Modeling Player-Character Engagement in Single-Player Character-Driven Games

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Abstract. This pilot study looks at how the formal features of character-driven games can be used to explain player-character engagement. Questionnaire data (N=206), formal game features (in 11 games), and ordinal regression were used in the analysis. The results show that *interactive dialogue* and *cut-scenes showing the romances* between the player-character and another character relates to higher character engagement scores, while *romance modeling* and *friendship modeling* relate to lower character engagement scores.

Keywords: ordinal regression, player-character, engagement, identification.

1 Introduction

This is a pilot study that aims to isolate formal game features that contribute toward player-character engagement. The focus of this study is on single-player character-driven games. Lankoski's theory [1] is used as the basis of the study. In order to evaluate connection between games and engagement, the formal game features are classified and then evaluated by using ordinal regression and self-reported engagement scores.

Lankoski [1] argues that player-character engagement relates to goal-driven engagement and empathic engagement. Here I focus only on empathic engagement. Lankoski suggests that character engagement depends on how the character is presented; the kind of access that the player has to the characters actions, thoughts, and emotions; and how the player evaluates the character in terms of morals and aesthetics. [1]

The following formal features where selected (c.f., [1]): dialogue vs interactive dialogue, moral choices (no–yes), supporting different play styles (no–yes), cut-scenes with romantically content – romance in cut-scenes, appearance customization (no; possibility to change some aspects of the character, e.g., cloths, hair style); customizing sex and appearance, character development (no, scripted character development, player-guided character development), player character dialogue is voice acted (no–yes), romance/friendship modeling (some modeling, complex modeling as in *Dragon Age: Origins)*) and moral choices (no–yes).

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Most of these features relate to the kind of access the player has to the character except for appearance customization, play styles, and character development that relate more to the aesthetical and moral evaluation of the character (c.f., [1]). It is possible that this list does not include all the features that are relevant to player-character engagement and, hence, the analysis below reveals only the information on these features in relation to the feature set.

2 Method

Player-character engagement is measured by using a single 5-point Likert scale question: I identified with my player-character (1: totally disagree, 5: totally agree). Here the concept of identification is used in the questionnaire as I assumed that the term is more familiar to players than that of engagement.

A non-proportional quota sampling method was used. The target was to set to 20 answers for each game. In addition the target for female respondents was set to 25%.

Respondents were gathered by advertising the study in Facebook, Twitter, Google+, and pelilauta.fi as well as in two forums dedicated to *Assassin Creed: Brotherhood* and *Uncharted 2: Among Thieves* whenever there was a need to gather more answers about those games. In addition, to get more answers from females, the study was advertised in a Finnish girl gamer forum.

The data was gathered by using two questionnaires. One-half of the games was in the first questionnaire and the other half in the second questionnaire.

I selected popular, rather new games for the study to ensure that the sufficient amount of answers were obtained. The games are listed in figure 1. The games were played and judged base on whether they have the aforementioned formal features.

The data were analyzed by using ordinal regression and mixed effect models. R [2] and cumulative link mixed models (clmm) from the ordinal package [3] were used. The Gauss-Hermite quadrature approximation with ten points was used in the analysis. No structure (except that $1 < 2 < ... < 5$) were assumed in the ordinal scale. Subjects were modeled as a random effect.

Stepwise model selection by using Aikake's Information Criterion (AIC) was used. The model with the lowest AIC was selected, However, simpler model was preferred when the models were not statistically different (by using the likelihood ratio test).

3 Results

The total number of subjects in the study is 206. However, there can be overlap, as the data was collected through two anonymous questionnaires. The mean age of the respondents of the questionnaires is 28.49 (min = 13.00, max = 51.00). 68.9 % of the respondents are male and 31.1 % female. 66% of the respondents are from Finland, 15 % from Sweden, 4 % from the US, and the rest from different countries. 21.4 % of the respondents had obtained high school eduction, 5.5 %

	Romance in cut-scenes	Moral choices	Perspective	Different play styles	Apppearance customization	Romance modeling	Interactive dialogue	Character development	Voice-acted PC dialogue	Friendship modeling
Fallout 3	no	yes	1st*	yes	yes	no	yes	yes	no	some
Dragon Age: Origins	yes	yes	3rd	yes	yes	yes	yes	yes	no	yes
Red Dead Redemption	yes	yes	3rd	yes	some	no	no	no	yes	no
Dragon Age 2	yes	yes	3rd	yes	yes	yes	yes	yes	yes	yes
Elder Scrolls V: Skyrim	yes	yes	1st*	yes	yes	some	yes	yes	no	some
Mass Effect 2	yes	yes	3rd	yes	yes	yes	yes	yes	yes	yes
Deus Ex: Human Revolution	yes	yes	mixed	yes	no	no	yes	yes	yes	some
Assassins Creed: Brotherhood	yes	yes	3rd	no	some	no	no	some	yes	no
Batman: Arkham Asylum	no	no	3rd	yes	no	no	no	yes	yes	no
Grand Theft Auto IV	yes	yes	3rd	no	some	yes	no	no	yes	yes
Uncharted 2: Among Thieves	yes	no	3rd	no	no	no	no	no	yes	no

Fig. 1. Categorization of games. The games with perspective *1st** have a default of a 1st person perspective, but allow playing using a 3rd person perspective.

vocational, 23.3 % college, 24.0 % bachelor, 18.5 % masters, 6.0 % doctoral, and 1.1 % other education. Figure 1 shows the various features of the games.

The predictor variables of the optimal model are *interactive dialogue*, *romance modeling*, *friendship modeling*, and *romance in cut-scenes* and *subject* is a random effect.[1]

The optimal model is significantly better ($p < .001$) than the null model containing only a random effect *subject*. This means that the data is explained better with the optimal model than by assuming that the player preferences would explain the data.

The random effect subject has a variance of 2.219 and a standard deviation of 1.489. The strongest positive effect is by *interactive dialogue* (2.1274, $CI_{95} = 1.4789 - 2.7759$). This means that the games having of interactive dialogue are estimated to have higher player engagement with their PCs. Showing romantic engagement in the cut-scenes emph(romance in cut-scenes: 0.6932, $CI_{95} = 0.1553 - 1.2310$) relates to higher scores in the terms of identification. The effect is considerably smaller than the effect of interactive dialogue. The games having romance (*yes*: -1.2650, $CI_{95} = -1.9054 - -0.6245$) or friendship modeling *(some*: -1.4392, $CI_{95} = -2.2342 - -0.6444$) have lower player-character engagement than the games without those features. As an effect, limited romance modeling (*romance some*: 0.0843, $CI_{95} = -0.6242 - 0.7929$) does not differ from

[1] Two models with lower thhe AIC was rejected, because there are problems in the models: Adding sex to the model decreases the AIC, but this model is not significantly better ($\Delta AIC = .493, p = .1143$) and the confidence interval for *sex* crosses zero (males and females are not significantly different). Hence, a simpler model is preferred. A model having a fixed effect with an interaction between *table-top role playing hobby, sex,* and *romance modeling* is significantly better than the optimal model ($\Delta AIC = 9.648$, p=.0009), but the confidence intervals of the interaction terms are very wide and cross zero. Hence, the model with interactions was rejected.

no romance modeling in a significant fashion (because the 95 % confidence intervals cross zero). The effect of limited friendship modeling (*friendship some*) could not be estimated because the model design is column rank deficient if the level is not dropped.

4 Discussion

As nonprobability sampling was used, the results are not directly generalizable by using probability theory. However, the optimal model indicates that the different backgrounds has no significant role in the results. However, the study includes only 11 games. The implementation of formal features can have an impact on the results. Finally, if some formal feature that is relevant to player-character engagement is *not* included in the list of features used in the model selection, the relevance of the feature cannot be evaluated (e.g., the set of games does not contain pure 1st person games such as *Half-Life*). To conclude, I believe that the results are somewhat generalizable to the population outside the sample, but it is likely that the results are tied to the implementation of the formal features within the games in this study.

The results indicate that interactive dialogue and showing romantic episodes in the cut-scenes relate to a higher player-character engagement. Interactive dialogue in all the games in this study contains dialogue options that can be used to present different types of personalities (e.g., in *Dragon Age 2* one can select from diplomatic/helpful, humorous/charming, and aggressive/direct lines). This allows the players to modulate the character towards their preferences. This can contribute towards positive evaluation of the character and a higher engagement (c.f., Lankoski[1]). Surprisingly, romance and friendship modeling relate to lower player-character engagement scores. This might relate to the quality of the modeling.

In this study I am able to connect formal game features to the identification self-evaluation scores by using ordinal regression. However, using only one question in the questionnaire is being simplistic. Using more nuanced measurements for evaluating player-character engagement remains to be done in a future work.

References

1. Lankoski, P.: Player character engagement in computer games. Games and Culture 6, 291–311 (2011)
2. R Development Core Team: R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria (2012) ISBN 3-900051-07-0
3. Christensen, R.H.B.: Ordinal—regression models for ordinal data (2122) R package version 2012.01-19, `http://www.cran.r-project.org/package=ordinal/`