An Approach to Quantifying Pokemon's Entertainment Impact with focus on Battle

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***Abstract*—This paper explores the attractiveness of Pokemon which is a turn-based Role Playing Game (RPG) and has been very popular for the decades. In this study we focus on Pokemon battle which is the most important component in Pokemon. The game refinement theory is used as a tool to assess the degree of sophistication of Pokemon battle. For this purpose we apply two approaches of game progress modeling to derive game refinement measure, i.e., score limit sports approach and board game approach. We calculated game refinement values for Pokemon battle by collecting many data from Pokemon Showdown, an online Pokemon battle simulator. The results show that the values of game refinement for Pokemon are slightly lower than the comfortable zone that we supposed in the previous study. We are tempted to conclude that such a slightly lower value is important to attract children with appropriate degree of excitement in playing Pokemon.**

***Index Terms*—game refinement theory, engagement, Pokemon**

I. Introduction

Classical game theory [13] originated with the idea of the existence of mixed-strategy equilibrium in two-person zero sum games. It has been widely applied as a powerful tool in many fields such as economics, political science and computer science. Game refinement theory is another game theory focusing on the attractiveness and the sophistication of games based on the concept of information of game outcome uncertainty [8]. The early works [5] [20] [21] focused on various types of games such as sports, board games and video games. It shows that the game refinement values of those popular games support the previous assumptions of a balanced range of game refinement value which is around 0.07-0.08 [22]. Game theory concerns the optimal strategy from the player's point of view, whereas game refinement theory concerns the optimization from the game designer's point of view.

While many works have been done for studying game refinement theory with focus on game entertainment among many domains, one of the domains which have not yet been investigated is turn-based RPG domain. Therefore, we now aim to investigate Pokemon, one of the most popular turn-based RPGs [7]. Many efforts have been devoted to the study of Pokemon with focus on different points such as education [10], media science [15] and social science [7]. We try to find an answer why Pokemon has been popular so long time. To tackle this challenge, we focus on Pokemon battle which is the most important component in Pokemon and game refinement theory is used as an essential tool in this study. We consider a reasonable model of game information progress to derive the game refinement measure for Pokemon battle. Then we apply two different existing approaches: score limit sports approach and board game approach.

In this paper we first give a short sketch of turn-based RPG and some detail of Pokemon is given. Then we present the basic idea of game refinement theory, which is used to assess the degree of sophistication of Pokemon battle. Moreover, the results obtained are discussed and concluding remarks are given.

II. Pokemon: Turn-based RPG

In this section, we present a brief history of turn-based game, RPG and the combination of these type of games, turn-based RPG. We have chosen Pokemon, a popular turn-based RPG as a testbed in this study. We then focus on Pokemon battle which is the most important component of Pokemon game. Moreover, we introduce Pokemon Showndown, an application that enables us to play Pokemon battle online, which is an important tool for this study.

A. Turn-based RPG

A turn-based game is a discrete time game where the game flow is partitioned into an explicit part, called *turn*. Each turn, players will have limited or unlimited time to think before making a decision in that turn. Then, game system will process the player's action and next player will be an owner of next turn respectively. There are many sub-types of turn-based games such as turn-based strategy (TBS).

A role-playing game (RPG and sometimes role playing game) [6] is a game in which players assume the roles of characters in a fictional setting. Players take responsibility for acting out these roles within a narrative, either through literal acting or through a process of structured decision-making or character development. Actions taken within many games succeed or fail according to a formal system of rules and guidelines. There are several forms of RPG such as massively multi-player online role-playing games (MMORPGs) [2].

TABLE I
HISTORY OF POKEMON

Generation	Year	Version
1st	1996	Pokemon Red Pokemon Green
	1997	Pokemon Blue
	1998	Pokemon Yellow
2nd	1999	Pokemon Gold Pokemon Silver
	2000	Pokemon Crystal
3rd	2002	Pokemon Ruby Pokemon Sapphire
	2004	Pokemon Fire Red Pokemon Leaf Green
		Pokemon Emerald
4th	2006	Pokemon Diamond Pokemon Pearl
	2008	Pokemon Platinum
	2009	Pokemon Heart Gold Pokemon Soul Silver
5th	2010	Pokemon Black Pokemon White
	2012	Pokemon Black2 Pokemon White2
6th	2013	Pokemon X Pokemon Y
	2014	Pokemon Omega Ruby Pokemon Alpha Sapphire

A turn-based RPG is a type of role-playing games. In turn-based RPGs, battles consist of turns where a player can command their characters to perform various actions to defeat opponents. Turn-based RPGs are one of the most popular types of RPGs on gaming consoles.

We see that turn-based RPG is a combination of turn-based game and RPG. Normally, the game run by a model same as normal RPG. But when fighting with an opponent, game will change from RPG system to turn-based system, by choosing what one wants to do in this turn such as attack, defense and so on. The core of battle stage is same as normal turn-based game. Then, when the battle ends, game will change from turn-based system to RPG system. Normally, in RPG mode one has to follow the story such as doing a quest or finding an item and everything that is done in RPG system will affect to battle mode, turn-based system.

B. Pokemon

Pokemon [3] [16] is a series of games developed by Game Freak and Creatures Inc. and published by Nintendo as part of the Pokemon media franchise. First released in 1996 in Japan for the Game Boy, the main series of role-playing video games (RPG) has continued on each generation of Nintendo's handhelds. Games are commonly released in pairs each with slight variations and then an enhanced remake of the games is released in a few years from the original release. While the main series consists of role-playing games, spinoffs encompass other genres such as action role-playing, puzzle, and digital pet games. It is the second bestselling video game franchise worldwide, next to Nintendo's own Mario franchise. We show, in Table I, a brief history of Pokemon.

The goal of Pokemon game [11] is to win the badges of gyms and become the champion of the league. For this purpose, one has to win every battle in the game. In this study, we mainly focus on the detail in each battle. The goal of Pokemon battle is to fight until the opponent does not have any Pokemon remain. Normally, each player will be called as a trainer because the duty of player is to train his or her Pokemon to be powerful enough to clear the game. Each trainer can bring up only six Pokemons and each Pokemon can remember only four moves. Each Pokemon has six kinds of stats composed of HP, attack, defense, special attack, special defense and speed. There are eighteen types of Pokemon and one Pokemon can be only one or two types such as Pikachu which is an electric type or Golem which is both rock type and ground type. The eighteen types consist of bug, dark, dragon, electric, fairy, fight, fire, flying, ghost, grass, ground, ice, normal, poison, psychic, rock, steel and water. The effectiveness of each move depends on the type of move and type of Pokemon that received move. Some examples are shown in Table II.

TABLE II
EXAMPLES OF TYPES AND ITS EFFECTIVENESS

	Defending Type					
Attacking Type	Type	Electric	Fire	Grass	Ground	Water
	Electric	$\times 0.5$		$\times 0.5$	$\times 0$	$\times 2$
	Fire		$\times 0.5$	$\times 2$	$\times 0.5$	$\times 0.5$
	Grass		$\times 0.5$	$\times 0.5$	$\times 2$	$\times 2$
	Ground	$\times 2$	$\times 2$	$\times 0.5$		
	Water		$\times 2$	$\times 0.5$	$\times 2$	$\times 0.5$

Normally, a trainer can choose what he/she wants to do among four choices: Fight, Switching Pokemon, Using Items and Run. However, in Pokemom battle rules, trainer cannot choose run or using item so trainer can choose only fight or changing Pokemon. There are many kinds of moves. It varies from offensive attacks like Tackle to defensive moves like Protect. Some attack moves are physical attack which will use one's attack status and the opponent's defense status to be calculated the results such as Slam while some attack moves are special attack which will use one's special attack status and the opponent's special defense status to be calculated the results such as Psybeam. Some moves can change one's status and/or the opponent's stats such as Tail Whip and Growl. Some moves inflict status effects to the target like paralyzed and poison such as Thunder Wave and Toxic.

Turn's order is decided by the speed of the two Pokemons which are currently fighting. The fastest simply goes first. Switching Pokemon always go before attacks. Moreover, each Pokemon has special ability which will effect in Pokemon battle such as Sniper ability that let the critical hit more powerful. Each Pokemon can hold one item, the item makes holder more forceful such as Leftovers which make holder regains its HP every turn. The trainer who has remained Pokemon while opponent has no Pokemon is winner.

Pokemon Showdown [17] is a Pokemon battle simulator. It allows us to play Pokemon battles online, by playing with randomly generated teams, or building one's own. Moreover, there are various works which have been carried out with Pokemon, for example, in the domains of mathematics [1] and computer science [4]. In the next section, we show our new approach to quantifying entertaining impact while applying game refinement theory.

III. Quantifying Attractiveness of Pokemon Battle

In this section we first give a short sketch of the basic idea of game refinement theory. Then we present two approaches: score limit sports approach and board game approach, in order to quantify the attractiveness of Pokemon battle which is the most essential component of Pokemon game.

A. Game refinement theory

A general model of game refinement was proposed based on the concept of game progress and game information progress [18]. It bridges a gap between board games and sports games.

We first show a general model of game progress in order to derive a game refinement measure. Then, we apply the idea to various games while identifying reasonable game progress models of given games, and compare them using game refinement measures.

The 'game progress' is twofold [19]. One is game speed or scoring rate, while another one is game information progress with focus on the game outcome. Game information progress presents the degree of certainty of game's results in time or in steps.

Having full information of the game progress, i.e. after its conclusion, game progress $x(t)$ will be given as a linear function of time t with $0 \leq t \leq t_k$ and $0 \leq x(t) \leq x(t_k)$, as shown in Equation (1).

$$x(t) = \frac{x(t_k)}{t_k}\ t \tag{1}$$

However, the game information progress given by Equation (1) is unknown during the in-game period. The presence of uncertainty during the game, often until the final moments of a game, reasonably renders game progress as exponential. Hence, a realistic model of game information progress is given by Equation (2).

$$x(t) = x(t_k)(\frac{t}{t_k})^n \tag{2}$$

Here n stands for a constant parameter which is given based on the perspective of an observer of the game considered. Then acceleration of game information progress is obtained by deriving Equation (2) twice. Solving it at $t = t_k$, we have Equation (3).

$$x''(t_k) = \frac{x(t_k)}{(t_k)^n} t^{n-2}\ n(n-1) = \frac{x(t_k)}{(t_k)^2}\ n(n-1) \tag{3}$$

It is assumed in the current model that game information progress in any type of game is encoded and transported in our brains. We do not yet know about the physics of information in the brain, but it is likely that the acceleration of information progress is subject to the forces and laws of physics.

Therefore, we expect that the larger the value $\frac{x(t_k)}{(t_k)^2}$ is, the more the game becomes exciting, due in part to the uncertainty of game outcome. Thus, we use its root square, $\frac{\sqrt{x(t_k)}}{t_k}$, as a game refinement measure for the game under consideration.

B. Game progress models

Arie *et al.* [18] studies a game progress model for time limit sports such as soccer and basketball. The game progress is run by information progress which can be substituted into number of shots because when the time passed there are many shots occurred. Therefore, we use G and T instead of $x(t_k)$ and (t_k) in the following way.

Let G and T be the average number of successful shots and the average number of shots per game, respectively. Thus, we use its root square, $\frac{\sqrt{G}}{T}$, as a game refinement measure for the game under consideration. We call it R value for short as shown in Equation (4).

$$R = \frac{\sqrt{G}}{T} \tag{4}$$

Next, we consider two approaches: score limit sports approach and board game approach, to figure out a reasonable model of game progress for certain type of sports games with their definitions.

Definition 1. Score limit sports approach *is a way to figure out the progress model of a target game using two factors: average winner's score (say W) and total scores of entire game (say T). R value is given by $R = \frac{\sqrt{W}}{T}$.*

The game progress is run by information progress which can be approximated by scoring rate. Therefore, for score limit type sports we can calculate R value by using the average winner's scores and average total scores of entire game. In the previous works [14] [19], the score limit sports approach was applied to this type of sports such as volleyball and table tennis, and we see that this approach is reasonable to figure out the game progress. We show the results from [14], in Table III.

TABLE III
Measures of game refinement for score limit sports

Sports	Version	W	T	R
Badminton	Old scoring system	30.07	45.15	0.121
	New scoring system	46.34	79.34	0.086
Table Tennis	Pre-2000	57.87	101.53	0.075
	Post-2000	54.86	96.47	0.077

Here we consider the board game case. Let B and D be average branching factor (number of possible options) and game length (depth of whole game tree), respectively. One round in board games can be illustrated as decision tree shown in Figure (1). At each depth of the game tree, one will choose a move to progress. We then obtain R value for board game in the following way [18].

Definition 2. Board game approach *is a way to figure out the progress model of a target game using two factors: average branching factor or number of possible options (say B) and average game length or number of plies of whole game tree (say D). R value is given by $R = \frac{\sqrt{B}}{D}$.*

Iida *et al.* [9] calculate the game refinement values for various board games such as chess, Go and Mah Jong. We show, in Table IV, the results.

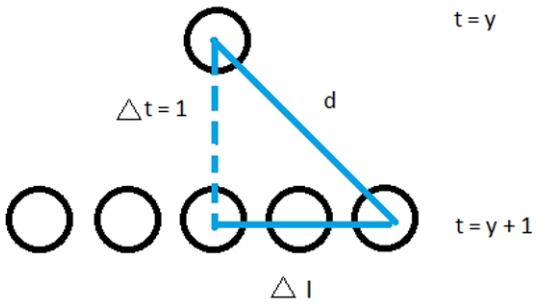

Fig. 1. Decision tree of a two-person game

TABLE IV
MEASURES OF GAME REFINEMENT FOR MAJOR BOARD GAMES

Game	B	D	$R(=\frac{\sqrt{B}}{D})$
Western chess	35	80	0.074
Chinense chess	38	95	0.065
Japanese chess	80	115	0.078
Mah Jong	10.36	49.36	0.078
Go	250	208	0.076

C. Score limit sports approach

We first consider Pokemon battle as a score limit type sport to find the R-value as $R = \frac{\sqrt{W}}{T}$, where W stands for the winner's score and T total score. HP [12] is an attribute assigned to each entity in game that indicates its state in combat. When the HP of a player character reaches zero, the player may lose a life or their character might become incapacitated or die. Therefore, we can consider HP as a score in score limit type sport.

The winner's score (W) is equal to the total damages loser received that is constant value 100. This is calculated by percentage because each Pokemon has different full HP. It depends on Pokemon's status, and one player can contain six Pokemons. Then, we assume that full of six Pokemon's HP ($= 100$) by percentage.

The total score (T) stands for the winner's score plus loser's score. The winner's score is constant value 100 mentioned before. However, the loser's score equals to the total damages winner received. The defeat of Pokemon battle is judged based on which player's Pokemon be all lost. By this reason, we can assume score as damage that player made. Next, the damage that winner received can be calculated by $100(fullHP) - remainedHP$. Because normally we can see only the remained HP. So, we can calculate R value as shown in Equation (5).

$$R = \frac{\sqrt{W}}{T} = \frac{\sqrt{100}}{100 + RHP} \tag{5}$$

where RHP stands for the average winner's lost HP, $RHP = 100 - Average\_winner's\_remained\_HP$.

By this approach, the example results are shown in Table V.

Table V shows the average remained HP for each Pokemon as percentage. Then, we can also find $Percentage$ which is the percentage of winner's remained HP by Equation (6).

TABLE V
30 SAMPLES STATISTICAL RESULTS OF POKEMON BATTLES

$Percentage$	Remained HP of each Pokemon					
	1	2	3	4	5	6
4.333	26	0	0	0	0	0
5.667	34	0	0	0	0	0
20.800	4	100	0	0	0	0
75.500	71	69	13	100	100	100
35.867	53.5	80	81.7	0	0	0
67.983	20	87.9	100	100	100	0
54.417	24	100	90.4	12.1	100	0
9.783	4	23	31.7	0	0	0
14.867	29	60.2	0	0	0	0
21.183	73	54.1	0	0	0	0
23.167	39	100	0	0	0	0
16.167	97	0	0	0	0	0
66.083	6	90.5	100	100	100	0
23.00	38	100	0	0	0	0
6.00	36	0	0	0	0	0
21.667	30	100	0	0	0	0
11.367	43	25.2	0	0	0	0
97.833	87	100	100	100	100	100
27.000	62	100	0	0	0	0
26.083	6	50.5	100	0	0	0
39.517	73	64.1	100	0	0	0
13.000	41	37	0	0	0	0
15.000	90	0	0	0	0	0
10.700	6	31.4	26.8	0	0	0
83.333	100	100	100	100	100	0
36.733	53	67.4	100	0	0	0
6.000	36	0	0	0	0	0
36.667	50	70	100	0	0	0
59.883	64	95.3	100	100	0	0
72.317	38	58.4	37.5	100	100	100

$$Percentage = \frac{1}{6}\sum_{i=1}^{6} Pokemon\_Remained\_HP_i \tag{6}$$

Finally, from the samples of 250 games, we obtained $Average\_winner's\_remained\_HP = 34.939$ with a standard deviation $SD\_winner's\_remained\_HP = 25.51$. So we constitute it to Equation (7).

$$R = \frac{\sqrt{100}}{100 + (100 - 34.939)} = 0.061 \tag{7}$$

D. Board games approach

Pokemon battle is a turn-based game where each player has to choose what to do at his/her turn, same as board games like chess. So we can suppose Pokemon battle as a board game. However, there are many important differences between board game and Pokemon battle, as described below.

One-to-one fighting: Pokemon battle is one-to-one fighting. This means that each player can control only one Pokemon to fight with opponent's Pokemon. If one wants to use another Pokemon, the player has to change his/her current used Pokemon [1] Chess, typical board game, is a kind of war with a lot of pieces in the battlefield. Player can choose which piece that

[1]There are two-to-two or three-to-three Pokemon fighting mode but not so popular.

they want to control in his/her turn. Thus, chess game is run by many pieces against many pieces of the opponent.

Position: Chess has a position on a board at each turn. This is a very important factor for board game. That's why we call 'board' game. But for Pokemon battle, there is no such position. A game is normally run by one Pokemon per player, i.e., one's Pokemon and opponent's Pokemon. They play what they want to do, whereas no positions are considered.

Turn's sequence and turn's meaning: Turn in chess means the chance that one can do what the player wants. Turn is run by switching system. $A's\ turn \rightarrow B's\ turn \rightarrow A's\ turn \rightarrow B's\ turn \rightarrow ...$, simple like this. In Pokemon battle, one turn means that both players have to choose what they want to do. Then, the speed (one of Pokemon's status) of current used Pokemon is the factor which is decided who will first start this turn. Pokemon with a faster speed can do first in that turn, then Pokemon with a lower speed will do afterward.

To summarize the meaning of turn, one turn in chess is for only one side player's action (one plyer), whereas Pokemon battle's one turn means simultaneous actions of both players. As for the turn's sequence, it is a simple order in chess but it is ordered in Pokemon battle by speed of current used Pokemon.

Then, game-refinement theory can be applied by using the same idea as another board game. Normally, we find R value by using possible options B and game length D, with an equation $R(=\frac{\sqrt{B}}{D})$.

For Pokemon battle, possible options are very limited. It can be easily counted as shown in Table VI.

TABLE VI
POSSIBLE OPTIONS IN POKEMON BATTLE

Attack with move	4
Changing Pokemon	5

Because one Pokemon can remember only four moves and player can change his/her current used Pokemon to the other Pokemons that player possesses. Basically, one can control at most six Pokemons, so player can choose five possible options. In case of using some items such as medicine and potion, it is illegal in Pokemon contests, so we do not consider that case. Therefore, we have possible options $B = 9$.

For game length D, we can find by collecting the data and find its average. However, the meaning of one turn in Pokemon battle is both players' simultaneous actions. Hence, there are two actions in one turn. So, we have to multiply 2 to this value. Finally, with this simple method, we can completely find R value as shown in Equation (8).

$$R = \frac{\sqrt{B}}{D} = \frac{\sqrt{9}}{Average\_number\_of\_turns \times 2} \tag{8}$$

From the samples of 250 games, we obtained $Average\_number\_of\_turns = 25.796$ with a standard deviation $SD\_number\_of\_turns = 11.53$, the results are given in Equation (9).

$$R = \frac{\sqrt{9}}{25.796 \times 2} = 0.058 \tag{9}$$

IV. DISCUSSION

We collected data of Pokemon battle from Pokemon Showdown, 250 games. Then, we applied game refinement theory in the manner prescribed in Section III-C and Section III-D. The results are compared in Table VII.

TABLE VII
POKEMON BATTLE'S GAME REFINEMENT VALUES: TWO APPROACHES COMPARED

Score limit game approach	Board game approach
$R = 0.061$	$R = 0.058$

In the previous studies, it is found that sophisticated games would have R value between $0.07 - 0.08$. We see that the results show slightly lower values for Pokemon battle. It may imply that Pokemon is one of great games, with a twenty years history and many best sale done before [7], and Pokemon is suitable for children. Because in general, the appropriate game refinement value calculated for sophisticated games is around 0.07-0.08 and if it is more than this it will be too much excited which is suitable for especial viewer such as Boxing which is extremely exciting sport. For Pokemon battle, the R value is lower than 0.07 and we conclude that this is suitable for children which is same as the target of Pokemon game.

However, in Pokemon battle, we explore that game refinement value $R = 0.061$ and $R = 0.058$ can be improved. For example, in board game approach, because branching factors $B = 9$ is too narrow. If we improve this point, game refinement value will increase.

- Increasing the number of Pokemons: Since the first episode of Pokemon, Pokemon Red and Pokemon Blue in 1996, one trainer (trainer means the Pokemon's owner) can carry only six Pokemons. Of course, they can catch many Pokemons, but they cannot carry more than six Pokemons. In one battle, trainers have to choose what Pokemon they want to use in this battle. And normally, one player will maintain only six Pokemons, because they can use only six in battle. So, there is no reason to maintain more than six Pokemons. By increasing the number of Pokemons that one trainer can carry, trainer will have more number of Pokemons in battle. This means that trainers will have more element, more technics and more excited to play.
- Increasing the number of moves: One Pokemon always can remember only four moves, since the first episode, this is the essential limitations of Pokemon. If we increase the number of moves that one Pokemon can remember, maybe from four to five or more, the game will have more possible options to choose at one's turn, so the battle will be more complex and more excited.
- Controlling HP and another status: Due to $R = \frac{\sqrt{B}}{D}$, we can also increase R value (or decrease, for some purpose) by changing some parameters related to D. For example,

if we increase HP, that means the game is longer and the value of D is more. Then, R value is lower. If we increase attack status or special attack status that means each Pokemon may be fainted easier and the game is shorter. Then, D is lower and R value is higher. We can apply the same idea to another status such as defense or special defense, both increase and decrease, it depends on what R value we want.

However, in score limit sports approach, we see that $SD\_winner's\_remained\_HP$ which is equal to 25.51 has slightly high value. Likewise, in board game approach, $SD\_number\_of\_turns$ equals to 11.53 which is also gently high value. It means that the value of $Average\_winner's\_remained\_HP$ and $Average\_number\_of\_turns$ which is used in score limit sports approach and board game approach respectively is unstable. Because the number of sample games (n=250) is not enough to make the value stable. It does not mean that this approach is wrong.

Nevertheless, the fun of Pokemon is not derived only from Pokemon battle. Because Pokemon battle is only turn-based game component, but Pokemon also has RPG mode in normal mode excepts battle mode. The fun of Pokemon depends on many factors in RPG mode such as game story, collecting Pokemons, doing a quest and so on. For example, customizing one's own Pokemon is one of important entertaining factors. If we improve the customization of each Pokemon such as skill or moves, it may be more excited. Moreover, the more customizing each Pokemon can be realized, the more the difference between those Pokemon will appear. Because now the main difference between Pokemons (excepts its appearance and little factors) is only its status and its move. Therefore, for current 719 Pokemons, it is too narrow to differentiate each Pokemon. If we have more detail such as skill tree or more kind of status it will be more attractiveness.

V. Conclusion

This work is an attempt to find a reason why Pokemon has been popular so long time. Then, we focused on Pokemon battle which is the most important component in Pokemon game. We applied game refinement theory with two game progress modeling approaches, one from score limit sports approach game model such as badminton and table tennis [14], and one from board game approach in the domain such as chess, Go and Mah Jong [9]. We used Pokemon Showdown, an online Pokemon battle simulator with a lot of players and prompt facilities, as an essential tool in this research. The results were shown in Table VII.

According to the results, we explore that Pokemon battle has slightly lower game refinement value than expected. $R = 0.061$ and $R = 0.058$ were found by two game refinement approaches applied. We conclude that this slightly low R means that it is suitable for children with not too much excitement. However, $SD\_winner's\_remained\_HP$ and $SD\_number\_of\_turns$ are gently high which means the number of sample games is not enough. Moreover, we propose many ways to increase or decrease R value in Pokemon battle such as increasing the number of Pokemons, increasing the number of moves or controlling its status as mentioned above.

In conclusion, it is obvious that game refinement theory can effectively be used in many domains of game such as classical board game, video game and sport game, of course in Pokemon battle, with an appropriate model of game information progress. It can be used as a helpful tool to measure an attractiveness of a game and it also enables game designers to make a target game more sophisticated. As a tentative conclusion, we observed that suitable game refinement value is around $0.07 - 0.08$, with many previous studies confirmed.

It is understood that the work presented here is a simple model with no complicated factors, and more studies are required. Further work may include in various data such as in older version or in another turn-based RPG which is also popular such as Final Fantasy or etc. However, the enjoyment and attractiveness of turn-based RPG do not come from only the battle. It may come from normal stage, so further work may try to apply game refinement theory in RPG.

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