

Article

MMORPG Evolution Analysis from Explorer and Achiever Perspectives: A Case Study Using the Final Fantasy Series

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Abstract: Due to the advent of the Internet, massively multiplayer online role-playing games (MMORPGs) have been enjoyed worldwide by many players simultaneously, and game publishers' revenues have reached billions of dollars from subscriptions alone. Frequent updates (e.g., versioning) and new contents (e.g., quest system) are the typical strategies adopted by developers to keep MMORPG experiences fresh and attractive. What makes such strategies attractive and retains the interest of players in MMORPGs? This study focuses on one aspect of a popular MMORPG: the player's experience of the quest systems of Final Fantasy XIV (FF14). The different quest systems were analyzed considering Bartle's players' classification, specifically for the explorers and achievers. From an information science perspective, such an analysis can be achieved via game refinement (GR) theory, which formulates the information of the game's progression into a measurable model of game sophistication. On top of that, we used the concept of motion in mind, which was derived from concepts in physics. It maps game progression information to enable the possible quantification and approximation of players' mental movements and affective experiences in the game. Based on the analysis of the collected data using the proposed measures of GR and motion in mind, the impact of regular updates on players in long-term games is discussed. Insights from the study provide guidance and suggestions for potential improvements in long-term game design.



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1. Introduction

With the development of technology, video games have developed into an everyday leisure activity of many households worldwide [1]. The number of players, both young and old, male and female, who play video games, has grown exponentially [2–4]. As the Internet has become part of everyday life [5], the popularity of massively multiplayer online role-playing games (MMORPGs) has increased. Recent estimates of the total number of MMORPG players worldwide are about 240 million (about 19 million active players) [6]. Such a vast audience shows the potential market benefits of MMORPG development. MMORPGs are online games where massive numbers of players interact with each other (human and non-human characters) to solve various quests or tasks [1].

Online games bring people together via mobile phones, computers, and consoles, but MMORPGs bring people together in a persistent virtual world, in which players develop characters and participate in long-term social groups [4]. As mobile video games rapidly gain popularity today, MMORPGs are the popular alternate choice. In 2017, MMORPG games were estimated to account for 39.5% of the entire 2017 massively multiplayer online (MMO) market. In addition, MMORPGs had the largest market share in 2019, reaching

CNY 48.8 billion (approximately equivalent to USD 7.5 billion) and accounting for 26.9% of the mobile game market size [7,8]. However, in terms of update iterations, MMORPGs seem to have reached a deadlock [9]. In January 2021, among the top ten MMORPGs listed by TechSpot, the latest game was released in 2014 [10]. Although MMORPGs have a considerable market value and a wide range of players, this game category lacks vitality and requires innovation. This situation is evident from the projection that MMORPGs will hold only a 9.9% share of the entire MMO market in 2022 [11].

Among the fundamental aspects of MMORPGs, the main ones involve the player types, the game content, and in-game interactions. In addition, MMORPGs have many unique features that appeal to many types of players over other games [12]. Based on people's motivations to play online games, Bartle [13] introduced multi-user domains or dungeons (MUDs) via qualitative interviews [1]. It was found that there are four types of players: achievers, explorers, socializers, and killers. Different players had different definitions of fun, and fun is often considered a subjective experience. Among them, achievers and explorers were more interested in the game content. Meanwhile, as their names imply, socializers and killers were more interested in the interactions between players in-game.

Another fundamental aspect of MMORPGs is the quest-driven gameplay [14]. These quests often have precise requirements (such as completing the in-game tasks) and rewards (such as experience points and equipment), which are obtainable from the non-player characters (NPCs). Moreover, each quest's narrative provides players with the choice to accept, complete, or abandon it based on their preferences while simultaneously acting as the medium for the player to learn and interact with the game world [12]. Such a non-linear, on-demand incentive system is a common characteristic of the MMORPG, distinguishing it from other MMO games.

From a business perspective, MMORPGs can be regarded as services, emphasizing the importance of minimizing infrastructure costs while maximizing or maintaining player numbers in the game [9]. Based on the fundamental aspects of MMORPGs, the business models related to selling virtual goods have overtaken, in importance, the retail selling of the games themselves [15]. Therefore, it is crucial to understand and analyze the patterns of players' behavior, in both the short and long term, for the feasible development of the MMORPGs quest system, contributing to the retention of the player community. As such, the main goal of this study involved analyzing the quest system of a popular MMORPG game, Final Fantasy XIV (FF14), from both a business and developer point of view. We took into account the influences of different versions of FF14 based on Bartle's player classifications, considering both short and long-term gameplay.

2. Related Work

MMORPGs have a wealth of content, and the quest system is responsible for guiding the player's experience. Over decades, MMORPGs have made great strides in visual representation, and their audience has remained widely varied, but their main characteristics have remained the same. This study focuses on different player types in MMORPG, as we matched the game content with each player's preferences. Research by Billieux et al. [1] showed that explorers and achievers spend more time in MMORPGs and make up the majority of players. Therefore, explorers and achievers were focused on as the primary players in this study.

Moreover, game pursuits involve discovering new features and completing various challenges, which are typically embodied in the MMORPG quest system. Studies on the quest system were affirmed as a guide to understanding players and provided some quest design methods [14]. However, these still failed to assess the impacts of different quests on different players accurately and ultimately disrupted the quest system's overall design.

2.1. Types of Players in MMORPGs

The earliest study that classified players was conducted by Bartle [13], where different psychological profiles were proposed in the context of multiplayer games. Said

classification identified players as achievers, explorers, socializers, and killers; this was the basis of many subsequent studies for years [16]. Then, Bateman and Boon [17] proposed a demographic game design model that provided a broad perspective on game genres based on four basic player types integrating different combinations of four dimensions of the personality types of the Myer–Briggs model: conqueror, manager, wanderer, and participant. Although it provides valuable insights into player characteristics, it was based on a psychometric model that does not focus on games [16].

Then, Yee [18] became the first study that investigated the psychometric properties of player's motivation factors using five main factors and ten sub-factors, consolidated into three main factors that motivate players in online environments: achievement, social aspects, and immersion. However, Bartle's motivational factors can be seen as a basis for Yee's player type motivations and psychological profiles, making the two models conceptually similar [16]. A more recent study was conducted by Xu et al. [19] that identified player types to theoretically evaluate a health game considering motivational and behavioral factors: achievers, active buddies, social experience seekers, team players, and freeloaders.

A meta-analysis of the scholarly works conducted by Tuunanan and Hamari [15] showed that a large number of the dimensions considered for player types were based on Bartle's original work. Such work has been criticized for being too dichotomous and simplified, albeit being a good tool for straightforward design. In addition, people's behavior and motivations can change over time and with context, and people can have multiple motivations existing simultaneously [15,16]. However, the frameworks that form the basis for Bartle's types consist of scales instead of nominal categories (Figure 1), making some of the criticism towards the model about being too strict partly unwarranted and stemming from the usage rather than the original work [15].

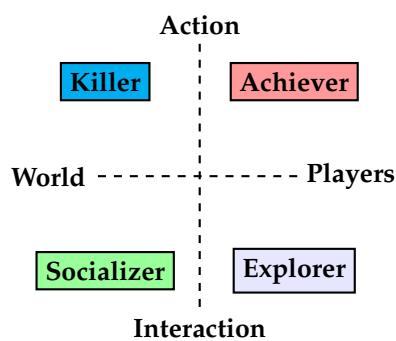


Figure 1. Interest graph of different players according to the multi-user domains or dungeons (MUDs), adapted from [14,20,21]. There are two dimensions to playing, namely, action versus interaction and player-orientation versus world-orientation. By determining one's position in each of the axes, one could determine which of the resulting player types he or she is.

Bartle identified and described four approaches to playing MUDs [13]. MUDs are the precursor to MMORPGs, so MUDs' division can also be used as a reference for MMORPG players, which given by four factors: the number of achievements within the game, the level of exploration of the game, the magnitude of socialization with other players, and the level of imposition upon others. Based on each factor, the player is categorized as an achiever, explorer, socializer, or killer. It is important to note that these types of players are not fixed but switchable, depending on state and mood [15,16].

Achievers aim to accumulate achievement points to complete various game challenges, and all actions are useful to achieve such challenges [20,21]. Explorers love to find hidden things in games that emphasize discovering interesting features (even bugs or loopholes) in the game world [20,21]. They tend to communicate only to obtain new ideas or information. The fun of being a socializer comes from friends. The game is their backdrop, a story that happens to all players, something that all players can discuss. Finally, killers base their value on other players. This situation may come from helping others, but very few people

do this because rewards (inner comfort) are very unstable. More often than not, they choose to be hostile towards other players [15].

In the game, the relationship between players is also part of the MMORPG mechanic [12]. Players express sympathy, care, listen, and joke to others. Some players will even be happy to observe people's growth. Such a situation makes the MUD division important to making the game world feel dynamic, natural, and realistic. Such a situation is essential for investigating the feedback loop of player typologies that affect game design, and for avoiding self-fulfilling and self-validating gamer typologies [15]. For example, if a game has too many players of one type, it may reduce the number of players of a specific type. Too many killers will cause achievers to run away for fear of being targeted as prey, affecting the number of killers because they are losing valuable prey. Therefore, a healthy MUD game should reach a balance among player types.

Odierna and Silveira [21] suggested that it is possible to identify and classify players via gameplay analysis using consolidated theories such as Bartle's archetypes or Marczewski's types of players, which group players using the k-means algorithm. They obtained the statistics of players' time spent on different types of activity in World of Warcraft. These players spent most of their time as explorers and achievers, and then socializers, before finally becoming killers. Based on this information, game developers can adjust the proportions of game content, create new quests for specific players, and create other gameplay to meet various types of players' needs. The work conducted by Billieux et al. [1] also showed that users, quests, and exploration achievements were explicitly related to the motives in the game of the World of Warcraft.

2.2. Research on the Quest System

The quest system is the embodiment of the content of an MMORPG. Ashmore and Nitsche [22] found that the most effective way to structure game content in 3D games is to use quests, where a primary quest was generated based on key and lock puzzles. They also discussed linking the game world with the quest generator, matching the quest content with the game environment, and ultimately increasing the player's interest in the game world.

However, different types of players have different preferences, and the quest types also need to satisfy different types of players. Doran and Parberry [23] analyzed 750 quests of popular role-playing games (RPGs) such as Eve Online, World of Warcraft, Everquest, and Vanguard: Saga of Heroes. They found that these RPGs shared a similar quest structure and proposed a quest generator based on such a structure to generate complex, automatically different, and suitable quests for various players.

As MMORPGs increasingly became popular, limited map resources struggled to satisfy the ever-expanding player base. In MMORPGs, players explore together in the game world. The quest system is used to guide and encourage players. The standard quest model is not compatible with the diverse needs of players. Sometimes, the game world's resource refresh rate cannot meet a large number of players' needs [15]. Tomai et al. [14] designed a dynamic quest system, which is an extension of the existing quest model, where players can increase their influence on the game world. The dynamic quest system adjusts quests by evaluating players and game resources to deliver a better questing experience.

In recent years, as research on player psychology has gradually matured, researchers have begun to pay attention to game elements' effects on player psychology. In high-degree-of-freedom games especially, it is crucial to keep players interested. Alexander and Martens [24] discussed several mechanics of the open-world games. In an open-world game (i.e., Minecraft), players explore the game space, which is typically satisfied by providing a quest system to provide players with a sense of purpose and progress via the task generation method. It is based not on a story model distinct from a game's mechanics but is also derived from them and directly leverages their emergent behavior. Hence, understanding the quest's role has gradually shifted from the game itself to the player. Nevertheless, these are still unable to take a quantitative measurement of the impact of a game's quests on the player as a whole.

3. Measures of Game Information of MMORPGs

3.1. Game Refinement (GR) Theory

Game refinement (GR) is a unique theory involving refining a game's sophistication and entertainment value based on the idea of progressing game information [25]. Several studies have demonstrated and implemented the GR hypothesis proposed by Iida et al. [26–28]. GR has been applied to many aspects of past research, such as time limit sports, score limit sports, board games, and gamified platforms. GR proposes that two aspects can represent the game's progression. One is the duration of the match or the scoring rate, and the other is the progression of game information centered on the game's outcome. Game information progress displays the levels of certainty of the game's outcomes in time or steps.

3.1.1. Original Game Progress Model

GR theory's analysis of a game is based on the premise game results' certainty. At the beginning of the game, the result is uncertain, and as the game progresses, the uncertainty of the result becomes smaller [29]. Understanding the source of the uncertainty would ensure the possibility of categorizing the types of uncertainty and determining success. GR theory has different representations of game progression for different games. The progress of the game can be considered from two angles. One is based on game duration or scoring rate, and the other is centered on the game's outcome.

The game progress $x(t)$ can be expressed as a linear equation about time t with $x(T) = 1$, $x(0) = 0$, and n is the number of possible options ($1 \leq n \in \mathbb{N}$), as shown in (1). However, the progress of the game is unknown during the in-game period. The game's uncertainty often lasts until the last moment of the game, making the game's progress nonlinear. Hence, a reasonable model can be obtained as (2). Note that $x(t)$ is the normalized amount of solved uncertainty where $0 \leq t \leq T$ and $0 \leq x(t) \leq 1$. Then, acceleration of game information progress is obtained by deriving (2) twice. When $t = T$, (3) can be obtained. In the current model, the game information is likely encoded and transmitted in players' brains. The transmission process will bring about in players the experience of the game. Acceleration in the transmission of information affects the player's level of excitement due to some degree of unpredictability [30]. With greater acceleration, the game will be more exciting due to the uncertainty of the game's outcome. Therefore, the final GR measure of the game under consideration is given as (4).

$$x(t) = \frac{n}{t} x(t) \quad (1)$$

$$x(t) = \left(\frac{t}{T} \right)^n \quad (2)$$

$$x''(t) = \frac{n(n-1)}{T^n} t^{n-2} |_{t=T} = \frac{n(n-1)}{T^2} \quad (3)$$

$$GR = \frac{\sqrt{n(n-1)}}{T} \quad (4)$$

Determining the match between the considered game progress model and game information is an essential and challenging task. The current game progress model is mainly used for board or tabletop games [25,31,32], time-limited games [33–35], score-limited games [28,33,35], and video games [36,37]. For a board game, a move selection model was adopted, where an efficient algorithm (such as $\alpha\beta$ algorithm) or players with sufficient ability (such as Grandmaster), was/were able to derive a few plausible options (b) from all possible options (i.e., branching factors of a tree-search, B). The moves (b) were assumed to be equally selected among the candidates. The best-case analysis enables the

approximation of the $b \simeq \sqrt{B}$. Since parameter n in (4) stands for number of plausible options b , $n \simeq \sqrt{B}$. Thus, for a game with a branching factor of B and of length D , the GR measure is given in (5). Meanwhile, sports games calculate the score based on two factors: the goal and the time or steps to achieve it. For example, in a basketball game, the game's goal is determined by the number of successful points, and the steps to achieve the goal are estimated by the average number of shots. Therefore, G and T represent the average number of successful points and the average number of shots, respectively, given in (5). The GR values for various games obtained are given in Table 1.

$$GR = \frac{\sqrt{B}}{D} = \frac{\sqrt{G}}{T} \quad (5)$$

Table 1. Measures of game refinement (GR) for some popular games [25,28,31–36].

Games	B/G	D/T	GR
Chess	35	80	0.074
Shogi	80	115	0.078
Go	250	208	0.076
Basketball	36.38	82.01	0.073
Soccer	2.64	22.00	0.073
Badminton	46.34	79.34	0.086
Table tennis	54.86	96.47	0.077
DOTA ver 6.8	68.60	106.20	0.078
StarCraft II Teran	1.64	16.00	0.081
Mafia (one of the setting)	6.25	46.90	0.074

B : average branching factor in card and board games. G : possible score chances in continuous movement games.

D/T : average game length. GR : game refinement value.

3.1.2. Game Progress Model in MMORPG

GR theory's applicability to board games and scoring games mainly involves analyzing games with specific results, clear rules, and clear victory goals [29]. Then, the game's behavior can be seen as the uncertainty progress of the result. However, at present, this method still has limitations. There are many endless games, and there is no general concept of "winning" in such games [38]. Playing a game is purposeful behavior. The purpose is not necessarily to win, but it may also be a sense of accomplishment or curiosity. The same applies to study and work. After all, flow theory [39], as the basis of game refinement theory and motion in mind theory, originated from the analysis of people's working status.

An MMORPG provides an entertainment platform on which players choose their favorite game content. This situation is similar to current learning platforms, such as Duolingo. Previous studies have presented some analyses on the relationship between game quests and players, but a key point is relating quests to psychology—how do the quests in the game relate to players' feeling? Mason [40] states that a sense of substitution depends on "meaningful choices"—for instance, players can perform "good" or "bad" quests (such as saving a person rather than killing him), and their gameplay experience changes depending on their decisions. In this study, such context is defined as the sense of substitution, which perhaps is the essence of MMORPGs. Such a game emphasizes the art of interaction and "meaningful choices" to mobilize the players' curiosity and excitement [29,30]; thus, this is the basis for analyzing player experience.

In past research, content and player classification has been performed for MMORPGs. The explorers find new features to satisfy their pursuit of progress in terms of completing the quests. The achievers satisfy their pursuit by completing challenging, complex content. Our research combined the GR theory and motions in mind concepts to analyze different game experiences. MMORPGs are online games, and in order to attract new players and retain old players, developers must constantly provide updates to their games. However, the accumulation of updates can make the game's quests system "bloated" [9].

Dealing with that problem is the focus of this research. Moreover, the game progression by explorers and achievers toward reaching their in-game goals was modeled. Thereby, we analyzed their game experiences, and observed the combined impacts of the game version updates on their game progress.

The progress for a player typically refers to reaching a goal. For a student who uses an edutainment game to learn, the goal might be reaching a level in some language, such as CET-6. However, for an MMORPG player, the game settings may be multifaceted, where a player could level up to the highest level, explore all the game maps, build their own house, build their guild, and so on. Therefore, trying to complete some quests to obtain the rewards is an incentive for users. This reward is often part of the player's goal. Therefore, quests and rewards can be used to measure the game progression in a long-term game. Consequently, the game progress model has two factors, Q and R , representing the average number of achievements or rewards and the average number of tries or quests, respectively. Q and R correspond to t and $x(t)$; thus, the GR value is calculated for long-term games as (6).

$$GR = \frac{\sqrt{Q}}{R} \quad (6)$$

3.2. Motions in Mind of Long-Term Games

3.2.1. Conceptual Background

With the optimization of the game progress model, the relationships between accelerations in game progress and the emotions can be obtained [41–43]. Iida and Khalid investigated a mechanism by adopting a logistic model of game outcome uncertainty for which a measure of GR had been derived [44]. This method can determine the balance between skill and chance in game design. The GR and flow theory's relationship is determined and discussed by considering the game progress model, thereby formalizing the law of motion in the game. Table 2 shows that various physics quantities can be measured in the game. This correspondence allows us to understand the psycho-physical quantities in various games better to have an intuitive understanding of the player's game playing experience.

Table 2. Game information corresponding to physical quantities [45].

Notation	Game	Physics
y	Solved uncertainty	Displacement
t	Total score/game length	Time
v	Winning rate ($v = p$)	Velocity
m	Winning hardness	Mass
a	Acceleration in mind	Gravitational acceleration, g
\vec{p}	Momentum of game	Momentum
E_p	Potential energy of game	Gravitational potential energy, U

The probability of p selecting the best choice among n plausible candidates makes picking the best choice about $p = \frac{1}{n}$. As such, the definition of gamified experience is based on the notion of the risk frequency ratio ($m = 1 - p$). The game's length is t , and $y(t)$ is the uncertainty that is resolved at time t . The average velocity at which players resolve uncertainty is given by (7). Additionally, the actual game progress model is $y(t) = v_0 t + \frac{1}{2} a t^2$. Since $v_0 = 0$ at $t = 0$, the game progress can be defined as (8). Assuming their cross point is at $t = D$, the acceleration a at this time is (9). The cross point represents the correct balance of skill and chance in the game experience by the accelerating information.

$$y(t) = vt \quad (7)$$

$$y(t) = \frac{1}{2}at^2 \quad (8)$$

$$a = \frac{2v}{D} \quad (9)$$

Everything that moves is in motion (in game context, game progress). Analogical links between physics and the game progress model were established based on such motion. Hence, such motion is determined based on two essential components [44]: game-playing options (i.e., branching factor, scoring possibility, reward probability) and game length (i.e., time/step). For board games, if B is the average number of moves and D is game length, velocity $v = \frac{1}{2} \frac{B}{D}$. In scoring games, G and T are the total number of points and the total number of attempts per game, and velocity $v = \frac{G}{T}$. The formulae of other physical quantities are given as (10)–(12).

$$m = 1 - v \quad (10)$$

$$\vec{p} = m \cdot v \quad (11)$$

$$E_p = ma \left(\frac{1}{2}at^2 \right) = 2mv^2 \quad (12)$$

3.2.2. Psychological Experience in Long-Term Games

One of the characteristics of long-term games is that developers release updates to enrich the game's content and extend its length [9]. This situation divides the game into three parts for each update: the game progress before the update (y_0), the game progress after the update (y_1), and the new game progress (y_n). When $t = t_0 + t_1$, the game progress is given as (13), where n is the update number. Therefore, as the game is updated, the game process model and the player's game experience will inevitably change. Hence, such information provides the necessary grounds for analyzing the game progress model, with which players' psychological experiences can be approximated.

$$y_n(t) = y_0(t_0) + y_1(t_1) + \dots + y_n(t_n) = \sum_1^n y_i(t_i) \quad (13)$$

Analysis of the long-term game includes each update and the whole. Even though the distribution of content is the same for each update, the overall analysis results will differ. The same quest and reward distribution can make v values the same. However, when the length of the game (t) changes, both the acceleration (a) and the potential energy (E_p) also change. Thus, there is no perfect, independent content distribution that allows developers to keep updating the game in this way. Therefore, a question arises: when is it meaningful to analyze the updated content separately?

The GR, m , and E_p values represent the comfortable thrills of solving quests, the difficulty of obtaining rewards (unlocking new features), and the player's expectations for the game content, respectively. E_p has more "weight" on the game's updates, and regular updates will make players' expectations relatively fixed, making it challenging to deliver improvements after each game update (e.g., attracting many new players and maintaining the interest of old players). Hence, this study's analysis is divided into three parts: analyzing the game progress models of the original game, its update, and the overall game.

Games such as MMORPGs are typically structured through character leveling in multiple different progression metrics [15]. Such metrics are similar to customer loyalty schemes, where customers can be differentiated based on their product purchases. In the context of MMORPGs, targeting virtual goods to specific players at a particular stage of their progression allows for tracking in-game behaviors (such as levels and achieve-

ments) [15,46]. Moreover, from an educational standpoint, the player's progression can be divided into learning and challenge phases using an arbitrary measurement of progress (e.g., experience points) [47]. Such measures provide novel opportunities ("leveling up" after specific predefined amounts of accumulated experience), maintain motivation (by a series of short-term feedback/rewards), and grant new in-game skills for tackling more exciting and complex challenges. However, there can be little opportunity to experience the game's actual depth at certain levels [9], which could induce temporary unbalancing of challenges (too difficult to level up); the challenges rather than exploration can be emphasized; and the experience distribution can be extremely wide (inconsistent difficulty with levels), which is the inherent shortcoming of long-term games.

In this research, the analysis of player types, based on Bartle's classification, specifically the explorers and achievers, was considered. An explorer is a curiosity-driven player. The main drivers are thrills (i.e., finding something that no one has ever encountered), challenges (i.e., achieving some special powers or solving hidden routes), and achievement (i.e., to exploit the game as much as possible) [20]. Hence, GR value, mass (m), and potential energy (E_p) are the associated measures that best approximate those experiences.

Meanwhile, achievers focus on the depth of the game. The a represents the player's excitement and keeps players excited during the training phase, which is an essential factor in judging whether an MMORPG is suitable for achievers. Similarly, jerk (j) reflects changes in a , which are often associated with uncomfortable experiences (i.e., roller coaster rides) [48,49]. j represents a sudden change in thrills and engagement, causing discomfort to many players, but at the same time becoming the motivation for players who are keen on challenges. As such, velocity (v), acceleration (a), and jerk (j) best reflect the gaming experience of the achievers. v represents the rate of uncertainty solved—that is, the rate at which the achiever completes the challenge.

Figure 2 is the stage division of the game progress model for an ideal game environment. At the beginning ($v > a > j$), the player rarely feels excited or uncomfortable when performing quests; when $t < t_1$, the player will feel relaxed and comfortable. Then, at $t_1 < t < t_2$, players begin to experience mood swings, but the effort is greater than the thrills. In this case, players exit their comfort zone but could overcome challenges through hard work [50]. In the danger region ($t_2 < t < t_3$), players feel uncomfortable because they lose control of the game. At t_3 , because the excitement brought by a matches the player's effort, t_3 becomes the upper limit of the appropriate game length. Areas outside of t_3 have too little profit for players' efforts and are high-risk gaming areas (such as gambling). As achievers strive for a challenge, a challenge beyond their control is unlikable. Thus, $t_1 < t < t_3$ is the most suitable for an achiever, where $j > a$ and $v > a$. At this time, it is also the sophistication zone where $GR \in [0.07, 0.08]$ and $a \in [0.0049, 0.0064]$.

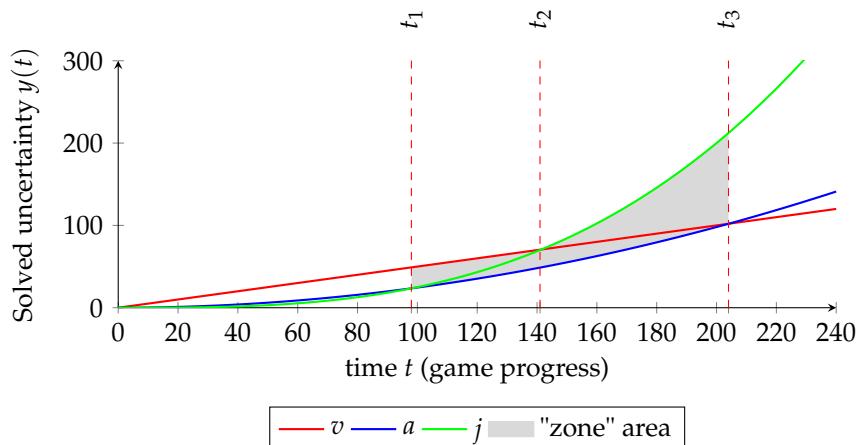


Figure 2. Different psychological experiences during game progression (adopted from [44]). The cross point between the line with velocity v , the curve with acceleration a , and curve with jerk j . Additionally, t_1 , t_2 , and t_3 represent the bounds for effort, achievement, and discomfort, respectively.

4. Experiment and Analysis

4.1. Data Collection

In this study, Final Fantasy XIV (FF14) quest data were collected [51]. FF14 quests can be divided into main quests, special quests, and regular quests (see Table 3) [52]. The main quests show the main storyline of Final Fantasy XIV, and they tend to be of low difficulty to allow all players to experience the well-crafted story. Special quests open up certain game features after completion, such as other stories, faction reputation, flight, equipment dyeing, partners, and more. Special quests are designed to meet the diverse needs of the players. Regular quests tend to have simple text descriptions, very little plot, and similar rewards (experience points and gold), but are one way for players to gain experience and level up.

Table 3. Quest data and metrics collected according to the game version quantities.

Version	Quests				$v = \frac{q}{Q}$	$GR = \frac{\sqrt{q}}{Q}$
	Main	Regular	Special, q	All, Q		
2	290	341	316	947	0.3337	0.0188
2.1	19	31	96	146	0.6575	0.0671
2.2	19	14	93	126	0.7381	0.0765
2.3	19	41	61	121	0.5041	0.0645
2.4	19	21	35	75	0.4667	0.0789
2.5	24	19	19	62	0.3065	0.0703
3	94	256	188	538	0.3494	0.0255
3.1	8	20	67	95	0.7053	0.0862
3.2	11	10	41	62	0.6613	0.1033
3.3	6	14	48	68	0.7059	0.1019
3.4	10	9	17	36	0.4722	0.1145
3.5	9	16	19	44	0.4318	0.0991
4	122	213	190	525	0.3619	0.0263
4.1	11	5	38	54	0.7037	0.1142
4.2	8	4	46	58	0.7931	0.1169
4.3	7	7	49	63	0.7778	0.1111
4.4	7	7	10	24	0.4167	0.1318
4.5	7	14	21	42	0.5000	0.1091
total2	390	467	620	1477	0.4198	0.0169
total3	138	325	380	843	0.4508	0.0231
total4	495	250	354	766	0.4621	0.0246
total (2–3)	528	792	1000	2320	0.4310	0.0136
total (2–4)	690	1042	1354	3086	0.4388	0.0119

The quests content can be divided into talking quests, gathering quests, combat quests, and instance quests [52,53]. The first three are simple and can be completed alone. However, instance quests often drain the player's resources and require some companions and clearance time. Instances are often at critical stages where the player is the main character for story development. Players will be able to better experience the story and hone their combat skills and cooperation with other players [9]. Each version of the game will release many instances and create more difficult instances at the end of each version. Finally, FF14 quests can be classified according to their versions, levels, types, content, and requirements. These classifications are the data required for modeling the progress of different types of players in long-term games.

4.2. The Game Experience of Explorers

Explorers tend to experience all the game features with great pleasure (in this study's context, the quest system). Through special quests, the player can unlock and experience all the features in-depth. The number of special quests is q , and the number of all quests is Q . $v = \frac{q}{Q}$ represents the completion rate of special quests. Based on v , the first minor version

of each major version has the highest number of quests (Table 3). This condition means that this minor version has the most content. Subsequent minor versions will provide smaller numbers of main quests to supplement the plot, and a large number of special quests will open up more storylines to satisfy the player's needs of plot, and create more instances to satisfy the player's needs for teamwork and challenging their skills. These quests also serve to distinguish the player types, since players no longer need regular quests to provide experience, reducing the number of regular quests drastically.

Figure 3 shows that due to the excessive total number of quests, the GR value of main versions ($X.0$) is less than the sophistication ($GR \in [0.07, 0.08]$). In the subsequent minor versions, most of the main quests and regular quests (telling the story and providing experience) were implemented in the main version. Thus, a high proportion of special quests makes the GR value more prominent towards the zone values. In turn, the game-playing experience was not suited for the explorer in the first minor version of the game update because the main goal was to complete the main story (main quest) and level up (regular quest). In later minor versions, there was no need to level up, and the quest system was focused on opening up more features (new instances and side stories), making the GR value increase, providing more options to explore. By the fifth minor version update, the game experience was best suited for an explorer.

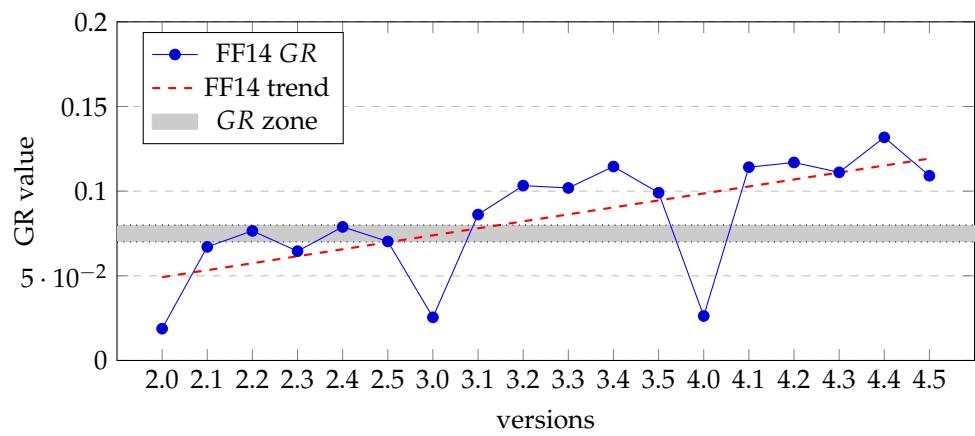


Figure 3. Game refinement values of the quests of each FF14 version.

It can be noted that the trend of the MMORPG updates was incremental, implying that each version was improving. However, what about a new player who joins midway through the game versions? Previous studies have shown that the game-playing experience of FF14 improves rapidly from the start. However, a new player must first complete the old quests when they want to explore the latest version's content, which other players have fully explored. Figure 4b shows that as a version changed, the player's experience became more exciting (increase a) and became more thrilling (increase GR). However, the transition between two (version 2–3) or more major versions (versions 2–4) was less exciting and thrilling (reduction of a and F).

Furthermore, it can be observed from Figure 4a that the GR value gradually grew closer to the sophistication zone of GR measure as each version was updated. This condition shows that as an explorer, the game's experience improves with each version. This situation is supported by the increased ratings and more than 20 million players that stand as paying subscribers worldwide of FF14. It was scored by Metacritic (<https://www.metacritic.com> (accessed on 25 May 2021)) at versions 2.0, 3.0, and 4.0 as 83/100, 86/100, and 87/100, respectively [54]. An explorer player can quickly be satisfied with the progress in completing the quests; they can accomplish their goals quickly with sufficient challenges and expectations (peak \vec{p} and $m > 0.5$).

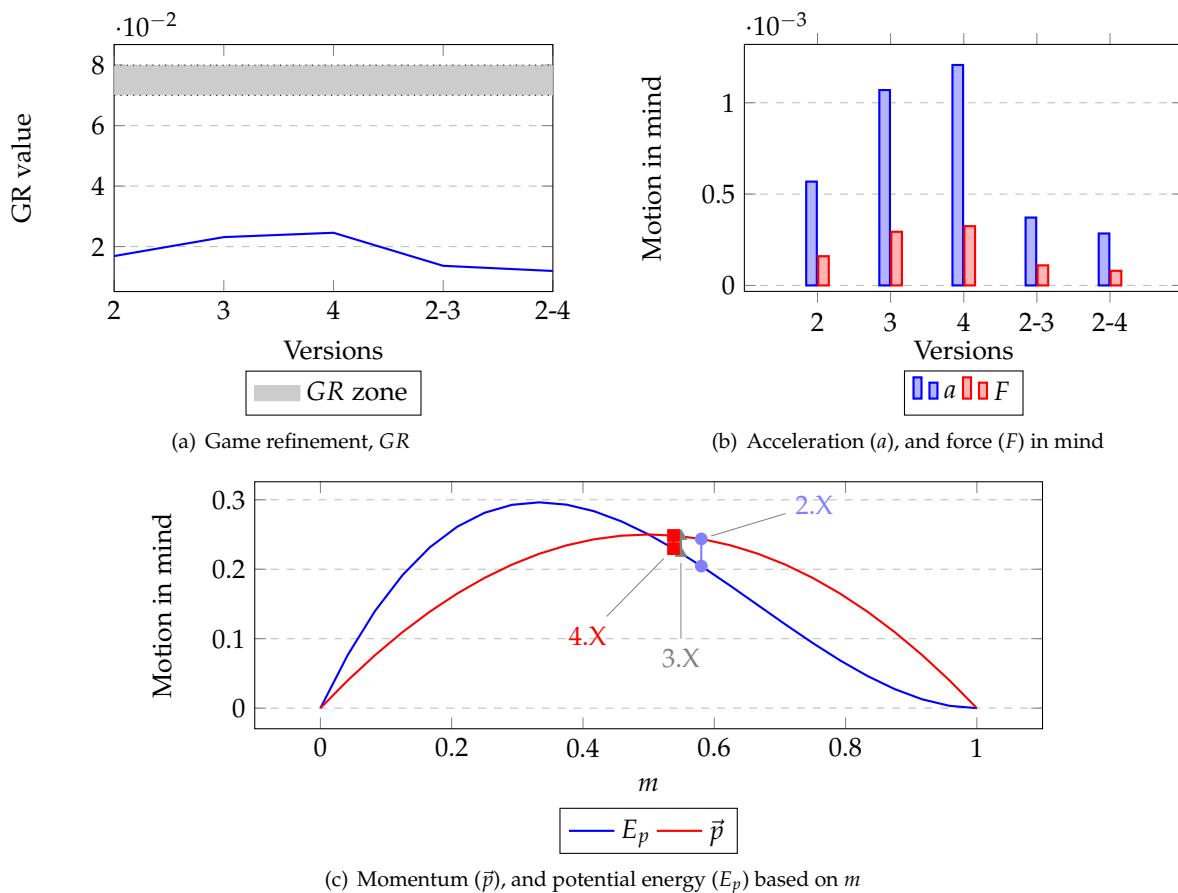


Figure 4. Metrics for different main versions (2, 3, and 4) and the major version transitions (version 2–3; and versions 2–4) based on (a) game refinement, GR values, and various motion in mind measures depicted by (b) and (c).

4.3. The Game Experience of the Achiever

The quest distribution for each level was collected, as depicted in Figure 5. Based on the computed average of the quest distribution, it can be observed that there are significantly more quests available at levels 1, 10, 15, 30, 50, 60, 70, and 80 than at any other levels. Level 1 allows beginner quests that are independent for different classes, which helps guide them initially. Then, at level 15, an instance system is available, giving the player the first challenge in the game’s career (the player is no longer a novice). Level 50 is the highest level for version 2.0 of the game.

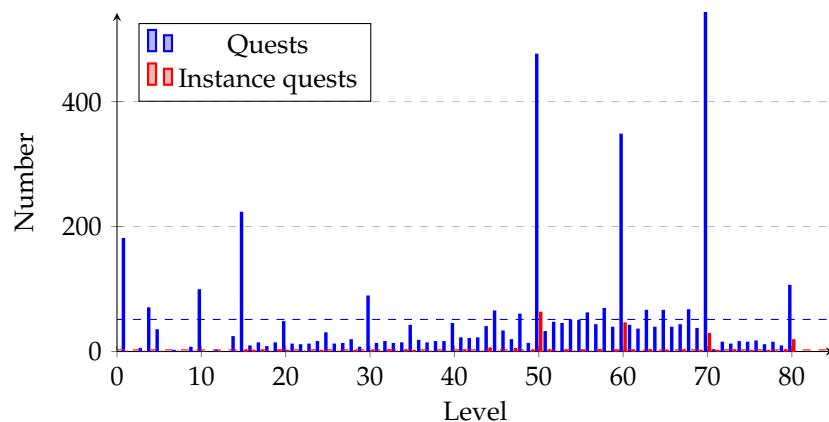


Figure 5. Quest distribution over different player levels. The averages for quests and instance quests were 51.2933 and 2.6267, respectively.

The proportions of instance quests to total quests were the highest at level 50 and level 70. This condition was an intentional design: to put a series of instances as the climax at the end of each version. Moreover, most of the quests of version 2.1, version 2.2, and other minor versions are also at level 50. When the highest level is reached, the next achievement for the achiever involves improving their equipment. Better equipment and skill improvements are achieved in the instance quests, where achievers strive for challenging instances to become stronger.

Additionally, the main content was designed to be enjoyed by fully-leveled-up players (levels 70 to 80), who also belong to version 5.X. However, the game data were released only up to minor version 5.3 and had fewer quests than the previous versions; thus, it was excluded from being considered in this study. However, based on the available data so far, it can be observed that difficult content was perceived to be decreasing.

In Figure 6, the number of instance quests at the current level can be assumed as n , and the total number of instance quests in the current version is N , so $v = \frac{n}{N}$, $a = v_y - v_z$, and $j = a_y - a_z$, where y and z are level indices and $y > z$. The first 50 instance quests are not evenly distributed among the levels, and at some levels, there is no challenge at all, thereby making the players bored. At the final level (levels 50, 60, 70, and 80) of each version, v , a , and j increase significantly. Since the next level is reached the beginning of the next version, the number of instance quests plummets, and the achiever's experience also deteriorates.

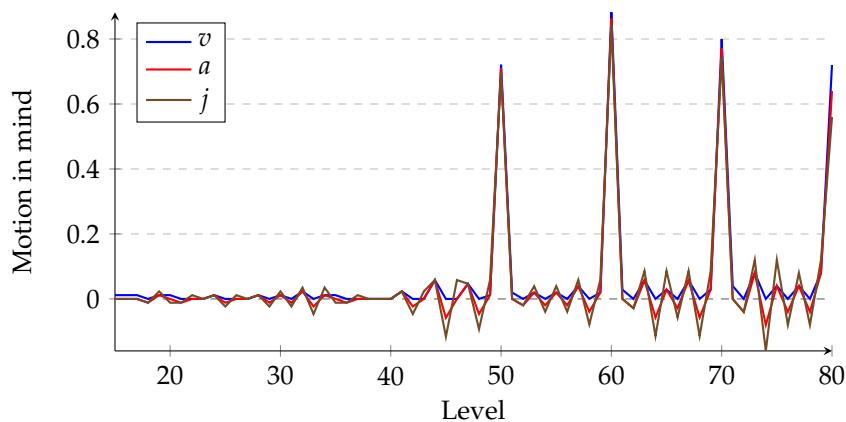


Figure 6. The player's psychological experience while in challenging instances, where the average and standard deviations of v , a , and j were ($\bar{v} = 0.060606061$, $\sigma_v = 0.184720538$), ($\bar{a} = 0.046515015$, $\sigma_a = 0.182936975$), and ($\bar{j} = 0.045204182$, $\sigma_j = 0.180209359$), respectively.

Nevertheless, after level 50, the distribution of instance quests becomes consistent; every other level will be one or two instance quests away. This situation allows the acceleration and jerk after level 50 to remain non-zero, allowing the achiever to remain excited. Moreover, the thrill of the upgrade progress increases with each release. According to Achterbosch's research, "level grind" is a common weakness of MMORPGs [55]. The FF14 developers are making the leveling progress less boring by regularly adding challenging instance quests.

Achievers dare to be challenged, but challenges beyond their ability will undoubtedly reduce the players' enthusiasm. Based on flow theory and motions in mind [44], when the environment strikes a balance between being challenging and suiting the ability of the player, the best psychological experience can be expected. Instance's requirements for the quality of equipment can be used to measure the difficulty of the instance (Figure 7). There is no equipment quality requirement before level 50, indicating that these dungeons' difficulty is relatively low in the designer's view. Therefore, the progression rate for achievers should be within $a \in [0.0049, 0.0064]$. Simultaneously, they ensure that jerk is less than acceleration, preventing players from changing too fast or finding it difficult to adapt to the challenges.

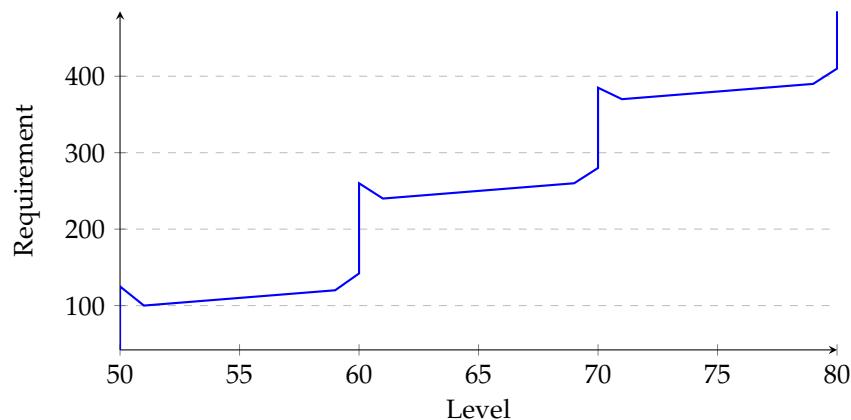


Figure 7. Requirements for equipment based on player level.

4.4. Discussion

Between new version releases, the trends of the motion in mind measures (E_p , v , \vec{p}) increased gradually, but the increases were trivial. According to the quest number (see Table 3), the changing trend of different versions' quest quantity is very similar. Therefore, the FF14 developer's update idea has not changed, so the game's potential energy has not changed much. Nevertheless, every version update of FF14 is progressing well in general, and the changes from version 2.0 to 3.0 were visible. This situation was caused by the initial version's release, which typically has a significant expansion of levels and more content. A continuous increase in the proportion of special quests makes the players experience fresh game content rather than repetitive game content, while keeping the explorers' GR value within the sophistication zone $GR \in [0.070.08]$.

It can be observed that the difficulty is gradually increasing, but the instances at the end of the previous version are more complex than the instances at the beginning of the current version. This situation allows the players who have cleared the previous version to start the next version's challenges quickly. As such, the previous versions' quests need to be simplified and provide a "catching up" mechanism to experience the new version of the game faster without undergoing the entirety of the previous version's content. Furthermore, developers need to adjust the distribution and the difficulty of instances better (i.e., adjusting the a), to minimize players' boredom during the leveling up progress. Simultaneously, attention needs to be paid to the gradual progression of difficulty, as a memorable game experience is dependent on challenges that match the player's abilities.

Our results aligned with Bartle's results of a survey of players' expectations [13]. The demand for large amounts of explorable content and the aversion to repeated content are consistent with the analysis of explorers. Simultaneously, as MMORPG players have already been playing these games for long periods of time, demand for more activities and goals has never been quenched. Thus, focusing on special quests has provided the needed insights for improving such content, which even today through, have been deemed insufficient by the players. The "level grind" is considered a significant issue where players repeat the same strategy to complete quests during the leveling-up process, causing boredom and frustration. The findings of this study suggest that adding instance quests regularly during the leveling-up process could maintain the players' excitement and surprise.

Unlike board games or MOBA games, an MMORPG is a long-term game, allowing people to explore and seek challenges long term. In this respect, while playing an MMORPG, the player's state is similar to their state at work or studying. Whether it is a game, work, or study, ensuring the users' long-term interest is key issue. Santos et al. proved that the state of flow can assist education systems, as they recognized that game-based research has promoted research on driving students into flow [56]. Moreover, learning platforms such as Duolingo and MindSnacks have unreasonable settings of difficulty in the later stages, which gradually reduces the attractiveness to users [57]. The insights obtained from those studies support such findings, which showed that the

current method could be a reliable game-based (or gamification) method that is applicable in the educational system. Modifying both the difficulty of content and the time taken to milestone parameters is important. A gradual and incremental introduction to learning content throughout the learning process can promote the existing educational platform to enhance long-term engagement and learning retention.

5. Conclusions

In this study, the MMORPG, FF14, was analyzed and discussed based on Bartle's player classification, which focuses explicitly on explorers and achievers. GR theory and the motion in mind concept were used as the primary research methods with which to evaluate long-term games. GR and motions in mind have been adopted for board games, sports games, and video games in the past due to clear and measurable goals; thus, its applicability to MMORPGs was questionable. Therefore, the analysis was shifted towards the analysis of the game content and different player types.

GR theory and motion in mind provided insights on many aspects of the game-playing experience that need to expand and improve. The GR zone balances the opportunities and skills presented by the game content (e.g., quests). It was found that acceleration and jerk provide sufficient approximations to users' psychological indicators. Such measures showed that appropriately placed content could provide more excitement and improve the perceived enjoyment. At the same time, adequately catered content based on the player's needs (features expectation) and timing (e.g., level) are also important in promoting both thrill and "comfort" (e.g., player's retention) in long-term games. According to the design concept of FF14's producer, Yoshida Naoki [58], "It's not about forcing players to keep playing the game consistently. If you just consume everything with each major patch then you've played everything, then you can play other games, you can spend your time and plan around your timing. If you want to come back to Final Fantasy XIV, you can come back and catch up easily". According to the finding of this study, that statement was found to be true for FF14.

It is imperative but difficult to keep players interested in long-term games such as MMORPGs. Therefore, several recommendations relative to future game developers, practitioners, teachers, and researchers alike can be outlined as follows. Firstly, the continuous increase in the proportion of the special quests (additional content or engaging activities) over the regular quests (general activity or content) provides fresh experiences rather than repetitive ones. Such a condition would keep the refinement measure (or GR value) of the explorer's game progress model in the sophistication zone ($GR \in [0.07, 0.08]$). Secondly, the fulfillment of the quests in the previous versions compared to the current one needs to be simplified and focuses on the "catching up" mechanism of player leveling. New or old players can experience the new version of the game faster while retaining the previous version in such a situation. In other words, progression or learning of the previous content's outcome can be simplified to improve the learning experience. Third and finally, developers need to adjust the distribution and difficulty of instances better, to minimize players' boredom in the leveling-up process with challenges that match their abilities.

In this study, explorers' and achievers' experiences were analyzed in FF14. However, our study's social and interaction aspects remain the limitations. A future study should focus on a player versus player environment for analysis. A comparative study between various MMORPGs is a potential direction worth being considered. Finally, enriching this work by undertaking a mixed-methods study and combining the players' behavioral data with our results would be advantageous.

Supplementary Materials: The following are available online at <https://www.mdpi.com/2078-2489/12/6/229/s1>. The raw data used in the present study can be referred to the attached data supplementary title "SupplementaryData.xlsx" file. Note that the data reported in this study were analyzed and processed according to the purpose of the study.

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