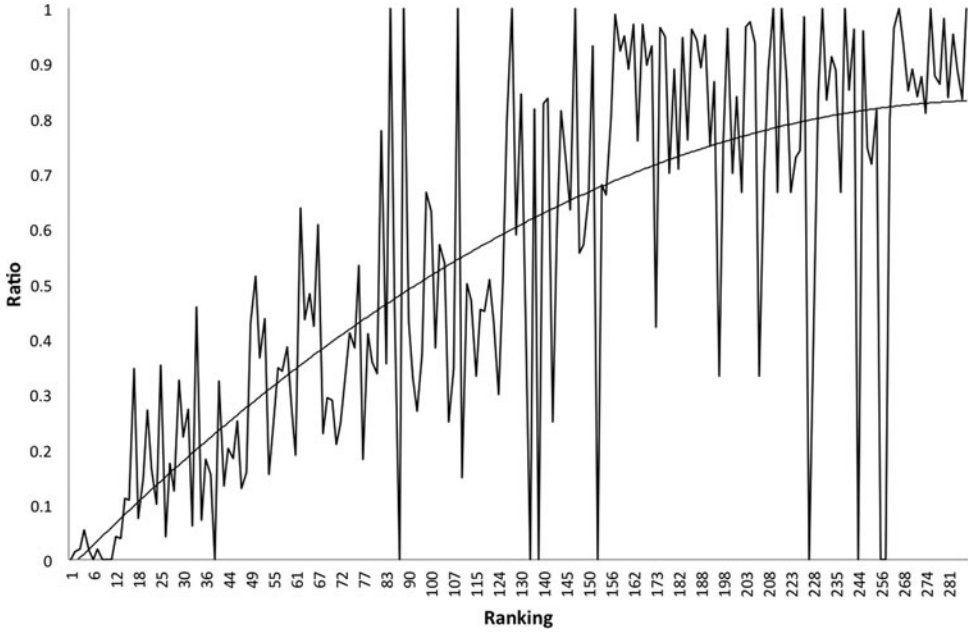

FIG. 2. Battle behavior of clans.

Internal Communications

From the 736 clans in the data set, we selected 183 that had more than 100 posts and comments during the 6 weeks that we collected information on the social network (communication network) of each clan. Summary statistics of the communication networks are presented in Table 2. The average number of posts and comments in the clan community pages was around 400; each player (node) communicated with about seven other players (average number of degrees) over the 6 weeks. The average density of communication networks is the average of the density values of each clan's communication network. The density of a network can be calculated as the number of existing connections between nodes divided by the number of possible connections between nodes.[13] The average group degree centralization index is the average of the group degree centralization index values for each clan's communication network. The centrality of a node is measured by the proportion of nodes that are connected to the node among all nodes; the group degree centralization index is a measure of the centrality of the individual nodes in the network.[13] The higher the group degree centralization index value, the more likely it is that a few players are quite central, with the remaining nodes considerably less central.[13] We could have drawn communication networks based on messages sent and delivered during battle, but these were generally to all participating members for directives, such as locating their positions. Thus, to draw the communication networks, we omitted these messages and used only posts and comments on the clan web pages.

Table 2. Descriptions of Communication Network Data

	Communication networks
Number of clans	183
Average number of posts and comments	403.137
Average number of nodes	47.357
Average number of degrees	6.615
Average density of communication networks	0.168
Average group degree centralization index	0.556

Figure 3 shows a decentralized clan (a) and a centralized clan (b) in terms of the group degree centralization index. A few players dominated the communications network of Figure 3(b) while there were many players with leading roles in communicating with other clan members in Figure 3(a).

We analyzed the structure of one clan's community posts and comments. The clan had posting boards for "Tips"," "Photos," "Free announcements," "Self introductions," "One-sentence board," "Guest room," and for sharing information about game maps. "Tips" was for sharing general game skills, and there were also some boards for sharing information about specific game maps. There were many questions from novice members, which were answered by other players. There were also some summaries of game plays written by experts within the clan.

Results and Discussion

We used the same 183 clans to analyze the effects of internal communication and external battle networks on clan performance. Point scores and total numbers of battles accumulated from the first game until the end of the 6 week period that we spent collecting battle histories and internal communications data. The social network measures for communication and battle networks were derived from the data we collected during these 6 weeks. We performed regression analysis, as shown in Table 3.

We included the total numbers of battles in the analysis to control for the effect of experience. Generally, as a clan engages in more battles, its points increase. Including the total numbers of battles as a control variable revealed the effects of communication structure and battle behavior. Centrality in

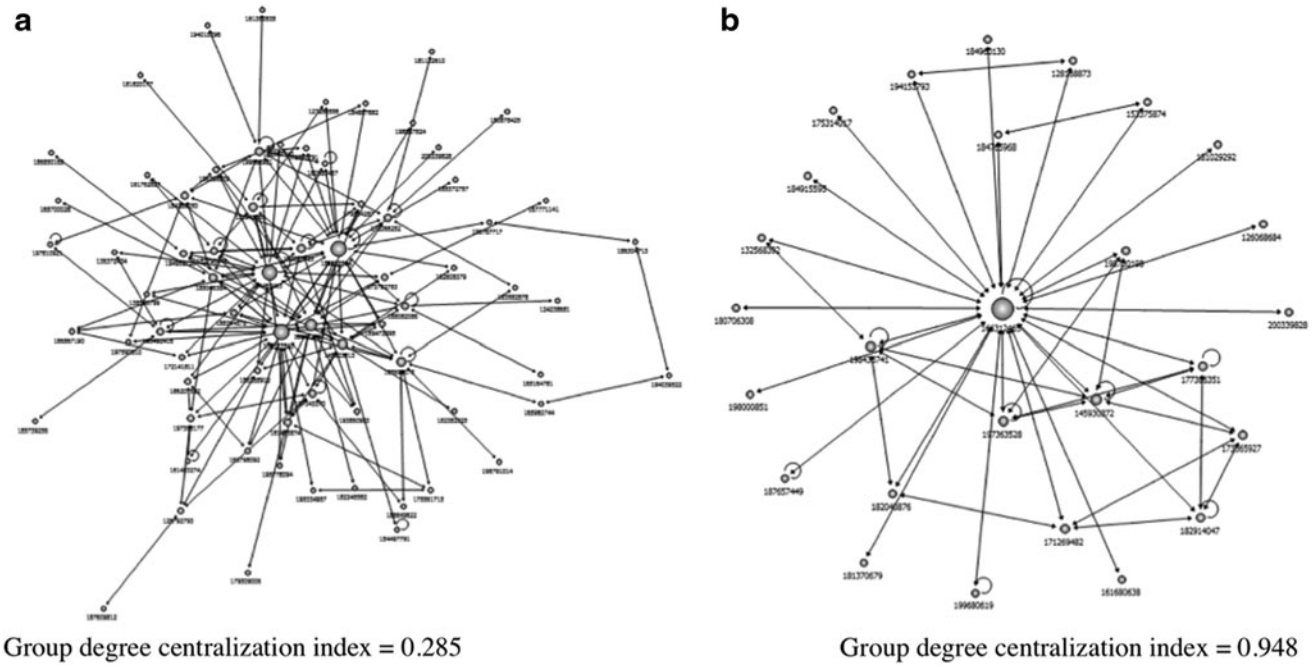

FIG. 3. **(a)** A decentralized clan, and **(b)** a centralized clan.

the battle network was significant, whereas the density and the group degree centralization index value of the communication network had no significant effect on clan performance. Thus, hypothesis 1 (density of communication network→clan performance) and hypothesis 2 (centralization of communication network→clan performance) were not supported. Hypothesis 3 (centrality in a battle network→clan performance) was supported.

We investigated the social dynamics between players within a clan and between clans. Within a clan, members nurtured other members by sharing their experiences in battles and offered tips for playing the game. They also displayed a sense of togetherness, talking about their lives and game playing.[2] These communications about the game and life led to "Brothers in Blood" in FPSGs.[2] We also analyzed clan battle behavior. Clans tended to have multiple battles with one other clan because arranging battles between different clans is difficult; the members of both participating clans have to be online at given times.

We measured the effects of the internal communications and the external battle networks of clans on their performance. Internal communications showed no significant effect on the performance of the clans. The density and the group decentralization index values of the communication networks in clans had no effect on clan performance. Although members shared many tips and tactics about gaming, the numbers of posts and comments on a clan's pages had no impact on the performance of the clan. Because there were more posts on real life experiences and personal relationships, rather than posts about game play, the structure of communications via community pages had no influence on clan performance. Centrality in battle networks was positively related to the performance of the clans. When one clan battled with diverse clans, its centrality increased in our study. Thus, experiences with diverse clans, by engaging in battles with diverse clans and experiencing different tactics, had a positive relationship on the performance of the clan. This corresponds well with the real world finding that an increase in diverse experiences enhances business performance.[24]

This study has some limitations. First, the independent variables in the regression analysis of this study were based on 6 weeks of battles and communications data, but the

Table 3. Results of Regression

	Model I		*Model II*	
Dependent variable	*Log (total points)*		*Log (total points)*	
Independent variable	β	t *statistics* (p *value*)	β	t *statistics* (p *value*)
Density of the communication network	0.416	0.794 (0.428)	−0.080	−0.873 (0.384)
Group degree centralization index of the communication network	−0.761	−2.079** (0.039)	−0.008	−0.126 (0.900)
Degree centrality in the battle network	4.289	6.540* (0.000)	0.860	6.978* (0.000)
Log (total number of battles)		—	0.882	75.251* (0.000)
R^2		0.204		0.976

*$p = 0.01$; **$p = 0.05$.

dependent variable, total points, was based on the entire period of the clans' establishment. This said, the 6 week data set contained about 16% of the total number of battles, on average, as shown in Table 1. Second, clan members can change clans, although one player can only belong to one clan at a time. Thus, it is difficult to distinguish the effects of member turnover on communications and battles.

Members and clans in FPSGs or MMOGs manifested patterns of social dynamics in communicating with other members and having battles with other clans. Online game providers and game developers should understand gamers and clan behaviors.[7–9,18] Even though the types of players and clans,[18,25] and the purpose of joining clans differ,[4] motivating online gamers to become members of clans and maintaining active clans is important to online game providers. Social interactions inside a clan and competitions among clans are favorite aspects of online game playing.[1,2,9] Gamers generally preferred to play socially in a team rather than each as a "lone wolf,"[26,27] and men's competitive response is greater when they engage in between group competitions than within group tournaments.[28] From these social interactions and competitions, players can obtain a sense of belonging, and of achievement through upgraded ranking or level.[2,5] Online game providers should devise ways to match diverse battle opponents to make it easier to set up battles, thus motivating clans to battle with many more clans.

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