Popularity vs Complexity in Esports Games

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Abstract

Esports is a booming new industry, full of a wide variety of players, games, sponsors, and tournaments. As the industry grows, audiences get bigger and bigger, with hundreds of thousands of fans from around the world watching their favorite Esports. With so much money and advertising deals on the line, Esport tournaments cannot afford to be boring. Esports need to be complex, interesting, and require vast amounts of skill. This paper aims to find a relationship between the complexity of an Esport and that Esport's popularity. Due to the lack of resources and previous research, this paper aims to be a preliminary study. For this paper, game theory concepts have been applied to create models to estimate game complexity in three different ways, and each was tested as a predictor for popularity.

Terms

Esport – A video game played at the professional level.
Game Theory – The study of the ways in which interacting choices of agents produce outcomes with respect to the preferences of those agents.
Overwatch – Esport. 6 vs 6 shooter game with widely varying characters.
Rocket League – Esport. 3 vs 3 soccer, but with RC cars instead of people.
Super Smash Brothers Ultimate – Esport. 1 vs 1 platform fighting game.
Super Smash Brothers Melee – Esport. 1 vs 1 platform fighting game, released 20 years before Super Smash Brothers Ultimate.
Street Fighter V – Esport. 1 vs 1 traditional arcade fighting game.
Brawl Stars – Esport. 3 vs 3 bird's-eye shooter game on smartphones.

Models Tested

The **Game State Model** supposes that Esport athletes spend enough time training in all possible situations (all possible enemies, maps, weapons, etc) that the initial conditions are the primary variable which decides their strategy. Once initial conditions are decided, athletes rely on training and muscle memory to execute their strategy. Thus, "complexity" is defined as the number of initial conditions that must be planned for.

The **Moment to Moment Decision Model** supposes that Esport athletes must learn in-game interactions by heart, so that they know an equilibrium for every situation. All Esport games have different systems with many interactions between characters. In this case "complexity" is the number of choices a player has at any given moment of their Esport game. They must run through every choice at every frame (the smallest measure of time in a video game) and decide which will give them a equilibrium.

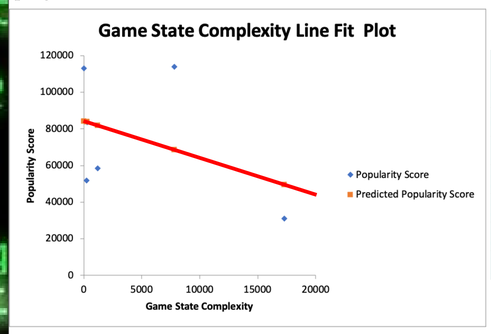
The **Information Model** asks: "How many values must an athlete know to make a decision that results in equilibrium?" This model is a middle-ground between the two previous models. Athletes must know the values that dictate their opponent's characters and playstyle, and they must know their teammates values as well to make the most informed decisions. This model seems to capture the idea of "complexity" the most accurately but can be unfortunately ambiguous.

Results

Popularity – For this study, popularity is defined as the average-minute-audience (AMA) of each game's grand final event in 2019.

Game	Event	Prize ($)	AMA @ Grands
Overwatch	Overwatch League 2019	3500000	113751
Rocket League	RLCS Season 8	529500	112966
SSBU	EVO 2019	35290	58286
SSBM	Genesis 6	28890	83600
Street Fighter V	EVO 2019	69510	51910
Brawl Stars	World Finals 2019	250000	30936

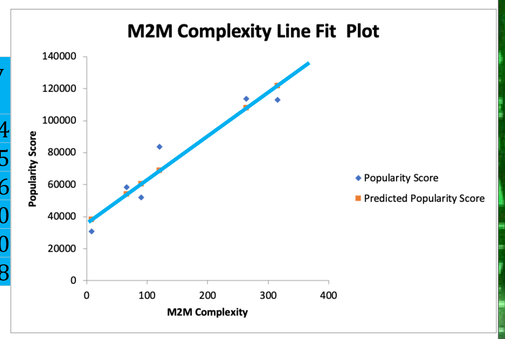
Game State Model – Complexity value calculated as:
players in match * characters * character choices (weapons, etc…) * maps.



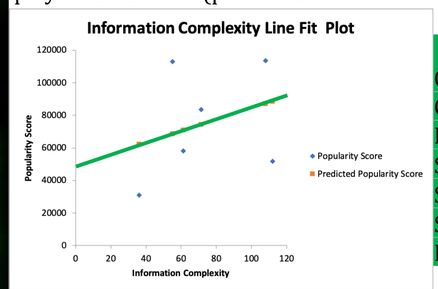
Game	Complexity Score
Overwatch	7812
Rocket League	30
Smash Bros U	1224
Smash Bros M	300
Street Fighter V	240
Brawl Stars	17280

Moment to Moment Decision Model – Complexity value calculated as:
number of action buttons * number of movement buttons * camera control.

Game	Complexity Score
Overwatch	264
Rocket League	315
Smash Bros U	66
Smash Bros M	120
Street Fighter V	90
Brawl Stars	8



Information Model – Complexity value calculated as:
players in match * (positions + resources + advantages)



Game	Complexity Score
Overwatch	108
Rocket League	55
Smash Bros U	61.2
Smash Bros M	71.33
Street Fighter V	112
Brawl Stars	36

Conclusion

The results of my research are ultimately inconclusive but provide a good basis for the study of complexity and Esports moving forward. The impressively accurate moment to moment decision model shows that complexity is most likely derived from the number of options that a player has at any moment. The game state model and information model will have to be reevaluated or scrapped entirely, as their predictions of popularity proved inaccurate. Furthermore, this study originally included a seventh game: League of Legends, a game with a popularity score in the millions. This game proved to be such a significant outlier that it had to be ignored in all three model's line fit plots. Games like League of Legends and other outliers will have to be somehow evaluated accurately in future studies on game complexity.

Future Directions

If a future study wishes to use the complexity models developed in this study, I recommend starting with more data: more games. Despite the simple instructions, computing complexity for more games introduces several levels of further difficulties. Data for the game state model can be difficult to gather when games are constantly updated and patched. Button combinations and special techniques for the moment to moment model might only be known by professional players, and they may disagree on what constitutes a special technique. The information model is ambiguous as it is, since different researchers may consider different variables worth counting. More robust methods of gathering data for each model will be required for future research.
Further difficulties face any researcher who wishes to build upon the concepts in this preliminary study. Gameplay time is impossible to calculate for many video games because players might use different accounts or play offline. Any model or study that relies on the number of hours an athlete puts into their game will find it difficult to get consistent data. Even beyond athletes themselves, gathering data for games in general is complex. Video game databases (wikis) are edited by players and can be indecipherable without prior knowledge of a game and its jargon. Furthermore, when games update, old data that might be needed can be lost since some databases don't keep track of changes. There are all obstacles that must be overcome as research into game complexity continues.

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