Game Balancing: Fair Experiences in Competitive Multiplayer Video Games

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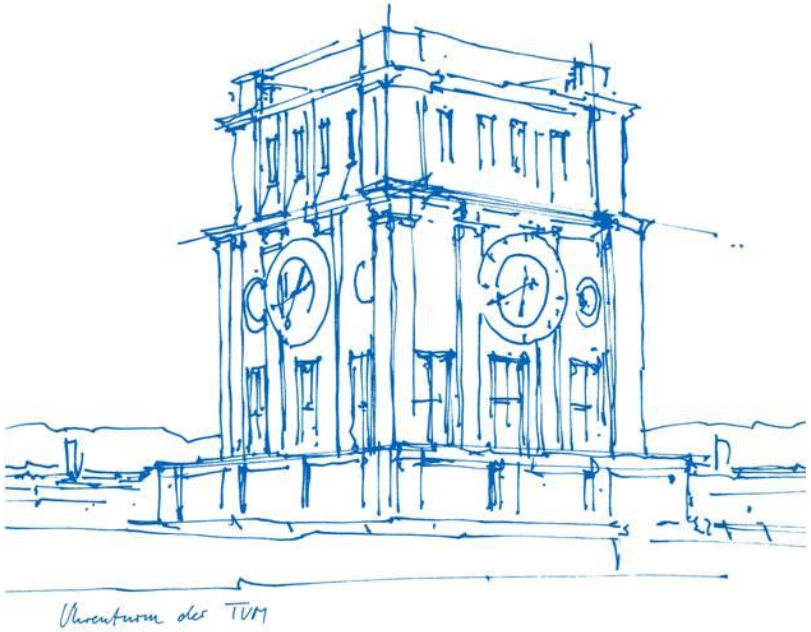


Competitive Multiplayer Games

- Players versus Player
  - In contrast to cooperative games
- Play to win mindset
  - In contrast to a casual mindset
  - Both contexts have to be considered
- Either way, games should not be unfair
  → Game Balancing

Source: ESTNN. (2022). URL: *https://estnn.com/lol-msi-2022-day-four-group-stage-recap/* last accessed on June 12th 2022

Goal of this Thesis

- How can developers balance game mechanics that maintain a fair experience for all players?
  - During the design of new game mechanics
  - During the process of balancing game mechanics after the game‘s initial release

Fairness, Balance, Experience

Fairness

- ”absence of any bias based on a person’s characteristics (inherent, acquired) that are irrelevant in the particular context of decision-making” [1]

- Equality
- Equity
- Need [2]

Fairness

- Equality
  - Everything is distributed evenly
- Equity
  - Distributions depend on the input
- Need
  - Individuals worse off receive additional help

[2]

Symmetry

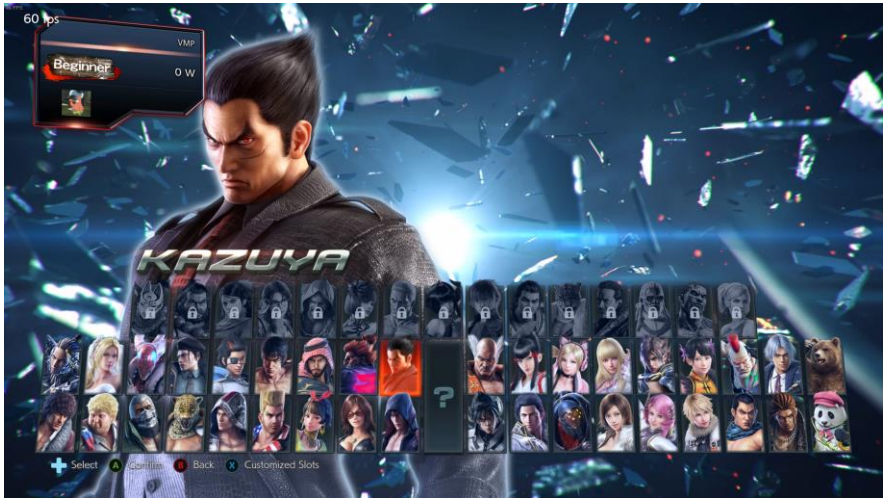
- Symmetric games maintain equality & equity
- True measure of skill

  → Better player will win
- Pure symmetry hard to realize across the board

Source: Wikipedia. URL: *https://en.wikipedia.org/wiki/Chessboard* last accessed June 12th

Asymmetry

- Asymmetric games offer multitudes of options
- More personalized experience
- Not purely equal anymore



Comeback Mechanics

- Need
- Specifically helps players at a disadvantage
- Especially useful for beginners
- But: good players can use them as well

Source: ”No More Lines”. (2019). URL: *https://www.youtube.com/watch?v=cceTxCl2-yg* last accessed on June 12th 2022

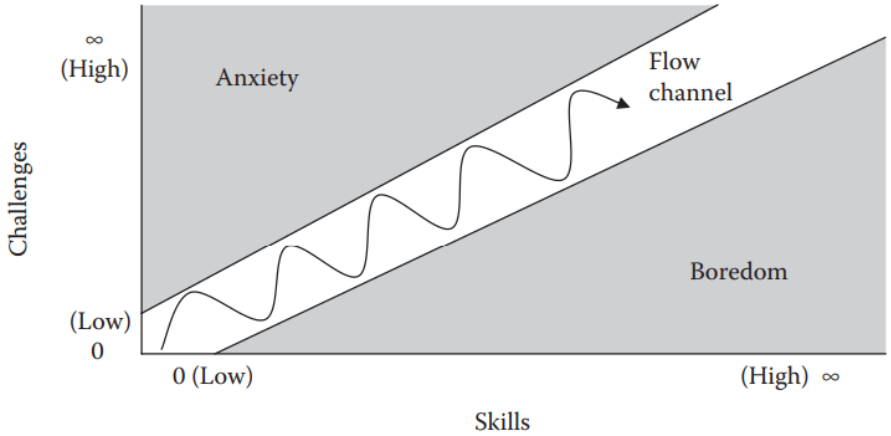
Game Balancing & Balance

- Game Balancing:
  - The act of tweaking aspects of a game
  - E.g. numbers, properties, algorithms…

- Game Balance:
  - Variety of meaningful decisions
  - Prevention of dominant strategies and tiers
  - Counters, Trade-offs… [3]

Game Experience

- Several aspects go into the experience
- Player Skill
  - mechanical skill
  - knowledge and awareness
- Flow[4]
- Perception is just as important
- Balance is more than fairness



Source: Schell, J. (2019). The Art of Game Design: A Book of Lenses, Third Edition. CRC Press LLC, Milton, United Kingdom.

Before Release
Design Questions & Filter

Design Questions

- Catalogue of 20 questions to balance out of a new game mechanic
- Address general aspects of competitive games and the new mechanic
- Cover several aspects regarding the new mechanic
- Developers should then be able to adjust risk & rewards
- No strict guidelines, rather thought-provoking aspects

Categories

- General questions
- Competitiveness
- Symmetry
- Randomness
- Speed
- Skill Requirement
- Uniqueness

General Questions

1. When is this mechanic supposed to be used?
2. Why should this mechanic be used?
3. What are general strengths and weaknesses of this mechanic?
4. What does it counter?
5. What is the counter to this mechanic?

Flowchart

- Filter out questions unrelated to new mechanic and game
- Mark aspects that apply

- For the game itself
- For the new mechanic

Flowchart - Example

	A	B	C	D	E	F	G	H	I	J	K
1	Game Questions				Mechanic Questions					Proposed Questions	
2	Game Setting	Symmetric/Asymmetric	mechanical executic	game speed	RNG?	mechanic speed	difficulty	universal/optional			
71	competitive	asymmetric	yes	fast	yes	fast	easy	universal		6,7,8,9,10,15,16	
72	competitive	asymmetric	yes	fast	yes	fast	easy	optional		6,7,8,9,10,15,16,19	
73	competitive	asymmetric	yes	fast	yes	fast	hard	universal		6,7,8,9,10,17	
74	competitive	asymmetric	yes	fast	yes	fast	hard	optional		6,7,8,9,10,17,19	
75	competitive	asymmetric	yes	fast	yes	slow	easy	universal		6,7,8,9,10,13,15,16	
76	competitive	asymmetric	yes	fast	yes	slow	easy	optional		6,7,8,9,10,13,15,16,19	
77	competitive	asymmetric	yes	fast	yes	slow	hard	universal		6,7,8,9,10,13,17	
78	competitive	asymmetric	yes	fast	yes	slow	hard	optional		6,7,8,9,10,13,17,19	
79	competitive	asymmetric	yes	fast	no	fast	easy	universal		6,7,15,16	
80	competitive	asymmetric	yes	fast	no	fast	easy	optional		6,7,15,16,19	
81	competitive	asymmetric	yes	fast	no	fast	hard	universal		6,7,17	
82	competitive	asymmetric	yes	fast	no	fast	hard	optional		6,7,17,19	
83	competitive	asymmetric	yes	fast	no	slow	easy	universal		6,7,13,15,16	
84	competitive	asymmetric	yes	fast	no	slow	easy	optional		6,7,13,15,16,19	
85	competitive	asymmetric	yes	fast	no	slow	hard	universal		6,7,13,17	
86	competitive	asymmetric	yes	fast	no	slow	hard	optional		6,7,13,17,19	
123											
124											
125											
126											
127											
128											
129											
130											

Discussion & Outlook

- Simple structure
- Easily modifiable & extendable

- General aspects
  → change questions to focus on specific games & genres
- Characters, archetypes…

After Release:

Analysis Tool for League of Legends

League of Legends

- 5 vs 5 Team game
- Each player controls a different *champion*
- 5 different roles (Top, Jungle, Mid, Bot, Support)
- Goal: Destroy other teams base

- Different ranks
- Different regions

Source: ”TC Zwag”. (2022). URL: *https://www.youtube.com/watch?v=88S6CciG4ao* last accessed June 12th

Draft Phase before matches

- Players can ban champions from being picked
- Each player picks their own champion

Source: Nerd Reactor. (2017). URL: *https://nerdreactor.com/2017/05/23/10-champion-bans-league-of-legends/* last accessed on June 12th 2022

Riot Games‘ Balance Framework

- Determine which champions are too strong (require **nerfs**) or too weak (require **buffs**)
- Separate players in different levels of play
- Statistics of all regions compiled as one

Source: Riot Games. (2019). URL: *https://www.leagueoflegends.com/en-us/news/dev/d ev-balance-framework-update/* last accessed on June 12th

Data Acquisition

- Taken from *u.gg*
- *League of Legends* patch 12.8 (April 27th 2022 to May 11th 2022)
- Relevant measures:
  - Win rate
  - Pick rate
  - Ban rate
- For each champion, role, rank and region
- Saved in .json files

Implementation

- Python
- Input:
  - .json files of champion data
- Output:
  - Spreadsheets of champion picks
  - One for top tier picks and one for low tier picks

Filtering out Champion Picks

Picks are filtered out if:

- Pick rate < 0.5%
- For high tier picks
  - Win rate < 52%
- For low tier picks
  - Win rate > 49%

Score Calculation

$$score = (win\_rate + 1) * pick\_rate * (ban\_rate + 1) * 0.2$$

- +1 for low tier picks
- 0.2 factor to accommodate for the ban rate of different roles (filter off-role picks)
- Applied to a champion in a role
- Within the context of regions and ranks

Determining Tiers

- Calculate the average score of each region-rank list (99 in total)
- Filter out entries below/above the averages

  → only true high/low tiers remain
- For each champion pick in a role:
  - List appearances are counted
  - Subtract number of list appearances from other tier

  → Majority vote

Comparison to League of Legends Patch 12.9

	A	B	C
1	Champion	Role	Votes
2	Renata Glasc	supp	33
3	Ahri	mid	27
4	Yasuo	mid	25
5	Mordekaiser	top	23
6	Soraka	supp	23
7	Veigar	mid	21
8	Master Yi	jungle	20
9	Pyke	mid	18
10	Nami	supp	18
11	Zed	mid	17
12	Senna	supp	17
13	Samira	adc	17
14	Rengar	jungle	17
15	Wukong	jungle	17

Overpowered Champion Picks

	Champion	Role	Votes
2	Aphelios	adc	86
3	Corki	mid	85
4	Ryze	mid	83
5	Syndra	mid	79
6	Twisted Fate	mid	78
7	Jayce	top	77
8	Zeri	adc	77
9	Kai'Sa	mid	76
10	Pantheon	supp	75
11	Varus	adc	75
12	Orianna	mid	73
13	Renekton	top	72
14	Hecarim	jungle	71
15	Xin Zhao	jungle	70
16	Gnar	top	67
17	Olaf	jungle	66
18	Jarvan IV	jungle	65
19	Galio	supp	63
20	Kennen	top	62
21	Seraphine	supp	62
22	Gragas	top	62
23	Braum	supp	61
24	Zoe	mid	60
25	Rakan	supp	60
26	Gwen	top	60
27	Azir	mid	57
28	Thresh	supp	51
29	Rumble	top	51
30	LeBlanc	mid	49

Underpowered Champion Picks

Discussion

- Simple implementation
- Score calculation & filter condititions can be changed freely
- Scores are tied to a list of a specific rank and region
  → score does not have a lot of explanatory power
- Low tier list still contains outliers

- Not specifically show developers what must be changed
- Assisting tool to make informed decisions

Conclusion

- Different ways to design fair game experiences for competitive multiplayer games

- During the development process:
  - Adjust risk and rewards of a new mechanic given its and the game‘s properties
  - Design questions with filtering process
- After the the game‘s release:
  - Analysis tool to determine options that need to be tweaked
  - Specifically here champions in League of Legends

List of References

- [1] Saxena, N. A., Huang, K., DeFilippis, E., Radanovic, G., Parkes, D. C., and Liu, Y. (2019). How Do Fairness Definitions Fare? Examining Public Attitudes Towards Algorithmic Definitions of Fairness. In Proceedings of the 2019 AAAI/ACM Conference on AI, Ethics, and Society, AIES ’19, pages 99–106, New York, NY, USA. Association for Computing Machinery.
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- [3] Becker, A. and Görlich, D. (2020). What is Game Balancing? - An Examination of Concepts. ParadigmPlus, 1(1):22–41. Number: 1.
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