Mapping the game landscape: Locating genres using functional classification

Steve Dahlskog
Malmö University
Ö. Varvsgatan 11a
205 06 Malmö, Sweden
steve.dahlskog@mah.se

Andreas Kamstrup
IT University of Copenhagen
Rued Langgaards Vej 7
2300 København, Denmark
anka@itu.dk

Espen Aarseth
IT University of Copenhagen
Rued Langgaards Vej 7
2300 København, Denmark
lastname@itu.dk

ABSTRACT

Are typical computer game genres still valid descriptors and useful for describing game structure and game content? Games have changed from simple to complex and from single function to multi function. By identifying structural differences in game elements we develop a more nuanced model to categorized games and use cluster analysis as a descriptive tool in order to do so. The cluster analysis of 75 functionally different games shows that the two perspectives (omnipresent and vagrant), as well as challenges, mutability and savability are important functional categories to use in order to describe games.

Author Keywords

Game analysis, game typology, cluster analysis, digital games

BACKGROUND

Digital games have been a part of human entertainment for more than thirty years. During that time digital games have grown from an arcade game industry run from the homes of entrepreneurs, via early adopters and enthusiasts of game consoles and home computers, to a place in our living rooms that is almost taken for granted. As the market grows the number of different types of games also grows and with this the need for categorizing different games into genres arises. Digital games are today discussed amongst players, journalists, developers and scholars and if the different parties in the field are to be able to communicate in a more precise and accurate way, they might need something to replace genres, that do not depend on arbitrary graphics, hyped buzz words created by sales divisions or creative journalistic vocabulary, all of which are applied with a fair amount of chance and without any methodological backbone. In other words we 1) see a growing need for unfolding what we actually mean, when we talk of genres like action games, sports games, strategy games or adventure games and 2) ask ourselves whether the classical genre categorizations are worn out and are becoming empty signifiers?

Previous work

Apart from trying to describe games from a design perspective with the use of design patterns in game design as well as the use of an activity-based description like Björk & Holopainen [6], there has been a lot of work done on a different approach, the game-ontological approach of Aarseth [1], Aarseth, Smedstad & Synnanå [3] and Elverdam and Aarseth [9]. This game-ontological approach builds on identifying functional categories and conditions that are important to the game. Some examples of such different functional categories are the possibility of saving a game state or not (savability), the possibility of evolving avatar characteristics, e.g. leveling up (mutability) and the presence of an opponent equal to the player (challenge).

TYPOLOGY REVIEW

Building on the model suggested by Elverdam and Aarseth [9], we suggest the following functional categories:

- Perspective, determines whether the player has an overall view (omnipresent) and / or has to follow a game token (vagrant).
- Position, determines whether the player can describe his or her position exact (absolute) or must describe it in relation to objects (relative).
- Environment describes if the player can make additions or alterations to the game space (free) or only alter the predefined positions (fixed) or no changed can be done (none).
- Representation Time, describes how times is represented in the game; either reflecting the way it is in our own world (mimetic) or not (arbitrary).
- Teleology, describes whether the game ends at a given state (finite) or not (infinite).
- Adversary, describes whether the player's opposition is based on AI controlled agents (none), one adversary (two players) or many (multiplayer).

Breaking New Ground: Innovation in Games, Play, Practice and Theory. Proceedings of DiGRA 2009

- Team, describes whether the player's performance is based on individual (individual) actions or is bonded with someone else (team).
- Challenge, describes if the opposition of the game is the same every time (identical), randomized (instance) or with the use of autonomous agents (agent).
- Goals, describes whether the game has an exact victory condition (absolute) or if it is unique to of a game session like the score in Soccer match (relative).
- Haste, describes whether the passing of time changes the game state.
- Synchronicity, describes whether game agents (players, avatars, AI controlled game tokens) can act at the same time.
- Interval control, describes whether a player can control game time.
- Mutability, describes how changes in the game state affect the game agents like leveling up or with the use of power ups. They could be passing over time (temporal), throughout the game (finite) or beyond different game instance (infinite).
- Savability, describes whether the game state can be saved freely (unlimited), under certain circumstances (conditional) or not (none).

The categories are described in detail in Elverdam and Aarseth [9] and allow for some 50 000 different functionally different games. All games are not functionally different and among these 50 000 theoretical and possible functionally different games we will have gaps. The gaps might be big enough to identify groups of games that share functional categories enough to see them as genres.

We have conducted minor changes to the model, to ensure it was appropriate for us to use – by refreshing the used vocabulary and definitions and by making sure that the typology is useful for data collection in a more practical study than its prior use as a theoretical framework. As seen above, the typology contains 14 categories which are based on the prior models (Aarseth 1997, Aarseth, Smedstad & Synnanå 2003, Elverdam & Aarseth, 2005). Compared to the earlier models we have left out categories that cover physical game space. In order to allow for an empirical use of the categories in analysis of a large number of games as well as for the mathematical algorithms in cluster analysis we transform these 14 categories into a matrix with 17 different functional categories. The extended number of categories allow for games that for instance use both an omnipresent and vagrant perspective.

Naturally we recognize that any model with ambitions to describe a complex phenomenon like digital games are bound to sometimes come up short. In choosing the 17 categories we are aware that some games have unique designs, which can be difficult to fit into the categories. Further we recognize that there is a potential problem in first establishing the categories and then fitting the games into them. At some point in the process of developing the 17 categories, other functional categories were suggested, like "Fog of War" and "Black Canvas", functions that have had impact on mainly RTS and strategy games. "Fog of War" could be described as the hiding of specific and often dynamic game space information (like enemy units movement and position) when none of the player's own game tokens are in vision range of that part of territory (or game space). A player may only see parts of the game space where the player have units. "Black Canvas" is primarily a part of "Fog of War"-concept, in games were the players have to traverse all positions of the game space, in order for the player to have knowledge of more static game space information (like terrain). In the initial phase of games that exercise the "Black Canvas" function, the player can only observe a black square instead of the in game map. If a game only has the "Fog of War" function, some information of the terrain of the game space is portrayed in the map. Ultimately we decided not to include these two categories, because they are applicable only to a small sector of games.

It is important to emphasize the flexibility of the typology: E.g. if a psychologist interested in studying game violence were to categorize games, she would be able to add categories such as as "Winning conditions related to killing adversary", "Adversary graphically resembles human being(s)" and so forth.

DATA COLLECTION

In order to establish the data material for the cluster analysis a large volume of digital games were classified according to the functional categories mentioned above. The games were selected based on the following criteria 1) the availability on the European and Nordic market, 2) the impact the game had in the history of digital games, either by a) design, b) large penetration of the market or c) critically acclaimed. It is imperative to stress that the actual result of a cluster analysis can vary quite a bit, if you for instance, let only availability, sales numbers, and the level of impact or journalistic reviews count. We have chosen a broad approach and thereby taking many of the previous mentioned aspects under consideration.

A number of issues arose during the selection process. E.g. what is a gaming platform, and how many should be acknowledged? In order to be able to pick games that could be viewed as suitable for this type of study we must choose platforms that are somehow seen as significant for the history of digital gaming. The, another factor is the availability of such a platform when the study is made. Consider for instance the handheld electronic game Mattel Auto Race [11] from Mattel Electronics, which is very hard to find in working condition today because of its

deterioration over the last thirty years. Another focal point is the geographical distribution of platforms and games. The world market for digital games is divided into submarkets like the USA and Canada, Japan, Europe, Australia, South America, Africa, South-east Asia etc. It is near impossible to have access to all games on a specific platform, unless the platform is the base for only a handful of games. Apart from the dividing of games into submarkets we also has a language and perhaps a cultural problem to overcome in order to access all significant games. Games that only have localization in one language, except English, may, even though they are important in one market, have an extremely limited impact in the rest of the world and thus be rendered unimportant. Some games have been played by many over the years but are typically not part of any game canon, such as Minesweeper [14].

One problematic part of the analysis of the games is that several of the functional categories can be present at the same time, depending on how rich and complex the piece of game software is. In order to minimize the impact of such mega-games on the cluster analysis, we focus on the prime gameplay mode of each game, and clearly state which one of the different gameplay modes we have analyzed. An example could be *World of Warcraft* [7]. The analyst has, for instance, in this case to choose between a gameplay mode of Player vs Player (PvP) or Player vs Environment (PvE, or Player vs Monsters - PvM).

Another challenge during this type of analysis is to be certain which of the functional categories are present within the game. As an example a well known game like *Pac-Man* [13], presents a bit of a conundrum on the functional category of goals. Pac-Man can on the first glance seem to be a game with relative goals, since you play to get the highest score possible or survive the longest. However, since the Pac-Man videogame have a so called "kill screen" (a level where the videogame always crashes, present in some arcade games) on level 256 one could argue for the case that Pac-Man is a game with an absolute goal instead. To further complicate things players have the possibility to impose a gameplay mode on Pac-man in which there is a a different goal, the fastest perfect play, in which the player has to eat every possible dot, power-up dot, fruit and monster in the first 255 levels as fast as possible. Currently this gameplay mode is used to determine who the World record holder of Pac-Man is, but it is by contrast a gameplay mode that very few players choose to play.

A further problem of play-based analytical approaches, in order for the analyst to know the game and describe its functional categories, is that the analyst must decide on an appropriate level of game knowledge and position towards the game. Aarseth [2] have stated that "the position vis-à-vis the game" could, for instance, be to decide what type of player the analyst is (newbie, casual or hardcore) or how much research the analyst have to do prior to playing the game. The main factor on how time-consuming a title is to analyze, is of course, how complex the gameplay is, as well as how far the analyst has to progress in the game in order to make a possible observation of all functional categories. The actual time spent during this phase is also dependent on the analyst position toward the game, as well as the amount of time previous invested in the game.

In this case we were three game players with a fair amount of diverse game experience, and thus able to draw on our personal game histories for much of the data collection. A larger number of data collectors would probably lead to a larger dataset, but at the expense of a much larger possibility for classificatory errors and inconsistencies.

Before commencing with the actual cluster analysis and interpreting the results, we verified our common understanding of the model by choosing 10 games that all participants classified according to the functional categories, thereby ensuring that we agreed on how to understand the 17 categories.

The analysis of the games were stored in a spreadsheet and later transferred to the *SPSS* software [15]. The final step in the preparation was to remove functionally identical objects in order to hinder an unbalanced analysis which would result in a cluster analysis were clusters would contain more than one functional identical game and thus distort the result. The use of functionally unique games – games that are not identical according the functional categories of the model, allow for the identification of different genres and which genres that are related. This approach turns the use of the cluster analysis into a descriptive method and not primarily a statistical method. By using a descriptive method we hope to map up the gaming landscape and thus understand it better. If we wanted to localize the most heavily populated genres we would naturally not want to delete duplets and thereby lose important information regarding the data population. For this paper the most important issue at hand is to develop the method and following this, do an initial mapping of the gaming landscape.

CLUSTER ANALYSIS

The cluster analysis was made in two different approaches, one based on the functional categories and one based on the games themselves. The first cluster analysis would show the importance of the different functional categories and the second one would show which games are close related based on what functional categories they share or perhaps even show genres, either new or the traditional ones. By excluding some games different results could be obtained. If we e.g. perform the cluster analysis on games in a certain time span we could show how different functional categories have grown in importance or keep its importance during game history. If this approach was applied to the different platforms we could get results on what functional categories or perhaps genres are important for different platforms.

When interpreting the cluster analysis results, we identify the largest clusters in a dendrogram and correlate what members (games or functional categories) it contains. An important aspect to consider during the analysis is to identify clusters that have few connections to other clusters, because these might result in a genre. By identifying clusters we might also identify which games are related to each other or which functional categories that is significant for the digital game landscape.

The output from the SPSS software is rather simple to analyze because of the methodological approach under which this study was conducted. The first analysis (based on the functional categories) renders a dendrogram with different clusters around the two perspectives (omnipresent and vagrant), and more remote clusters with challenges, mutability and savability that indicate their importance. With these clusters we suggest that the most important characteristics for categorization of games are the possibility of saving a game state (savability), the possibility of evolving avatar characteristics, e.g. leveling up (mutability) and the presence of an opponent equal to the player (challenge). Further more, we stress the importance of perspective (either a perspective that is limited by the game or a perspective with perfect information) as a categorical factor.

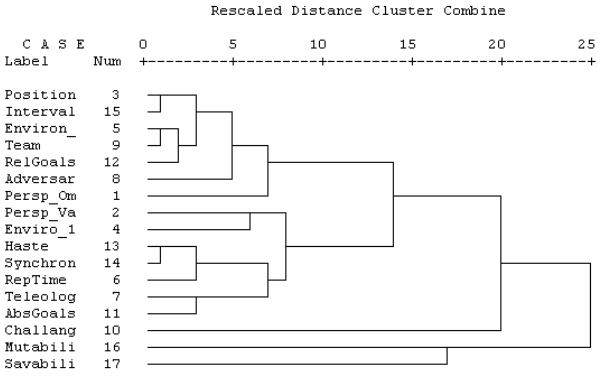

Figure 1: Cluster analysis results of categories

The cluster analysis of games instead of categories gives clusters that suggest some form of genres around games that share gameplay with strategy games like *Civilization 4* [10], First Person Shooter (FPS) games like *Counter-Strike* [17] and several arcade-style, historical games based around perfect information like *Pac-Man* as well as games based on progression, either on the evolution of the player avatar or avatars, like *Final Fantasy* [16], the evolution of a story, like *Baldur's Gate* [5], or the exploration of game space like *Myst* [8].

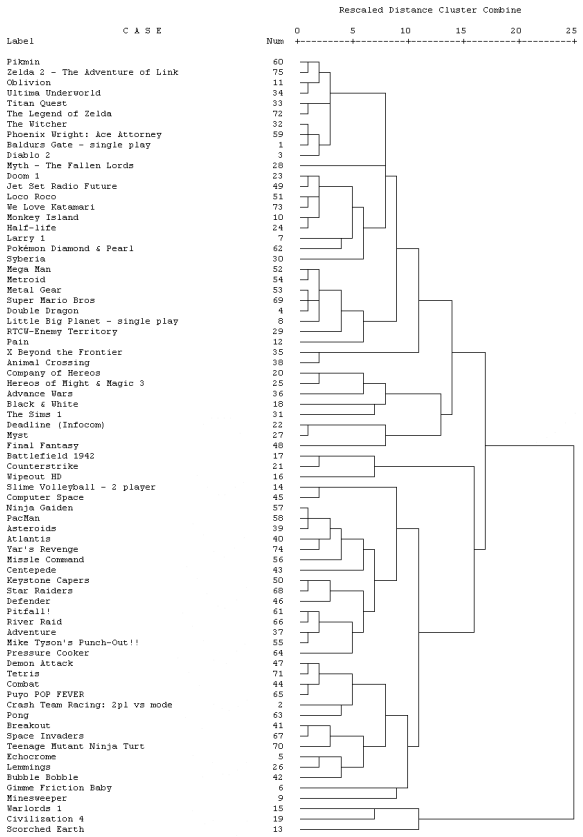

Figure 2: Cluster analysis results of different games

Further work

We suggest that the data gathered for this study is used with other descriptive techniques in order to better understand the digital game landscape. For instance, by using correspondence analysis on the data and thereby identifying functional genres in multidimensional space, which in turn can be used to describe games and their characteristics more accurately than the current genres like Role Playing Games (RPG), Real Time Strategy games (RTS), FPS, sports games and action games we will hopefully have a better understanding of the popularity of certain genres and perhaps also individual games.

Conclusion

When applying the analysis of games and a chronological perspective we can see a pattern emerging when we move through the digital game library from *Pong* [4] to *The Sims* [12]. The early games do not contain many of the 17 functional categories but later on more and more categories are identified as game elements. From this we hypothesize that other functional categories may emerge with the future development of game design.

In the chronological perspective we can also follow how different functional categories become part of the games

over time. For instance we can see that many games in the beginning share a common trait of using omnipresent perspective of the game. This can be explained as a way to facilitate a multiplayer view on a single screen with no possibility of using Internet as a communication platform for digital games, but it is also likely that the early game designers did try to mimic old-fashioned sports and board games when designing games for computers and digital game consoles. The chronological perspective shows us how the game space of digital games has grown over time as well as the importance of game space for players and the games themselves. The move away from perfect information in a game to a game where exploration and uncertainty is more important might suggest an explanation to why and that even more players will engage in games with large game space as well as social games like Massive Multiplayer Online Role Playing Games (MMORPG:s).

Furthermore, we hope that by describing the four main clusters that these 100 games (75 functionally different games) add up to, allow for a more distinct approach for game scholars to analyze and describe digital games instead of using imprecise genres like action games and RPGs. The four main clusters of games are;

1) strategy games,
2) First Person Shooters (or rather games where the player controls an avatar in the game space based on vagrant positioning and camera placement),
3) Progression and Exploration Games (the exploration of story, character or game world) and
4) Perfect Information Games (all information on the game state is available to the player, sharing resemblance to traditional physical games like Chess or Go).

These four clusters may be enough to be valid descriptors and useful for describing game structure and game content from a high level as well as tool to group games before scholars engage in an analysis based on another more fine-grained method or model.

REFERENCES

1. Aarseth, E. *Cybertext: Perspectives on Ergodic Literature*. Johns Hopkins University Press. Baltimore MA. 1997.

2. Aarseth, E. “Playing Research: Methodological approaches to game analysis” in *Game Approaches Papers* from spilforskning.dk Conference, august 28-29 2003 Spilforskning.dk. 2004.

3. Aarseth, E., Smedstad S. M. & Sunnanå L. "A multi-dimensional typology of games," presented at the DIGRA/Level Up conference, Utrecht, November 4th 2003. Published in Marinka Copier and Joost Raessens (eds.) *Digital Games Research Conference*, (Utrecht University) pp. 48-53. 2003.

4. Atari. *Pong* [Videogame], Sunnyvale, CA: Atari. 1972.

5. BioWare. *Baldur’s Gate* [Videogame], Orange County, CA: Black Isle Studios. 1998.

6. Björk, S. & Holopainen, J. *Patterns in game design* Stamford, CT: Cengage Learning. 2005.

7. Blizzard Entertainment. *World of Warcraft* [Videogame], Irvine, CA: Blizzard Entertainment. 2004.

8. Cyan Worlds. *Myst* [Videogame], Eugene, OR: Brøderbund. 1993.

9. Elverdam C. & Aarseth E. “Game Classification as Game Design: Construction Through Critical Analysis.” In DIGRA Conf. 2005, published in *Games and Culture* 2007.

10. Firaxis Games. *Civilization 4* [Videogame], New York, NY: 2K Games. 2005.

11. Mattel. *Mattel Auto Race* [Electronic game], El Segundo, CA: Mattel. 1976.

12. Maxis. *The Sims* [Videogame], Redwood City, CA: Electronic Arts. 2000.

13. Namco. *Pac-Man* [Videogame], Tokyo, Japan: Namco. 1980.

14. Oberon Games. *Minesweeper* [Videogame], Seattle, WA: Microsoft. 1992.

15. SPSS Inc. *SPSS* version 16 [software], Chicago IL: SPSS Inc. 2008.

16. Square. *Final Fantasy* [Videogame], Tokyo, Japan: Nintendo. 1987

17. Valve. *Counter-Strike* [Videogame], Paris, France: Vivendi Universal. 1998