

Contents

Abstract	ii
Acknowledgments	iv
1 Introduction	1
1.1 Game Theory	2
1.2 Game Refinement Theory	4
1.3 Gamification	6
1.3.1 Game Elements	7
1.3.2 Game Design	7
1.3.3 Non-game Context	8
1.4 Problem Statement	8
1.5 Structure of The Thesis	10
2 An Overview of Game Refinement Theory	11
2.1 Chapter Introduction	11
2.2 Game Progress Model in Boardgame	12
2.3 Game Refinement Model in Continuous Movement Game	14
2.4 Chapter Summary	17
3 Evolutionary Changes of MOBA game: From DotA to DOTA2	18
3.1 Chapter Introduction	18
3.2 MOBA Game	19
3.3 From DotA to DOTA2	20
3.3.1 The Remarkable Changes of DotA Era	20
3.3.2 Reborn: From DotA to DOTA 2	21

3.3.3	The Remarkable Changes of DOTA 2 Era	23
3.4	Analysis of DOTA2 by Using Game Refinement Theory	27
3.4.1	Game Progress of DOTA2	27
3.4.2	Game Refinement Measure	31
3.4.3	Rule Changes in 2011-2013: Towards More Skillful	33
3.4.4	Rule Changes in 2014-2016: Towards More Popular	34
3.4.5	High Prize	35
3.5	Weak Point and Improvement	35
3.5.1	Complex Game Information	35
3.5.2	Improvement of Maintaining the Diversity of Heroes	36
3.6	Chapter Summary	37
4	Analyzing Gamification of Language-Learning Platform Duolingo	39
4.1	Chapter Introduction	39
4.2	Gamification and Education	40
4.2.1	Related works	40
4.2.2	Duolingo	41
4.3	Quantifying the Game Sophistication of Duolingo with focus on Course Structure	43
4.3.1	Data Collection	45
4.4	Chapter Summary	47
5	An Analysis of Gamification Effect of Frequent-Flyer Program	48
5.1	Chapter Introduction	48
5.2	Gamification	50
5.2.1	Tier System	50
5.2.2	Points System	52
5.3	Analyzing Gamification Effect	53
5.4	Chapter Summary	55
6	Measuring the point system in the Starbucks Loyalty Program	57
6.1	Chapter Introduction	57
6.2	Research Background	58

6.3	Starbucks Loyalty Program “My Starbucks Rewards”	59
6.3.1	US	59
6.3.2	China	61
6.4	Assessment Methodology and Data Collection	62
6.5	Evolution of Point System in Starbucks US Loyalty Program	62
6.6	Analyzing the Point System	63
6.7	Chapter Summary	65
7	Comprehensive Evaluation of the Game Elements of Hotel Loyalty Program	67
7.1	Chapter Introduction	67
7.2	Overview of Five Hotel Loyalty Programs	70
7.2.1	Comparison of Hotel Loyalty Program	71
7.2.2	Gamification Mechanics	71
7.3	Analytic Hierarchy Process	73
7.4	Game Refinement Theory	75
7.4.1	Evaluation of Search Space for Customers	77
7.4.2	Evaluation of Tier System and Point System	78
7.4.3	Effectiveness of Points System	82
7.5	Return on Investment	84
7.6	Chapter Summary	87
8	Conclusion and Future Work	91
8.1	Concluding Remarks	91
8.2	Answer to RQ1 and RQ2	93
8.3	Answer to Problem Statement	95
8.4	Future Work	95
	Bibliography	97
	Publications	105

List of Figures

2-1	Illustration of one level of game tree	15
3-1	History of M●BA	20
3-2	The New Interface	22
3-3	Sceen shot of special boosters that spawn on the map	26
3-4	Screen shot of scan ability to detect any enemy Heroes in an area	27
3-5	Screen shot of level-up	28
3-6	Screen shot of Gold and Experience	30
3-7	GR values and prize pool of DOTA2 in 2011-2016	33
4-1	GR when starting from Milestone 1	46
4-2	GR values when starting from Milestone 3	47
5-1	Measures of game refinement for tiers system from four FFPs	53
5-2	The trend of GR_P with increasing number of free segment redemption	55
6-1	Evolution timeline of Starbucks loyalty program	60
6-2	Game refinement value for point system in Gold Level with increasing number of free cups redemption	64
7-1	Comparison of five famous hotel groups	71
7-2	AHP modeling of hotel rewards selection	74
7-3	Consolidated decision matrix	76
7-4	Breakdown by each node and consistency check	77
7-5	Measures of game refinement(GR_T) for hotel loyalty program with focus on qualifying nights: five hotel groups compared	79
7-6	Correlation Analysis	89

8-1	Interpretation of the Contribution(Grey Area)	92
8-2	Interpretation of the relationship between tiers system and points system. Both systems aim to bring customers to Loyalty Guest position in a differ- ent path.	93

List of Tables

2.1	Measures of game refinement for traditional boardgames	14
2.2	Measures of game refinement for boardgames and sports games	17
3.1	Top 10 Game Awarding Prize money in 2015	24
3.2	GR of Levelling up	29
3.3	Hero Kills	31
3.4	Measures of game refinement for DOTA2 series and prize at TI championship	32
3.5	Tournament prize in sports, mind sports and e-sports compared	35
3.6	Radiant: Team 1	36
3.7	Dire: Team 2	36
4.1	Popular languages in <i>Duolingo</i>	44
4.2	Measures of game refinement for <i>Duolingo</i> language course	44
4.3	Measures of game refinement for each milestone in EFSS course	46
5.1	Eastern Miles	50
5.2	Phoenix Miles	51
5.3	Sky Pearl Club	51
5.4	Fortune Wings Club	51
5.5	Measures of game refinement for points system in Fortune Wings Club . .	55
6.1	GR_P values of different versions of Starbucks US loyalty program (point system) in earning a free item in Gold Level	62
6.2	Differences between My Starbucks Rewards in US and China	63
7.1	The elite membership requirement and benefit: five hotel groups compared	73
7.2	Table of relative scores (2, 4, 6, 8 values in-between)	75

7.3	The Result of Computer Simulation by AHP . . .	76
7.4	Measures of game refinement GR for hotel groups in different locations (Shanghai/Tokyo/Paris) . . .	78
7.5	Tiers system (Qualifying nights)	78
7.6	Measures of game refinement (GR_P) for hotel loyalty program in Shang- hai/Tokyo/Paris with focus on free nights: five hotel groups compared . .	81
7.7	The ranking of points system based on GR_P values with considering the location	83
7.8	The hotel loyalty program satisfaction of the US News & World Report 2016-2017	83
7.9	ROI of hotel loyalty program in Shanghai/Tokyo/Paris for different mem- bership: five hotel groups compared	85
7.10	Evaluations of a hotel loyalty program with the quantity of customer mem- bership(Million), AHP, game refinement measure 1, game refinement mea- sure 2 and ROI in Shanghai/Tokyo/Paris: five hotel groups compared . .	86
8.1	The Range of Game Refinement Value	94