Analysing Social Metrics in an Online Game Site

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ABSTRACT

Understanding real-time coordination behaviour around multiplayer games is important as it allows designers to make informed decisions about supporting player communities. However, studying existing sites is difficult because of the amounts and range of data involved. In this paper, we argue for using social accounting metrics to investigate large game sites. We demonstrate the use of these metrics to explore the social coordination behaviour of the game site PlayOK, and gain a high-level view of social activity in the game site.

Keywords

Games, analysis, social metrics.

1. INTRODUCTION

There are many popular online multiplayer game sites ranging from reproductions of board and card games – e.g. PlayOK (www.playok.com) – to rich 3D worlds such as World of Warcraft (WoW). These game sites have large numbers of people interacting and gaming together. They are an ideal setting to study meta-game coordination behaviour.

However, it is difficult to understand this real time coordination behaviour in these sites because the sites are very large, often with millions of people and activity throughout the day. The wealth of data that results makes them valuable for study but also makes them difficult to investigate.

It is important to understand social coordination activity in these game sites. Deeper understanding enables designers to make informed decisions when supporting game communities.

Our goal was to take a broad initial look at how people behave in the game site PlayOK; in particular the real time meta-game coordination to establish and support gameplay. PlayOK is a very large game site that supports 38 different types of multiplayer games and has over 5 million registered users.

There are various approaches to understanding the social nature of virtual sites. Some sacrifice breadth of understanding and use methods such as questionnaires (e.g. [1,10]) or observations (e.g. [8]) to get a very deep and rich understanding of certain aspects. Others, such as Social Network Analysis [9], computationally process large amounts of data to produce summaries of community structure. Social accounting metrics, as in [2,5], make use of simple statistical summaries of activity data to gain insight into large-scale behaviour.

In this paper, we demonstrate how social accounting techniques can be used to gain a broad understanding of the meta-game activity throughout a game site. We investigate the PlayOK game site using three themes that are frequently considered in work about online communities. These are: *permanence*, the idea that social groups benefit when people are long-term residents of a place (virtual or real) [1]; *social interaction*, which has been primarily considered in terms of verbal communication, but which can also include shared activity [3]; and *forming ties*, in which people meet others, associate, and make lasting connections (strong or weak) [3].

2. PREVIOUS WORK

There are many methods for analysing community and social behaviour in virtual settings, both in games and in other online interactive settings.

2.1 Humanities Inspired Methods

Many methods for studying virtual settings are directly inspired by fields such as psychology, sociology and anthropology, which have years of experience in investigating social structures.

A notable example is Blanchard's measure for 'sense of virtual community' [1], which derives from the physical world 'sense of community' psychological measures. The measure is a questionnaire for members of an online group to test for the presence of a community. Surveys tailored to particular questions are also often used, such as in Yee's study of player types [10].

Participant-observation techniques have been used in most studies of social interaction in multiplayer role playing games. These include studies of Multi-User Dungeons (MUDs) (e.g. [7]) and Massively Multiplayer Online Games (MMOGs) (e.g. [4,8]). Social interaction insights are based on observations of researchers who play the games.

The strength of this broad category of technique is that researchers gain a deep understanding of some aspects of the community. The weakness is that, while the understanding gained is deep, it is not very broad. Typical game site populations are large and so questionnaires and surveys can only be applied to a small proportion of the population. Similarly, an observer can only see a small part of the activity.

2.2 Computational Methods

The most prominent method of this category is Social Network Analysis (SNA) (see [9] for a full treatment). In brief, SNA is a collection of algorithms for extracting structural information from social network graphs. Graph nodes are typically people in the social network, and the weighted edges are based on measures of relationships between members, such as number of chat messages exchanged. SNA algorithms can be used to discover features of interest such as communities (groups that interact more frequently with each other), people that are central to communities, people that are connectors between different communities, and many other properties of interest.

The strength of SNA is that it provides insight into the large scale structure of the community, especially subgroups. Analysis takes into account data from the whole virtual setting. A weakness is that SNA techniques rely on a well-connected social network. The PlayOK social network was too sparse and disconnected.

2.3 Social Accounting Metrics

Social accounting metrics use low-level traces of activity – such as logging events – reconstruct community behaviour. This is a very broad category of analysis and there is a lot of research that would qualify. We will use two notable examples to illustrate the qualities of our study.

Brush et al [2] used social accounting metrics to study Usenet. The main difference with our investigation is that in Usenet the primary purpose is to communicate directly with text. We are studying a game system where there are multiple means to interact – such as chatting or playing – and the primary purpose is gaming. In addition, the interactions in the game site are real-time, while Usenet is (mostly) asynchronous.

The second defining example is Ducheneaut et al's [5] study of grouping behaviour in World of Warcraft (WoW). While grouping behaviour is of interest to us, we are concerned with how game groups are negotiated and coordinated. WoW is a 3D Massively Multiplayer Online Game, and is a fundamentally different experience than PlayOK. We expect to observe correspondingly different community behaviour.

We chose this style of analysis because it allows us to target aspects of interest: specifically real-time communication and coordination around the gameplay.

3. METHODOLOGY

Our results are based on analysis of three months of system logs from the online gaming site PlayOK. The logs contained events such as logins, games and chat messages (Table 1).

3.1 The Game Site: PlayOK

PlayOK was established in Poland in 2001 and has grown steadily, with 5.2 million unique accounts as of June 2010 (accounts are removed after one year of inactivity). PlayOK is a web-based game site that offers 38 different game types, including board games such as Chess and Backgammon, card games such as Hearts and Canasta, and other games such as Dominoes and Dice. All analysed games are player-vs-player only. Free registration is required to play and the site is ad supported. The games are partitioned by language and region, so not all games are available to every person.

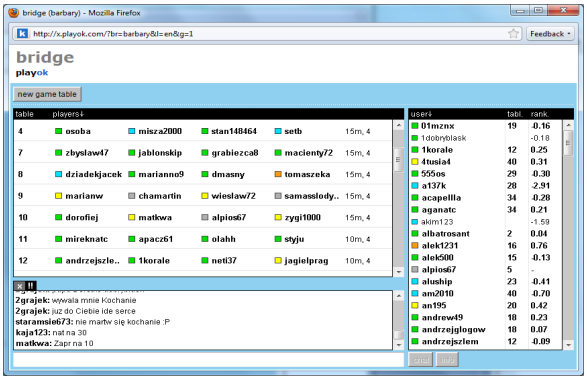

Figure 1: A Bridge room: player list at right, table list at left, and room chat at bottom left.

After logging in and selecting a game type, the player is presented with a list of rooms. Selecting a room starts a java applet in a new window (Figure 1). In this window are a list of active game tables, a list of other people in the room, and text chat. A game table is a virtual area for a single game, and each room can contain many game tables. Users can enter game tables currently in progress or create new tables.

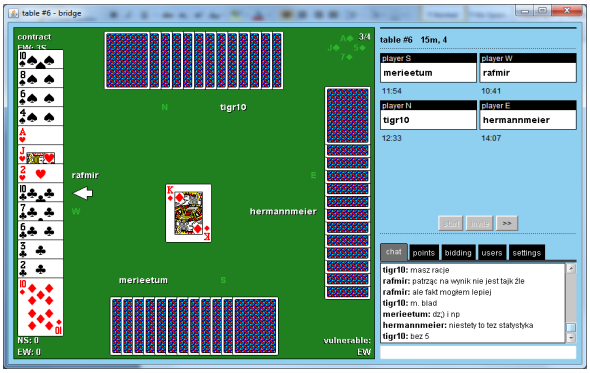

Figure 2: Bridge game table: player information at top right, chat area at bottom right.

Entering a game table opens a new window (Figure 2) with a view of the game, a list of people at the table, the names of the players (or empty places if the game is not full), and a chat area. If there is space at the game, and the game has not started, users can 'sit down' and become players.

3.2 Log Files

The PlayOK administrator made daily log files available to the authors. Our data covers 8 April 2010 to 8 July 2010 (91 days) and consists of ~12GB of compressed text files. Table 1 summarises the structure of the events recorded in the log files.

Table 1: Log event types (all include a timestamp)

Login	User ID, Language, Contacts (list of user IDs), Registration date, #people on the game type
Logout	User ID, Time logged in, #people in the game type
Room Chat	Sender ID, Room name
Table Chat	Sender ID, Room name + Table number
Private Chat	Sender ID, Receiver ID
Join Room	User ID, Room Name, #people in the room
Leave Room	User ID, Room Name, #people in the room
Join Table	User ID, Room name, Table number, #people at table
Leave Table	User ID, Room name, Table number, #people at table
Invite	Inviter ID, Invitee ID, Table number
Game Start	Room name, Table number, Player IDs (w/ rankings)
Game End	Room name, Table number

4. PLAYOK SOCIAL DYNAMICS

Our analyses looked at three themes frequently used to describe communities and social groups – permanence, social interaction, and formation of ties. Our goal was to take a broad initial look at how people behave in PlayOK.

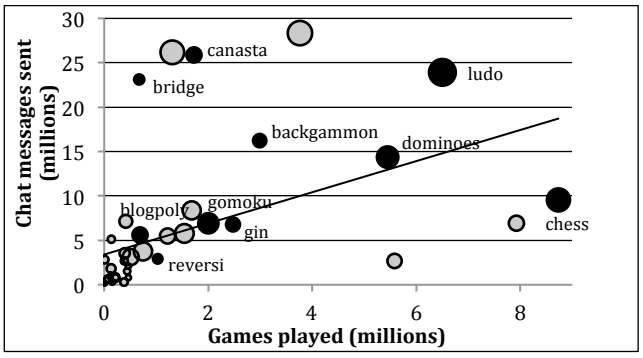

Figure 3: Game types by number of games and chat messages. Size shows population. Selected games are black and labeled.

For each theme, we identified specific questions that can be answered through our log-based analyses. In some charts that accompany our analyses, we show a subset of games to reduce

visual clutter. We selected ten representative game types for this subset: four board games (chess, reversi, gomoku, and backgammon), four card games (canasta, gin, bridge, and ludo), and two other games (blogpoly and dominoes). These games cover a range of values of games played, chat messages sent, and number of players (Figure 3). The actual analyses, except where explicitly indicated, always take into account all games.

4.1 Theme 1: Permanence

Because PlayOK does not have a persistent world like some on-line games, we explored the theme of permanence by looking at the degree to which people form a long-term association with the site – in real-world groups there is persistence of membership as people commit time to the group. To address this issue we investigated whether people participate regularly.

4.1.1 Do people participate regularly in PlayOK?

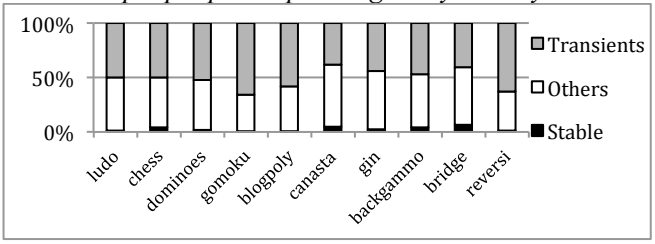

Figure 4: Population types, by game type.

To investigate this question, we looked for two subgroups: stable players and transients. We defined stable players as those that had some activity every week, and transient players as those with all their activity within a three day window (not including people who joined in the last two weeks as they could have returned later). Figure 4 shows proportions of stable and transient players.

The figure also shows a large proportion of 'other' people. This category covers a wide variety, such as irregular players, 'transients' who participated a little longer than our threshold, or stable players who missed a week or two.

Our definitions are conservative and yet the proportion of transient players is very high. The smallest proportion of any game is 35% and for most games the majority of players are transient. This affects the establishment of behavioural norms, connections between people, support structures and other foundations of stable social groups.

4.2 Theme 2: Social Interaction

We carried out two investigations to look at people's social interaction in PlayOK: game interactions (doing things together), and verbal communication (talking together).

4.2.1 How much do people play together in PlayOK?

Real world social groups often do things together (e.g., a cycling club rides, a board game club plays games). The activity is an important part of social interaction, so we analysed how much people play games in PlayOK.

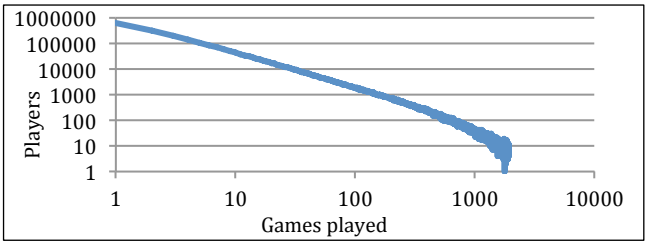

Figure 5: Log-log plot of games played.

Figure 3 (Section 4) gives a visual indication of the number of games, number of chat messages, and number of people in each game type. There were more than 60 million games played in three months. Chess had the most games with approximately 8.7 million games.

Figure 5 shows games per person for the three months of logging. There is a lot of variation: for example, more than 50,000 people played ten games, and more than 3,000 played 100 games. However, there is a large group that plays only a few games (e.g., transient players), and the largest group of people played only one game on average. In addition, there is variation by game type and by individual.

4.2.2 Verbal communication in PlayOK

A common characteristic of social groups is that when people get together, they talk. Verbal communication in PlayOK occurs through three types of text chat: room messages to everyone in a game room (Figure 1); table messages to people at a game table (Figure 2); and private messages to an individual (not shown).

Although the total number of chat messages was large (Figure 3), this is an artefact of the large population; our overall finding is that there is very little verbal communication on PlayOK. There was an average of 81 messages per person, less than one per day. In addition, 32% of the population did not chat at all.

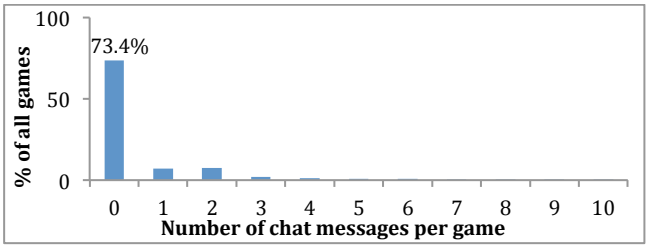

Figure 6: Histogram of number of chat messages per game.

On average, 3.2 messages were sent per game (across all game types). There was wide variation in the amount of verbal communication in different game types, with some card games having high numbers of messages per game (e.g., bridge: 28.8; cribbage: 24.7), but most games still had few messages. Overall, more than 72% of games were played without any chat messages at all. Figure 6 shows a partial histogram of messages in games.

4.3 Theme 3: Forming Ties

We used two questions to explore the ways that people can form ties and associations with others in PlayOK: how do people find opponents; and do people connect with the same people over time.

4.3.1 How do people find opponents in PlayOK?

One of our primary goals was to find out about meta-game interactions; i.e. how people arrange games.

There are four ways people can get together to start a game:

1. There is an established gaming relationship;
2. A conversation leads to a game;
3. One player invites another to a game;
4. A player creates a table and waits for opponents.

We classified every game (skipping the first two weeks, as category 1 relies on historical information). Games were marked category 1 if the players had played >2 games together previously. Otherwise, it was marked category 2 if there were >2 messages exchanged in the last five minutes, or category 3 if there was an "Invite" within the last two minutes; everything else was marked category 4. Thresholds were chosen to favour sociable categories (1 and 2). Categories 3 and 4 rely on non-chat interactions.

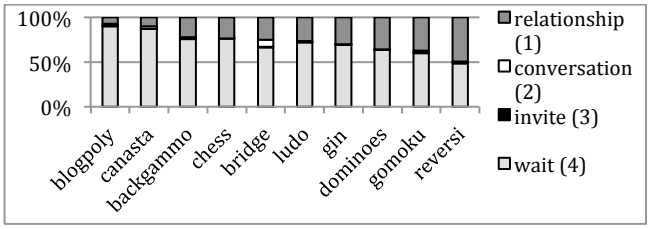

Figure 7: Different categories for starting games.

Figure 7 shows the categories for our sample game types. The majority of games are started with no previous interaction between the players. For example, nearly 80% of backgammon games are category 4 (wait for opponents).

4.3.2 Do people play (or talk) more with a small group?

A common property of larger groups is that people associate more with a smaller subset of people. To look for group-forming behaviour in PlayOK, we looked at how much people repeatedly played or chatted with the same people, and at the rate people added new opponents over the log period.

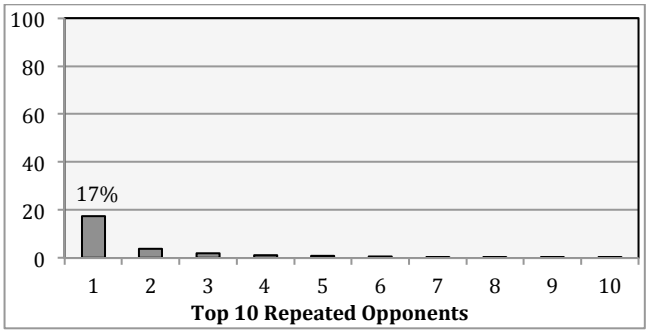

Figure 8: Percentage of games against favourite opponents (10 sample games only).

Frequency of playing against different opponents. Figure 8 shows the percentage of repeat games played against each player's ten most frequent opponents. People do play against their most frequent opponents more often–the average frequency for the most likely opponent was 17.5% of games, whereas the mean across all opponents was 0.01%. This suggests that PlayOK players are maintaining small sets of favourite opponents with whom they spend most of their time. The favourite groups are small, however, and the graph quickly tails off.

A similar pattern exists for chat partners, showing that players are again maintaining sub-groups of partners, though once again the groups are small.

Last, we examined the rate at which people played new opponents. People added new opponents at a near-linear rate throughout the three months; this implies that even though people play regularly with a small subset, they also consistently play with new and unknown partners. Overall, 65% of a player's opponents are seen for only one game.

4.4 Summary of Findings

Permanence: Using player activity data, such as login and logout counts, we were able to find a high transient population.

Social Interaction: Using basic game and chat counts, we found that people played a lot of games but did not chat very much.

Forming ties: Using events such as game starts, chats, and invitations, we were able to find that there is little repeat interaction between players.

5. CONCLUSION

We used social accounting metrics – simple statistical summaries – to investigate the social behaviour of the PlayOK game site. This method allowed us to gain an overview understanding of the behaviour throughout the very large site.

The results of our investigation are intriguing, as they show that there is little of the social interaction we might expect in a site as successful as PlayOK. A more in-depth exploration of the meaning of our findings can be found in [6].

The contribution of this paper, however, is to show how this style of social accounting metrics can be used to reveal social behaviour information in a large-scale virtual environment.

6. ACKNOWLEDGMENTS

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