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# MMOG GAME-BASED KNOWLEDGE CONVERSION: AN ECOLOGICAL VIEW OF MUTUALISTIC CO-PRESENCE

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## Abstract

*This research-in-progress study aims to extend the research on Massively Multiplayer Online Game (MMOG) collaborative learning by theoretically exploring the role of virtual co-presence from an ecological perspective. Although a growing number of researchers has started to investigate learning behaviors of digital native in the MMOG virtual environment, the study for theoretical justification of collaborative behavior and motivational profile of players in MMOG is still under-researched. To bridge this gap, this study applies concepts from ecology, namely biological interactions, and integrates with technology-based collaborative learning streams of research to theoretically explore the patterns of knowledge conversion in MMOG. Based on existing literatures, this study proposes two constructs of co-presence based on the theory of symbiosis in the field of ecology on biological interaction to explain and predict gamers' motivational profile and participation in knowledge conversion mode in the MMOG game-based learning. Also, this study proposes a multiple method approach (including field observation, self-reported survey and focus group interview) to test four hypotheses that advocate the research potentials of MMOG in future research.*

**Keywords:** MMOG, Mutualism, Co-presence, Collaborative Learning Behavior, Knowledge Conversion, Motivation Profile.

# 1 INTRODUCTION

This research-in-progress study aims to bring together motivational theories and Massively Multiplayer Online Game (MMOG) streams of research to examine the relationship between the unique MMOG game features and motivational factors affecting gamers' collaborative learning behavior.

From the gaming perspective, MMOGs are defined as games which "... are highly graphical 2- or 3-D videogames played online, allowing individuals, through their self-created digital characters or 'avatars,' to interact not only with the gaming software (the designed environment of the game and the computer-controlled characters within it) but with other players' avatars as well. These virtual worlds are persistent social and material worlds, loosely structured by open-ended (fantasy) narratives, where players are largely free to do as they please – slay ogres, siege castles, barter goods in town, or shake the fruit out of trees" (Steinkuehler 2004).

An increasing number of educational researchers have started to adopt online game as an educational platform and suggest that MMOG has numerous exclusive features that may motivate gamers to acquire, share, integrate and create knowledge together through collaborative learning behavior in the MMOG game-play (e.g. Gee 2004, Childress and Braswell 2006, Mikropoulos 2006, Kong and Kwok 2011). However, the commonly agreed answers for the occurrence of collaborative learning behavior in MMOG and the motivation drivers for learning to occur in a MMOG context are still unknown.

To explore this under-researched area, this study intends to extend our understanding of learning in MMOG game-play by looking at how the dynamics on collaborative knowledge conversion modes are related to the continuum of level motivational profile and gamers' perception of co-presence in the typical massively collaborative online game-play environment. In addition to its contribution to the theory of online game-based learning research and the theoretical advances in understanding the concept of co-presence in the MMOG game-play, the expected results of this research will provide practical insights into the design of MMOG and potentially important practical implications to educators, game developers and game players.

In the next section, we will present our literature review on MMOG game-based learning, co-presence and motivational profile. Then we will discuss our research model and hypotheses. Afterward, we will describe our proposed multiple method approach including field observation, self-reported survey and focus group interview, which will be used to test our hypotheses. Lastly, we will present our conclusion in the final section.

## 2 LITERATURE REVIEW

### 2.1 MMOG Game-Based Learning

From the game-based learning prospective, MMOG has numerous exclusive features (e.g. avatar/virtual identity, co-presence, group identity and transparency) that can motivate gamers to participate in collaborative learning behavior in the gaming context. For example, the use of avatar of MMOG aligns with Gee's (2004) example of virtual identity in gaming environment that the self-created avatar is necessary for players to commit and take on a new identity they value and in which they become heavily invested in deep learning; Transparency in MMOG is to allow players to retrieve statistical performance figures of other players in the environment. Such characteristic allows informational influence to happen between players' actions in the virtual environment, which in return generate an internalization process when a player perceives information as a means to enhance his/her knowledge above that of reference groups (Kelman 1961). Players can also join named groups (e.g., *guilds* in *World of Warcraft*) in order to socialize and play together. Previous research also shows that learning intentions in MMOG can be driven by peer-motivations (Kong et al. 2012), and different

modes of collaborative knowledge conversion processes do occur at different stages of engagement level throughout the MMOG game-play (Kong and Kwok 2011).

## **2.2 Co-Presence**

MMOG, as its name described, allows massively amount of players to interact with each other in the virtual environment (Steinkuehler 2004). Similar to the other exclusive features of MMOG (like avatar/virtual identity and transparency), co-presence can also facilitate MMOG game-based learning. As defined by virtual communication media researchers, co-presence is a person's sense of being there in same virtual environment and being together with other people (Biocca et al. 2001; Zhao 2003). This unique feature of MMOG motivates a player to interact with other players in the virtual environment which facilitates complex social behavior (Vogiazou and Eisenstadt 2005). Co-presence is the fundamental prerequisite of collaboration between MMOG gamers and is claimed to be one of the most crucial social components of computer-mediated communication (Spears and Lea 1992).

In the MMOG's virtual environment, co-presence facilitates the emergence of group identity (known as *guilds*), with which players can join together and perform in-game tasks in groups. Collaborative-victory is introduced in MMOG game-play and encourages collaboration among in-group players to compete with the out-group players (Williams et al. 2006). However, the mechanism of such complex inter-personal relationship related to co-presence feature of the MMOG is not well understood, especially in the MMOG game-based learning context.

In this research, we propose two constructs of co-presence based on the theory of symbiosis in the field of ecology on biological interaction to explain and predict gamers' motivational profile and participation in knowledge conversion mode in the MMOG game-based learning.

With reference to studies of ecology in biological interactions, co-presence of players in the virtual environment is similar to the mechanism of symbiosis that is related to "the living together of unlike organisms" (Wilkinson 2001). There are a number of symbiotic relationships in biological interactions that can be used to interpret player-to-player survivability in the online game-play environment: (1) Competition – both players (as competitors) decrease survivability, (2) Predation – the player (as predator) increases survivability while the player (as prey) decreases survivability, (3) Parasitism – the player (as host) decreases survivability while the player (as parasite) increases survivability, and (4) Mutualism – both players (as win-win partners) increase survivability.

Given that the MMOG game-based learning and its relationship with gamers' perception of co-presence in MMOG game-play (i.e. sense of "being in the MMOG game-play and being together with other players") is rarely researched, this study aims to examine a specific symbiotic relationship, i.e. mutualism, which is highly relevant to the MMOG game-play ecological environment where the incentive of collaborative victory (win-win relationship) is in place.

Prior research on visibility, relationship and co-presence in the online environment (e.g. Bregman and Haythornthwaite 2003) suggests that the perception of co-presence (especially with "win-win partners") enhances an individual's feeling of perceived warmth and intimacy in a closely bonded community. This sense of co-presence can motivate individuals to act for the benefit of "win-win partners" (with the same social identity and common goals) since they usually enjoy helping others (Wasko and Faraj 2005).

## **2.3 Motivational Profile**

Motivation has long been used to explain various human behaviors related to goal pursuits. Classical motivational theories basically classify motivation into intrinsic and extrinsic, in which Self-determination Theory (Deci and Ryan 1985; Ryan and Deci 2000) intends to explain both the "what" and "why" of goal pursuits. A fundamental hypothesis of Self-determination Theory is that people are more probable to participate in behavior when they are self-determined or acting out of their own

volition. When people want to do something rather than feeling as though they have to do it, they are more likely to participate in it and will move to higher level of self-determination.

Within Self-determination Theory, there is a continuum of level of motivation (we call it motivational profile in this paper), in which the lowest level is amotivation, the middle level is extrinsic motivation, and the highest level is intrinsic motivation. Amotivation is a state in which a person is not stimulated to engage in an activity or behavior. Extrinsic motivation is often activated by regulations that may be external, introjected, identified, or integrated (e.g. gaming attitudes or beliefs relating to the benefits and barriers of gaming behaviors). Intrinsic motivation is usually guided by self-regulation that draws upon one's competence and satisfaction in relation to experiences (e.g., the self-efficacy of performing gaming behaviors).

In this paper, based on prior related research on MMOG gamers' motivational profiles, we propose to extend the traditional continuum of level of motivation by including the "peer" level motivations (Kong et al. 2012) (including peer-intrinsic motivation and peer-extrinsic motivation) into the existing motivational profile, which may accurately and significantly predicts gamers' participation in knowledge conversion process and their perception of co-presence in the MMOG game-play.

### 3 RESEARCH MODEL

To extend the concept of co-presence in MMOG game-play according to the theory of symbiosis in the field of ecology on biological interaction (Trivers 1971; Clutton-Brock 2009), the study aims to propose two new constructs of co-presence based on mutualistic relationships, namely *pseudo-mutualistic co-presence* and *true-mutualistic co-presence*, and examines their moderating effects on the relationship between the motivational profile and collaborative knowledge conversation. The concepts of *pseudo-mutualistic co-presence* and *true-mutualistic co-presence* are new and form the core of this project.

More specifically, the concept of mutualism (collaborative relationship between win-win partners) in the sense of co-presence in MMOG game-play can be further defined according to the underlying purpose of player-to-player collaboration with the incentive of collaborative victory in the MMOG environment. *True-mutualistic co-presence* can be defined as an individual player's perception of collaborating with other players in the MMOG game-play with the mutually beneficial relationship, without considering any individual benefit out of the collaboration. It is a higher degree of mutualism in which win-win collaboration is driven by considering others with uncalculated helping behavior in the virtual environment. On the other hand, *pseudo-mutualistic co-presence* can be defined as an individual player's perception of collaborating with other players in the MMOG game-play with the mutually beneficial relationship, but considering the social comparison of his/her performance with that of other players. It is a lower degree of mutualism in which win-win collaboration is driven by considering the comparative individual benefit out of the collaboration.

In the following hypotheses (see Figure 1 for the research model; and Table 1 for the summary of the hypotheses), we will associate different modes of knowledge conversion processes with the six cognitive domain of Bloom's Taxonomy (Anderson and Krathwohl 2001), involving knowledge and development of intellectual skills moving from the lowest level of learning to the highest: (1) knowledge, (2), comprehension, (3) application, (4) analysis, (5) synthesis, and (6) evaluation.

#### 3.1 Hypothesis 1: Acquiring knowledge from others via internalization

Nonaka (1994) defines internalization as a knowledge creation process by converting explicit knowledge to tacit knowledge. In the MMOG context, the internalization process emphasizes that a player can learn through reading explicit knowledge (e.g. written walkthroughs and guides in blogs and forums, listening to advices and suggestions in in-game chats, etc.) written using game specific languages (Kong and Kwok 2011). Through internalization, players acquire other players' knowledge to formulate their own game specific skills, action strategies and experiences. This mode of knowledge

conversion exhibits memory of previously learned materials to associate internalized facts, terms and basic concepts answers, which is associated with the lower levels of Bloom's Taxonomy (e.g. knowledge and comprehension levels).

As elaborated earlier, there is a continuum of level of motivation in the motivational profile, from amotivation to extrinsic motivation and finally intrinsic motivation. In the starting point of motivated game-play, the MMOG player will extrinsically focus on the advancement of avatar through accumulation of experience point (a.k.a. *grinding*) and in-game equipment (a.k.a. *farming*). Consequently, such self-extrinsic motivational drive may trigger the feeling of envy and social comparison (Kong et al. 2012) even among other team players (win-win partners) of the same guild. In this project, we define this specific perception of co-presence with others MMOG players as *pseudo-mutualistic co-presence*.

Based on these arguments, we hypothesize that a player with a motivational profile of higher self-extrinsic motivation will result in higher level of internalization in collaborative knowledge conversion. Also, the relationship between self-extrinsic motivation and internalization is stronger for players with higher level of perception of *pseudo-mutualistic co-presence*.

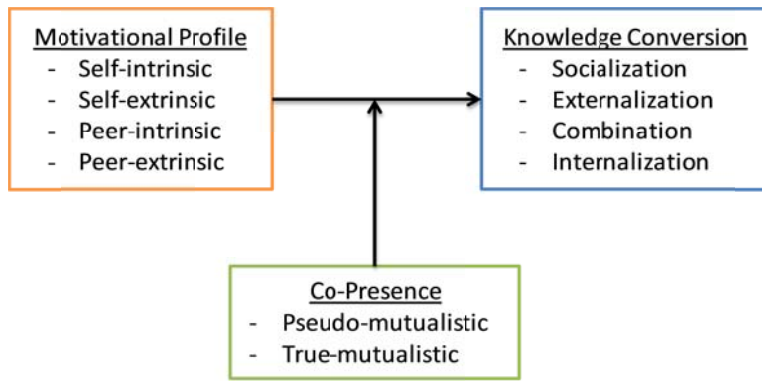


Figure 1. Research Model

Motivational Profile	Collaborative Knowledge Conversion Process			
	Internalization	Externalization	Combination	Socialization
Self-extrinsic	Acquire other's knowledge H1: True < Pseudo			
Self-intrinsic		Share their own knowledge H2: True > Pseudo		
Peer-extrinsic			Integrate group knowledge H3: True > Pseudo	
Peer-intrinsic				Create group knowledge H4: True > Pseudo

Table 1. Summary of Hypotheses

### 3.2 Hypothesis 2: Sharing knowledge to others via externalization

Nonaka (1994) defined externalization as a knowledge creation process by converting tacit knowledge to explicit knowledge. In the MMOG context, the externalization process emphasizes that a player can

learn through sharing his/her experience and skill of playing the game in community forums, and share the knowledge to other players in the MMOG (Kong and Kwok 2011). The sharing of the explicit knowledge can be occurred through verbal conversation or in-game chat, and written experience in blogs, which are accessible and communicable to other players. Different from internalization, this mode of knowledge conversion exhibits MMOG players' application of previously internalized materials in the MMOG game-play and sharing of their experiences to other players, which is associated with a higher level of Bloom's Taxonomy (e.g. application level).

According to Self-determination Theory (Ryan and Deci 2000), a sufficient level of self-efficacy is an important factor to initiate and sustain behavioral change. Self-efficacy is an individual's belief in their ability to accomplish a specific goal (Bandura 1986). In the MMOG context, a player will gain sufficient self-efficacy when his/her game specific knowledge is accumulated to a certain point, and as a result, the player will enjoy the participation with fun in the MMOG game-play based on self-intrinsic motivation. Also the player doesn't mind to share or externalize his/her knowledge to others as he/she has accumulated a satisfactory level of experience point that he/she is happy with it. In this project, we define this specific perception of co-presence with others MMOG players as *true-mutualistic co-presence*.

Based on these arguments, we hypothesize that a player with a motivational profile of higher self-intrinsic motivation will result in higher externalization in collaborative knowledge conversion. Also, the relationship between self-intrinsic motivation and externalization is stronger for players with higher level of perception of *true-mutualistic co-presence*.

### **3.3 Hypothesis 3: Integrating group knowledge via combination**

Nonaka (1994) defined combination as a knowledge creation process by converting explicit knowledge to explicit knowledge. In the MMOG context, the combination process emphasizes that a player can learn through integrating individuals' knowledge of a group (Kong and Kwok 2011). This mode of knowledge conversion requires the demonstration of breaking down facts and ideas into elements and parts, and then combining the breaking elements and parts to form a new whole, which is associated with the higher levels of Bloom's Taxonomy (e.g. analysis and synthesis levels).

According to the Social Categorization Theory (Turner et al. 1987; Turner 1985), the identity of self may become less salient, or even anonymous within a group. Depersonalization may then occur when individuals directly base their behavior on the goals and needs of a salient group (Brown and Turner 1981); and subsequently hyper-personalization may happen when individuals offer their friendship help and support to others of a group without questioning their individual identities (Walther 1996). In the context of MMOG, tasks are assigned to groups while rewards will be given to every player of the group after successful completion of tasks through collaboration among players (win-win partners). This reflects the concept of collaborative victory. Similar to hypothesis 2, when players have accumulated a satisfactory level of experience point, they are motivated to help others to achieve game rewards based on their peer-extrinsic motivation. They don't mind combining relevant externalized individuals' knowledge to form a consolidated knowledge of a group in the form of blogs and forums for the benefit of all players of the group.

Based on these arguments, we hypothesize a player with a motivational profile of higher peer-extrinsic motivation will result in higher combination in collaborative knowledge conversion. Also, the relationship between peer-extrinsic motivation and combination is stronger for players with higher level of perception of *true-mutualistic co-presence*.

### **3.4 Hypothesis 4: Creating group knowledge via socialization**

Nonaka (1994) defined socialization as a knowledge creation process by converting tacit knowledge to tacit knowledge. In the MMOG context, the socialization process emphasizes that a player can create group knowledge through observation and imitation of other game players (Kong and Kwok 2011).

This mode of knowledge conversion exhibits demonstration, evaluation, design and creation of game specific skills and action strategies among MMOG players, which is associated with the higher levels of Bloom's Taxonomy (e.g. synthesis and evaluation levels).

In the context of MMOG, in order to create higher levels of game skills and action strategies (like Chinese *Kung Fu* practice) when verbal and textual description can no longer define, learning through observation and imitation will take place. Similar to hypotheses 2 and 3, when most players of a group have achieved a high level of experience point, they are motivated to help others to achieve collective enjoyment based on their peer-intrinsic motivation. They are happy to demonstrate their game skills and peer-evaluate each other with the purpose to design and create new set of game skills with fun as they start to enjoy playing and practice together without considering the personal and collective extrinsic rewards out of the collaboration.

Based on these arguments, we hypothesize a player with a motivational profile of higher peer-intrinsic motivation will result in higher socialization in collaborative knowledge conversion. Also, the relationship between peer-intrinsic motivation and socialization is stronger for players with higher level of perception of *true-mutualistic co-presence*.

## **4 METHODOLOGY**

The plan is to use a multi-method methodology to examine gamers' self- & peer-motivations, perception of co-presence and collaborative knowledge conversion in MMOG – *World of Warcraft* (WoW). The multiple methods include a MMOG field observation in a specific MMOG group (i.e. a specific *guild* in WoW), self-report online survey as well as focus group interview. Multi-method protocol is suggested to study complex social phenomena in IS discipline (Mingers 2001, 2003). Triangulation of results is very beneficial in enhancing our understanding of the collaborative knowledge conversion modes that occur in an emerging MMOG virtual gaming environment.

### **4.1 Field Observation**

Two research assistants of our research team, who are blind to the research hypothesis, will be engaged in the WoW as participant observers. The research assistants will set up a guild and recruit new voluntary game players to join, so as to observe the changes of players' collaborative knowledge conversion process, perception of co-presence and motivational profile throughout their ongoing participation.

### **4.2 Self-Report Online Survey**

Based on prior research, we adopted the measurements that have been developed and validated in previous research. In particular, the measurement of collaborative knowledge conversion will be adapted from Kong and Kwok (2011); the measurement of co-presence will be adapted from Wilkinson (2001) and Wasko and Faraj (2005); the measurement of motivational profile will be adapted from Kong et al. (2012). The complete list of items was validated using Moore and Benbasat's (1991) card sorting procedure.

### **4.3 Focus Group Interview**

To further achieve a better understanding of the survey findings, focus group interviews with individual players will be conducted for the purpose to collect another set of qualitative data on their personal stories and events at the time of playing the game.

### **4.4 Data Analysis Method**

In this study, Partial Least Squares (PLS) (Wold 1982) structural equation analysis will be used to test the hypothesis. PLS Graph 3.00 with 200 iterations of bootstrapping technique was used to estimate



reliability and validity of items, as well as Partial Least Square (PLS) path analyses. PLS requires a sample size consisting of 10 times the number of predictors, using either the indicators of the most complex formative construct or the largest number of antecedent constructs leading to an endogenous construct, depending on whichever is greater. To be conservative in terms of MMOG player turnover and satisfy the required sample size, around 300 MMOG guild players will be recruited in our research game site of *World of Warcraft*.

## 5 CONCLUSION

This study aims to propose two new constructs of co-presence, *pseudo-mutualistic co-presence* and *true-mutualistic co-presence*; and examine their moderating effects on the relationship between the motivational profile and collaborative knowledge conversion. We propose a multiple method approach which consists of field observation, self-reported survey and focus group interview to test our hypotheses. The result of this research project is expected to validate the motivational impact of an important MMOG feature and its effect on collaborative learning behavior in terms of collaborative knowledge conversion during the game-play. The expected results of this research will provide practical insights into the design of MMOG and potentially important practical implications to educators and game developers.

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