Design for game situation based on player's personality

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Abstract

Recently, online game has been prevalent because of the spread of Internet and smart phones. Especially the games in which the player aims to reach a goal and to defeat an enemy with partner are getting popular. In such a game, it is thought that the state of mind, the motivation and the performance of player are influenced by the relationship of the skill with not only the enemy but also the partner. In this study, to investigate the influence of these relationships on the player’s state of mind and performance, the simple game system has been constructed. To prepare the various situations, the partner and the enemy player are computer in the proposed game system. Using this system, some experiments are performed in various relationships of the skill with the partner and enemy. As a result, the relationship of player’s game skill with the partner may affect the player’s performance. So, players are classified in the three types by their performance. And the player’s state of mind and performance for each type are verified. Using these results, we indicate that the appropriate games for the player can be proposed.

Keywords: Game system; Flow; Mind of state; Performance

1. Introduction

Recently, online game has become a mainstream due to the spread of Internet and smart phones. Most of conventional video games have been played by one player, trying to defeat an enemy to reach a goal, or creating a self-made character to compete with the counterparts created by the other player who plays on the same game. So far a number of researches on player’s state of mind in one-to-one relationship such as between a player and a competitor or a player and a partner have been conducted [1,2,3]. However, other than such existing one-to-one...
fighting games, cooperative-type on-line games are the recent trend. In such games, a player makes a team with the other player and cooperate each other to defeat the enemy team or to achieve goals. It seems that the relationship of skills and performances among players, partners and enemies affects the player’s state of mind and performance. In this study we verify how the performance of partner and enemy affect the player’s state of mind and performance.

Although the relevant studies including optimization of platform game levels intended for game itself [4], motivation enhancement in operation utilizing game system [5,6] and study on elements of entertainment and design [7,8] have been conducted. However there have been few researches evaluating games and the designs from a viewpoint of the relationship with partners and enemies. In this study, we created a simple cooperative fighting-type game system in order to investigate the impact of the players’ skills within/between teams on the performance and psychological mind of the players. We also investigated the impact of the difference among the player’s skills on the performance and psychological mind of the players. Based on the results of the above experiments, we proposed an appropriate game situation by classifying the players.

Additionally, a psychological concept called “Flow theory” proposed by Mihaly Csikszentmihaly, psychologist, has been paid much attention especially in sociological field. Flow is the mental state of operation in which a person performing an activity is fully immersed in a feeling of energized focus, full involvement, and enjoyment in the process of the activity and this concept has been widely adopted in various fields. Flow is considered to be experienced when a person perceives his/her skill level matches the challenge level of the operation [9,10,11]. It is considered that video games can induce Flow state easily. Therefore we investigated the elements of Flow theory from the viewpoint of the player’s psychological mind.

2. Creation of game system

2.1. Position of player’s skill within/between team

The game system created in this study was team-competition game, in which a player cooperates with his/her partner making one team and defeat the enemy to achieve the goal. The relationship between the skill of the player and the partner was classified into three conditions as follows; when the partner’s skill was lower than the player referred to as “L”, when it was equal to the player referred to as “E” and when it was higher than the player referred to as “H”. The relationship between the skill of the player and the enemy was classified into three conditions likewise, “L”, “E” and “H”. Therefore there were nine different combinations of the conditions for the relationship of partner’s and enemy’s skill for player’s skill. For example, when the partner’s skill was higher than the player (the subject), we indicated as “Player<Partner”. The subject played the game under all these nine conditions as shown in Table 1.

![Table 1](image)

2.2. Outline of experimental system

In order to investigate the impact of partner’s and enemy’s skill on the player’s performance, the skill levels of the enemy and the partner was varied variably in this experiment.

As shown in Fig.1, the subject is presented two digits number randomly and asked add these numbers. The subject and the partner made one team and compete with their counterpart. Both teams answer the prepared numerical calculations. When the total numbers of correct answers given by both teams become hundred, the team that makes more correct answers wins the game. The digit number shows the correct answer of player, partner, both of them and enemy team. And the right bar shows them visually. The partner’s and the enemy’s skills are set three
levels as follows; “Low=L”, “Equal=E”, and “High=H” based on the average answer time of subject’s practice. The partner and enemy takes 1.5 times longer to answer the problem than the player, when the skill level is set to “L”(Low), takes same time referred to as “E”(Equal), and takes half time, referred to as “H”(High).

3. Validation of impact of partner’s and enemy’s skill on player’s performance and mind of state

3.1. Objective

Using the system created for this experiment, the subject solves numerical questions under the condition of controlling the partner’s and enemy’s skills. Then the player’s performance and psychological mind is analyzed based on the answer time and questionnaire.

3.2. Experimental procedure

A subject was instructed to enter a room and solve several two-digit additions in practice. After being informed that the partner and enemy were in the different room, the subject was asked to choose the one condition out of nine shown in Table 1. The subject and partner made one team and compete with the enemy team by solving one-hundred additions with playing the game. 36 university male/female students aged between 18 and 22 years were participated as the subjects. Each subject conducted the experiment under all nine conditions in random order. The answer time and the number of correct answers of each subject were scored every nine conditions. The subject was asked to fill out a questionnaire each time. The questionnaire used one-to-five scale to describe applicable levels based on the eight elements of the Flow theory: “clear goals”, “intense concentration of attention”, “loss of self-consciousness”, “distortion of time”, “immediate feedback”, “balance between challenge and skill”, “sense of control situation and activity”, and “intrinsic value in the activity”. The sum of seven elements’ scores except “distortion of time” was analyzed as Flow score. Additionally, based upon a Circumplex Model of affect of human emotions proposed by J. A. Russell with horizontal axis representing pleasant/unpleasant and with vertical axis representing awakening/sleeping on horizontal axis [12], the subject answered 12 surveys items in one-to-four scale: Tense, Angry, Unpleasant, Depressed, Board, Tired, Relaxed, At Ease, Satisfied, Glad, Astonished, and Excited and 4 survey items answered by many participants in pre-experiment: Eager, Impatience, Resignation and Composure. Moreover the subject gave a subjective evaluation for the partner’s skill when scoring own skill as 100 point, for the enemy team’s skill when scoring own team’s skill as 100 point respectively and evaluated fun of the game on a 100-point scale.
3.3. Experimental results

For the relationship with the skill of subject and the partner, and the skill of subject and the enemy, the number of subjects who took the highest and lowest average answer time was shown in Fig.2. It was considered that the lower the average answer time showed higher performance and the higher the average answer time showed lower performance. Also Fig.2 showed that in the relationship with the subject’s and partner’s one, when the partner’s skill was higher than the subject, there were the least number of the subjects who had the longest average answer time and the largest number of the subjects who had the shortest average answer time. On contrary, when the subject’s skill is higher than the partner’s one, there were the largest number of subjects who had the longest average answer time and the least number of the subjects who had the shortest average answer time. In short, it showed that the higher the partner’s skill became, the higher the subject’s performance could be. In the relationship with the subject’s and the enemy’s skill, there was few differences between the number of the subjects who had the longest and shortest average time. These results indicated that the relationship with the subject’s and partner’s skill was more likely to impact on the subject’s performance than the relationship with the subject’s and the enemy’s skill.

In each relationship with the subject and the partner, the subject’s emotion evoked in questionnaire was shown in Fig.3, in which the survey items describing the emotion were answered in one-to-four scale as follows: 1. Applicable, 2. Little Applicable, 3. Not Very Applicable, 4. Not Applicable. The answer 1 and 2 were scored 1 point and the answer 3 and 4 were scored 0 point to average out the all subjects’ answers. Moreover Fig.4 shows the subject’s emotion evoked by varying the subject’s and the enemy’s skill. Thus it is seen the results from Fig.3 and Fig.4 that the difference with the partner’s skill has a low impact on the subject’s emotion and the difference with the enemy’s skill has a greater impact on the subject’s emotion. That is, it was found that the difference with the enemy’s skill is likely to have a greater impact on the subject’s emotion than the one with the partner’s skill.
4. Classification of player’s performance

4.1. Method of classification

Using the result, as shown in the previous chapter, that the relationship with the partner’s skills has a greater impact on the subject’s performance than the one with the enemy’s skill, 36 subjects were classified focusing on the difference between the subjects and the partners’ skills. Fig.5 shows the classification result using Ward method based on the 3 conditions of partner’s skill - “Low”, “Equal” and “High” - against the average answer time comparing to the subject’s skill. The classification result of 3 type’s subjects is shown in Fig.6. It is seen that the 1st group subjects showed the higher performance when the partner’s skill was equal to that of the subject and the lower performance when the partner’s skill was lower than that of the subject. Also it is seen that the 2nd group subjects showed the higher performance when the partner’s skill was higher than that of the subject and the lower performance when the partner’s skill was equal to that of the subject. In the 3rd group, the subjects’ performances tended to become higher when the partners skills were lower than those of the subjects.
Using each tendency seen in these 3 types, the players were classified more easily. Fig. 7. shows the classification result focusing on the relationship with the partner, under which the subject perform well. The 1st type is called “Equal type”: the subjects who had the highest performance when their skills were equal to those of the partners. 13 subjects were classified into this type. The 2nd type is called “High type”: the subjects who had the highest performance when the partners’ skills were higher than those of the subjects. 14 subjects were classified into this. The 3rd type is called “Low type”: the subjects who had the highest performance when the partners’ skills were lower than those of the subjects. 9 subjects were classified into this type.

4.2. Characteristics depending on type

Fig. 8 shows the performance of Equal type subjects by focusing on the relationship with the subject’s and partner’s skills and the one with the subject’s and enemy’s skills. The Equal type subjects naturally shows the highest performance when the subjects and partners’ skills are as equals and shows the lowest performance when the partners’ skills are low. Moreover, in the relationship with the subject’s and enemy’s skills, the performance of the subjects tends to lower when the enemies’ skills are low. Thus the Equal type is likely to show the higher performance with following 3 conditions: equal partner, equal enemy and high level enemy.

Fig. 9 indicates the average Flow score of Equal type by focusing on the relationship with the subject’s and partner’s skills and the one with the subject’s and enemy’s skills. The Flow scores are almost same in varying the subjects’ and partners’ skill levels. In the relationship with the subject’s and enemy’s skills, Flow scores tends to be high with the enemies having equal or low skills.

Fig. 10 shows the average of the fun of the game in Equal type by focusing on the relationship with the subject’s and partner’s skills and the one with the subject’s and enemy’s skills. It is seen that the fun of the game and the Flow score indicates the same tendency.
From these results, by providing Equal type subject with an equal level partner and enemy, it is more likely to enable a high performance and satisfaction.

Moreover, the same kinds of analysis were conducted in High type and Low type respectively. Summarizing these results, Table.2 shows the appropriate game situations sorted by each player’s type using the average answer time.
5. Conclusion

This study investigated the impact of a player’s skill level in a competitive game on the player’s performance and state of mind. Moreover we propose an approach for recommending the appropriate game situation for the game player based on the examination result. The result indicates there is a high possibility that the relationship with the partner’s skill has more impact on the player’s performance than one with the enemy’s skill. On the other hand, the relationship with the enemy’s skill is more likely to have the impact on the player’s psychological status comparing to the one with the partner’s skill. Therefore we classified the players into the following 3 types by focusing on their performance levels based on the relationship between the players and partners: “Equal type” with highest performance when the skill of the player and partner is equal, “High type” with the highest performance when the partner’s skill is higher than that of the player, and “Low type” with the highest performance when the partner’s skill is lower than that of the player. Moreover we evaluated the performance, motivation and state of mind of each player’s type. As the result, Equal type is more likely to enable the high performance and satisfaction in providing a competitive game under the condition of an equally-skilled partner and an equally-skilled enemy. High type is more likely to enable the high performance and satisfaction in providing a competitive game under the condition of a higher-skilled partner and a lower-skilled enemy. Low type has high chance to enable the high performance and satisfaction in providing a competitive game under the condition of a lower-skilled partner and a lower or equally-skilled enemy.

We will investigate more details on the validity of the proposed approach and study further on the availability of this approach in the other fields.

Acknowledgements

This work was supported by JSPS KAKENHI Grant Number 26560016.

References