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Research on the Influence of Curiosity on MMORPG Grinding Player Experience

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Abstract

In MMORPGs, there are many problems with the Grinding player experience. This research divides the Grinding player experience into four dimensions: Grinding in-Autonomy, Competence, Relatedness and Positive affect through theoretical investigation of game experience. Through the study of Litman (2008), Curiosity is divided into two dimensions, I-Type Curiosity and D-Type Curiosity, and the relationship between Curiosity and Grinding player experience is studied. By distributing questionnaires, collecting data, and using SPSS software to conduct reliability analysis, validity analysis, correlation analysis and multiple regression analysis on the data, it is verified that in MMORPG, I-Type Curiosity can positively affect Grinding in-Autonomy, Competence , Relatedness and Positive affect. D-Type Curiosity can positively affect Grinding in-Autonomy, Competence and Positive affect, but D-Type Curiosity has no statistical relationship with Grinding in-Relatedness. And through the standardized coefficient (Beta) value, between the Curiosity factors, I-Type Curiosity has a greater impact on Grinding in-Autonomy and Positive affect, and D-Type Curiosity has a greater impact on Grinding in-Competence. Finally, from the perspective of I-Type Curiosity and D-Type Curiosity, combined with the drawbacks of the MMORPG Gringding mechanism, some concrete and feasible suggestions and optimization schemes are put forward to improve the Grinding player experience. This research result can provide some feasible suggestions for MMORPG developers and designers, optimize the MMORPG Grinding mechanism from the perspective of I-Type Curiosity and D-Type Curiosity, and improve the Grinding player experience. It can provide appropriate assistance for the improved development of MMORPG games.

Key Words: Grinding Player Experience, I-Type Curiosity, D-Type Curiosity, MMORPG.

I. INTRODUCTION

MMORPG is an acronym for Massively Multiplayer Online Role Playing Game. So far, many MMORPG games have been developed, such as "World of Warcraft", "리니지", "검은사막", "Final Fantasy 14", "Guild Wars 2", "梦幻西游", "天涯明月刀" and so on. MMORPG was very popular around the 2000s, like many Korean game companies focused on the development of MMORPG around 2000, MMORPG also brought them a lot of commercial value. It was reported that the rare game props of the MMORPG game "리니지" were sold for several million won on the item trading site "아이템베이", and the enthusiasm of players who invested in MMORPGs was very high. But in the mid-to-late 2000s, other game genres such as the casual game "Running Kart", the MOBA game "League of Legends", and the shooting game "Half-Life 2" rose rapidly. They began to erode the existing MMORPG market, and the market share of MMORPG games declined year by year.

In fact, MMORPGs are very close to hardcore games in the whole game. For the growth of the characters, players have to invest nearly 24 hours a day in order to reach the Supreme on each server, which takes a very long time. In order to collect rare game Props, players spend a lot of money to trade in the game mall. It is actually an unfair game to get a high level of game mechanics just by investing a lot of time or investing a lot of money. And a lot of time spent in MMORPG is mainly doing repetitive and uninteresting quests, which violates the interesting characteristics of the game and brings a bad game experience to the players, and even this bad experience has its own exclusive word-Grinding. In Wikipedia, "Grinding" is a commonly used gaming term used to refer to the action of the player engaging in one or more quests over and over again, just to get "quest rewards" [1]. sometimes Grinding is also referred to as pushing the bar (leveling up), farming

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(acquiring loot repeatedly from one source), or catassing (extensive play sessions) [2]. Grinding also exists in other types of games, but is most common in MMORPGs [3]. For example have the player kill x number of y beasts just to get the fur of those beasts, or get a certain item from one city, walk a long way to bring it to some NPC in another city, etc [4].

In player forums and games, Grinding is often described by players as a monotonous, boring, unconscious, obligatory and rote game experience. The content of Fig. 1 is a screenshot from multiple player forums. Many researchers have also pointed out problems with the Grinding player experience. For example, a website did a survey: Worst thing about mmos, and the survey results showed that Gind (the general work of the game) had the highest frequency, accounting for 37.2%, as shown in Fig. 2. Schubert, D. [5] believes that many players continue to spend time and energy on Grinding in MMORPGs, only to obtain quest rewards and become slaves of Grinding. T.L. Taylor [6] defines MMORPG Grinding as a gaming experience that is painful, boring, or mechanical. Golumbia, D. [7] pointed out in the research that Grinding is a kind of work that is not fun. Consalvo, M. and other scholars [8] believe that Grinding is the performance and reward of players' hard work in MMORPG, which has been separated from the essence of the game. According to J. P. Zagal, S. Bjork, and C. Lewis [9], the Grinding experience is a dark mode in game design, where Grinding is "performing repetitive and tedious quests" where players feel that their time is "cheated".

As one of the important internal driving forces of individuals, Curiosity has always been concerned by many scholars in the fields of philosophy, education and psychology. Hu Kezu [10] argues that Curiosity is a positive internal driving force and that Curiosity has a positive and important impact on all aspects of people's lives. Sinclair

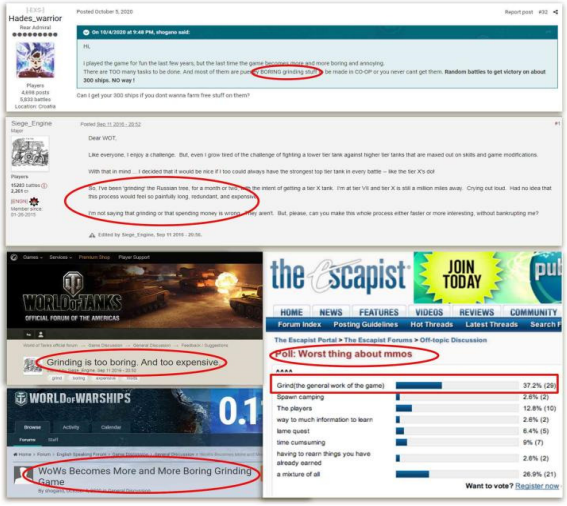

Fig. 1. On the player forum thread about accusing Grinding.

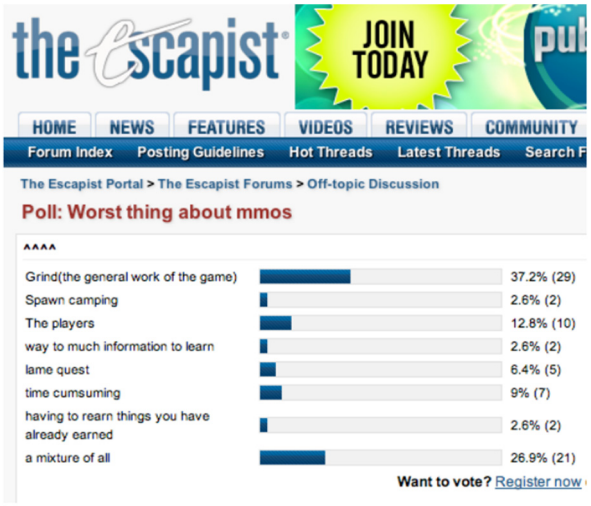

Fig. 2. A website survey about Worst thing about mmos.

[11] argues that attraction is primarily supported by Curiosity and fantasy. Shang-hwa HSU [12] et al. have confirmed in the study that Curiosity can motivate players to have more gaming fun. Litman [13] believes that people have two kinds of Curiosity, one is named Interest Type Curiosity, referred to as I-Type Curiosity, it can stimulate people's interest, can arouse people's emotional experience of active exploration, and is a pleasant feeling related to interest; The other is named Deprivation Type Curiosity, or D-Type Curiosity for short. When people realize that they lack a certain knowledge or lack the ability to deal with complex problems, they will try to bridge this gap, which will lead to D-Type Curiosity.

Through this discussion, the research questions of this study are organized as follows:

Does Curiosity have an impact on the Grinding player experience? If there is an impact relationship, which of the I-Type Curiosity and D-Type Curiosity has a stronger impact on the Grinding player experience?

This research result can provide some feasible suggestions for MMORPG developers and designers, optimize the MMORPG Grinding mechanism from the perspective of I-Type Curiosity and D-Type Curiosity, and improve the Grinding player experience. It can provide appropriate assistance for the improved development of MMORPG games.

II. Theoretical Investigation and Hypothesis Formulation

2.1. MMORPG Grinding Player Experience

By reading the extensive literature on Grinding player experience, we have a comprehensive and clear understanding of the four aspects of the history and evolution of Grinding, the definition and classification of Grinding, and

the problems and complexities of Grinding player experience. And mastered the situation that the current research field has insufficient research on the MMORPG Grinding player experience. Because there is no theoretical research on Grinding player experience, we expanded the scope of theoretical investigation and found that there are some researches on game experience.

Ryan et al. (2007) [14] extended the Self-Determination Theory (SDT) to the Player Experience Needs Satisfaction Model (PENS). PENS can measure the Player Experience Needs Satisfaction through five dimensions, namely PENS in-game autonomy, PENS in-game competence, PENS in-game relatedness, PENS presence, PENS intuitive controls. Based on focus group interviews, expert meetings and questionnaire research, FUGA group members Poels et al. (2008) [15] developed a seven-factor model of game experience with a total of 36 items. The seven factors are: Sensory and Imaginative Immersion, Tension, Competence, Flow, Negative Affect, Positive affect, Challenge. Both the PENS model and the seven-factor game experience model are game experience models for all types of games. What we are studying is the player experience of Grinding in MMORPG. Therefore, based on the reference to the PENS model and the seven-factor game experience model, we have made modifications. In this study, we divide the Grinding player experience into four dimensions, namely Grinding in-Autonomy, Grinding in-Competence, Grinding in-Relatedness and Grinding in-Positive affect. The specific definitions and item settings are shown in Table 1.

2.2. Curiosity

Litman [13] believes that people have two kinds of Curiosity, one is named Interest Type Curiosity, referred to as I-Type Curiosity, it can stimulate people's interest, can arouse people's emotional experience of active exploration, and is a pleasant feeling related to interest; The other is named Deprivation Type Curiosity, or D-Type Curiosity for short. When people realize that they lack a certain knowledge or lack the ability to deal with complex problems, they will try to bridge this gap, which will lead to D-Type Curiosity. The Curiosity measurement questionnaire was compiled by scholars Litman and Spielberger [16], and Chinese scholar Li Yumei [17] edited and calibrated the Chinese version of the Curiosity measurement questionnaire. The Curiosity measurement questionnaire contains 10 items, of which I-Type Curiosity has 5 items and D-Type Curiosity has 5 items. The Curiosity scale is scored on a 5-point scale, with 1 indicating complete disagreement and 5 indicating complete agreement, with higher scores indicating higher levels of Curiosity. The Chinese version of the Curiosity Scale edited and calibrated by scholar Li Yumei, the overall Cronbach's Alpha value is 0.726, the KMO value is 0.826, and $p<0.001$, which proves that the scale has good reliability and validity (Table 2).

Table 1. The 4 dimensions of grinding player experience.

Variable name	Definition	Item	Source
Grinding in-autonomy	An experience where players freely make decisions and choices in the game.	Grinding because I'm interested. Grinding because I was forced. I hope grinding is optional according to my preference.	Ryan et al. (2007)
Grinding in-competence	The right balance between the challenge of the game and the player's ability level.	I am very good at grinding. While at grinding, I feel successful. While at grinding, I feel skilled. The way the grinding works is just fine.	Ryan et al. (2007)
Grinding in-relatedness	Refers to the degree of connection a player has with other players in the game.	At grinding, I feel like I have found a sense of belonging to the team. At grinding, you can make many new friends. At grinding, I feel a good interaction with other players. At grinding, you can run your own relationships.	Ryan et al. (2007)
Grinding in-positive affect	There is enjoyment, joy and relaxation in the Grinding experience, and the post-grinding experience is energizing.	At grinding, I was very happy. At grinding, I was very satisfied. I feel like the grinding is pretty impressive. The grinding is very attractive to me. The grinding makes me feel very interesting. At grinding, I felt myself imaginative at grinding.	Poels et al. (2008)

Table 2. Curiosity measurement questionnaire.

Type of curiosity	Item	Source
I-type curiosity	I like to explore new ideas.	Litman, J. A. (2008)
	I like to discuss abstract concepts.	
	I enjoy learning about things that are uncertain to me.	
	When learning something new, I want to know more about it.	
	I am interested in learning and acquiring new information.	
D-type curiosity	I will try my best to get the problem solved.	
	I would spend hours thinking about a question until I came up with an answer.	
	I will ponder for a long time to solve some fundamental problems.	
	When I have a problem, I can keep my mind clear.	
	I think problems encountered in work or study must be solved.	

2.3. Curiosity and MMORPG Grinding Player Experience

Curiosity is one of the important internal motivations of individuals, and many studies have confirmed that Curiosity has a positive impact on games. Researcher Loewenstein [18] believes that Curiosity is an individual's tendency and desire to know and understand new and unknown things, and cognitive gaps in knowledge or understanding will stimulate Curiosity. Curiosity has been included in some game engagement models as an important element, such as the "Easy Fun" element in the "Four Keys of Fun" model developed by Lazzaro [19], which is the type of fun that is caused by Curiosity. In their research, Alexandra, T. et al. [20] linked Curiosity theory to the game uncertainty theory proposed by Costikyan [21]. Alexandra, T. et al. believed that game designers can use uncertainty to motivate, manipulate and Improve the Curiosity level of players and improve the playability of the game. Based on the above analysis, I believe that Curiosity can positively affect the Grinding player experience. Therefore, we propose some hypothetical conclusions:

H1: In MMORPGs, I-type curiosity can positively affect Grinding in-autonomy.
H2: In MMORPGs, I-Type Curiosity can positively affect Grinding in-Competence.
H3: In MMORPGs, I-Type Curiosity can positively affect Grinding in-Relatedness.
H4: In MMORPGs, I-Type Curiosity can positively affect Grinding in-Positive affect.
H5: In MMORPGs, D-Type Curiosity can positively affect Grinding in-Autonomy.
H6: In MMORPGs, D-Type Curiosity can positively affect Grinding in-Competence.
H7: In MMORPGs, D-Type Curiosity can positively affect Grinding in-Relatedness.
H8: In MMORPGs, D-Type Curiosity can positively affect Grinding in-Positive affect.

III. SAMPLING

The questionnaire consists of 3 parts. The first part designed 3 questions about MMORPG Grinding, the purpose is to test whether the subject group understand MMORPG Grinding experience; The second part is the text of the questionnaire, which is divided into two parts: Curiosity scale and Grinding player experience scale. The third part is general content such as respondents' gender, occupation, time spent playing games, and average monthly spending on games. It is worth mentioning that the research objects are Chinese players, so the questionnaires actually distributed are the Chinese version of the questionnaires.

The object of this research is for players with MMORPG Grinding experience, and the main subjects are players who play games in 5 large Internet cafes in Taiyuan City, Shanxi Province. Another group of subjects filled out the questionnaire through links shared on WeChat and QQ platforms (the two largest social communication apps in China). We designed the questionnaire as an electronic questionnaire and put it on the online research platform "Questionnaire Star (https://www.wjx.cn/)" to form a questionnaire QR code and a questionnaire link address. The tested group can enter the questionnaire filling page by scanning the QR code or visiting the link address. The questionnaires were distributed from November 20, 2021 to November 25, 2021, and a total of 300 questionnaires were collected. For the accuracy of the test sample, we designed three questions about MMORPG Grinding in the first part of the questionnaire, in order to test whether the subject group understand MMORPG Grinding. Through the screening of the first part of the questionnaire and the screening of invalid questionnaires, 220 valid questionnaires were recovered, and the effective rate of the questionnaires was 73.3%. The sample characteristic information is shown in Table 3.

IV. DATA ANALYSIS AND RESULTS

4.1. Reliability Analysis

Using IBM SPSS Statistics 22 software to conduct reli-

Table 3. Descriptive statistical analysis.

Basic information		Number of people	%
Gender	Male	113	51.4
	Female	107	48.6
Occupation	School student	76	34.5
	Civil service/public institution	69	31.4
	Company employee	52	23.6
	Self-employed persons	13	5.9
	Other	10	4.5
Years of playing games	2 months-6 months	26	11.8
	6 months-2years	21	9.5
	More than 2 years	173	78.6
Grinding frequency	Occasionally	111	50.5
	Often	94	42.7
	Always	15	6.8
Average monthly spending on games	1-50 Yuan	72	32.7
	51-100 Yuan	57	25.9
	101-300 Yuan	77	35.0
	More than 300Yuan	14	6.4

ability analysis on the 220 data collected, to examine the internal consistency of the 2 factors of Curiosity and the 4 factors of Grinding player experience. It can be seen from Table 4 that the Cronbach's alpha values of the whole and each factor are greater than 0.80, and the internal consistency is very high, which is suitable for further analysis.

4.2. Validity Analysis

Validity analysis was performed on the 220 collected data using IBM SPSS Statistics 22 software, and the specific results are shown in Table 5. The KMO value is 0.858, above 0.6, x^2=3080.308, p<0.05, indicating that the validity of the research data is of high quality and can be used for further analysis.

Table 4. Reliability analysis.

Factor	Cronbach's alpha	Number of items
I-type curiosity	0.87	5
D-type curiosity	0.883	5
Grinding in-autonomy	0.924	3
Grinding in-competence	0.888	4
Grinding in-relatedness	0.917	4
Grinding in-positive affect	0.871	6
Overall scale	0.836	27

Table 5. Validity analysis.

KMO and Bartlett's test		
KMO sampling suitability quantity		0.858
Bartlett's sphericity test	x^2	3080.308
	df	205
	p	0.000

4.3. Correlation Analysis

Using IBM SPSS Statistics 22 software to conduct correlation analysis on Curiosity and Grinding player experience, the specific results are shown in Table 6. It can be seen from Table 6 that the two factors of Curiosity and the four factors of Grinding player experience are significantly positively correlated, and the results of this correlation analysis also provide a basis and guarantee for the subsequent multiple regression analysis.

4.4. Multiple Regression Analysis

Using IBM SPSS Statistics 22 software to conduct multiple regression analysis on Curiosity and Grinding player experience, the specific results are shown in Table 7-Table 10.

It can be seen from Table 7 that the explanatory power o f the independent variable Curiosity to explain Grinding in -Autonomy is 30.8%, indicating that this regression model is statistically significant (F=41.460, p<0.05). In addition, the VIF value is low, 1.663-1.752, so it is judged that there

Table 6. Correlation analysis.

	I-type curiosity	D-type curiosity	Grinding in-autonomy	Grinding in-competence	Grinding in-relatedness	Grinding in-positive affect
I-type curiosity	1					
D-type curiosity	.274**	1				
Grinding in-autonomy	.468**	.368**	1			
Grinding in-competence	.387**	.414**	.213**	1		
Grinding in-relatedness	.221**	.287**	.314**	.225**	1	
Grinding in-positive affect	.472**	.379**	.388**	.213**	.316**	1

*p<0.05, **p<0.01.

Table 7. Analysis results of the impact of curiosity on grinding in-autonomy.

	Unstandardized coefficients		Standardized coefficient	t	p	Collinearity statistics	
	B	Standard error	Beta			Tolerance	VIF
(Constants)	1.302	1.024		5.819	0.000		
I-type curiosity	0.489	0.037	0.488	2.774	0.000	0.460	1.663
D-type curiosity	0.396	0.036	0.389	2.211	0.000	0.452	1.752

R^2=0.313, Adj.R^2=0.308, F=41.460, p=0.000.

is no multicollinearity problem. Between the Curiosity factors, both I-Type Curiosity and D-Type Curiosity had significant effects on Grinding in-Autonomy (p<0.05). According to the results of the Standardized Coefficient Beta value, I-Type Curiosity (0.488)>D-Type Curiosity (0.389), that is to say, in order to improve Grinding in-Autonomy, both the player's I-Type Curiosity and D-Type Curiosity need to be improved , but the player's I-Type Curiosity has a bigger impact on Grinding in-Autonomy.

It can be seen from Table 8 that the explanatory power of the independent variable Curiosity to explain Grinding in-Competence is 23.5%, indicating that this regression model is statistically significant (F=36.884, p<0.05). In addition, the VIF value is low, 1.663-1.752, so it is judged that there is no multicollinearity problem. Between the Curiosity factors, both I-Type Curiosity and D-Type Curiosity had significant effects on Grinding in-Competence (p<0.05). According to the results of the Standardized Coefficient Beta value, D-Type Curiosity (0.426)>I-Type Curiosity (0.275), that is to say, in order to improve Grinding in-Competence, both the player's I-Type Curiosity and D-Type Curiosity need to be improved , but the player's D-Type Curiosity has a bigger impact on Grinding in-Competence.

It can be seen from Table 9 that the explanatory power of the independent variable Curiosity to explain Grinding in-Relatedness is 34.5%, indicating that this regression model is statistically significant (F=16.841, p<0.05). In addition, the VIF value is low, 1.663-1.752, so it is judged that there is no multicollinearity problem. Between the curiosity factors, I-Type Curiosity had a significant effect on Grinding in-Relatedness (p<0.05), but D-Type Curiosity had no meaningful effect on Grinding in-Relatedness (p>0.05). That is to say, in order to improve Grinding in-Relatedness, it is only necessary to increase the player's I-Type Curiosity. The player's D-Type Curiosity has no effect on Grinding in-Relatedness.

It can be seen from Table 10 that the explanatory power of the independent variable Curiosity to explain Grinding in-Positive affect is 28.8%, indicating that this regression model is statistically significant (F=27.727, p<0.05). In addition, the VIF value is low, 1.663-1.752, so it is judged

Table 8. Analysis results of the impact of curiosity on grinding in-competence.

	Unstandardized coefficients		Standardized coefficient	t	p	Collinearity statistics	
	B	Standard error	Beta			Tolerance	VIF
(Constants)	0.850	0.221		3.117	0.001		
I-type curiosity	0.267	0.040	0.275	2.198	0.000	0.460	1.663
D-type curiosity	0.433	0.042	0.426	3.441	0.000	0.452	1.752

R^2=0.241, Adj.R^2=0.235, F=36.884, p=0.000.

Table 9. Analysis results of the impact of curiosity on grinding in-relatedness.

	Unstandardized coefficients		Standardized coefficient	t	p	Collinearity statistics	
	B	Standard error	Beta			Tolerance	VIF
(Constants)	2.845	0.907		3.983	0.010		
I-type curiosity	0.273	0.065	0.265	3.726	0.020	0.460	1.663
D-type curiosity	−0.449	0.078	−0.449	−0.577	0.226	0.452	1.752

R^2=0.351, Adj.R^2=0.345, F=16.841, p=0.000.

Table 10. Analysis results of the impact of curiosity on grinding in-positive affect.

	Unstandardized coefficients		Standardized coefficient	*t*	*p*	Collinearity Statistics	
	B	Standard error	Beta			Tolerance	VIF
(Constants)	1.983	0.436		3.839	0.000		
I-type curiosity	0.436	0.037	0.453	3.613	0.000	0.460	1.663
D-type curiosity	0.194	0.036	0.195	2.002	0.000	0.452	1.752

R^2=0.292, Adj.R^2=0.288, F=27.727, p=0.000.

that there is no multicollinearity problem. Between the Curiosity factors, both I-Type Curiosity and D-Type Curiosity had significant effects on Grinding in-Positive affect ($p<0.05$). According to the results of the Standardized Coefficient Beta value, I-Type Curiosity (0.453)>D-Type Curiosity (0.195), that is to say, in order to improve Grinding in-Positive affect, both the player's I-Type Curiosity and D-Type Curiosity need to be improved , but the player's I-Type Curiosity has a bigger impact on Grinding in-Positive affect.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusion

Through correlation analysis and multiple regression analysis, it is verified that in MMORPG, I-Type Curiosity can significantly and positively affect Grinding in-Autonomy, Competence, Relatedness and Positive affect, and D-Type Curiosity can significantly and positively affect Grinding in-Autonomy, Competence and Positive affect, but D-Type Curiosity has no effect on Grinding in-Relatedness. That is to say, except the hypothetical conclusion 7 is not established, the rest of the hypothetical conclusions are established. And through the standardized coefficient Beta value, between the curiosity factors, I-Type Curiosity has a greater impact on Grinding in-Autonomy, and Positive Affect, and D-Type Curiosity has a greater impact on Grinding in-Competence.

Therefore, we can improve the Grinding Player Experience from the perspectives of I-Type Curiosity and D-Type Curiosity.

5.2. Improve Grinding Player Experience from the Perspective of I-Type Curiosity

First of all, the Grinding in-Autonomy, Competence, Relatedness and Positive affect can be improved from the perspective of I-Type Curiosity. Litman believes that I-Type Curiosity refers to a person or something that attracts people's attention, and people want to know more and explore more. Non Player Character-NPC are mainly generated by the finite state machine (FSM) algorithm. There are many problems with the intelligence of NPCs, and players feel boring after many attempts. In MMORPGs, players have the experience of repeatedly attacking foolish NPCs. This kind of Grinding content is meaningless, cannot make the player feel a pleasant feeling related to interest, cannot mobilize the player's I-Type Curiosity, and it can easily affect the player's sense of game experience. Therefore, in MMORPG, the intelligence of NPC should be improved. We can improve it from the following two aspects.

Firstly, the monte carlo search tree (MCST), neural network and genetic algorithm can be used to try to improve the artificial intelligence of NPC, so that players can have more possibilities to interact with NPC, to improve Grinding in-Relatedness. In addition to foolishly attacking the NPC, the player can also communicate intelligently with the NPC, and the NPC can set different obstacles or problems for the player according to the player's behavior. The fun of the game is no longer limited to the confrontation between the player and the computer, but expands to the player using the environment to confront the NPC, and the player can even use physical and chemical methods to achieve the goal, to improve Grinding in-Autonomy and Competence.

Secondly, probability can be introduced into the interaction between NPC and player. For example, after the player defeats the NPC, the game will randomly drop game items according to the probability. For example, uncertain activities such as lottery, rolling dice, and random selection can be added to the interaction with NPC. These random interactions with NPCs allow players to see expectations, luck, and uncertainty. Players will continue to try and explore, and they believe that they will be lucky, which will stimulate players' I-Type Curiosity and greatly increase the Grinding in-Autonomy and Positive affect.

5.3. Improve Grinding Player Experience from the Perspective of D-Type Curiosity

We can also improve the Grinding in-Autonomy, Competence and Positive affect from the perspective of D-Type Curiosity. Litman believes that D-Type Curiosity refers to

our desire to understand a person, thing, or event, because not knowing it makes people feel deprived, like depriving you of what you should have. Based on this, D-Type Curiosity provokes competitive spirit and intellectual curiosity. D-Type Curiosity is like a desire to control in the guise of curiosity, and the inner voice is: "I should have known, how can I not know?" We take the MMORPG "MOONLIGHT BLADE" as an example to describe specific suggestions.

In the MMORPG "天涯明月刀", the “Daily competition” is a kind of daily grinding. As shown in Fig. 3, the “Daily competition” has 1v1 single-player battle and multi-player battle. In the 1v1 single-player battle, we can increase the operation skills of weapons. These skills require players to pay some energy and wisdom to master. Players with skilled operation skills will defeat players who are unfamiliar with operation skills. In order to defeat the opponent, players will continue to explore these unmastered operation skills, thereby stimulating players' D-Type Curiosity, to improve Grinding in-Competence. In multiplayer battles, we can develop more cooperative skills for different sects to fight in teams. Team players with mature cooperative skills and operations are more powerful, so that players will continue to build their own team strength in order to defeat the opponent, thus inspiring players D-Type Curiosity. In this PVP-type gameplay that increases the information gap of operating skills, the result of **each** battle is defined by the strength of other players and cannot be determined. If the player loses, he will feel that he has not mastered the skills well. Players will assume that if they improve their skills, they can beat their opponents, so they will work harder to explore unmastered skills. In this way, players will seriously participate in every PVP battle, because they desire to be a winner every time, and this mentality and behavior of eager to fill the information gap will continue to stimulate the player's D-Type Curiosity and improve the Grinding in-Autonomy and Positive affect.

Fig. 3. Single-player battle and multi-player battle in "天涯明月刀".

VI. RESEARCH LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This research analyzes how to improve the Grinding Player Experience from the perspective of Curiosity theory, optimizes the design of the MMORPG Grinding mechanism. However, in the complex MMORPG virtual game society, there are many factors that make up the player experience of Grinding. We only cover Grinding in-Autonomy, Competence, Relatedness and Positive affect in this research, and there are other factors that are not involved, such as Grinding in -Flow, Game quality, Significance, Luck, Challenge and other factors. Limited by the length of this paper, this study only examines the impact of Curiosity on the Grinding Player Experience. Subsequent research can further explore the influencing factors of Grinding Player Experience from other aspects.

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