



## Friending your way up the ladder: Connecting massive multiplayer online game behaviors with offline leadership



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### ABSTRACT

In what ways do the online behaviors of wizards and ogres map to players' actual leadership status in the offline world? What can we learn from players' experience in Massively Multiplayer Online games (MMOGs) to advance our understanding of leadership, especially leadership in online settings (E-leadership)? As part of a larger agenda in the emerging field of empirically testing the "mapping" between the online and offline worlds, this study aims to tackle a central issue in the E-leadership literature: how have technology and technology mediated communications transformed leadership-diagnostic traits and behaviors? To answer this question, we surveyed over 18,000 players of a popular MMOG and also collected behavioral data of a subset of survey respondents over a four-month period. Motivated by leadership theories, we examined the connection between respondents' offline leadership status and their in-game relationship-oriented and task-related-behaviors. Our results indicate that individuals' relationship-oriented behaviors in the virtual world are particularly relevant to players' leadership status in voluntary organizations, while their task-oriented behaviors are marginally linked to offline leadership status in voluntary organizations, but not in companies.

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### 1. Introduction

With more and more transactions happening online and virtual teams becoming pervasive in the working space, both leadership practice and scholarship demand changes to adapt to the digital era (Avolio, Kahai, & Dodge, 2000). One approach to advance leadership in virtual contexts or E-leadership research and practice is to identify behaviors in the virtual space which can correspondingly enhance individuals' offline leadership competence (Reeves, Malone, & Driscoll, 2008). In this way, people can gain desirable leadership skills and associated technical expertise through training in virtual spaces. Indeed, experiential learning and training in virtual world aiming to advance leadership has attracted more and more research interests (Lisk, Kaplancali, & Riggio, 2012; Lopes, Fialho, Cunha, & Niveiros, 2013; Reeves et al., 2008). To contribute to this practical need and scholarly trend, our study proposes to test its core premise: can we draw meaningful connections between people's virtual behaviors and their offline attributes? Using the "mapping" principle as our theoretical

guidance (Williams, 2010), the current study explores the parallel comparison between people's behaviors in Massively Multiplayer Online games (MMOGs) and their offline leadership status.

Broadly defined, MMOGs depict persistent and immersive graphical environments where participants may engage in social, transactional and gaming activities via on-screen characters known as "avatars" (Castronova, 2005; Williams, Yee, & Caplan, 2008). They are a significant genre of online activities, with an estimated 50 million players in the United States in 2012, and 400 million across the globe (Petitte, 2012). One of the defining features of MMOG is its social nature – collaborative play in teams and guilds across geographical, temporal and cultural boundaries is often critical to game advancement and enjoyment (Cole & Griffiths, 2007; Wu, Wang, & Tsai, 2010). Scholars have argued that, despite MMOGs' differences in goals, themes, and user populations, the social, behavioral and economic behaviors within them may abide the same rules and patterns found in the offline world (Bainbridge, 2007; Castronova et al., 2009; Zhong, 2011). An emerging stream of empirical studies start to focus on the degree to which specific dimensions of virtual worlds may present parallels to those of the offline world, and further, how behaviors and skills observed in virtual worlds are indicative of the same traits and behaviors offline (Williams, 2010).

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In what ways do the online behaviors of wizards and ogres map to players' actual leadership status in the offline world? What can we learn from players' experience in MMOGs to advance our understanding of leadership, especially E-leadership? These questions are part of a larger agenda in the emerging field empirically testing the "mapping" between the online and offline worlds (Williams, 2010; Williams, Contractor, Poole, Srivastava, & Cai, 2011). They tackle a central issue in the E-leadership literature: how technology and technology mediated communication have transformed leadership-diagnostic traits and behaviors for individuals and organizations (Avolio, Walumbwa, & Weber, 2009; Avolio et al., 2000). To answer them, we surveyed over 18,000 players of a popular MMOG and also collected matched behavioral data of a subset of survey respondents over a four-month period. Our results, from both the survey responses and a subset of respondents' in-game behaviors, indicate that individuals' relationship-oriented behaviors in the virtual world are particularly relevant to leadership in voluntary organizations, while their task-oriented behaviors are marginally linked to offline leadership status in voluntary organizations, but not in companies.

We begin with a brief review of the leadership literature and identify the important predictors of leadership in the offline world. We then introduce the corresponding mechanisms and behaviors commonly observed in MMOGs, and propose hypotheses concerning relations between players' virtual behaviors and their leadership status in offline world. Next, we describe the study setting, our survey and behavioral datasets, and the results of our analysis. We conclude with a discussion of limitations of the current study and future research directions.

## 2. Conceptual framework and hypotheses development

### 2.1. Leadership: A brief review

Leadership is one of the most studied subjects in the social sciences (Avolio et al., 2009; Bass, 1985; Derue, Nahrgang, Wellman, & Humphrey, 2011). An extensive review would exceed the current study's scope, so here we briefly outline important milestones in leadership research related to our study, and then specifically focus on what observable attributes related to offline leadership status can be identified in virtual contexts. We also discuss how "mapping" virtual behaviors with offline world leadership can contribute to future leadership research.

Earlier attempts to understand leadership began with the question: are leaders born to be leaders? Scholars tried to answer this question by examining heritable leadership qualities within influential families (Galton, 1869), which originated the trait paradigm of leadership research. The trait paradigm contributes to leadership scholarship by effectively identifying potential leaders to invest in, e.g., select suitable candidates for training. Subsequent research has shown that capable leaders often possess distinctive individual characteristics, including certain demographic traits, intelligence, and personality traits (Eagly, Karau, & Makhijani, 1995). Despite its merits, the trait approach has been criticized for failing to take leader behaviors and the context in which leadership functions into consideration (Mann, 1959; Stogdill, 1948).

By contrast, the behavioral view posits that, instead of natural traits, effective leaders should be defined as a set of observable activities or categorized to broad leadership styles. In other words, leaders are "not born, but made". The behavioral paradigm has gained considerable scholarly attention due to its promising potential to provide intervention for leadership development. Several important examples of the behavioral approach include Blake and Mouton's (1964) managerial grid model and transactional versus transformational leadership classification (Bass, 1985).

Specifically, transactional leadership is a type of leadership style in which leaders tend to be goal-driven, and they manage teams through exchanging rewards and punishments with followers depending on their job performance (Bass, Avolio, Jung, & Berson, 2003). Conversely, transformational leaders attend to followers' individual needs and provide followers inspiring visions (Bass, 1985). In a broad stroke, transactional leaders tend to exhibit task-oriented behaviors, and transformational leaders oftentimes show relationship-oriented behaviors.

To further develop leadership scholarship, researchers realized that the behavioral paradigm paid inadequate attention to the leadership context in which leadership functions (such as task characteristics and the nature of organizations). Thus, the contingency view emerged and holds that leadership effectiveness depends on the specific context. For instance, Fiedler (1967) suggested that the effectiveness of task-oriented and relationship-oriented leadership styles is not universal, but is conditioned on the specific situation. In other words, the contingency view has started to synthesize the trait, behavioral, and situational approaches. Progressively, we see more and more attempts to integrate previous leadership research (Derue et al., 2011) and extend them in new contexts as part of the increasing demand for E-leadership research (Avolio et al., 2000).

As organizations increasingly span their boundaries across multiple countries, more and more work has been done by virtual teams. Subsequently, the question of how to lead these virtual teams has become a critical but understudied area (Avolio et al., 2000; Huang, Kahai, & Jestice, 2010; Malhotra, Majchrzak, & Benson, 2007). Part of the reason for E-leadership's significance is that virtual leaders face elevated challenges such as different time zones, restricted physical presence, and limited chance to build trust and group solidarity (Kayworth & Leidner, 2002). Therefore, scholars also suggest that traditional leadership building requires considerable extension to be applied to virtual contexts (Zigurs, 2003).

Three points are worth highlighting from this brief review of existing leadership scholarship. First, leadership can be learned through effective intervention, such as training. Avolio and colleagues (Avolio, 2005) conducted a meta-analysis of 201 studies and concluded that leadership interventions work, and their effects did not differ between US and non-US samples. Second, the situation in which leadership is developed determines the specific effective leadership behaviors, traits, or their interactions (Porter & McLaughlin, 2006). Thus, distinctive contexts require different learning experience or training to develop effective leadership. We cannot assume leadership skills identified in offline context should be transferred to virtual leadership without any adjustment. Third, given the increasing demand for E-leadership, leaders need not only project and interpersonal management skills, but also technical expertise to competently manage team members and tasks through technology-mediated communications (Lisk et al., 2012). In other words, technology competence, or fluent virtual interactions have become important part of leadership skills. Taken altogether, identifying activities or behaviors in virtual contexts that can help to develop individuals' suitable leadership skills can enormously benefit leadership scholarship in the digital era. Accordingly, in the next section, we discuss why MMOGs can be an excellent field for such an endeavor, and then, we discuss why transactional and transformational leadership framework particularly suits our research agenda, which is followed by proposed hypotheses.

### 2.2. MMOGs and leadership

MMOGs are high-fidelity two- or three-dimensional immersive environments, which allow users to interact with the environment

itself as well as other users via multiple communication channels (Castronova, 2005; Williams et al., 2008). Compared to other digital media forms such as web forums, blogs or wikis, MMOGs provide more technological affordances, combining interactive multimedia and user control to create an immersive environment that mimics complex physical spaces. The social and collaborative dimension of MMOGs is a central topic of MMOG-focused scholarship, and has been studied from various angles, including the individual goals and motivations to play MMOGs (Yee, 2006), the socio-emotional and task communication among players (Pena & Hancock, 2006), the dynamics of team formation (Huang et al., 2009), the cultivation of bridging and the bonding social capital (Shen, Monge, & Williams, 2012), emerging reward distribution systems in group play (Malone, 2009), as well as the practices of informal learning in user communities (Fields & Kafai, 2010).

Williams (2010) categorized MMOG-focused research into two broad streams. The first simply attempts to understand the behaviors within MMOGs and the impact of these emerging spaces. The second stream often compares virtual worlds against their offline, “real-world” counterparts, and explores (1) the validity of virtual worlds as “petri dishes” to test social science theories, and (2) the potential to use them as “training grounds” for skill development. Indeed, empirical results of the latter have shown considerable promise in various fields. For example, teamwork practice in virtual worlds has been found to be effective in training offline world emergency department personnel working in a collaborative fashion (Heinrichs, Youngblood, Harter, & Dev, 2008).

Still, the premise of using MMOGs as effective training grounds is that the patterns of human behaviors in MMOGs have parallels in the offline context. In terms of leadership, many argue that the collaborative, complex, and distributed nature of MMOG gameplay is strikingly similar to how work is done in contemporary organizations (Jang & Ryu, 2011). A recent study by Reeves and associates observed gameplay in World of Warcraft (WoW) and interviewed many expert players to compare leadership in WoW with the Sloan Leadership Model (SLM) (Ancona, Kochan, Scully, Van Maanen, & Westney, 2005), which contains four dimensions, sensemaking, inventing, relating and visioning, and concluded that these were all found to be important, in different degrees, for game leadership (Reeves et al., 2008). In other words, there is initial evidence suggesting that leadership in MMOGs could map to leadership in the offline context.

Building on Reeves et al.’s work (Reeves et al., 2008), our study aims to answer the following question using quantitative data: can we draw connections between people’s behaviors in MMOGs and their leadership status in offline context? The literature review on leadership suggests that transactional and transformational leadership (Bass, 1985) provides a useful framework. This framework fits our research agenda well for two reasons. First, these two types of leadership provide observable behaviors that scholars can obtain in MMOGs correspondingly. To meet our research goal, or validating the comparable relation between individuals’ virtual activities and their offline leadership status, transactional and transformational leadership can be employed to pinpoint what activities we should focus in virtual worlds. Specifically, players’ task-oriented behaviors and relationship-oriented behaviors in the virtual world are reasonably expected to parallel to their real world behaviors, which correspond to these two distinctive leadership styles. Thus, we expect:

**H1.** Individuals’ task-oriented behaviors in the virtual context will be positively related to their offline leadership status.

**H2.** Individuals’ relationship-oriented behaviors in the virtual context will be positively related to their offline leadership status.

Second, these two types of leadership are context sensitive as well. For instance, Bass (1985) explained that “transformational leadership is more likely to reflect social values and to emerge in times of distress and change while transactional leadership is more likely to be observed in a well-ordered society” (p. 154). Similarly, Shamir and Howell (1999) argued that charismatic leadership would be more dominant when organizational goals are consistent with employees’ moral commitment. To support, Egri and Herman (2000) found that transformational leadership is more well received in non-profit environmental organizations than for-profit organizations. De Hoogh et al. (2005) reported that in voluntary organizations, leaders with high responsibility were favored more than in for-profit organizations. Taken together, we reason:

**H3.** Individuals’ task-oriented behaviors will be a stronger predictor for leadership status in companies than in voluntary organizations.

**H4.** Individuals’ relationship-oriented behaviors will be a stronger predictor for leadership status in voluntary organizations than in companies.

### 3. Method

#### 3.1. Study site

To test our hypotheses, we partnered with Kingsoft, a leading digital game company in China, and collected data from its most popular MMOG, *Chevaliers’ Romance III* (CR3). CR3 was launched in 2009, and has since consistently ranked among the top three most played MMOGs in the Chinese market, according to China Game Weight Rank, a third party industry research service (CGWR, 2013).

CR3 shares many similarities with mainstream MMOGs in the West, such as WoW. It is a role-playing game about Kung Fu traditions set in ancient China, and allows players to choose from eight character class archetypes, which have distinct and complementary skills and abilities, providing a basis for in-game collaboration. Social interactions in CR3 may take the form of ad hoc groups, dyadic friendship, and guild systems. CR3 takes Player-versus-Player (PvP) mode as the default, so that players are able to directly engage other players (in addition to non-player characters) in combat.

#### 3.2. Participants and procedure

In partnership with KingSoft, we fielded a large-scale online survey to CR3 players in late 2011. The survey was announced on the official CR3 website, offering a virtual weapon desirable for all character classes in exchange for participation. Voluntary participants who self-identified as 18 years and above were directed to an external survey website. The survey took approximately 20 min to complete. No identifying information was collected. The survey remained open for five weeks, collecting a total of 22,004 responses, among which 18,819 were usable and valid, and then used in further analysis. Among the 18,819 respondents, 25% were female, and the average age was 23.58 years.

We also obtained partial behavioral server logs of CR3 from Kingsoft. The behavioral server log data recorded players’ in-game behaviors covering a 4-month period from May to September 2010 (one year earlier than our survey data). These logs are particularly valuable because they were time-stamped, complete, and obtained unobtrusively, avoiding many common pitfalls associated with self-reports. The server logs were then merged with the survey

dataset using unique character IDs. The considerable time lag between the server logs and the player survey resulted in a limited group of players who appeared in both datasets ( $N = 829$ , 4.4% of all survey cases). This subset of players was slightly older (average age 24.93) and had slightly fewer female (21.2%) than the survey-only respondents. The first set of our analysis was conducted using only the survey data. The second set of analysis relied on the smaller sample that had both survey and server data.

### 3.3. Measures

#### 3.3.1. Dependent variable: Offline leadership status

Respondents were asked to indicate the highest position they ever had in the organizational hierarchy on a slider ranging from 1 to 100 where 1 means entry level, 50 means the middle level, e.g., a manager, and 100 means CEO or the president of the organization. Moreover, we asked respondents to specify their leadership status in two types of organization: (1) in for-profit companies, and (2) in voluntary organizations. We report results for both types of organization respectively below.

#### 3.3.2. Survey variables

To capture in-game task-oriented behaviors, we asked respondents to indicate the extent to which they consider strategies to win the game when deciding whom to play the game with. For instance, “I play with other players” because (1) “they have the skills that the team needs”; and (2) “some tasks are too difficult for a solo player” on a 5-point Likert scale (1 = *strong disagree*, 3 = *neither disagree nor agree*, and 5 = *strongly agree*). To capture people’s in-game relational consideration, we asked respondents to indicate the extent to which they collaborate with others because (1) “they are my friends”; and (2) “We played together previously” on a 5-point Likert scale (1 = *strong disagree*, 3 = *neither disagree nor agree*, and 5 = *strongly agree*).

#### 3.3.3. Controls: Demographic and socioeconomic variables

**Gender.** Gender is one of most extensively studied demographic variables in leadership studies (Derue et al., 2011). Multiple meta-analyses found that females are more likely to exhibit transformational leadership than males, and males tend to show more aspects of transactional leadership (Eagly, Johannesen-Schmidt, & van Engen, 2003; Eagly et al., 1995). However, males and females do not manifest differences in leadership effectiveness. Since our study focuses on how players’ virtual activities, particularly how task-oriented behaviors and relationship-oriented behaviors, “map” to their offline leadership status, we included gender as a control variable, and male is coded 1, female as 0.

We also included age and education as control variables. Respondents were asked for their birth year, which was used to calculate their age. Education was measured on an ordinal scale, ranging from elementary school or less to master degree and above. For ease of analysis, this variable was later transformed into years of education.

Lastly, previous literature has suggested that personality traits influence leadership effectiveness. Although there is discrepancy among scholars regarding the magnitude of various personality traits, one consensus from previous research is that extraversion is a relatively reliable predictor (Bono & Judge, 2004; Judge, Bono, Ilies, & Gerhardt, 2002). Thus, we measured players’ extraversion using items from a validated brief measure of the Big-Five personality (Gosling, Rentfrow, & Swann, 2003). Specifically, we asked respondents to indicate the extent to which they agreed with these statements on a 5-point Likert scale: (1) I see myself as someone who is outgoing, sociable; and (2) I see myself as someone who is reserved (reverse coded). We calculated the mean of these two items as the score for extraversion in our analysis.

#### 3.3.4. Behavioral variables

For a subset of the survey respondents, we were able to collect their behavioral data from server logs. The server log data recorded players’ behaviors up until one year before the survey. To measure players’ task-oriented behaviors, we calculated the accumulated value of all the items players acquired (“loot”) during the observational period. Compared to number of tasks completed, item value gained can more accurately reflect players’ ability to gain experience and level up in CR3. This is because tasks have a wide range of difficulty levels. Typically, in early stages of the game, there are many tedious and simple tasks players can complete to practice their skills and gain experience. As players level up in the game, tasks become increasingly difficult and demand sophisticated teamwork, and items acquired in these tasks also become increasingly valuable. Moreover, some collaborative tasks might not generate enough loot for all participated members. For instance, killing a dragon might generate only one valuable item for the whole team. To make sure players are rewarded what they deserve, most MMOG communities have adopted a semi-formal system called Dragon Kill Points (DKP) (Malone, 2009) to divide reward based on their contribution. Therefore, accumulated item value is a reasonable measure of players’ experience and competence than the number of tasks completed. The mean accumulated item value was 29689.96 ( $SD = 94765.60$ ). To make the coefficient of regression easier to interpret, we divided the item value gained in the game by 10,000 for the analysis.

To capture players’ relationship-oriented behaviors, we obtained the number of friends players added during the observational period from the server log data. In CR3, players can add friends for learning tips, teaming up, mentoring or being friends. It is reasonable to expect this variable will reflect players’ relationship-oriented behaviors in game.

We also included a series of in-game play variables to further control for experience and interest level in the game, including players’ end level (or maximal level) at the end of our observation and their average daily play time (in minutes). Table 1 summarizes the descriptive statistics of our data.

## 4. Results

### 4.1. Analysis based on survey data only

We conducted hierarchical linear regressions on two dependent variables respectively: offline leadership status in companies, and offline leadership in voluntary organizations. The results of the regressions are summarized in Table 2 (predicting offline leadership status in companies) and Table 3 (predicting offline leadership status in voluntary organizations).

First, we started with a base model including all control variables (see Models 1 in Tables 2 and 3). Gender of players did not have a significant effect predicting offline leadership in companies ( $\beta = .01$ ,  $p = .23$ ) but did have an effect predicting leadership in voluntary organizations ( $\beta = -.07$ ,  $p < .001$ ). That means gender does not have an effect on identifying leaders in companies. But in voluntary organizations, females are more likely to be leaders than males. Age has a positive effect on leadership in companies ( $\beta = .09$ ,  $p < .001$ ) but no effect on leadership in voluntary organizations ( $\beta = -.00$ ,  $p = .73$ ). In both types of leadership, years of education respondents received has a positive effect on their leadership ( $\beta_{\text{company}} = .03$ ,  $p = .001$ ;  $\beta_{\text{voluntaryorganizations}} = .11$ ,  $p < .001$ ). As expected, in both types of leadership, players’ extraversion trait has a positive effect on both types of leadership as well ( $\beta_{\text{company}} = .08$ ,  $p < .001$ ;  $\beta_{\text{voluntaryorganizations}} = .13$ ,  $p < .001$ ).

H1 proposed that players’ task-oriented behaviors would be positively related to respondents’ offline leadership status. Our results provided partial support for this hypothesis. For leadership

**Table 1**  
Descriptive statistics and zero order correlations.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Leadership in companies														
2. Leadership in voluntary organizations	.27**													
3. Gender	0.01	-.09**												
4. Age	.08**	-.01	.04**											
5. Education	.03**	.12**	-.16**	0.01										
6. Extraversion	.08**	.13**	.00	-.03**	0.01									
7. Task-oriented behavior 1-survey	0	.03**	-.10**	-.00	.05**	.01								
8. Task-oriented behavior 2-survey	.02*	.05**	-.08**	-.02**	.07**	.03**	.53**							
9. Relational-oriented behavior 1-survey	0.01	.06*	-.15**	-.06**	.10**	.02*	.39**	.41**						
10. Relational-oriented behavior 2-survey	.02**	.04**	-.10**	-.06**	.05**	.02**	.32**	.40**	.53*					
11. Average play time	.00	-.01	-.02	0.07	.00	0.07	0.01	-.00	-.03	-.01				
12. End level	0.04	-.03	0.02	0.02	0.05	0.08	-.07	0.01	0.03	0.03	.72**			
13. Item value gained/10,000	-.00	-.05	-.02	0.07	0.03	0.03	0.02	-.01	-.01	-.01	.77**	.53**		
14. Add friend count	0.04	0.02	-.01	0.02	0.02	.09*	-.03	.00	-.01	0.01	.88**	.76**	.74**	
Mean	36.83	44.5	0.74	23.9	14.9	2.83	4.15	3.99	4.1	3.76	33.24	26.77	2.97	23.35
S.D.	21.34	25.03	0.44	4.27	2.17	0.73	0.92	0.91	0.95	1	62.77	25.5	9.48	48.23

\*  $p < .05$ .\*\*  $p < .01$ .\*\*\*  $p < .001$ .

**Table 2**  
Regression models predicting offline leadership in companies.

	Model 1	Model 2	Model 3	Model 4
Gender (Male = 1)	0.01	0.01	0.04	0.04
Age	.09***	.09***	0.10*	0.10*
Education	.03**	.03**	0.03	0.03
Extraversion	.08***	.08***	0.10*	0.10*
Task: skills needed		0.02	.00	.00
Task: tasks too difficult		-.01	0.04	0.04
Relationship: playing w/friends		0.01	0.03	0.03
Relationship: teamed before		0.01	-.00	-.00
Average play time			-.05	-.014
End level			0.09	0.07
Item value gained/10,000			-.04	
Add friends count				0.09
F	56.85	29.8	1.19	1.23
N	15,238	15,238	397	397
Adjusted R <sup>2</sup>	0.01***	0.02***	0.01	0.01

All coefficients are standardized.

\*  $p < .05$ .\*\*  $p < .01$ .\*\*\*  $p < .001$ .

**Table 3**  
Regression models predicting offline leadership in voluntary organizations.

	Model 1	Model 2	Model 3	Model 4
Gender (Male = 1)	-.07***	-.07***	-.11*	-.10*
Age	-.00	.00	-.01	-.01
Education	.11***	.10***	.12*	.13*
Extraversion	.13***	.13***	.20***	.19***
Task: skills needed		0.02*	-.03	-.03
Task: tasks too difficult		-.01	0.03	0.02
Relationship: playing w/friends		0.03**	-.04	-.04
Relationship: teamed before		.02	-.00	-.01
Average play time			.10	-.19
End level			-.08	-.15
Item value gained/10,000			-.11	
Add friends count				.30*
F	143.99	77.25	2.76	
N	15,238	15,238	397	397
Adjusted R <sup>2</sup>	0.04***	0.04***	0.04**	.06***

All coefficients are standardized.

\*  $p < .05$ .\*\*  $p < .01$ .\*\*\*  $p < .001$ .

in companies, the task strategic consideration items did not have an effect ( $\beta_{\text{task1}} = .02, p = .13$ ;  $\beta_{\text{task2}} = -.01, p = .45$ ); for leadership in voluntary organizations, one of the task-oriented item was marginally related to leadership ( $\beta_{\text{task1}} = .02, p = .05$ ;  $\beta_{\text{task2}} = -.01, p = .31$ ). Models 2 in Tables 2 and 3 summarize the results.

H2 proposed that players' relationship-oriented behaviors would be positively related to respondents' offline leadership status. Our results also provided partial support for this hypothesis. For leadership in companies, the relational consideration items did not have an effect ( $\beta_{\text{relational1}} = .01, p = .32$ ;  $\beta_{\text{relational2}} = .01, p = .19$ ); for leadership in voluntary organizations, "they are my friends" provided strong support for this hypothesis ( $\beta_{\text{relational1}} = .03, p = .001$ ); yet, the other item was non-significant ( $\beta_{\text{relational2}} = .02, p = .11$ ). Models 2 in Tables 2 and 3 summarize the results.

#### 4.2. Analysis with both survey and behavioral data

Then, we tested our hypotheses using behavioral data from the server. To begin with, we entered two in-game control variables (play time and end level) into the model with all survey variables. For both leadership in companies and voluntary organizations, these two variables did not have an effect. Since add-friends-count and item-value-gained are correlated at .74, we entered these two research variables into the model separately. Model 3 and Model 4 in Tables 2 and 3 summarize the results.

Results from server behavioral measures did not provide support for our H1. Item-value-gained during that period was not significantly related to either leadership in companies ( $\beta = -.04, p = .63$ ) nor in voluntary organizations ( $\beta = -.11, p = .13$ ). We observed partial support for H2. Number of friends added during that period was not significantly related to leadership in companies ( $\beta = .09, p = .45$ ), but was positively related to leadership in voluntary organizations ( $\beta = .30, p = .01$ ).

Since the predictors for leadership in companies were not significant, H3 was not supported. Further, because relationship-oriented indicators, both from the survey and server logs provided support for leadership in voluntary organizations, but not for leadership in companies, H4 was supported.

## 5. Discussion

The current study is one of the first empirical studies to provide insights into what aspects of online behaviors parallel offline

leadership–diagnostic behaviors, and what aspects do not. In brief, our study showed that players' social interactions, such as the consideration of playing with their friends and the frequency of adding friends while playing are positively related to their real world leadership status, especially in voluntary organizations. Our study found partial support that task-oriented behaviors are related to people's offline leadership status, and we speculate this happens due to the nature of task in our research context.

First, our results demonstrated support for the linkage between players' relational activities in MMOGs and their offline leadership in voluntary organizations, but not in companies. In other words, individuals who play with friends more, actively get to know other players, and include them in their social circle in MMOG context are more likely to be in higher hierarchical positions in voluntary organizations. This finding provides more evidence for the significance of relationship-oriented behaviors for leadership formation. More importantly, this result extends previous literature by offering insights from a novel context: MMOGs. Our study showed that, to some extent, experience gained in MMOGs can be transferred into effectiveness in individuals' job activities. Existing literature exploring how to use games and simulations to develop leadership skills have provided promising conceptual guidance, and argued that through experiential learning, people are able to transfer their virtual experience into their in-role job requirements (Lisk et al., 2012; Lopes et al., 2013). Our study is one of the first empirical attempts to examine this relation, and we did find encouraging results: players can transfer certain skills or experiences gained in MMOGs into resourceful job activities.

Further, our result also resonates with previous literature showing that the context in which leadership is examined matters (De Hoogh et al., 2005). Previous studies have shown that distinctive purposes of organizations lead to different types of leadership development. As expected, relationship-oriented behaviors are significant indicators for leadership in voluntary organizations, which emphasize on inspiration and responsibility. By contrast, in performance-driven companies, relationship-oriented activities might not be the priority.

Surprisingly, the relation between task-oriented behaviors and leadership received partial support for leadership in voluntary organizations only. The reason this happens might be that the nature of task performed in MMOG is different from those in companies. As mentioned earlier, Reeves et al. (2008) observed leadership emergence in complex online games and reported that certain dimensions of Sloan Leadership Model, such as Relating and Inventing, showed stronger parallel to in-game leadership, while other dimensions including sensemaking and visioning were not as prominent due to the game design. In other words, the nature of tasks in typical MMOGs might be impacted by certain typical MMOG game designs, therefore might constrain players' abilities to demonstrate their task-focused orientation.

Our study can also shed some light on the designs of MMOGs, especially for the purpose of leadership training. We did not find that players' task-oriented behaviors can be transferred to their work-related jobs in this particular MMOG. Further, Reeves' study (2008) showed that sensemaking and visioning can be limited in MMOG due to their existing task structure and storylines. Taken together, it points to the possibility that certain aspects of game designs can be improved to this end. Thus, future games can benefit from empowering players to actively interact with the game, such as choosing the direction of story development freely. In this way, the tasks in MMOG can become more powerful in terms of inspiring leadership skills.

Our study has a number of limitations that call for future research. Because part of our analysis relied on survey data, to a large extent this study is cross-sectional and therefore we cannot make

causal inferences. However, we also managed to collect behavioral data for a limited subsample of participants and the further analysis based on both survey and behavioral data did show some promising results in line with results from survey data alone. Since the behavioral server data were collected more than 12 months prior to the survey data, it is plausible that behaviors in CR3 might have a causal effect on real world leadership status. Yet, the subsample may be systematically different from the much larger pool of survey participants. At least, they had started playing CR3 in or before 2010, thus having a longer tenure in the game than other survey respondents. Therefore, future research with rigorous design is warranted to further investigate the direction of relationship between MMOG behavior and offline leadership.

Second, due to the nature of our survey method (i.e., the company announced our survey link on their official website), it was not possible to compute a response rate or to assess the extent to which our respondents could represent the general gamer population. We provided a virtual weapon desirable to all players regardless of character class to incentivize participation, a recruitment approach proven to be successful in similar studies in the US (Williams et al., 2008). Still, future research based on random samples of the gamer population is needed to evaluate its representativeness.

Third, our study focused on offline leadership, but did not explore specific online leadership roles within MMOGs. A plausible mechanism for the relationship between individuals' virtual behaviors and their offline leadership is through establishing leadership roles in the virtual space. For instance, guild leaders have been practicing leadership skills: they need to recruit and manage players to sustain the guild's competitiveness, maintain guild's day-to-day functioning, and coordinate conflicts among team members, such as how to divide DKP among players. All these virtual world behaviors require and exercise exactly the same skill set for offline tasks. Thus, it is plausible that players' virtual world behaviors lead to leadership status in the virtual worlds, which parallel to their real world leadership attributes. It can be potentially beneficial for future research to examine this mechanism.

Lastly, we used value of items gained to detect players' in-game task-oriented behaviors. Although this measure has the advantage over the number of tasks completed and also takes DKP into consideration, it also has its pitfalls. This measure might be diluted by the possibility that players who are excellent followers, e.g., actively participating all the raids, also have lots of items but lack leadership potential. Future research can benefit from more endeavors on detecting task-oriented behaviors more precisely.

## 6. Conclusion

In conclusion, researchers have started to map the complex differences as well as similarities between virtual worlds and offline contexts. This study aims to tackle a central issue in the E-leadership literature: how have technology and technology mediated communications transformed leadership–diagnostic traits and behaviors? To answer this question, we surveyed over 18,000 players of a popular MMOG and also collected behavioral data from a subset of survey respondents. Our results indicate that individuals' relationship-oriented behaviors in the virtual world are particularly relevant to players' leadership status in voluntary organizations, while their task-oriented behaviors are marginally linked to offline leadership status in voluntary organizations, but not in companies. We see this as an initial step to generate new knowledge about virtual worlds, and the connections between these seemingly distinct but increasingly intertwined worlds.

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