A Topographical Study of Persuasive Play in Digital Games

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ABSTRACT

Expanding the bounds of digital educational games, this research describes the characteristics of games designed to modify player perspective, understanding, interests, activities or opinions. These persuasive play games include social impact games, games for change, and others games designed to persuade players. In summary the characteristics of 150 such games are reported through three broad categories of development, design and play experience. This summary of results focuses on digital play and proves effective at providing a topographical view of the state of play designed for extrinsic action and understanding. The focus of this research is the design and development characteristics of such games.

Categories and Subject Descriptors

K.3.1 [**Computing Milieux**]: Computers and Education – computers in education

General Terms

Measurement, Documentation, Performance, Design, Human Factors

Keywords

Persuasive Play, Social Impact Games, Computer Games, Digital Games, Advergames, Games for Change, Serious Games

1. Introduction

Research in persuasive play is relatively new. Although most explicitly proposed by Ian Bogost in the book Persuasive Play [1], the concept combines the heuristics of psychology, marketing, education and game design to effect player perspectives and understanding. Its evolution is quite expected as the mass adoption of specific media often results in varied attempts to exploit the convincing potential of that media [2]. Books, newspapers, film and music evolved to include a variety of

persuasive approaches more commonly recognized as propaganda and marketing. Games and the realm of play have been used to both sell items and ideas. Whether used to promote social good or promote a brand, the use of persuasive play continues to evolve.

This research provides the first formal, academic analysis of the state of these practices as they relate to digital games. The goal is simply to catalog the state of the practice in individual areas under the larger umbrella of persuasive play in the digital domain. This is a study of games as artifacts. It reports on characteristics witnessed from a wide view of persuasive play games. It does not focus on the how, it merely focuses on the what. It describes what choices developers and designers make, in an effort to capture the visual, audio, and other sensuous characteristics of such games. Combining such research with prescriptive observations on heuristics of captology [3] and general game industry research should produce a more complete view of persuasive gameplay.

To clarify the focus, each of the games studied must have an explicitly identified game goal of persuasion. Such persuasion may take the form of encouraging consumer action (e.g. advergame), social action (e.g. social impact game), educational understanding (e.g. educational game) or complimentary approaches. Games that aim to teach a language, for example, are not the focus of this research because such games may seek to educate, but they do not seek to persuade. If such a game sought to demonstrate the value of one language over another, such a game would fall under the domain of persuasive play.

It is important to understand that persuasive play in non-digital play is not new. It can and has been argued that analog play is full of argument designed to persuade players [4] [5]. The specific study of digital play is far more limited. Combined with the nearly absent large-scale analysis of such game designs, this study of 150 games should prove exceptionally valuable to the researchers, designers, and developers of a variety of digital games. It serves as a view into the state of persuasive play games.

2. Methodology

This research was gathered and analyzed by a group of seven investigators over 6 months between June and December of 2011. All researchers were required to participate in training to standardize reporting. Each researcher learned the interdisciplinary terminology and data collection standards for the research.

As part of the data integrity and coder evaluation process, all researchers coded games in a test bed database before contributing

to the final research data set. All anomalies in the test database were evaluated and researchers were either retrained or the coding instrument adjusted to accommodate the anomaly. During this process two prospective researchers were removed from the study for failure to produce consistent results.

All researchers were between the ages of 19-35 and all were experienced game players who played digital games at least 5-10 hours a week. The final research team consisted of 2 females and 5 males. The results from 1 female and 1 male were removed from the reporting data set because their data was incomplete for the games they were required to evaluate. The data presented here is based on the 5 researchers who completed the work and the analysis conducted by the two research architects.

Over a period of 10 weeks each researcher investigated 10 games weekly. Each researcher played the game then collected data based on play sessions, web metrics, developer released data, and game postmortems. This data was collected in a simple relational database. More than 200 individual games were played and researched multiple times. A subset of that data is presented here. This subset excludes games for which data was deemed unreliable or incomplete.

All of the digital games studied were randomly collected from several online resources. The Games for Change festival website [6], Advergames.com [7], CandyStand.com [8], Molleindustria [9], the Meaningful Play conference [10] and others.

The games to be studied were chosen at random. When they were studied the researcher used the primary developer resource for evaluation. This typically meant that the online resources for the games were not the location through which the game was played. If a game were listed on the Games for Change Festival website, for example, the researchers used the latest versions of the game supplied by the developer. This was essential to understanding all play formats available, assessing the full version of the game, and understanding game distribution channels.

Inter-coder reliability was determined by two methods. First, every researcher was allocated a 10% overlap in games studied. The duplicate data was evaluated for quality and reliability. It was determined that there was no significant variance between redundant data collected. All such duplicate data was removed for accurately reporting results. Additionally, a random set of 15 games was re-coded by the research architects once the coding period had ended. No significant difference between the recoded games and the original data set was noted.

All researchers used one of two types of laptop computers to evaluate the games. Each researcher had available a Lenovo G560 laptop, Apple Macbook Pro, and iPhone 3G. An external mouse and Logitech gamepad F310 were also available to each researcher.

In sum, the researchers collected 55 characteristics about their play sessions and the games. These characteristic groups included 15 design items, 9 developer items, 5 art items, 5 educational content items, 4 implementation items, 3 sound items and 14 researcher related characteristics. The generalized findings for each of these are described in the following sections. These generalized findings include only the most reliable data from this large set of attributes.

3. Research Findings

3.1 Development

In terms of development, the researchers were primarily interested in understanding how persuasive play games were made. In this study 92% of the games were implemented through a web based solution such as Flash, Java plug-ins or HTML 5.

Windows downloads were available as primary or secondary play for 9% of the games, and 5% offered Mac operating system downloads. The study included only 1 game for mobile devices.

These results include games that were available in more than one format. There are games, for example, that were available for web based play and windows download. In such cases the game play type was subcategorized as primary or secondary play options. When more than one version of the game was made available, primary and secondary play types were determined via the most widely disseminated version of a game. Under this model less than 2% of the games studied offered a download as the primary play type, with web based solution as secondary.

Games available only as downloads ranged from large 3D games like Wolfquest [11] at 214mb to small 2D games like Harpooned [12] at 11mb.

The human-factors interactions were largely based on mouse-keyboard interaction. 76% of the games required a mouse or single point touch device to play or initiate play. 56% required a conventional keyboard as well.

Part of understanding the production model, is understanding the organizational structure under which these games were produced. 74% of the games studied were explicitly developed by a private or public business. 7% were developed by a governmental or non-governmental organization. Just under 3% were developed by students. The remaining games had developers that could not be determined or were purposefully obscured.

To determine the organizational structure, researchers combined multiple resources. Public companies based in the United States and some European countries are required to provide annual reports indicating company size, profits, and number of employees. Other developer information was collected from developer provided post-mortems, grant announcements, festival announcements, competition prize announcements and related publicly available data.

Game length was recorded as less than 10 minutes, less than 1 hour, 1-10 hours and 10 or more horse. These intervals were revised, after preliminary tests of the coding instrument revealed that an initial linear, half hour increment (e.g. less than 30 minutes, 30-60 minutes, 60-90 minutes) did not provide useful data. Play lengths were calculated by averaging multiple play sessions from the first moment play interaction started to the point at which the game announced its end or redirected the player to an external resources like a sponsor website

The games themselves were most often simple and short. 26% of the games could be completed in less than 10 minutes. 55% could be completed in less than 1 hour. Only 3% could be played for 10 or more hours without explicitly restarting the game multiple times. These long games tended to offer no explicit end (e.g. algorithmic play). In sum, 81% of the games could be completed in less than one hour

The games studied were overwhelming free. 96% of them could be played without fee. They were also fairly solitary experiences, with 90% requiring only one player. Multiplayer opportunities were generally offered as networked play with other players in remote locations.

3.2 Design

A larger collection of attributes were collected about the design of these games. To understand design objectives, researchers collected data on the type of objectives developers pursued. 68% of the games studied advertised a product. 25% were designed to create social impact or awareness. 10% were designed to deliver an explicit training agenda, and 8% sought to advertise a service.

Each of these groups was not considered mutually exclusive, although the games' primary objective was used to record game type. As an example, a game designed to teach colors through the Thomas the Train website, would be a game designed to advertise a product and education. This is because the goal of the developer is both to offer support in the development of color recognition in toddlers and perpetuation of the Thomas the Train product brand.

It should be noted that while it could be argued that all advertising is educational, the researchers were trained to categorize educational content. The fundamental criteria involved determining if the game provided extrinsic knowledge with demonstrable benefit beyond brand building.

3.2.1 Instructions

One factor determining the quality of play experience is the clarity of play instructions and play goal. 96% of the games provided some set of instructions. 4% of the game provided no visible or audible instructions at all. A lack of instructions did not always make a game unplayable.

83% provided the instructions at the start of the game, while 39% continued to offer them during gameplay. Interestingly, 31% also offered instructions after gameplay had been executed. These post-play instructions were most commonly offered after players performed poorly in the game or the game sought to emphasize its themes by explaining how the player could improve their performance. A few games provided instructions outside of the game, requiring players to visit a website or non-game resource to understand how to play. These external instructions represented only 6% of all the games studied.

The ease of understanding instructions can also be used to understand the relative complexity of a game. Only 76% of the games had instructions that could be understood by players in less than 1 minute. In particular, social impact games had the largest percentage of instructions that required more than 5 minutes to understand. 10% of all social impact games studied left players unclear as to game goals or how to accomplish games after 5 minutes of instruction review.

One particularly challenging instruction set was present in Garbage Dreams [13], a game about recycling. The game provides 9 separate instructions at the start of play. Once the instructions were reviewed, game goal was clear, but understanding how to play the game remained confusing. This was further compounded by a busy interface and a design that demanded extrinsic information about how to sort organic, paper and landfill waste. Although the game is part of a series of classroom lesson plans devised by the Public Broadcasting Service, it is publicly available and somewhat confusing to the uninitiated. The

confusion comes from a heavy reliance on the extrinsic experience of classroom training before play. The game is designed for 30 minutes of play by middle school students, but seems to require more than 10% of that time for preparatory instructions on playing the game. In this case, the instructions are part of a larger lesson plan which is not part of the casual player's general experience. Out of context, such a game would seem problematic. In context, and with an understanding that the game is both an evaluation tool and a persuasive tool, the game is considerable less problematic.

3.2.2 Image Representations

Image representations in games can be described as natural, abstracted or geometric. Using the general language of visual design, a natural form is one that is found in nature. An abstracted form represents its subject in a simplified, but recognizable manner. A geometric form is generated from common shapes. Using the criteria in this research, examples include an appropriately proportioned human player character (natural), a stick figure (abstracted) and a representative circle (geometric).

As shown in figure 1, 62% of the games studies used natural forms, while 31% used abstracted forms and 7% used geometric forms as the primary representation in the game. No game studied used only geometric forms, but some, like the Free Culture Game [14] had strong geometric forms. Pure natural forms typically came from interactive video games like Range Rover's Being Henry [15] which used filmed actors in play.
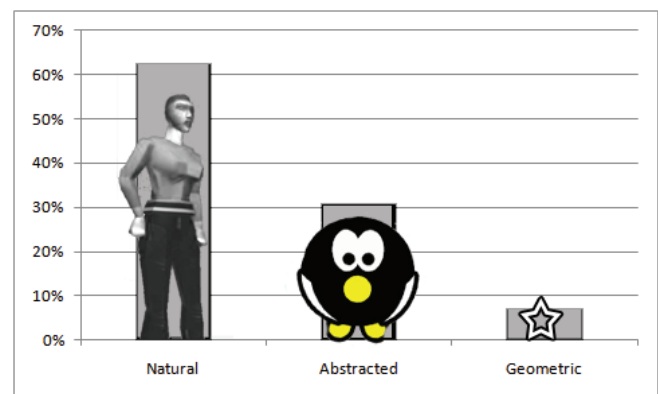

Figure 1. Image representations in persuasive play (with example image type)

Image rendering perspective information was also collected. Games were categorized as either two dimensional (i.e. 2D), three-dimensional (i.e. 3D), or 2D isometric/imitated 3D. 2D games offered no perspective projection. 3D games included both perspective projection and transformations (i.e. move, rotate, scale) within the gameplay environment. The third category, 2D isometric/imitated 3D was reserved for any game that provided perspective projection, but no transformations. Researchers coded depth based on the primary gameplay experience only.

These distinctions helped prevent ambiguity in perception between varied forms of projection (e.g. diametric, trimetric, oblique). Games that looked 3D, but afforded only 2 dimensions of movement were categorized as 2D isometric/imitated 3D. Distinguishing 3D from other categories of perspective was simplified by including movement criteria. If a player could not move in 3 dimensions with appropriate 3D projections, then the

game was considered 2D isometric/imitated 3D, even if it were rendered using a 3D game engine. This helped eliminate the deductive ambiguity of games with 3D art from games rendered in 3D. This categorization system precipitated from prior analysis which reveled the ambiguity of 2D or 3D from player perspective.

As shown in figure 2, two-dimensional gameplay was most common at 63% of the games studied. 23% of the games were 2D isometric/imitated 3D and only 14% were 3D. No games in the collection included stereoscopic 3D, which would have been recorded as a note on researcher's collected data about the game.
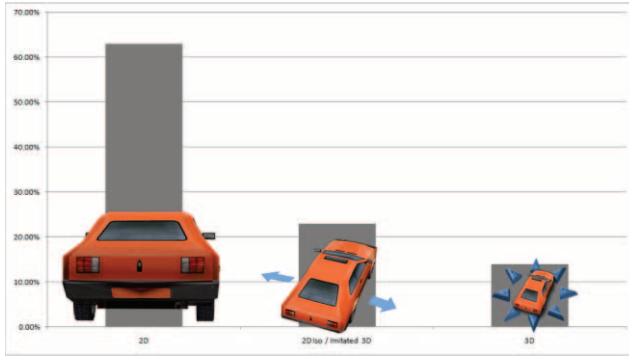

**Figure 2. Image depth in persuasive play
(with example image type)**

As demonstrated in the collected data, the compound image representations of 2D, natural forms are most common. This may imply that persuasive play producers bias toward literal representation (e.g. natural forms) at low computational costs (i.e. low commitment to 3D). Further investigation is required to understand this hypothesis.

3.2.3 Sound Representations
Two attributes of sonic qualities were recorded for each game. These were general sound timbre and overall music rhythm. The art and science of describing sounds qualities can be quite complex, but in keeping with the rest of the study researchers were introduced to the basic principles of the attributes they were recording.

Sound timber, or more simple, tone color was recorded as bright, neutral, or dark. These classifications were mutually exclusive, so that neutral timbre indicated a relatively even combination of bright and dark tone color. 52% of the games used a neutral tone. 34% of the games used bright timbre, and 14% were dark toned. Social-impact games demonstrated the most neutral tone use at 72%.

Music rhythms were recorded as fast, moderate or slow. 49% of all games were considered moderately paced. 32% were fast paced and 19% were slow. Games designed to advertise a service tended to be paced faster than any other group. 50% of games designed to advertise a service were fast paced, and 36% were moderately paced. Social impact games tended to be paced slower, with 61% moderate pace, and 26% slow. As social impact games covered serious topics, it may not be surprising that their audio is both paced slower and more neutrally toned. The faster pace of service selling games could relate to implied quality of service (i.e. fast rhythm connotes fast service), but further research needs to be conducted to make any assertions about the effect of such decisions. At this stage it as reasonable to believe fast rhythms connote fast service as it is to hypothesis fast rhythms imply sloppy service.

3.3 Play Experience
Researchers were asked to answer a series of questions related to their personal experience with the game. These questions were asked to both understand coder bias in the collection of data and to identify qualitative observations about the games studied.

Coders were allowed to choose whether to play the game via the web or as download. 92% of the coders chose to play the game through a web page when available. 5% of the games were played as Mac operating system downloads, and 3% were played as Windows downloads. The collected data indicates that when given the choice, the researchers chose to play the game online instead of available download versions.

98% of the games were played by a single player as a product of convenience. Researchers were not required to study the games with others, so it was often more convenient to play the games alone than invite another player into the lab for a play session. Future studies will seek to address this bias of convenience.

Researchers reported that they understood 91% of the games. The remaining 9% had at least one instruction that was unclear to the player. Regardless of their understanding, all researchers played each game to the best of their ability.

Researchers were required to play each game multiple times. 54% of the games were played between 15 and 45 minutes, with the average play session lasting just under 30 minutes. Each game was played for a minimum of 3 separate sessions.

After all play sessions for an individual game were completed, the researchers were asked to describe their feelings about the play experience. Only 54% of the games provided enjoyable experiences for the researchers. The most common complaints about the games were that they were poorly play balanced. Common statements about games that were not enjoyed included "too easy" or "difficult to play." However, games that were liked were often identified as "simple and easy" or "addicting." Such assertions hint at the fundamental concept of flow [16] offered by positive psychology. Enjoyable play balanced challenge with skill level, avoiding anxiety and preventing boredom.

The researchers were asked to evaluate whether or not the game could be deemed offensive. The criteria was very liberal, and included anything to which a person or group of persons might take offense, including put downs, stereotypes, or demeaning caricature. 31% of the games contained content such offensive content.

4. Observations
4.1 Human Computer Interactions
Several positive indicators are revealed from this study. It seems that some development decisions align well with the scope and scale of the games. The majority of these games were short, simple and web-playable. This is an essential and somewhat obvious consideration. A 5-minute download and installation seems disproportionate to a 10-minute play experience. This observation was also supported by the habits of the research team. The type of casual gameplay offered in these games lends itself well to the simple persuasive play goals pursued by the games studied. The games were generally easy to run and quick to offer

play. By these patterns, persuasive play games are more often like slogans than documentary films. They are quick, short, easily understood and require little player investment. The term "slogan gaming" applies to this persuasive play design model.

Web playable games were not always short play or simple games. The Great Piggy Bank Adventure [17] a web-playable training game for effective savings habits, offered some of the longest gameplay and complexity. However, it, like Get the Glass [18] derived their play from virtual board games. This design approach was rare and required more time than other games studied. Virtual dice rolls, picking character pieces, and watching players move on virtual boards added to the play time, but not the time the player committed actions in the game. The games require substantial amounts of time for players to complete, but also delivered persuasive content evenly over an extended period of time. Basic education and psychology theory indicates that extended exposure assists retention [19]. The benefit of this model requires further research, but such an approach sharply contrasts the general slogan gaming approach that dominates persuasive play.

From a human-computer-interaction perspective, the games studied were generally accessible. Notably, more games could be improved by considering the changing landscape of the web. While the previously dominant mouse-based interaction is losing ground to touch-enabled devices, many touch devices treat a single touch as a mouse selection. This means that in theory, single click games can be played on a touch device. Qualitatively, experimenting with playing some of the HTML5 games on the small screen of the Apple iPhone 3G resulted in several mis-clicks. The result, although not part of the formal research, indicates a general issue in universal accessibility.

However, the high number of games requiring both Adobe Flash and a computer keyboard is perhaps more concerning. As the use of tablets and web-enabled phones increases, these games will become less playable. Small touch screens struggle to provide on-screen keyboards and display games in the same limited space. Likewise Adobe's retreat from Flash support on mobile devices is likely to make Flash based games unplayable for such users. HTML 5 based games are more robust from this perspective, but they could benefit from a more sustained watch on universal accessibility standards. In particular zones of interaction and scale of text revealed incidental issues.

4.2 Game Design and Rule Sets
In a competitive environment attracting players is strongly effected by the clarity of rule sets and the enjoyability of play. Social Impact games demonstrated the most significant derivation from typical rule sets. As mentioned, as many as 10% of the social impact games studied offered instructions that were unclear after 5-minutes of review.

From the analysis, a few characteristics of such games became clear. These games tended to combine instructions with educational information about the social impact issues they address. This mean that players had to learn how to play at the same time they were learning about the game's topic. In basic educational terms, the player had to compete with two non-complimentary learning goals. The first is learning how to play the game, the second is learning about the game's topic. Unfortunately for these game designers, the player's learning goal is often tied to their most pressing need, playing the game.

In contrast games designed to sell products and services were often the simplest. These games relied heavily on common game mechanics, but also tended to offer the fewest minutes of gameplay. Landmark International Group's Hazard Lane [20] is designed to help players understand how to identify profitable real estate while avoiding environmental hazard properties. The player must catapult characters into appropriate properties and then read about the environmental risks present. The game offers no new game mechanics and the same basic challenge throughout. This lack of increasing challenge or ramp up limits the games potential as something players would like to share or replay. Hazard Lane is easy to understand, but lacks the novelty of gameplay experience more common to social impact games.

It's also important to recognize that rule sets apply to fundamental human-computer interactions like moving in 2D or 3D space. As the standard for interaction on most computers is in 2D, the instruction set is somewhat intrinsic knowledge for computer users. 3D introduces ambiguity that may complicate the ability to understand a designer's persuasive message. Non-game players may struggle to navigate with the WASD letter keys while using the mouse to look at objects. Likewise, moving with arrows keys in 2D is a bit simpler to understand, as it does not contain ambiguities like an up arrow meaning forward (Z-axis translation) or jump (Y-axis translation). These differences, coupled with low technical barriers to entry for 2D games, may account for the generally high frequency of 2D play.

4.3 Enjoyability and Availability
Enjoyability of play varied widely between games, but did not vary between duplicate reviews of the same game. The primary concerns in the enjoyability of play came from play balancing. Players complained about games that were too easy or too difficult, but were satisfied with games that balanced challenge and ease. There was no correlation between enjoyability and the type of aesthetic forms chosen. Players enjoyed games with natural forms as much as they enjoyed games with abstracted or geometric forms. This is an important observation as it has ramifications in both implementation and design. At the very least it hints that the quality of the game system is a higher priority than its aesthetic representation. Unsurprisingly, a game that looks good may not play well.

One final overarching observation should be made about the study of these games. Games designed to sell products and services are often ephemeral. During the 6 month period an estimated 20% of the games that were studied were no longer made available by the original producer. This seems to occur for a few reasons. Many such games are part of short-lived debuts or promotions which are shuttered once the promotion ends. Some of these games reside on secondary sources that act as clearinghouse repositories for such games (e.g. Advergames.com). Other games are produced by small design studios that fail, are subsumed by other companies, or become effected by some other fate that is not immediately clear. This trend was less common for games designed for training or social impact.

Importantly, games from all the categories studied were subject to software atrophy. An estimated 10% (20 games) of the games chosen for play could not be played because of changes in software dependency. This includes downloadable games made with Torque, a previously popular game development tool, Shockwave and others. It is not surprising that such problems were often limited to small budget projects with smaller scale and aspiration.

5. Conclusion

Overall the attributes of digital persuasive play games indicate reasonable decisions in development and design. The simplest games are typically delivered solely via the web, have simple instructions and are designed to be played over short periods of time. Such games slogan games are also fairly literal in their representation of visual forms, favoring natural and abstracted forms to full geometric. These attributes seems to set a standard for basic functional play within the persuasive play domain. They coincide with heuristics from other human-computer interaction domains supporting wide audiences with easy to learn experiences.

However, the experience of these games is greatly varied in enjoyability and ease. As demonstrated by the data, careful attention to the clarity of rules sets and game balance should help facilitate success. Likewise, game designs looking to distinguish their aesthetic experience from others could consider employing the minority aesthetic of geometric forms if their persuasive goals support it.

Lastly, to support the greatest audience in the diverse universe of player technographics, developers should consider input beyond tactile keyboard and mouse. As the proliferation of portable, touch screen based devices increases many persuasive play games will cease to be played.

The number of large-scale studies revealing data about design decisions in digital games is fairly rare. It would seem beneficial to conduct similar analyses on other sectors of game design. Cross sector comparisons of traditional commercial games to persuasive play, for example could yield a set of characteristics that would help designers and developers follow or reject standards across games.

It should also be noted that the design of this study was not meant as a heuristic guide. This study was meant as topography, providing a view of the large landscape of persuasive play. Once a critical lens is applied to validating the success or failure of many persuasive play projects the task of appropriately studying and reporting persuasive play success complicates. It is not enough, for example, to list the attributes of award winning persuasive play as that may only indicate which projects are good at submitting and winning contests. It is also limiting to look at the number of players, sales, downloads, and other common industry metrics. Some of the games studied address specific, limited topics where the ability to persuade 70 stakeholders may prove more useful than 7,000 unassociated players.

Persuasion itself rests on a spectrum between the non-persuasive and the very persuasive. The results of these persuasions vary, as a game may change a player's opinion for 5-minutes and be forgotten, or leave an indelible notion on a person's mind. This research seeks only to provide a snapshot as a map for more detailed analysis.

It is hoped that this brief overview of ongoing research findings on games designed to modify player perspective, understanding, interests, activities or opinions proves useful to project leaders in a wide variety of game design development domains. It is also hoped that such efforts support the continued improvement of games designed to modify player behavior. The researchers involved in this project expect to continue their efforts in analyzing this distinct subset of games in an effort to effectively understand the characteristics of successful projects.

6. Acknowledgement

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