

Using Visualization Data to Explore the Fairness of One Game's Matching Mechanism

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Abstract: This article explores the fairness of the matching mechanism in the card game “Harry Potter: Magic Awakening” through visual data analysis methods. The study compared the ratio of card level to opponent level and win rate between experienced players and newly registered players by setting up two test accounts. The experiment found that the system matches lower-level opponents for beginners and higher-level opponents for experienced players, thereby maintaining a win rate of around 50% for both sides. This reveals the mechanism of the game by dynamically adjusting the matched opponents to control the player's win rate. The chart data further shows that matching fairness is higher during peak player activity periods (such as in the evening). Despite the limited sample size and uncertainty, this study warns players to pay attention to the inherent rules of the game and points out the duality of such mechanisms in maintaining the general player experience.

Keywords: Matching mechanism; Data visualization; Game fairness; Winning rate control

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1. Introduction

With the advancement of technology, the use of electronic products has gradually become a daily routine and an indispensable part of daily life, and compared to the 20th century, 21st-century teenagers are more inclined to online gaming (virtual gaming) than to participate in offline organised activities ^[1]. In this context, more and more game developers have been proved to use many mechanisms to stimulate players' desire to consume in order to achieve more objective revenue, such as launching limited products (which can only be purchased in a specific period of time), which is a more direct way to stimulate consumption, and another indirect way is to control the winning rate of the game ^[2], to let the players maintain a higher level of participation in the game, which indirectly improves the likelihood of players' consumption. According to the response of many players, a very popular card game called “Harry Potter: The Magic Awakens” has a situation of controlling the win rate of the players, more specifically, the system always tends to match the level of cards lower than their own as the opponent when facing novice players, to increase the possibility of winning the game. The opposite is true if the player's card level is higher, so that no matter what the player's level is, the win rate basically stays within a fixed range, and this range is thought to keep the player's interest in the game the strongest.

2. Experimental design and methodology

In order to determine whether or not this game uses an unfair matching mechanism, whether or not there is control of the win rate, the study used two accounts for testing. The first time using the account, which has been playing for a long time and has a high card level, it can be used to simulate a veteran player, and the second account is newly registered and happens to match the card level of a novice player. In order to minimize the impact on the results of the experiment due to fluctuations in the level of play, all anomalies are excluded (e.g., playing below expectation when simulating a veteran player, only showing the level of an average player). The study has used 5% as an acceptable margin of error, as it is the most commonly used acceptable margin of error in statistics. Thus, the matching mechanism is considered fair if the average of the ratio of the card ranks of both players is between 0.95 and 1.05.

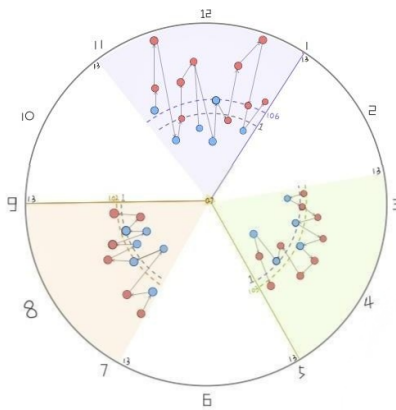


Figure 1. First time data.



Figure 2. annotation of graph.

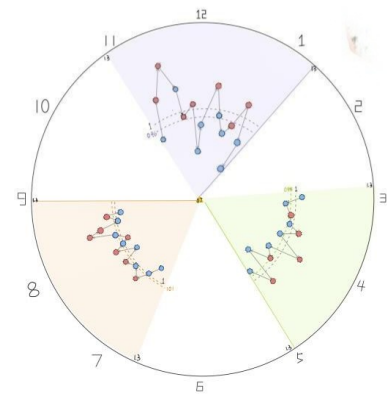


Figure 3. Second time data.

3. Design and implementation of data visualization

The numbers on the graph represent the ratio of your own card level to your opponent's card level. The card level largely determines the difficulty of the game and indirectly affects the win rate. Ideally, this ratio should be one, meaning that each game will be matched with an opponent of the same level as you, and then the system can be considered fair. A ratio of less than one means that the game is not in your favour, while a ratio of more than one means the opposite. According to the data on the graph, new players are more likely to be matched with cards of a lower level than their own than experienced players, and both have a win rate of around 50%.

The study used graphics as a tool for visual communication and therefore the choice of hooks such as colors and symbolism was important. Considering the colors first, highly saturated, low-light colors would mislead that this data is of relative social importance^[3], therefore, choosing softer, less saturated colors would be more appropriate.

Secondly, in view of the necessity for non-metaphorical symbols, a series of easily recognizable selective retinal variables was considered that could be symbolically attributed by the viewer to specific sets of corresponding values. Each variable in the data was assigned a different hue, colour value, shape, or position, while avoiding the use of complex, non-essential variables, thus further simplifying the graphic. Next step, the study chose circles as the vehicle for the data, as they are considered to be soft^[4], aesthetically pleasing shapes that provide a relaxing visual experience for the reader. The study chose three time periods to count data, which was considered reasonable, and the circle graphs are most appropriate for displaying data when there are no more than 5 or 6 sectors^[5], and when the values for each sector are different. Otherwise, they can be difficult to read and understand. In order to differentiate the time periods of the statistics, the study initially employed a color scheme comprising three different shades of grey, with the intention of weakening the background and thereby focusing the reader's attention on the data points. However, this approach resulted in the pie charts appearing grey, rendering them unsuitable as an attractive visual representation.

Subsequently, after numerous trials, the study determined that the three secondary colors were the optimal choice.

They effectively distinguished between the disparate time periods represented by the data points without too strong a contrast between colors, letting readers feel uncomfortable, while also providing a sufficient contrast that did not overwhelm the reader. However, pie charts may lead readers to draw inaccurate conclusions based on visual impact rather than data analysis ^[6]. But on subsequent reflection, the study felt that the use of arrows, although clearly indicating the chronological order in which the data was collected, did not have a significant effect on the results of this test and added visual complexity, and was therefore unnecessary. In addition, the level of player play in real situations is unstable, so the study should not discard this part of the ‘anomaly data’ in order to pursue the ideal state.

4. Experimental results and analysis

For experienced players, the system assigns opponents with slightly higher card levels than their own, which increases the difficulty of the game and makes it more difficult to win. For novice players, the system tends to assign players with lower ranks than their own to reduce the difficulty of the game and increase the win rate. Under this unfair matching mechanism, the win rate of experienced players is still close to that of novice players, which is an interesting phenomenon. From my understanding of the game, the study thinks the most likely reason is that the strength of the experienced players makes up for the disadvantage of their card level to a certain extent, so they have a higher win rate when their card level is lower than that of their opponents. We can also see from the graph how the matching mechanism changes over time, with the highest dispersion of data relative to one at 11–1 pm and the lowest at 7–9 pm, suggesting that the difference between players matched at noon and their own rank is significantly greater than at night. This may be explained by the fact that 7–9 pm is the peak time for playing the game ^[7], and more players are online at the same time compared to noon and other times of the day, so there is a higher probability of being matched with a player of a similar level in a limited amount of time.

5. Limitations and discussion of the study

A comparative analysis of the two sets of data revealed that the system attempted to adjust the win rate of players through an unfair matching mechanism, as evidenced by the two average rates falling outside the acceptable error margins. While the data source was deemed to be authentic, given the amount of data is too small, the limited sample size, and the fact that the data is based on a single source, introduces a significant degree of uncertainty and potential for bias.

If the sample could have been enlarged by including more player data, the results would have been expected to be more convincing. Although the design of this experiment is not ideal, and the results may not be accurate, the purpose of this test is to remind players of the underlying rules of the game, and not to over-pursue the winning rate, as winning or losing in a game sometimes has little to do with one’s level. This matching mechanism is not reasonable from the perspective of competitive games, but it does apply to a portion of handheld games. Firstly, the competitive attributes of handheld games are lower than those of end-game, while the lower cost will also attract a considerable number of non-competitive players. Under this kind of game ecosystem, to ensure that all kinds of players’ gaming experience has become the highest priority ^[8], and is also the means of harvesting high economic benefits.

Initially, the study was disconcerted by this inequitable mechanism. However, upon further reflection, the study came to understand that it serves to guarantee the gaming experience of the majority of players. As a result, the study no longer resent it, but rather tries to think more about both sides of things, which the study believes potentially influences and encourages readers to approach life with a more holistic and positive attitude, which aligns with the overarching objective of my visualization design.

Disclosure statement

The author declares no conflict of interest.

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