

RTS-GameFlow :A New Evaluation Framework for RTS Games

Sha Ding

Department of Computer

Sichuan University

Chengdu, China

dingsha 7320@gmail.com

Ningjiu Tang

Department of Computer

Sichuan University

Chengdu, China

tangningjiu@cs.scu.edu.cn

Tao Lin

Department of Computer

Sichuan University

Chengdu, China

lintao@cs.scu.edu.cn

Shiyuan Zhao

Department of Computer

Sichuan University

Chengdu, China

fengxiangxp@163.com

Abstract —Modern games have shifted their core from game itself to the player enjoyment and preference.RTS games are the special category of computer games which are military simulation and abstraction.This paper proposes a new evaluation framework for RTS games—RTS-GameFlow which is based on the quintessence of Game Theory and an extensive model of GameFlow.RTS-GameFlow fills vacancy of evaluating RTS games. This evaluation framework is not only a development of the GameFlow, but also an extended model with new features. Meanwhile, the paper analyzes the relationship among the elements of RTS-GameFlow , and refines the evaluation criteria to use in experiment. This RTS-GameFlow will be mainly used to evaluate the enjoyment while playing RTS games.

Keywords-GameFlow;RTS-GameFlow;evaluation;framework;
enjoyment;criteria

I. INTRODUCTION

The evaluation of game has gone through main three stages of development.Firstly,Federoff focused on user testing to get more user data,so as to find out specific behaviors and problems in the game[1].Secondly,according to Clanton[2] and Jenkins's research on usability of games[3] ,Desurvire introduced Heuristic Evaluation for Playability(HEP),a comprehensive set to use heuristics to evaluate the playability of games[4].Aiming to explore critical factors for game design ,Song provided a new framework of usability evaluation for MMORPGS through a case study of "World of Warcraft"game[5].With the development of HCI (Human Computer Interaction),user-centered has become a new core issue in designing and developing successful products. Combining games with flow, a new model for evaluating player enjoyment in games was concluded by Sweetser&Wyeth[6].The three stages are shown in Figure1.

GameFlow is a model with unversial commonness of all types of games,but it is lack of unique character.If GameFlow applys to any different type of game or a idiographic game,the problem of generalization,redundancy and omission will be released.Furthermore,GameFlow consists of eight elements ,but there is no contact among them.

RTS(Real-Time-Strategy) games are no-round games and

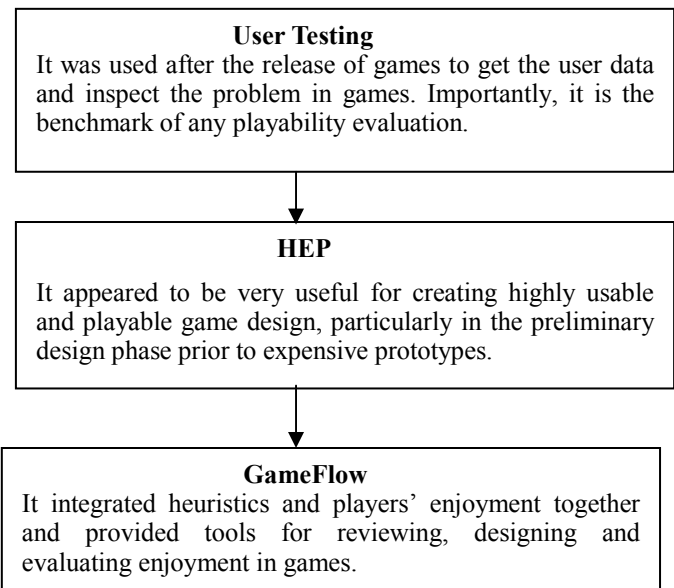


Figure1. Main stage of evaluation for games

military simulation [7].In such games,players choose a tribe they like and act as leaders of the tribe.Then,they gather resources and use the resources to build domestic and military buildings and engage in war.Game Theory deriveing from games is a tool for analyzing the interaction between decision makers with conflicting objects.The essence of RTS games is Game Theory that players manage resources and make decisions under rules.

The paper aims at developing a new evaluation framework called RTS-GameFlow for RTS games based on the quintessence of Game Theory.RTS-GameFlow reserves elements which are suitable for RTS games in GameFlow and adds new elements to RTS games.In the meantime,this paper analyzes the relationship among the new elements and refines the criteria of elements in RTS games.The new framework,involving the comomnness of games and unique characters of RTS games,can be used to evaluate player enjoyment in games,even assistantly design RTS games.

II. RELATED RESEARCH

A. *GameFlow—A Model for Evaluating Player Enjoyment in Games*

Csikszentmihalyi conducted his research with extensive people. Finally, he found the optimal experience or flow when the situation is in the balance between the person's skill and the challenge associated with the task[8]. Chen thought that different players may have different flow zone and designers offered many deliberate choices to suit to different users' personal flow zone[9]. Weetser & Wyeth constructed a model of enjoyment in games to adapting flow to games. Mapping to the elements of flow, the result was the GameFlow which consisted of eight pivotal elements, as follows[6]:

- Concentration
- Challenge
- Player skills
- Control
- Clear Goals
- Feedback
- Immersion
- Social Interaction

Each element includes a clear goal and a set of central criteria that can be used to design and evaluate games with respect to enjoyment. However, GameFlow is difficult to apply in practical game. Why? The reason is that the model is so general for all games.

B. *The Development of Game Theory*

The development of modern Game Theory focuses on the interaction among the construction of inspiration. Game Theory is a branch of applied mathematics that is used in the social science, economics, political science, military affairs and so on. The essence and basic mode of Game Theory is "Rationality-Prediction-Equilibrium"[10]. Equilibrium concepts are differently depending on the field of application. Game Theory attempts to find equilibrium to adapt to the situation.

III. THE CORE AND ESSENCE OF RTS GAMES

RTS games are military simulation and abstraction. The reason why many RTS games are successful is not only the entertainment in the games, but also the direct control over units as leaders. Whatever being successful or lost, a big part of players will come into flow zone.

The game interface, game play, game narrative and game mechanic of RTS games is apparently different from others. Therefore, the core and essence of RTS games are followed:

- The core—Main three steps in RTS games: Gather—Production—Attack. The three steps are unique which run through the whole games.
- The essence—Game Theory is used in military affairs virtually. Players make decision depending on the

resources, surroundings and choices of others make. They try to find out a optimal idea to defeat the counterworker.

IV. RTS-GAMEFLOW

RTS-GameFlow, a new evaluation framework for RTS games, is based on Game Theory and GameFlow. RTS-GameFlow is an extensive model from GameFlow, because GameFlow is suit for all types. It includes eight elements of GameFlow and new four ones that are special in RTS games. Compared with other game type, the characters of RTS games and the motivation of players are more apparent. The categories and features of RTS games are diverse. Importantly, games should provide the mechanic of equilibrium and players choose the set of strategies to carry out their plans. Victory may come to the swift, that is, to those who attack early (a strategy called "rushing"), or to those who wait and patiently build up (a strategy called "turtling"). All of activities are done in real time.

A. *The Elements of RTS Games Based on Game Theory*

The essence of RTS games is Game Theory and its quintessence is "Rationality – Prediction – Equilibrium". The eight elements of GameFlow don't refer to the core of RTS games, so as not to distinguish the distinction between RTS games. Thus, RTS-GameFlow adds new elements to GameFlow, adapting to evaluate RTS games. The new elements are discussed below:

- Rationality—Players think about maximizing their benefits and master many kinds of game strategies all along. According to the information they get, they make the right decision.
- Prediction—Players' behavior is consistent with their decision; They may predict their counterworkers' behavior.
- Equilibrium—RTS games should be balanced in the whole process. Equilibrium ensures games to be fair for everyone and makes the competition become possible.
- Strategy and manipulation—The elements reflect the extent of complexity. Both of them interrelate and mutually constraint with each other. It is difficult for players to control them at the same time. Actually, if players pay more attention to manipulation, they will ignore making the strategy.

RTS-GameFlow with the new elements is an organic whole based on Game Theory. Equilibrium is the key in RTS game. Only games with equilibrium in all aspects are eligible.

B. *The New Evaluating Criteria of RTS-GameFlow*

RTS-GameFlow inherits from GameFlow and can be used to evaluate player enjoyment in the process of RTS games. In this section, every new element contains a set of central criteria that are drawn on the the games literature on user-experience and usability. The criteria are shown next:

Rationality

- Games should provide various roles for players, while different roles occupy different advantages and disadvantages.
- Players have many kinds of resources and start to complete the task, so that they can pursue the optimal benefits.
- Games should provide a lot of sets of strategies to fit for any level of players.
- Game should provide the clear and real-time information to players so that they may predict the behavior of opponent.

Prediction

- The production of strategy depends on the players' consciousness and manipulative ability.
- Games should provide the manipulation which is consistent with the players' prediction.

Equilibrium

- The amount and value of resources, the arrangement of soldiers and other sort of people, the force of attack or defense for any role or combat unit should be in a balance state. Each strategy should not always be better or worse than others.
- Game units' power and cost should be in the balance. The choice and the cost of resources interrelated. The cost is directly proportional to avail.
- Games should be in the balance of opportunity cost. Under the same level, different combat units' average production are equal in the time unit.
- Games should provide various levels for players to balance their skill, such as easy, normal, hard.

Strategy and Manipulation

- Games should be an integration of combat system and can provide many interesting choices to select.
- Games should attach importance to various players. Some players prefer to immerse in manipulation, while others are apt to make strategies by their efforts.

V. EXPERIMENT

20 students participated in this experiment. The experimental sessions were divided into four sections. First of all, The subjects were given clear instructions about the general goal and the primary content of the experiment. Second, according to the experience of playing RTS games the participants had, they were classified into two groups. One group was the novice who knew but had no or a little experience of playing RTS games. Other group was the expert who possessed of plenty of experience. Why it was necessary to classify? The reason was that player's experience may bring on different feel during gaming, such as the degree of difficulty, the player's adaptability and so on. After this, they were asked to play appointed RTS games individually and think of the evaluating

criteria. Third, in order to evaluate player enjoyment after the playing session was terminated, participants filled out the table with the evaluating criteria according to evaluating mark. Finally, we computed the result and get the conclusion.

Two RTS games—Warcraft and Rise of Nation (as RoN) were selected to be compared. Both of them were so famous that many players were absorbed in studying to play them. Though they were all RTS games, they were different from each other in details, that was the reason why we proposed the evaluation of the player enjoyment in different RTS games.

It is identified that RTS-GameFlow consists of 48 criteria—the eight elements of GameFlow (36 criteria) and the four elements (12 criteria) based on the essence of Game Theory. Each criteria is with the same evaluating mark—10 (0—not at all, 1—a little, 3—below average, 5—average, 7—above average, 10—well done). After the participants measured the enjoyment in games, the mark was given by themselves. Table I shows the information derived from the survey.

TABLE I. THE RESULT OF EVALUATING TWO RTS GAMES

Players	RTS Games	RTS-GameFlow		Total
		GameFlow	New Criteria	
Novice	Warcraft	142	52	194
	RoN	159	55	214
Expert	Warcraft	168	59	227
	RoN	166	52	218

Table I summarizes the subject of this paper significantly. There are two brief points to be shown based on the result. On the one hand, The novice and the expert have visibly different in the result. From the perspective of total above, the novice prefer RoN, because RoN is designed to assist the novice to learning. Like many other excellent games, RoN makes the novice assess the tasks they have to do and the level where they are. RoN is less complicated than Warcraft, so the novice may pay attention to strategic thinking without focusing on the manipulation. On the contrary, the expert consider that Warcraft is full of attraction. Equilibrium in Warcraft is perfect to perform. The expert are deeply arrested by the tense atmosphere. On the other hand, it is necessary to provide a new evaluation framework for RTS games. For example, for the expert, there is no significant difference between the two games according to the criteria of GameFlow. Whereas, the result of new criteria appears apparent difference.

VI. CONCLUSION

The objective of this paper is to provide a new evaluation framework for RTS games. Instead of the traditional evaluation for games, this paper regards player enjoyment as the core of games. As a matter of fact, there are few systematic reviews on how much RTS games impact players and how important elements are combined with the quintessence of RTS games. From this viewpoint, our research field should start rethinking and deconstructing evaluation framework of RTS games.

RTS-GameFlow is based on the quintessence of Game Theory and an extensive model of GameFlow. RTS-GameFlow fills vacancy of evaluating RTS games. This evaluation framework is not only a development of the GameFlow, but

also an extended model with new features. RTS-GameFlow could be used as a simple evaluation model for the players' enjoyment in RTS games.

The result of the test preliminarily showed that RTS-GameFlow is necessary for reviewing RTS games. Moreover, RTS games should suit to different level of players. RTS-GameFlow includes the features of HCI and can make designers pay attention to append the elements differing from other sorts of games.

In the future, RTS games should support to realize the flow in game playing. It is so important to combine RTS games with other styles, such as RGB, MMORPGs, and so on. With the trend of beautiful screen, wonderful music, absorbing plot of story, and perfection of AI, players will be able to appreciate the mode of dual games much better.

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