

TOWARD A PLAYFUL DESIGN ENVIRONMENT - DIGAME

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Abstract. Computer game has the potential that helps us to realize the design. However, these particularities still has not been found and organized under the circumstance of combining computer game and designing process. We will develop from the point of the computing that discuss how to use game elements to create a suitable digital design environment. Therefore, the problem is how to let a designing process as a game playing? And the objective is providing a prototype for playful design environment called *DiGame (Design in Game)* for discovering the game issues within the design. The implementation of DiGame is described in details.

1. Introduction

1.1. BACKGROUND

Computer game has been blossomed as the major entertainment of our daily life in just a few years; one of its attractions is to spending leisure time in a relaxing mood. The hinge that makes a designing process going well is the relaxing mood; therefore, computer game has the potential that helps us to realize the design by its behaviors—playing games. However, these particularities still have not found and studied extensively under the circumstance of combining computer game and designing process; on this

condition, it is a worthy aspect to discuss that applying the particularities of computer games to a designing process.

Before we discuss combining the computer game playing and design processing, design process itself has confronted numbers of difficulties on computational studies. The design process, a goal-directed, complex human behavior, often regarding as a black box, is hard to comprehend. Two main views of design process are problem solving and puzzle making. By dividing the designing problems into the sequence of sub-problems, design goal is satisfied while all of its sub-problems are resolved. In addition, puzzle-making metaphor provides a view for re-defining the problems at the first place. Following this trend, a research called *Design Puzzles* (Chang, 2004), using puzzle, especially the puzzle games, metaphor to discuss the response of playing/solving puzzles within a design process. This establishes the methodology for realizing playful activities in design process. This research extends the concept of Design Puzzle to further study how we can apply the computer game elements on design process in a playful activity.

1.2. PROBLEM AND OBJECTIVE

To discuss the matter that uses game elements to create a suitable design environment, this research studies the characteristics of fun that game circumstance has apparent advantages of self-motivation. Base on other studies over the issue of combination between game and design process, we realize that the playful activity makes designer more freely and creatively. Then, we desire that through playful activity, designer could comprehend the problem of design more efficiently and willingly to pay more time in designing. Hence, the problem is how to making design process more like playing computer game than the other way around.

In addition, computational theory has been applied and used for analyzing and further developing the most advanced computer games. Therefore, we implement the games as the platform for studying our objective that discussing game-oriented design experiments for discovering the game issues within the design.

2. Related Work

Related works of this research could be divided into three groups: 1) the theory and structure of computer games, 2) the behavior of playing game, 3) design process and operation. They are described as following sections (as seen in Figure 1).

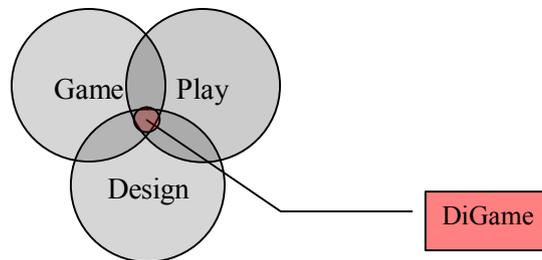


Figure 1. Three groups of relevant works

2.1. THE THEORY AND STRUCTURE OF COMPUTER GAME

Computer game theory is a new field of research that framework on the research of the game behavior of human. Six characters identified by (Caillois, 2001) are: 1) Free, 2) Separate, 3) Uncertain, 4) Unproductive, 5) Governed by rules, 6) Make-believe. (Paras and Bizzocchi, 2005) thus explained that it is the freewill to do anything you want in a game environment obviously differ the Make-believe in game environments from the others. Consequently, this research focuses on unproductive rules and using trivial game objective for providing “make-believe”. (Smed and Hakonen, 2003) defined the computer game process in a way to present the game features that players might be anticipated. Even more, (Björk and Holopainen, 2003), on the view of interaction, developed a model that describes computer games. These provide us the base, in the player’s view, to analyze the playing behavior.

On the research of computer game structure, they commonly agree that the main frame of computer game is consisted of rules. On the other hands, the one directly related to playing behavior is about the discussing of the goal of the game: (Salen and Zimmerman, 2004), by observing the action and outcome in playing computer game, presented the process that how did players achieved the goal by accumulating their actions; then built the relationship between the rules and goal. (Björk and Holopainen, 2003) advanced divided the rules and goals in the point of *endogenous* and *exogenous*. (Montola, 2005), base on the previous view, presented it bring energy to the game when players defining the goal different meanings. In advance, integrating these concepts, we will study in details how players give endogenous-goal a personalized meaning in the mechanism of rules, and how they move in the process of endogenous-goal derivation.

2.2. THE BEHAVIOR OF PLAYING GAME

Opposite to the definition of the game, the definition of playing behavior, researchers has come in a similar concept: (Huizinga, 1970) defined the playing behavior as a clear conscious of freewill behavior that is not serious

in daily life; moreover, players are fascinated with strongly and thoroughly. (Galvis, 2001) presented similar concept as well. On the other hand, aside from emphasizing on playing behavior often oriented to some specific goals, (Paglieri, 2003) presented that the goal of the game would be different from different player. This assures us that goal-oriented is the core of our research to integrate gaming-behavior.

Meaningful play regards the fact that a game must have a meaning in itself to allow for gameplay. This meaning develops when the player or players enter the magic circle of gameplay and it disappears when the gameplay ends. The concept Meaning Beyond Play, continuation of Salen's concept, (Engeli, 2005) shows that how a game affect a player's daily life, and believe that creative involvement with the game in a playful way. On the issue of combining design process, these concepts show us extra value. Continue these concepts, through the designing-problem we attempt to connect the meaning inside and outside the game and arouse the game to design in a playful way.

2.3. DESIGN PROCESS AND COMPUTING

Regarding design as a black box, (Archea, 1987) used the metaphor of puzzle to discuss the design behavior. In further, (Chang, 2004) separate the design process into Puzzle-Making and Puzzle-Solving, and provide a computable model. These researches help us to realize the design process. As a result, the computing of a design becomes more easily to realize and discuss. On the opposite, (Asimov, 1962) presented A-S-E (Analysis-Synthesis-Evaluation) model that subdivided the design process into the circle of Analysis, Synthesis and Evaluation and proves distinguished the importance of a slight proportion of the design process. Related to these three groups of research, we build the foundation of the research on combining design process and game process.

3. The Essence of Computer Game

3.1. OBSERVATION ON PLAY

A general observation on players' Spend time mode in players' view in a various packages provide several hypothesis and objectives of this research for integrating the game characteristics in computational mechanism.

3.1.1. *The outer of players' behavior—the establishment and practice of strategy*

First of all, by observing the players that concentrated on the game, we found out a way to describe the outer of game interacting process—the players' mind in gaming process mainly separated into three phases: 1) perception, 2)

decision, 3) execution. Base on different types of game configuration, players interact with the games by shifting these three phases in different rates.

We discovered that the capability of judgment is involved with the process from “perception” to “decision”. Each player that with different capability of judgment takes different time to make the right decision after they received perceptions; as we called the process the establishment of strategy. And also it counts on the capability of harmony to proceed from “decision” to “execution”. From the process “decision” to “execution”, each player depends on his capability of harmony to takes different time for making an accurate execution after making a decision; as we called the process the practice of strategy.

Players need to apply different ratio of those capability to achieve the goal in different types of games. In simple says, it is the establishment and practice of strategy that compose the appearance of game interacting process. As a game itself, could be regarded as a computing mechanism that supports establishment and practice of strategy.

3.1.2. The inner of a player’s behavior—the establishing and solving of goal

On the next step, observing the players’ intention in playing games helps us to discover a interesting phenomenon—players are not always follow the game designer’s rule to archive the goal. For example, some players do not obey the rules in a racing game; they purposely drive reverse to hit the competitor’s car for fun.

We should encourage the game designers that drop a hint to help players to re-establish the goal of the game. But, for a real hit, it is the real matter to make players confront a whole new goal when they interacting with the game each time. On the opposite, the goal value should only exist in the time and space of the game, no matter to the player’s real life.

The process of game playing could be regarded as a process that establishing and solving the goal without ending. Through a game’s computational mechanism that supports the establishment and practice of strategy, players could be satisfied emotionally by establishing and solving a goal in a personal manner.

3.2. DEFINING GAME

3.2.1. The core rules of a game

Based on the view of game is mainly composed by some rules. We use to describe a game, and subdivide the game into three types of rules by using establishment and practice of strategy: 1) Payoff Rule: Describe every behavior that affects the current situation in a game. According to this rule, Players deliberate upon the establishment of the strategy. 2) Interact Rule:

Describe the class of the options that player might choose in vary situations. Players could pick one of the rules and proceed to the practice of the strategy.

3) Present Rule: Describe how the two previous rules present perceptions to players; for instance, a certain appearance of a digital game is sense of sighting and hearing. Hence, the rule of a certain appearance is to describe how a game designer organizes the current situation by the media of the sense of sighting and hearing.

3.2.2. Using rules to integrate the practice and establishment of strategy; goal establishing and solving

As a whole, game is a goal-oriented constantly playing interactive process. As following the hints of the game designer, players base on the mechanism of the game constantly establish his or her unique goal and attempt to achieve.

In further analysis, we found out that independence events exist in each sub-goals; describe how do players following the rules to establish and practice the strategy. In the unit of time, for the slightest behavior of the establishment and practice of the strategy, players apply the capabilities of judgment and harmony that would be different kind of load to players' cerebation. It is the load of players' cerebation to achieve his owns goal that makes the players satisfied (as seen in Figure 2).

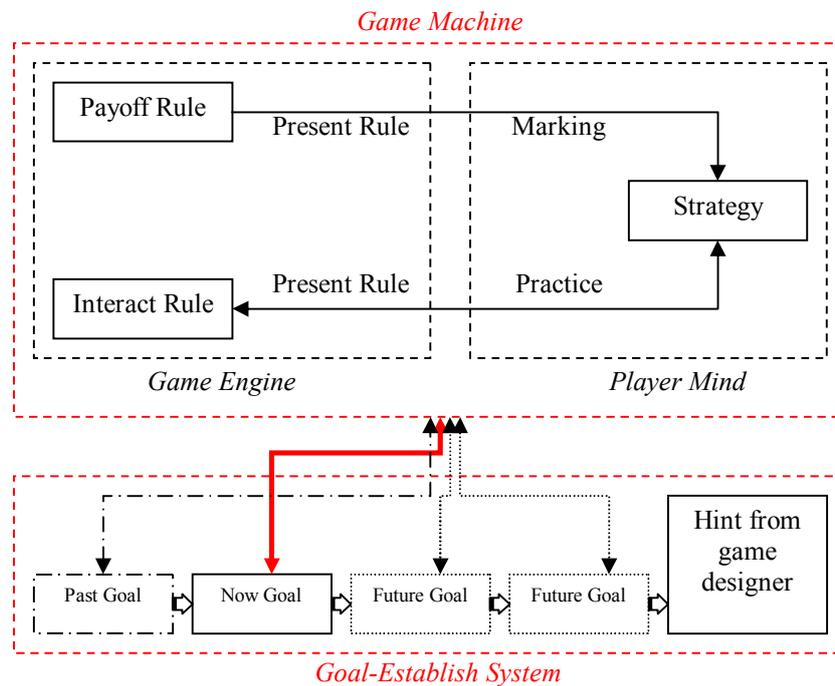


Figure 2. The relationship between Goal-Establish System and Game Machine.

4. Implementation of DiGame

4.1. ANALYZE DIGITAL DESIGN ENVIRONMENT BY GAMEING VIEW

In the past digital design environment, the imagination in the designer's mind, the design problem out of the digital platform that designer would seek the illusion constantly until he satisfied with the image on the screen. If we examine it in the view of a game, we would confront two conflicts: 1) the imagination is not meaningless; it is still a design problem in designer's daily works, 2) the goal-establish system does not exist digitally; the designers still have to establish the goal before they enter the digital platform.

Furthermore, comparing to the digital environment design system, in the game goal solving system could discover another conflict: After confirming the problem, we always solve it in the shortest procedure; on the opposite, in order to cost players' time and cerebration load, we purposely raise the difficulty of the degree on the practice and establishment of strategy in the process of the goal-solving in the game.

4.2. THE GOAL-ESTABLISH MECHANISM OF RPG

Broadly observing vary RPG's Payoff Rule and Interact Rule, we found out that the rules of RPG have a specific common feature: through the accumulate of the playing behavior, as well as the mechanism of repeat to establish and practice of the strategy that gain the advantage or resource then separate it into the role's abilities; in order to achieve the sub-goal, or helping achieve the goal more efficiently.

4.3. THE DIGAME SYSTEM

The primitive concept of DiGame is to establish 3D Form-Making by the modes of create, modify and delete. Under this design mechanism, we aid the elements of RPG then observed how do the players generate and realize the playful goals that impact the design problem in the design process (as seen in Figure 3).

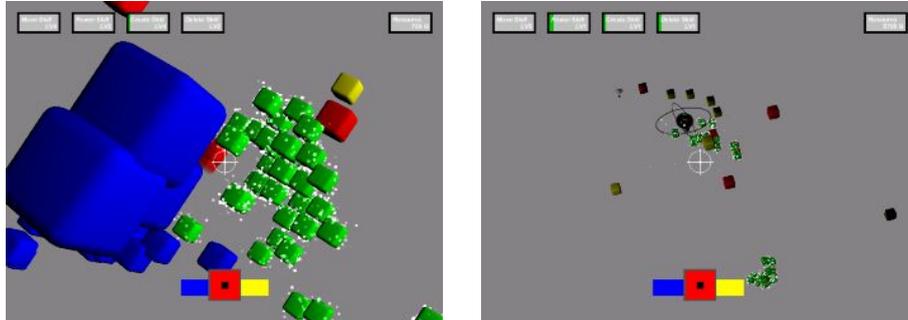


Figure 3. The design process of the DiGame system.

The Interact rules of the DiGame: 1) Designer could use mouse's left click to create volume, and determine the size of the creating volume by how long you push the left click. 2) Designer could use mouse's right click to delete volume, and determine the size of the deleting volume by how long you push the right click. 3) Designer could move in the game space by pushing W, S, A, D, Space bar and Ctrl. 4) Designer could use the middle wheel to choose upgrade item and push the middle wheel to buy the item.

The Payoff rules of the DiGame: 1) Creating ability: the higher the level of the ability, the bigger creating-cube could be fired. 2) Deleting ability: the higher the level of the ability, the bigger deleting-cube could be fired. 3) Each cube that designer fired, would cost energy from the energy tank by the size of the cube. 4) The energy tank will be refill by the time, the higher the level of the energy refill ability, the shorter time would be taken. 5) The higher the ability of movement, the faster you move. 6) Corresponding to use the ability's frequency, in some degree of frequency, would upgrade the ability. 7) Effectively create a volume, could gain a unit of resource. 8) Effectively delete a self-created volume, could gain a unit of resource.

4.4. EXPERIMENT

4.4.1. Experiment setup

Experiment taker: we choose 5 architecture-graduates that each has different degree of fascination on computer games. The average frequencies of playing computer game are 0.5 hr/week, 1 hr/week, 2 hr/week, 14 hr/week and 20 hr/week. Each taker has been requested to design on the theme of a table by using the DiGame. Experiment manner: recorded the user's operating process in video and audio. Comprehend the designer's cerebration by protocol analysis.

4.4.2. Primary finding

The higher the degree of fascinate on the computer game, the designers are more willing to realize the game mechanism, and used to apply trial and error method to comprehend the game mechanism. Basically the experiment should be accomplished in 15 minute; we expect that the faster the designer master the system, the short the design would be accomplished. As the result, the high degree fascinated designer that was attracted by the game spontaneous spend more time on the design; They are concentrate on the Payoff rule and having fun over more frequency of establish and accomplish the goal of the game (as seen in Figure 4).

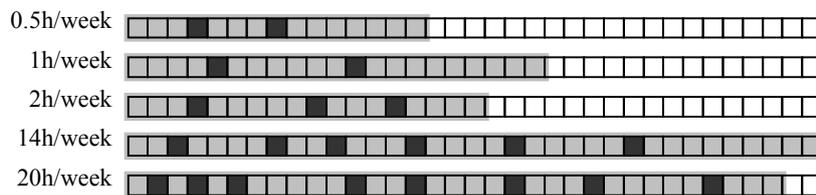


Figure 4. The experiment which show the relationship of generating the target of the game between time and process

5. Conclusion

Retreat to this research's problem and objective, in accordance with the combination of computer game and design process, we present the following issues: 1) From the view of players self-motivation on the game, we assure that it is through the response between the Interact Rule and Payoff Rule approve players establish a trivial goal and accomplished in real time makes the players pleasure and also the reason that players are willing to spend time on computer games. 2) On the influence of the game bring up to design, we separately examine the value of playing-behavior in the point of Problem-Making and Problem-Solving: at the view of Problem-Making, playing-behavior is controlled by the player himself, but the outcome does not conform to the player's predict.

Through the view of the designer, playing-behavior has provided more broadly possibility for Problem-Making when the designer examines his own creation; at the view of Problem-Solving, we have to subdivide the design problem to suit the mechanism of the game for solving problem. The reason is that the environment of the game is limited by some rules and is hard to deal with vary kinds of design problem, therefore, after a suitable subdivided, the design problem would be more pure and simple. Through the practice and discussion of the DiGame, we distinguish the direction of exploring the field of game-design combination and the potential of the game application on the digital design environment.

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