Abstract
Small-scale qualitative studies have shown group cohesion in games can be strong enough to allow groups to transfer to new settings, but this phenomenon has not been studied with a large-scale dataset to see if it is widespread or rare. Using a three-year scrape of an MMO, World of Warcraft, the guild membership and playing time of over 90,000 characters was observed for patterns indicating group cohesion or character pairings. Groups of players who play together do stay together across time and guild changes, sometimes across multiple guild changes, indicating social ties. An average of 2/3 of the characters seen both week-to-week and across four-week periods stay in the same guild, suggesting a baseline for social stability. Previously documented rupture events, although important to study, are actually rare and unrepresentative of the continual slow turnover found here.

1. Communities and Communication
Qualitative work has shown that people in online groups and communities can stay together when moving from one group or space to another [27,30]. Yet it remains to be seen if such work is describing a widely found behavior or if it is a rare occurrence. Here we seek to add to the literature and these qualitative findings with large-scale numerical analysis, focusing on social groupings in three years of data from one online game with over 90,000 characters, representing a large number of human players, and over 500 online groups.

Community, communication, and playfulness in human beings have been long known as important and related topics. Community and its rituals [5,15] are deeply intertwined and co-productive, communication forms community via mediated channels [1] and also across the sociological and neurological levels [11], and play is vital for humans and other species [4,18], where it is a pro-social element, teaching us how to be part of a community [4,26,29].

Communities formed through playful spaces and specifically online games, that is, through in-game communications such as playing together, texts, voice chat, and even web forums related to the game [28], are compelling and historically new, while mediated communities themselves are much older [36]. We do not expect any great difference between “online” and “offline” behavior [12,22], despite differences in affordances: people are always in communities, and communities with mediated components are not new in the historical record or unique to the 21st century [3,8,35,36]. What is new is the capability to study such communities on a large scale, and observe both individual and group behavior with regard to change in community membership, as we do here.

1.1. Guilds
One major focus of community in games has been guilds, which are long-term groupings of players in large games with possibly thousands of players. Guilds are commonly found in massively multiplayer online games (MMOs), although there are communities found in other types of games. MMOs and their guilds allow for easily discernable communities—if guilds are indeed communities, as many guilds in some games are quite small, often just one character [32], which does not make for much of a community. Their importance varies from player to player: some players have strong connections to the others in their guild [30], some do not. It is this potential long-term bond between players that is the focus here. Although anecdotally known to be true to players and player-researchers [27], can we see players sticking together over time and across guilds in large-scale longitudinal digital trace data? That is, do those who play together stay together? Continued study of people in online communities furthers our knowledge of this important area, especially given the growth of such communities. Although technologies and affordances change, people and their behaviors do not. Studying people in a variety
of digital environments furthers our understanding of how people react to and act in these digitally mediated channels.

Guilds come in a range of sizes and are found across a range of games. Guilds, to some extent part of the gaming canon (that is, some types of games should unquestionably have them), may also allow players a long term sense of social connection [30], or a sense of accomplishment by leveling up their guild and increasing its available resources. Data for guilds and the characters in them does exist and is sometimes easily collected, allowing for analysis of these groups across some variables. Human groups come in different sizes, relating to the level of social support they offer [14], which may relate to online community size. Group belonging, like in a guild, is part of humanity’s genetic makeup and is intimately tied to communication [11]. Time spent together interacting, such as happens with guild mates, is widely seen as a key factor in building strong ties [16].

Guilds have been a focus of much research, with a variety of frameworks and findings. Roles in a guild can be based on social factors [2], but can also be determined by a character’s gameplay role and may actually drive players from one guild to another [33]. Social tensions, perhaps more so in large guilds, can fracture the ties in a guild and lead to its dissolution [7]. Social skills have been found to be highly important in navigating these worlds and the amount of knowledge needed to be a successful player [6]. Playing together in a collaborative manner is a source of enjoyment for many in such games, including the MMO World of Warcraft [24]. For these social groupings it is clear that social aspects are key.

1.2. World of Warcraft

World of Warcraft (WoW), the source of the data here, is run by Blizzard and has been a topic of much research, inspiring the somewhat derisive term painting all of game studies at one point as “World of Warcraft studies” [20]. It is a virtual world familiar to gamers and sci-fi/fantasy fans: a Tolkien-esque world of elves, wizards, magic swords, and foes to overcome. Like many other MMOs, it has multiple servers to support thousands of players across the earth’s time zones [6], and supports guilds and groupings of players. WoW has its own backstory, lore, and narratives about character races that may be reminiscent of real world people’s histories [17,23,31]. One part of the WoW story is the two factions in the game: the Horde and the Alliance. The two are mostly opposed to each other, and characters cannot actually communicate in-game if they are of different factions.

Note that groups are short-term aggregations of small numbers of characters (in WoW a maximum of 5), while guilds are a generally much longer and semi-permanent affiliation (an important distinction for those unfamiliar with such games). Guilds can include thousands of characters, and are often considered part of a character’s or even player’s identity in the game. For instance guild members often meet face to face at game conventions, such as Blizzard’s annual convention BlizzCon, and photos of guild members posing for the camera or socializing together at such conventions can be easily found online.

1.3. Game Studies

Approaches to game studies and MMOs include qualitative and experiential [6,23,25], the strongly quantitative [10,21], and work including both [9]. Social issues, that is, dimensions of communities, are paramount in much of this work regardless of the work’s methodological bend.

Pearce [27] showed that people’s in-game ties are strong enough to survive when the game where they are playing together shuts down, and they move to other online spaces together. Uru, an MMO version of the once-popular game Myst, had a devoted but small fan base, and the game was ultimately shut down. In search of a home, different groups of players tried to recreate what they had had in Uru in new spaces such as Second Life, forming a diaspora. Such transitions proved achievable but difficult, with players having to make new digital structures and in-space norms reinforced by the affordances of the new spaces. Such transitions, it is clear, can be made.

Other work [30] has shown that ties can survive the demise of a guild but still be found in other guilds, games, and online spaces such as Facebook. When one member of a seven year old guild in the WoW-like MMO EverQuest 2 (EQ2) received a beta-test key for another MMO, he took several guild members with him, unintentionally destabilizing the guild. They immediately formed a new guild in the new game (Rift) and later more members formed another new guild in the Star Wars MMO. Players envisioned these two new guilds as related versions of the original EQ2 guild, that is, the idea of the guild transcended any one gamespace. Other members had formed a secondary guild in EQ2. The players drifted away from the main guild in EQ2 but were still active members of the guild in its other embodiments, including a Facebook group for the guild.

These case studies inspire further work in this area, to see how widespread common patterns of guild membership and playtime are, or, who is playing together and do they stay together over time? Studying...
only cases where movement does happen does not inform us about where it doesn’t happen, or how often it happens. We need the larger picture of the communities in the setting where this change occurs.

There are two patterns relevant to the general question. One is when players in one guild all move to another guild at the same time, theoretically indicating social ties that are strong enough to suggest or cause the move. That is, there is a difference between connection to a group and connection to the members of that group [13]. The second is characters that have similar playing time and simultaneous guild membership, suggesting either a human couple of some sort—either close friends, significant others, or parent and child, that is, two players—or multiboxed characters of one player. Multiboxing, roughly, is when one player on one computer runs multiple instances of the game and uses one of several approaches to share key- and mouse-clicks across those game instances. This allows one player to run two or more characters simultaneously and together, although this is a vastly simplified explanation. To some extent, multiboxing changes a game that requires multiple instances. This allows one player to run two or more characters of one player

Players can, and do (depending on the game), have more than one character per account and may also have multiple accounts. Players, the accounts they have, and the characters in those accounts are not usually a one to one to one relationship, although it may be so. As such, since the data here only has characters, conclusions about players need to be carefully considered. A few characters moving from one guild to another at the same time could represent one player moving her or his multiple characters at the same time (although not all players keep all their characters in the same single guild or even on the same server). Many characters moving most likely represents more than one player, although it is impossible to tell exactly how many without account-level data. However, during the data collection period, WoW-savvy researchers felt that most players in the game “tend[ed] to focus on developing one character exclusively for a reasonably long stretch of time instead of constantly switching between many” [10], so most likely the character-

2. Data, Hypotheses, and RQs

In order to study such patterns, the right data is called for. It needs to be extensive in terms of both time and coverage, that is, it should be complete and not a sample of characters, as with a sample it would be unknowable how many relationships were missed. Some sampling types do poorly with rare events, and some of the items of interest here are rare. Luckily such data is available: a complete three year scrape of one server (and one faction) for World of Warcraft, kindly made available by Lee, Chen, Cheng, and Lei [21]. The data has over 36 million observations, over 90,000 characters, and over 500 guilds.

The data is a continuous rolling scrape of one server, similar to the collection method used by Ducheneaut, Yee, Nickell, and Moore [10], starting in January 2006 and extending for just over three years (for this study the data is truncated at the three year mark, the end of the day on December 31, 2008). Characters and guilds were given anonymized ID numbers, in the order in which they were recorded, along with other available variables. Due to the occasional error, a few days were not included in the data collection. Each observation was of a character, its
guild if any, a timestamp, and other variables not used in this analysis such as character level, class, and race.

Given theory, our experience with both online communities and online communities in games, and the data, we came up with three hypotheses and three research questions.

Using week-to-week (short term) and four-week (longer term) time frames for analysis, we felt that, H1: The overall trend would be stability in guilds, that is, a majority of characters would stay in the same guild over time.

As found by [9] and given people’s social nature, we propose H2: There will always be more characters in guilds than not; and, H3: There will never be more characters leaving guilds altogether than there are unguilded characters joining guilds. Also, more generally, RQ1: What are the distributions for character guild membership and change? For this RQ, we used both a week-to-week time frame and a four-week time frame. (For the data, there are 155 week-to-week pairings, e.g., the weeks of 1/1/06 and 1/8/06, then 1/8/06 and 1/15/06, and so on, and 152 four-week periods, e.g., the weeks of 1/1/06 and 1/22/06, etc.)

RQ2 deals with groups of characters at the guild level. RQ2a: How often do characters move, en mass, from one guild to another? RQ2b: Are there instances where characters move en mass from one guild to another and then yet again to a third guild or more? RQ3 deals with similar issues but at a more personal level, that of possible friends, couples, parent-child, or perhaps of two-boxed characters. RQ3: Are there characters that appear tightly coupled in terms of play time and guild?

This dataset looks at characters, which are sometimes conflated with players but are not the same. Players can, and do (depending on the game), have more than one character per account and may also have multiple accounts. Players, the accounts they have, and the characters in those accounts are not usually a one to one to one relationship, although it may be so. As such, since the data here only has characters, conclusions about players need to be carefully considered. A few characters moving from one guild to another at the same time could represent one player moving her or his multiple characters at the same time (although not all players keep all their characters in the same single guild or even on the same server). Many characters moving most likely represents more than one player, although it is impossible to tell exactly how many without account-level data. However, during the data collection period, WoW-savvy researchers felt that most players in the game “tend[ed] to focus on developing one character exclusively for a reasonably long stretch of time instead of constantly switching between many” [10], so most likely the character-
account ratio is rather low and close to one-to-one at this point in WoW’s history.

3. Methods and Tools

To combine the individual files from the Avatar History Dataset (over 130,000 files and over 3.5 GB), Python 2.7 was used, and it was also used to aggregate the data into both monthly and weekly chunks for analysis (analysis which would be more difficult on a rolling basis).

Initially, for preliminary exploration of the data, R (3.01) and ggplot2 (0.9.3.1) were used to visualize the numerical strength of guilds over the data collection period on a monthly basis. This showed that guilds both came and went, and even came back after weeks where there were no characters affiliated with that guild online. Many guilds were small, too small to field a group of five characters on their own, and as noted researchers have observed the preponderance of small guilds in some games.

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Figure 1: Guild to guild moves (greater than 10). Node size and shade by in-degree, edge weight by frequency. All three years of data.

Exploratory observations of the data showed one guild that had a large number of players for several weeks, and then it vanished in November 2007: after one typical week with many characters, never again were any characters affiliated with this guild seen (guild 21). Although revealing at the guild level, this does not indicate what happened to the characters in that guild: did the players abandon them, or did the players move them to another guild? If they moved, did they move together? Movement to the same guild would indicate that the players’ bonds with each other were strong enough to warrant the simultaneous movement from one guild to another guild, or more colloquially, they played together and they wanted to stay together. Is this what occurred?

Python and its Pandas library (0.14.1) were then used to aggregate the 36 million observations into weekly chunks instead of monthly ones, identifying the character, guild, and week. Tableau 8.2 was used to recreate the ggplot view on the data (it was easier to identify the guilds of interest), and to break out the data by first character and then guild in a Gantt chart. This view showed the guild history for each of the over 90,000 characters for the full three years, making patterns easily recognizable. Python and Pandas were then used again to count which guild-to-guild movements were the most common and how often such changes occurred. Gephi (0.8.2) was also used to map guild networks for illustrative purposes.

The main focus here is the persistence of the same group of characters simultaneously in the same (but perhaps changing) guild over time, and finding such common bonds across the entire dataset.

4. Results

Summary statistics, shown in Table 1 for week-to-week and Table 2 for the four-week periods, show that H1 is supported. 2/3 of the characters seen in any one week across the three years are still in that guild both one week later and three weeks later.

Table 1: Summary of week-to-week guild membership.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std Dev</th>
<th>Mean/Seen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seen</td>
<td>2670</td>
<td>604</td>
<td>100%</td>
</tr>
<tr>
<td>Stayed Same</td>
<td>1795</td>
<td>453</td>
<td>67%</td>
</tr>
<tr>
<td>Moved Solo</td>
<td>24.2</td>
<td>10</td>
<td>0.9%</td>
</tr>
<tr>
<td>Moved With Others</td>
<td>22.4</td>
<td>26</td>
<td>0.8%</td>
</tr>
<tr>
<td>Joined from None</td>
<td>74.3</td>
<td>28</td>
<td>2.7%</td>
</tr>
<tr>
<td>Left to None</td>
<td>25.2</td>
<td>10</td>
<td>0.9%</td>
</tr>
<tr>
<td>No Guild</td>
<td>729</td>
<td>221</td>
<td>27.3%</td>
</tr>
</tbody>
</table>

The statistics show that H2 is supported, as 72% of characters on average are in guilds at the end of each week-to-week period, and the same is true for 74% of characters in the four-week time periods.

H3 is also supported. In both the week-to-week and four-week periods across the three years, there is never a time frame where there are more characters leaving guilds and not joining one than there are characters not in a guild which join one. Each of the time-frame approaches do have one week where the numbers are tied, however. (Details for these numbers not shown.)
Investigating RQ1 revealed that 2/3 of characters seen in any week are still in the same guild on the following week (Table 1) and three weeks later (Table 2). Only about one percent move by themselves from one guild to another on average week-to-week, while the same is true for characters moving with other characters from one guild to another. Approximately 1/4 of the seen population in any week aren’t in a guild and still aren’t in a guild on the following week.

Table 2: Summary of four-week spread guild membership.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std Dev</th>
<th>Mean/Seen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seen</td>
<td>2333</td>
<td>542</td>
<td>100%</td>
</tr>
<tr>
<td>Stayed Same</td>
<td>1535</td>
<td>419</td>
<td>66%</td>
</tr>
<tr>
<td>Moved Solo</td>
<td>48.0</td>
<td>17</td>
<td>2%</td>
</tr>
<tr>
<td>Moved With Others</td>
<td>73.2</td>
<td>49</td>
<td>3%</td>
</tr>
<tr>
<td>Join from None</td>
<td>121.1</td>
<td>39.4</td>
<td>5%</td>
</tr>
<tr>
<td>Left to None</td>
<td>43.6</td>
<td>14.5</td>
<td>2%</td>
</tr>
<tr>
<td>No Guild</td>
<td>512</td>
<td>145</td>
<td>22%</td>
</tr>
</tbody>
</table>

There are always three times as many characters which weren’t in a guild but that joined one than there are characters in guilds that leave and do not join one in both time frames. And, although there are clearly large sudden migrations, movement with other characters is not always a simultaneous event, as shown by the means for the “moved with” measure across the two time frames. A migration event may take a few weeks to play out.

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Figure 2: Sample guild membership suggesting mass character migrations along path 2, 4, 65, 5.

In terms of RQ2 and RQ3, R and ggplot2 indicated that the data should be examined more deeply for characters changing guilds, besides showing that many guilds were too small to field a group (in WoW five characters at once), and that many guilds came and went and came back, resisting permanent active or inactive status over time.

Data was plotted in Gephi to highlight character guild movement (Figure 1), common guild-to-guild moves, and possible guild movement paths over time. Any character that moved from guild to guild, excluding when characters left a guild and remained without guild membership, was counted, resulting in a guild pairing with explicit direction (from guild A to guild B). Due to the size of the data, only the most common guild movement pairs were included, which was arbitrarily set at a minimum of 10. This resulted in 202 guild pairs, covering a total of 4,121 character moves (see Table 3 for moves with more than 40 characters). Players do move their characters more than once, and this count includes many of the same characters making different moves over the three years in the data. For instance in Table 3 note that many of the same guilds are in a variety of guild-to-guild moves, as both the from and the to guild (e.g., guilds 103 and 204).

Table 3: Common guild to guild moves (40 and greater). Data is for the combined three years.

<table>
<thead>
<tr>
<th>From Guild</th>
<th>To Guild</th>
<th>Occurred</th>
<th>Repeats</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>55</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>19</td>
<td>204</td>
<td>41</td>
<td>1</td>
</tr>
<tr>
<td>103</td>
<td>204</td>
<td>42</td>
<td>0</td>
</tr>
<tr>
<td>101</td>
<td>103</td>
<td>44</td>
<td>0</td>
</tr>
<tr>
<td>169</td>
<td>167</td>
<td>44</td>
<td>0</td>
</tr>
<tr>
<td>204</td>
<td>103</td>
<td>45</td>
<td>1</td>
</tr>
<tr>
<td>117</td>
<td>155</td>
<td>46</td>
<td>0</td>
</tr>
<tr>
<td>169</td>
<td>103</td>
<td>48</td>
<td>2</td>
</tr>
<tr>
<td>72</td>
<td>205</td>
<td>51</td>
<td>0</td>
</tr>
<tr>
<td>106</td>
<td>169</td>
<td>57</td>
<td>0</td>
</tr>
<tr>
<td>103</td>
<td>104</td>
<td>59</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>103</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>104</td>
<td>204</td>
<td>60</td>
<td>1</td>
</tr>
<tr>
<td>104</td>
<td>103</td>
<td>70</td>
<td>1</td>
</tr>
<tr>
<td>65</td>
<td>5</td>
<td>71</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>87</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>65</td>
<td>107</td>
<td>0</td>
</tr>
</tbody>
</table>

Total Chars 972

The resulting network (Figure 1) shows potential patterns that can’t be as easily seen in Tableau, but point to items of interest to explore there (Figure 2). Figure 1 uses the Fruchterman Rheingold layout with post hoc manual node adjustment for readability. There are some potential pathways from one guild, to another, to another, and yet another (the most prominent is 2, 4, 65, 5, and then perhaps 104 and 204). As this is three years of data all at once, these pathways need to be verified in Tableau as these moves may have taken place at about the same time, in sequence, or at very different times.

Figure 1 also shows which guilds were on the receiving end of character guild moves, as indicated by both node (guild) color and node size, where darker shades and larger sizes indicate a higher in-degree in the network (that is, a to guild not a from guild, although many guilds in this network are both). Edges are weighted by frequency. (The node [guild] in the middle of the network is guild 103.)
Given the Tableau views on both individual characters and their guild histories (e.g., Figure 3) as well as the view of how many characters are seen in guilds (e.g., Figure 2), RQ2a is supported: characters do move, en mass, from one guild to another with some frequency.

On occasion, these moves were large and sudden. 127 characters moved in the same rupture event from guild 4 to guild 65, which included several characters that spent a week or two in another in-between guild (or none) before making the switch (so this number is larger than the one reported in Table 3, which is only direct moves). It appears that almost the entire guild decamped (but it did survive). 17 of these characters went through guild 13, although 35 characters had moved from guild 13 to guild 4 before its members switched to guild 65, so this temporary move was guild 13 members returning to their previous guild before moving to 65.

Three other large moves were, first, a total of 91 characters moving from guild 2 to guild 4 at the same time, with a few joining other guilds or de-guilding entirely before joining guild 4. A second was when 67 characters moved from guild 65 to guild 5 at the same time. The third was when 46 characters moved from guild 2, to guild 4, and then to guild 65, and finally 15 of those moved at the same time to guild 5.

One unusual rupture was when two groups split off of guild 5 at the same time: 17 characters went from guild 5 to guild 103 and 19 went from guild 5 to guild 204 (one with a brief stop in 103).

The network revealed by Gephi, along with the individual guild histories for each character shown in Tableau first on the guild level (Figure 2) and then of individual characters (Figure 3), shows that yes, there are instances where multiple characters move from one guild, to another, and later yet another (RQ2b). Some players who play together stay together across several shifts in larger group affiliation, emphasizing the importance of people-as-groups in contrast to the group-as-itself. However, large disruptions are unusual.

The visualizations also show a few characters that are tightly coupled in terms of playing time and guild (RQ3, image not shown). There are 67 sets of paired characters that match times and guilds, 5 sets of triples, two sets of four characters, and one group of five. In total only 162 characters are involved (out of 90,366, although 40,550 is more accurate, see below). Although pattern matching here is a bit of an inexact science—the anonymous ID numbers for characters had to be relatively close to each other, not just to indicate similar starting time but also for pattern matching—most instances were of characters pairs, with only eight cases with more than two characters. With this lens we see that there are some characters or perhaps players, as opposed to what are more clearly most likely players and their characters in RQ2, which play together and stay together in this manner.
5. Discussion

Clearly, some who play together stay together, over time and across guilds, with enough frequency that it can be easily seen in the data using numerical analysis—fully 2/3 of observed characters, both week-to-week and across four-week periods, stay in the same guild. In contrast there are times when a large number of characters all move together from one guild to another, up to 127 in one instance. Although qualitative work has shown mass migrations for selected case studies, here we can study a larger population, that of one faction on one server in World of Warcraft, and can view patterns for thousands of characters all at once. It is clear that being in a guild is seen as better than not being in one, given the distributions week-to-week and of four-week periods over the three years and character movement patterns.

The overall number of characters in the data is 90,366, but 22,298 were seen only once at all (that is, only one observation during only one week), and 49,816 were only seen during one week, leaving 40,550 characters with a more interesting multi-week record (churn has been well-noted in academic research and the professional press). Note that characters observed during the last few weeks may or may not have gone on to have lengthy playing careers, and that characters may have had long playing times before the data collection began (although this could be inexact judged by a character’s level when it is first seen in the data).

That we see characters moving, en mass (RQ2a), from one guild to another is not overly surprising but is new in terms of the numerical approach here. Whereas movement might be slow, a trickle of characters moving to a new guild as players’ friends woo them over, what we can clearly see here is that some of these movements are relatively quite large and sudden. Guilds do collapse (Figure 2), leaving just a few players logging in, and on occasion the majority of a guild decamps to another new or existing guild. This raises the question of group and guild identity—if everyone in a guild changes, is it the same guild? (The same question can be asked of professional sports teams as the roster changes over time.)

Characters do move with others more than once (RQ2b, Figure 3), and each time this can be a large migration of characters from one guild, to another, to yet another. Previous work has shown that existing networks of players (and their characters) may stay together, but their ties may become more diffuse as people move away to different spaces and they spend less time together. Time together helps bonds, and time apart weakens them [14,16]. Here we see players (via their characters) staying together over time yet across changes in setting (that is, guild). Some players’ bonds are clearly to other players.

The number of characters involved in these large moves is sizable enough that it certainly represents many players as opposed to just a few players moving a large number of their own characters around. Recall Table 3, which only has moves from one specific guild to another specific guild when the number of characters involved in such a move was 40 or greater, up to 107. This is not one player with dozens of characters, nor is it one player making the same move over and over. These are different players, and, with the other views on the data, we know these players often make these moves at the same time.

The mass migrations we see here are notable. Ones that involve most or all of a guild at the same time represent both social upheavals and social continuities. Three large sudden moves (all previously noted) include 127 characters (guild 4 to 65), 91 characters (guild 2 to 4), and 67 characters (guild 65 to 5). The large number of characters in each move clearly represents many players. The guild on the losing end may terminate, struggle on with few members, or may be either large enough or have enough motivated individuals to continue. This type of decamping has social consequences for both those who move and those who don’t.

There was at least one instance (previously noted) where a move involved two different destination guilds: 36 characters left guild 5 at the same time, but 19 went to guild 204 while 17 went instead to guild 103. This could represent a large number of players placing their main characters and their alts in two different guilds, but more likely represents two slightly different social groups from guild 5 that departed at the same time, perhaps for the same reasons, and chose different destinations. Instead of cohesion in the group moving, we see a split. The splits reveal the sub-groups within the guild.

The mass migrations also show decreasing in-group ties over time, as theorized [16]. 91 characters that had played together in guild 2 moved to guild 4 around the second week of January, 2006, at the beginning of the data collection. Two months after that, 46 of them moved to guild 65 during the second week of March, 2006. Finally, four months later during the third week of July, 2006, 15 of those characters moved to guild 5 together. Over time the group bonds that had allowed the movement of the players behind the initial group of 91 characters had changed, decreasing as new ties to newer guildmates increased. With only two months, the new split was about 50%, but with four more months only 33% were still close enough to stick together for another move. Notably, Dunbar [14] has
theorized human group sizes at around both 50 (bands) and 15 (foraging group), and here we see splinter groups of 46 and then 15, although the simultaneous moves seen in the data here do not always match up to theory so nicely.

As for the guild that imploded in November 2007, guild 21, some of its members did keep playing, and several moved to guild 252 and guild 258. Some unguilded, and some characters aren’t seen again in the data. Analysis at the guild level is part of the story, but we need the character level of analysis as well, and the player/account level would also be revealing but due to the data and privacy concerns cannot be addressed here.

The four weeks starting November 19, 2006, show an unstable time in terms of character solo moves (one character from one guild to another) and co-moves (more than one character moving from one guild to the same destination guild). Why this movement occurred is so is not obvious: the end of the year for the other years do not show greater movement, and there was no game expansion near this time.

We do see that one of the two expansions, The Burning Crusade, released in Taiwan at the end of April 2007, was followed by two weeks of greater than average co-movement, but the second expansion during the data collection, Wrath of the Lich King, was not followed by greater than average movement. Instead that period was greatly below average—the week immediately following Wrath of the Lich King had zero co-moves. Why this is so is not clear, although possibly the expansions were different enough that players reacted to them differently.

We can also see that some guilds are active recruiters over time. They maintain active membership by constantly drawing in new players, players from other guilds, or even entire other guilds, in order to balance out losses due to players dropping out of the game (churn). Two guilds, 103 and 204, were particularly good at attracting new members from other guilds over the data-gathering period (Figure 1, Table 3). Whereas recruiting efforts are necessary to continue active membership, such poaching can destabilize and destroy smaller guilds, unless the smaller guilds also actively recruit, and there are occasions where the data shows the same guilds poaching membership from each other over time. There are even times where larger guilds swallow smaller guilds almost entirely.

With the guild-to-guild moves, where there were at least 10 characters that moved from one guild to another, there were 4,121 character moves, which is sizable—the number of moves equivalent to 10% of the characters that were seen for more than a week over the three years. Changing guilds is common, yet is also a function of time (more time gives more opportunity). 12% of characters had some sort of guild move, on average, in the four-week periods.

Most moves for a character occur just once, yet a few moves are repeated in the data for a few characters. This finding was not an original research question, but arose when determining the number of unique moves between guilds as opposed to total moves. 30 characters made the same move twice and one character made the same move 3 times. Five characters made the same paired moves more than once, that is, moving back and forth directly between the same two guilds repeatedly and each time ending up back in the original guild, with one making the same move three times.

Thus, guild movement from one specific guild to another is usually not a repeated event. Perhaps the guild the character moved from is falling apart, or no longer meets the needs of the player in some other way [33], but here characters rarely return to guilds they have left. Perhaps leaving a guild is seen as a form of social betrayal or insult, rejecting a group that allowed you group membership. This may have both social causes and ramifications. These moves for the most part should represent specific sensible moves on the part of the players, moving their characters where and when it makes sense, possibly given pre-existing social ties. Like a fan of a professional athlete in a team-based sport, the fan’s attachment may be simultaneously to the player and to the team, a source of tension if the player changes teams—here, we see attachment to both other individuals and the groups they are a part of. Some people move with a group of people from a group, while some stay with the original group.

On the paired character level, it is hard to say if the character pairings that are evident in the data are friends, couples, or parent and child, or instead represent one player using multiboxing software to play two characters at the same time. As such, findings here cannot be definitive based solely on the data. Although multiboxing is common in some games, in WoW it is not, because a paid account is required to access some features of the game (such as high level characters), whereas in some other games characters can be high level with free accounts but are then restricted in other ways. Although this does not make multiboxing in WoW impossible, it does make it costly. It is likely that some of the paired characters here are friends, couples, or a parent and their child, but it is impossible to say without more information.

The instances of three and more characters that followed similar playing time and guild paths are of note. For the five sets of three characters, it could be a player three-boxing, it could be two players with one two-boxing, or it could be three friends. 15 characters
across 5 sets of three out of approximately 40,000 (those that were played for more than a week) is almost negligible, yet in these edge cases we can find the unusual behaviors that some methods overlook, and that random sampling, as opposed to a census, will rarely find. The two sets of four and one of five are also notable for the same reasons and yet their composition on the player side is also unknown due to the limitations of the data.

As shown in Tables 1 and 2, there are always more characters in guilds than not, and the weekly movement pattern for characters if not in a guild is towards guild membership as opposed to leaving a guild if in one. It is clear that players feel there is a benefit to guild membership. That benefit may be social [19], and may not be for character leveling [34].

6. Conclusions

Although anecdotally and qualitatively studied on a small scale focused primarily on those characters or players who moved, this larger scale study of player bonds across time and across guilds agrees with and complements those earlier qualitative studies. Here we can see specific numbers, and movement and patterns through the data visualizations, but not the reasons for such movements, for which we must rely on the qualitative approaches.

Clearly, players who play together stay together, over time and across guilds, as we have empirically shown—week-to-week and across four-week periods, 2/3 of observed characters stay in their guild. There is a small amount of constant guild change (5% across four-week periods), but there are large migrations of dozens of players on the rare occasion—the largest in this data involved 127 characters simultaneously, a huge amount. This suggests that the important ties a player has are to the other players, and not the idea of the guild, despite the overlap of the two since players constitute a guild. Players move with other players to other guilds.

These bonds, perhaps of online friendship or trust in others’ playing skills, can maintain for more than one guild move, as the data shows (RQ2b, Figure 3). Given the variety of players and playing time (evident in the data but also more generally in the literature and well known to players), that this happens is no surprise. At the same time we need to keep in mind that although guild switching is common to some extent, the actual numbers of characters that do so must be few relative to the total number (more than 40,000 characters which were played for more than a week) seen over the three years of data. This type of move cannot happen every day with every character. It must be somewhat rare, relative to the number of characters and guilds on the server in question, so guilds have a chance at some stability. The data suggests a baseline for this stability: on average, 2/3 of the characters seen across each two-week period stayed in the same guild. Without stability leading to time spent interacting, bonds would be difficult to form [11,16]. Yet, there is also constant churn: about 2% of characters move from guild to guild during any week, half of them with others, and 5% move across four-week periods. Lastly, about 1/4 of observed characters are not in a guild at all.

The lessons we see here are not just applicable to online games but are more widely, and more importantly, applicable to online communities in general. As Pearce [27] showed with a focused case study and as we show here more broadly, people’s ties to a community are to the people within it. People do have loyalty to a guild as shown by H1, but perhaps more important, time and time again, is the bond to other people. 69% of observed characters either stay in their guild or move with others over four-week periods—whether moving or staying put, people play together and stay together.

7. References

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