

# Selection of appropriate terms for a subjective evaluation of video game contents

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**Abstract:** This study investigated appropriate evaluation terms representing video game characteristics. First, many terms for evaluating video games were collected from game magazines and user questionnaires. Next, an experiment of video game evaluation, in which experimental subjects evaluated the game characteristics after playing 20 video games, were performed for extracting the appropriate evaluation terms. As a result, six kinds of evaluation terms of "innovative," "fantasy," "length of waiting time," "reality," "comical," and "enjoyable with many people" were selected as the appropriate evaluation terms for video games using statistical analysis.

## 1. Introduction

In recent years, the video game industry has developed rapidly, and game performance and image quality improved so much. Also, variety of video games became much wider and mobile type games, which enable us playing games anywhere, developed in addition to conventional stationary type games. Furthermore, many kinds of game software were developed. As a result, games are played by not only certain people but also many people at present. Concerning with these many kinds of video games, a lot of evaluation terms for video games are used to express game characteristics. But these terms are not common among game magazines and game users. It is, therefore, difficult for game users to understand game characteristics well when they select game software without actual playing. Also, it is difficult for game makers to understand how game users evaluate video games and to develop video games satisfying user needs.

In this study, we discussed appropriate evaluation terms for video games, which enable users to know game characteristics easily and enable makers to develop video games satisfying user needs. Then, we collected evaluation terms representing video game characteristics from game magazines and user questionnaires, and performed an experiment of video game evaluation.

## 2. Collection of Game Evaluation Terms

For selecting video game evaluation terms, we collected evaluation terms from game magazines and performed user questionnaires. In the extraction of evaluation terms from game magazines, we investigated 10 magazines and extracted about 5,000 terms in total. In user questionnaires, 168 numbers of people participated and wrote down evaluation terms in their mind on the answer sheet. As a result, we collected about 600 evaluation terms in total.

Next, we calculated the frequency in use of each term and ranked these terms in order. And we selected high frequency terms, which rankings are over 25th (include the same ranking) in both the magazines and questionnaires. Finally, we selected 51 evaluation terms. The collected evaluation terms are shown in Table 1.

## 3. Game Playing Experiment

We performed game playing experiment using the extracted 51 terms for setting evaluation terms of video games, where the characteristics of video games are effectively expressed in a minimum number of evaluation terms. Twenty four subjects in their 20's, who are familiar with video game playing, participated in this experiment. The experimental participants evaluated fitting degree for 7 categories (+3: agree so much, +2: agree, +1: agree a little, 0: difficult to answer, -1: disagree a little, -2: disagree, -3: disagree so much) in each evaluation term after playing the game. Four kinds of hardware (Nintendo Wii, Nintendo DS Lite, SONY PLAYSTATION3, and SONY PSP) and five kinds of software (sports, shooting, action, racing, and role-playing) were employed in the experiment, therefore, 20 kinds of games were played in total. After playing one game for one hour, the participants selected the fitting degree in each evaluation term. Also, the participants were instructed to select 0 when it is difficult to evaluate by using a presented evaluation term.

Table 1. Fifty one evaluation terms extracted from game magazines and questionnaires.

No.	term	mag.	que.
1	enjoyable	y	y
2	difficult	y	y
3	original	y	y
4	easy to control	y	y
5	fun	y	y
6	fine graphics	y	y
7	good story	y	y
8	exhilarating	y	y
9	high degree of freedom	y	y
10	real	y	y
11	craze	y	y
12	good music	y	y
13	good character	y	y
14	easy	y	y
15	high strategy	y	y
16	speedy	y	y
17	insatiable	y	y
18	powerful	y	y
19	novel	y	y
20	simple	y	y
21	full-scale	y	n
22	excite	y	n
23	light	y	n
24	elaborate	y	n
25	dramatic	y	n
26	attractive	y	n
27	innovative	y	n
28	practical	y	n
29	high tempo	y	n
30	high tension	y	n
31	magnificent	y	n
32	comical	y	n
33	enthusiastic	n	y
34	presence	n	y
35	comfortable	n	y
36	long waiting time	n	y
37	full of curiosity	n	y
38	stressless	n	y
39	favorite	n	y
40	emotional	n	y
41	enjoyable with many people	n	y
42	alive	n	y
43	addicted	n	y
44	intelligible	n	y
45	well-matched	n	y
46	easy to play	n	y
47	fantasy	n	y
48	profound	n	y
49	get accomplishment feeling	n	y
50	enjoyable for long time	n	y
51	strong enemy	n	y

mag.: magazines, que.: questionnaire

## 4. Analysis and Selection of Evaluation Terms

We performed statistical analyses to above experimental results for selecting appropriate evaluation terms of video games. First, we applied the analysis of variance to clarify whether the evaluation terms are taken common feeling among subjects or not. As a result, the following five evaluation terms of "high degree of freedom," "emotional," "addicted," "profound," and "get accomplishment feeling" had high significance probabilities ( $P > 0.005$ ). This means that the feelings of these terms were different among subjects and these terms were not employed in the following analyses (46 evaluation terms were used in the next analyses). Next, we calculated the average value among all subjects in each evaluation term to obtain scores of the played games.

From the score of each game, we obtain the number of evaluation terms, that could express the game characteristics comprehensively using a minimum number by summarizing the evaluation terms which had high correlation. For summarizing the evaluation terms, many previous studies [1]– [3] employed the principal component analysis. This method is useful to summarize many terms and to obtain how many axes are necessary to express the objective information value comprehensively. On the other hand, in this method, the experimenter has to name the summarized axis from the evaluation terms having a high correlation with the summarized axis.

In this study, we would like to select user friendly game evaluation terms which are frequently used by users. The selected terms, therefore, should not be named by the experimenter. Thus, we did not employ the principal component analysis but used the cluster analysis to summarize the 46 evaluation terms. In the cluster analysis, evaluation terms which have a high correlation are grouped step by step. Figure 1 shows the result of cluster analysis. From this figure, it is observed that "innovative," "novel," and "original," or "enjoyable," "favorite," and "fun" are gathered at an early step, this means that these terms have high correlation.

Next, to clarify how many terms are necessary to express game characteristics in a minimum number, we divided the 46 evaluation terms into some groups in which correlation coefficients are over 0.4 in the result of the cluster analysis. Because two groups, whose correlation coefficient is under 0.4, are considered that the feelings of two groups are different any more. As a result, the 46 evaluation terms were classified into six groups as shown in Table 2.

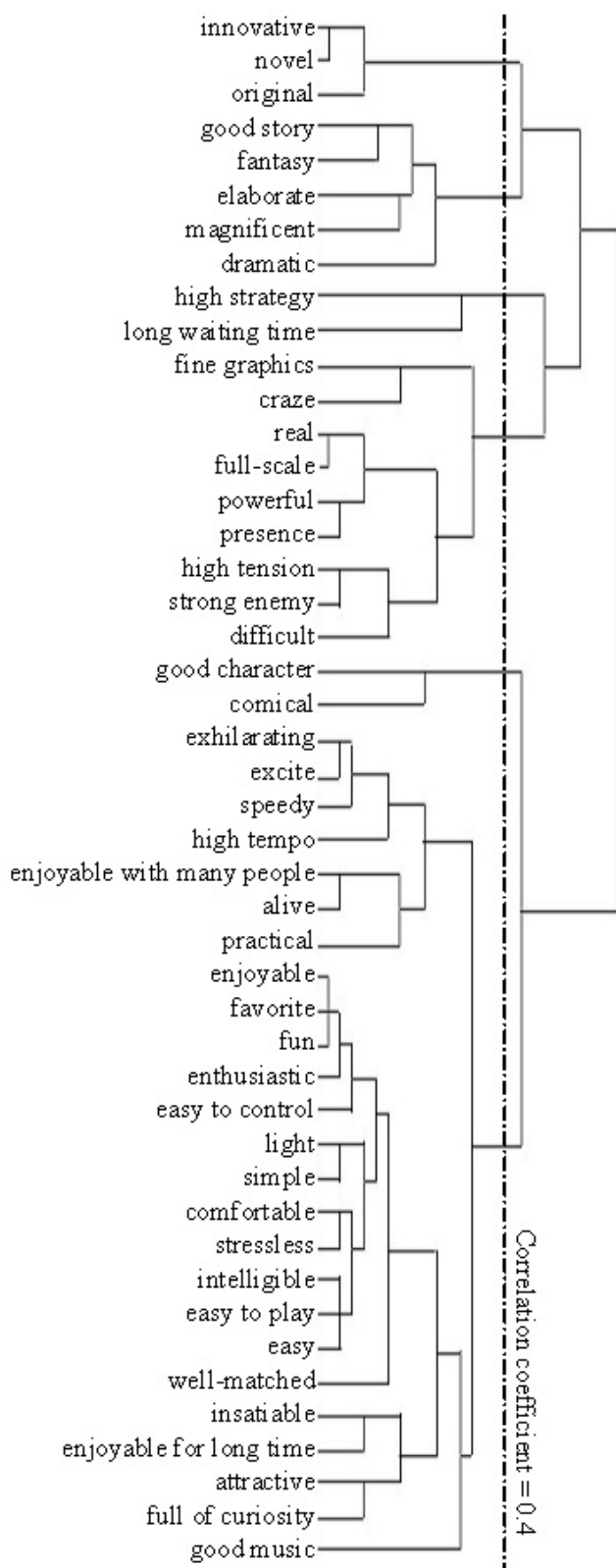


Figure 1. Result of cluster analysis

Table 2. Evaluation terms grouped by a cluster analysis.

gr.	terms
1	innovative , novel , original
2	fantasy , magnificent , elaborate, good story , dramatic
3	long waiting time , high strategy
4	real , full-scale , presence, craze , powerful , fine graphics, high tension , strong enemy , difficult
5	comical , good character
6	enjoyable with many people , enjoyable , fun, high tempo , exhilarating , alive, practical , excite , favorite, speedy , enthusiastic , easy to control, light , simple , comfortable, stressless , intelligible, easy to play , easy , well-matched, insatiable , enjoyable for long time , attractive, full of curiosity , good music

The first group includes the terms concerning with new and innovative meaning, the second group includes the terms concerning with spectacular and fantasy meaning, the third group includes the terms concerning with complex and high load meaning, the fourth group includes the presence and reality meaning terms, the fifth group includes the terms concerning with the characteristics of the game character, and the sixth group includes the terms concerning with enjoyable and interesting.

In order to select the representative evaluation terms from the six groups, the term which had largest standard deviation among the played 20 games in each group was selected. Because the term which had large standard deviation is considered to distinguish the game characteristics clearly. Table. 3 shows the calculation result of standard deviation in each evaluation term. As results, "innovative" from the first group, "fantasy" from the second group, "long waiting time" from the third group, "reality" from the fourth group, "comical" from the fifth group, and "enjoyable with many people" from the sixth group were selected as representative evaluation terms from the six groups.

From a series of experiments and analyses, we could select six representative evaluation terms from 51 terms, those are familiar with game users and can express game characteristics effectively in a minimum number of terms.

Table 3. Standard deviation of evaluation term in each group.

gr.	term	S.D.
1	<b>innovative</b>	<b>0.873</b>
	novel	0.675
	original	0.557
2	<b>fantasy</b>	<b>1.151</b>
	magnificent	0.934
	elaborate	0.423
	good story	1.088
	dramatic	0.485
3	<b>long waiting time</b>	<b>0.981</b>
	high strategy	0.660
4	<b>real</b>	<b>1.169</b>
	full-scale	0.714
	presence	0.762
	craze	0.475
	powerful	0.808
	fine graphics	0.763
	high tension	0.997
	strong enemy	1.017
	difficult	0.951
5	<b>comical</b>	<b>1.338</b>
	good character	1.004
6	<b>enjoyable with many people</b>	<b>1.325</b>
	enjoyable	0.684
	fun	0.598
	high tempo	0.773
	exhilarating	0.857
	alive	0.999
	practical	0.577
	excite	0.698
	favorite	0.722
	speedy	1.091
	enthusiastic	0.562
	easy to control	0.692
	light	1.010
	simple	0.711
	comfortable	0.621
	stressless	0.653
	intelligible	0.868
	easy to play	0.884
	easy	1.057
	well-matched	0.473
	insatiable	0.459
	enjoyable for long time	0.617
	attractive	0.528
	full of curiosity	0.498
	good music	0.729

## 5. Conclusion

In this study, to select appropriate evaluation terms which represent video game characteristics, we collected evaluation terms from game magazines and user questionnaires, and performed an experiment of video game evaluation. As a result, we selected six kinds of evaluation terms by applying statistical analyses. The terms are "innovative," "fantasy," "long waiting time," "reality," "comical," and "enjoyable with many people."

By setting the appropriate evaluation terms, it is considered that the users can select their desired software easily and the makers can develop software considering their users feelings.

## References

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