Original Article

Narrative in Exergames:
Thoughts on Procedure, Mechanism, and Others

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Abstract

Narratives are stories with a beginning, middle, and end that provide information about the characters and plot. Exergames are videogames that require players to move or exercise. Narratives and exergames have seldom been examined together. Based on my review of the literature, there are five potential opportunities narratives could bring to exergames: Enhanced engagement with characters and with the plot, increased motivation, repeated play sessions, and better behavioral consequence. However, the rewards offered by these possibilities may be offset by the challenges they pose. These challenges include the difficulty in fully integrating narratives into the gameplay, the players' limited information processing capacity, difficulty in measurement, the lack of full understanding of the player–character identification process, and the narrative saturation effects. Innovative research is needed to bridge the two potentially important domains.

Introduction

EXERGAMES ARE "INTERACTIVE video or electronic games that feature player movement, such as would occur in 'real-life' exercise participation."[1] The earliest exergames emerged in the 1980s, when Autodesk developed immersive games such as "HighCycle" and "Virtual Racquetball."[2] Since then, other companies have joined this market genre. However, it wasn't until the early 2000s, when "Dance Dance Revolution" (Konami Digital Entertainment, El Segundo, CA) and the Nintendo™ (Kyoto, Japan) Wii™ became internationally popular, that this genre became more recognized within the halls of gaming. As of 2013, all major game console manufacturers offer products that can be used as exercise equipment.[3]

Although the effects of exergames for obesity prevention and intervention are still being investigated,[4] exergaming as a leisure-time activity serves as an active replacement for sedentary behavior with the potential to increase free-living physical activity levels (i.e., the level of activity that people typically perform at their own pace, within their physical limitations, and in their own environment[5]).[6] A few published studies have indicated that exergaming is capable of reducing obesity-related health outcomes in youth,[7] but there are variable elements inherent in gaming that may alter these results.

For example, the duration of players' exergaming varies. Although one study found that about a quarter of young gamers exergamed for 2 days a week in bouts of 50 minutes each on average,[8] another showed that the daily average time spent playing exergames was only 5 minutes (standard deviation [SD] = 13.1 minutes) for adults and 8 minutes (SD = 14.7 minutes) for children.[9] More important is that players often are not motivated to play continuously a single videogame. A recent study showed despite the game companies' investment in "AAA" games (games with the highest development budgets and levels of promotion as well as quality[10]), most players do not even finish their games before beginning a new one.[11] The obesity-combating effects of exergames could suffer if players do not keep playing the games.

Narratives, or stories, have not yet been systematically examined in exergaming research. In this article, I will explore conceptually the procedure and mechanism of narratives in exergames to engage players. The article consists of four sections: Section 1 visits related theories and concepts, Section 2 reviews several research projects, Section 3 explores opportunities, and Section 4 examines challenges.

Theories and Concepts

Narratives

A narrative consists of "any cohesive and coherent story with an identifiable beginning, middle, and end that provides information about scene, characters, and conflict, raises unanswered questions or unresolved conflict; and provides resolution."[12] Although types of narratives can be exemplified by the inclusion of various structural elements,[13] a simpler definition holds that a narrative is any two events

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arranged in a chronological or causal sequence.[14,15] Fisher[16] defined the narrative as a story people tell about themselves and others to establish a meaningful life-world. To sum up, narrative is a complex and powerful tool that can be used in many ways.

Narratives' transportation ability (immersion)

In the early 1990s, Gerrig[17] described transportation (the phenomenological experience of people's engagement with narratives) as a process in which people "travel" into the story world and are transformed by the journey. Systematic empirical exploration of narrative transportation did not start until Green and co-workers started a series of explorations beginning in 2002.[18,19] In their seminal work, Green and Brock[20] conceptualized transportation as "a distinct mental process, an integrative melding of attention, imagery, and feeling" (p. 701). Although "transported" may describe well the feeling that narrative readers have while engaged in their text, exergames involve more of the players' senses; thus "immersion" is likely a better descriptor and one that I will use in the place of "transportation."

Story immersion is a highly involving and integrative process whereby the cognitive and affective resources of the player are concentrated in a single activity. There are at least three methods by which stories immerse people. The first of these occurs through suspension of disbelief[21] and the lessening of counterarguments. When a person suppresses (whether consciously or unconsciously) his or her doubt about some of the story elements, the cognitive capacity may be fully committed to processing events and thus not have available sufficient mental resources to counterargue. The second method involves a personalization of the narrative—When a person feels as if he or she has personally experienced the events depicted in a narrative, his or her perspectives about relevant events should change more in accordance with the narrative.[22] These relevant events are depicted via the plot, or the "narrative discourse." Plot plays a pivotal role in story delivery by organizing events into a logically unfolding series of events[23] that personally engage the audience.

The third method through which immersion operates is through the creation of deep affection in the narrative participant for characters in the narrative. This audience–character interaction may make the story more personally relevant. Indeed, character and plot are the main components of a narrative and are important determinants of its immersive quality.[24] A character is a crucial structural property,[25] providing the driving force of a narrative[26] and serving as an "internal" source of information or beliefs.[27]

Narrative immersion in (exer)games

Systematic empirical research of narratives in games has been scarce, for various reasons[28]: Game scholars still debate the feasibility of integrating narratives in videogames[29,30]; media effect researchers tend to focus more on the negative aspects of gaming, such as violence[31]; and a lack of empirical theory development in (exer)game studies. For example, a recent systematic review[7] of the sedentary and active games used for childhood obesity prevention found that less than 10% of the games contain some narrative element.

However, this lack of systematic research into exergaming narrative does not mean that narratives were not being developed and used in the games. For example, Adrian Hon,[32] co-creator of the highly successful smartphone exergame, "Zombies, Run!," proposed that there are at least six ways that stories are told via videogames:

First, stories can serve as a reward for the players. For example, many role-playing games such as the "Final Fantasy" series (Square Enix, Tokyo, Japan) require the players to finish some preprogrammed gaming activities before the game will display some prerecorded computer-generated movie clips. Most current games follow this pattern

Second, stories can be integrated into gameplay and solicit players' input on how the story should develop—For example, "Heavy Rain" (Quantic Dream; Sony Computer Entertainment, Tokyo) is an interactive drama that allows players to decide story progression using real-time input. Based on their input, the story will progress into different directions without making the players feel that they have to make a choice

Third, unlike "The Legend of Zelda" series (Nintendo) (in which narrative progress depended on dialogue fed to the player), branching narrative, or "interactive story," is more like the traditional "Choose Your Adventure" series, in which the entire game progress is still based on some preset plots from which players choose the option they prefer.

Fourth, pseudo-artificial intelligence games, such as "Façade" (developed by Michael Mateas and Andrew Stern), use natural language processing scripts to attract players' creative participation, via personal command entry, in the narrative development.

Fifth, sandbox games, or open-world games where players could roam freely, such as "Minecraft" (Mojang AB, Stockholm, Sweden [recently acquired by Microsoft, Redmond, WA]), usually do not have an established narrative sequence, but instead require the players to use different strategies to make progress in the game or even set up the game world before playing. Consequently, the sequence of events and the experience could be different for each player.

Sixth, alternative reality games such as "Year Zero" (42 Entertainment, Burbank, CA) begin with preset early narrative, but develop the narrative in response to the player's input and action in the real-world setting. To a certain extent, the game narrative becomes personal and could have some real-world impact.

Research Projects

Game scholars have published the results of studies of narratives in videogames[33–36]; however, most of these studies were nonempirical and originated in theoretical backgrounds such as narratology, critical screen studies, and literature. Systematic empirical exploration of narratives in videogames has not yet been performed.

Recently, there has been some industry research published on narrative and videogames. For example, the Game Developers Conference has been hosting the Game Narrative Summit for years. However, the results of the research have not necessarily favored the role of narrative in videogames—Two 2014 studies[11,37] on the game completion rates indicated that narratives might not be the panacea for the problem of players not completing the game. For example, only 42

percent of players completed the videogame ''Mass Effect 2''[38] (developed by Bioware; published by Electronic Arts, Redwood City, CA), a heavily invested action role-playing game that garnered numerous awards and worldwide sale records.[11] The industry research also found a related problem, namely, that most gamers do not remember the game stories with accuracy.[37]

However, stories are, and still should be, an important platform for videogames because they may facilitate the process of immersion. Schneider et al.[39] compared the effect of narratives in four first-person games: ''Doom II'' (id Software, Richardson, TX) and ''Quake II'' (id Software) had little or no story line, whereas ''Outlaws'' (Lucas Arts, San Francisco, CA) and ''Half-Life'' (Valve Corp., Kirkland, WA) had integrated narratives into the gameplay. They found that player enjoyment of the stories helped to keep the players involved in the gameplay, made them feel more immersed in the virtual environment, and kept them aroused. Similarly, a recent study of health games[40] looked at the effects of immersion in ''Escape from Diab'' (Archimage, Houston, TX), a childhood obesity-combating game. The results showed that story immersion was positively correlated with an increase in fruit and vegetable preference, intrinsic motivation for water, vegetable self-efficacy, and physical activity self-efficacy. On a related note, the study also documented enhancements in immersion effects and several health outcomes when there was ethnic similarity between videogame characters and players.

Peer-reviewed academic research about stories and exergames has been rare. In the next two sections, I discuss the potential opportunities and challenges of bridging stories and exergaming research, hoping to inspire new research in this area.

Opportunities

In reviewing the existing literature on narratives in exergames, I have identified at least five opportunities where game designers could create narrative spaces for players.[41]

Enhanced engagement with character(s)

Animated characters are prevalent in many interactive media.[42,43] According to literature in media psychology, there are several ways through which audiences interact with media characters. Interpersonal attraction refers to ''a constellation of sentiments which comprise the evaluative orientation of one person toward another.''[44] An attractive narrative game character might help enhance play frequency and duration by using interpersonal attraction to help players like it and thus form a positive evaluation of the gaming experience. Identification refers to ''an imaginative process through which an audience member assumes the identity, goals, and perspective of a character''[45]; in gaming, this refers to the process by which players temporarily lose their self-awareness and take on the role of the character. Gaming involves the use of one of two control methods: Motion-controller-driven active games using Nintendo Wii and Sony PlayStation® Move or body motion tracking using Microsoft Kinect™. It is likely that the latter method—synchronizing as it does the full body movements of the in-game virtual character with those of the player—renders the identification process more seamless and effective than the former method

does, and this in turn suggests that players would be more likely to identify with the Kinect virtual characters.

For example, ''Marvel Avengers: Battle For Earth,'' a Kinect game, requires the players to master a sequence of moves for each character and then deploy them fast enough again the opponent to advance to another level. ''Rise of Nightmares,'' on the same platform, makes the players run in place and mime ladder climbing to escape the zombies. Although narratives are not the strong selling point of either game, both have the potential to elicit strong identification from the players. In addition, the development of a virtual reality headset such as the Oculus Rift (Oculus VR™, Irvine, CA) could help further enhancing the identification process beyond the two-dimensional screen. An involving narrative arch will help the processes of interpersonal attraction and identification in enhancing the game experience by helping players internalize the control method.

There is one additional element to enhanced character engagement that is worth mentioning. In gaming, parasocial interaction (PSI) refers to the mental pseudorelationship a player may form with a virtual character.[46] PSI differs from identification in that there is no loss of self-identity—Instead, the assumption is that the self is an individual entity separate from the media character. PSI might help enhance the gaming experience especially for those exergames that feature a personal trainer. If the virtual trainer is a part of an appealing narrative (not simply a virtual character giving orders), players might experience interpersonal attraction as part of PSI, thus making them more receptive to the game.

Enhanced engagement with the plot/play

According to recent reviews,[7,47] most current exergames do not have a plot. Plots are capable of eliciting different emotions in their audience as the plot unfolds, including arousal (excitement, enthusiasm, inspiration) and curiosity, along with more cognitive elements (e.g., a need for resolution in the form of narrative closure). The addition to videogames of interesting plots might therefore foster immersion through an enriched gaming experience, thus engaging players more deeply in the play process. This would be better enhanced when the gameplay starts to mimic real-world activities as closely as possible (H. Albano, personal communication, 2014). A good story would help the player become a figurative and literal participant (a character of the story), not a mere spectator or a subject of the game mechanism.

Increased motivation

Combining the effects of enhanced character engagement and enhanced plot engagement, players might be more motivated to play an exergame with great characters and involving plots. Intrinsic motivation is a core type of motivation underlying physical activities.[48] An engaging narrative with appealing characters could induce a strong intrinsic motivation to play exergames by reducing cognitive load[49] through immersive qualities,[50] engendering a positive and powerful arousal and attention,[22] and enhancing character identification.[51,52] The gaming experience might also be enhanced by the use of a narrative that helped to internalize external factors and other reward mechanisms within the players. This in turn might help foster the perception of

exergame play as *necessary*, thus permitting the goals to be evident without destroying the games' entertainment qualities.[53] There is some initial evidence that using tempting narrative audiobooks that are only available in a gym at least temporarily increased participants' gym visits.[54]

Repeated play sessions

Replayability is usually considered as a characteristic of a good game[55] and, for an exergame, could also potentially increase the health outcomes resulting from each game purchased. Making players stick to one game only over a long time is likely impossible as novelty seeking is an important part of consumer behavior.[56] Narrative could help with replayability in several ways. Although it is perhaps impractical to expect players to undergo the same exact story each time a game is played, a sufficiently good narrative might overcome this obstacle, or, alternatively, interactive narratives[57] could be used to ensure variability in the narrative's progression. Either approach could ensure replayability by enhancing the gaming experience.[58] In addition to the use of an interactive narrative, creating characters whose personalities and traits develop interactively (with the narrative) might also motivate players to revisit those characters to experience their ''growth.'' Replayability might also be enhanced through the use of novel hidden or secret places made available to players only in subsequent gameplay iterations. Narratives, as compared with non-narratives, have the potential of helping elongate the duration of players' engagement with each game.

Better behavioral consequence, a natural outcome following from the above opportunities, is the behavioral consequence of the narrative exergame play. A good exergaming narrative can help to reduce boredom in the player by providing non-repeated interesting dialogues, to alleviate players' frustration by offering timely encouragement from their favorite characters, or to justify the gradual increase in exercise intensity as a natural narrative progression. As a result, exergames with well-constructed stories may elicit desirable cognitive, affective, and behavioral consequences such as longer play duration, higher activity energy expenditure, and physical activity intensity. For example, the game ''Zombies, Run!'' constantly offers new episodes available for players to download, thus making players continuously engaged in physical activities.

Challenges

Despite the promising prospect of the narrative exergames, at least five challenges remain.

The first of these is that the integration of narratives with the gameplay can be difficult. The most challenging task for game designers is to align the gameplay with the narratives. The provision of computer-generated movie clips (which are unrelated to the story) is unlikely to satisfy players. Another large difficulty is the creation of the game within the narrative (instead of grafting the narrative onto the active videogame); starting with a narrative-driven game and then making the game play as physically active as possible seems a good solution to this problem (H. Albano, personal communication, 2014). Unfortunately, many current games (e.g., ''BioShock'' [2K Games, Quincy, MA], ''The Last of Us'' [developed by Naughty Dog, published by Sony Computer Entertainment]) still use narratives as the ''carrot,'' and most of the narrative games tend to focus on one character as the only protagonist. This would tend to limit both PSI and identification. A multicharacter narrative game such as ''Grand Theft Auto V'' (Rockstar Games, New York, NY) would solve this difficulty but would require a much greater fiscal investment.

A second challenge lies in the limited capacity of information processing, which hampers players in processing narrative (particularly of exergames), compared with sedentary behavior. Because the players are required to perform the designated physical activity or movement during the gameplay, their hand–eye–body coordination would be a crucial element for them to be successful in the game, and physical exertion will probably be more intense than sedentary games or games that do not require as much body movement. According to the Limited Capacity Model of Motivated Mediated Message Processing,[59] people have a limited capacity for cognitively processing information. An example of this can be found in movie theaters, which dim the house lights and ask the viewers to turn off cell phones before showing an involving movie (otherwise perceived as ''the distraction'' instead of the devices).

Measurement continues to be a challenge for exergaming and media psychologists interested in narrative and story immersion. The original narrative scale[20] and many other engagement measures were made up of postexposure survey questionnaires. Most of the physiological measurement devices[60] (which must be affixed to participants' bodies) could be intrusive as well as making physical movement cumbersome and potentially interfering with the devices that measure the physical activities. Enhanced portable monitoring devices that wirelessly transmit their data and are resistant to body movement will not only facilitate measurement of player response, but also help explicate the mechanism of the narrative exergaming play.

The fourth challenge is that the systematic understanding and explication of the nature of players' interaction with gaming characters in exergames are still underway. This is influenced by the difficulty in measurement of story immersion and the interaction-related variables. Most studies have focused on noninteractive media contents such as video clips,[61,62] rendering assessment of identification difficult. Furthermore, the process and mechanism of the cognitive and affective reaction underlying the player–character interaction during the exergaming process are unclear.

The last challenge involves the narrative saturation effect, a scenario in which negative real-world consequences occur because of a ''too real'' story immersion experience. For example, wishful thinking about the effects of watching the protagonist exercise could result when a player has been involved in a touching narrative about an attractive protagonist's struggle to form an exercise habit. An easy solution to this conundrum would be to avoid any sedentary cutscenes and to make the best effort to integrate the actual exercise session into the game, thereby forcing players to finish the exercise.

Conclusions

Technological development could help better integrate narratives with exergames, which offer great potential to

improve players' health outcomes. Despite the challenges, narrative exergames provide a promising channel to achieve positive behavioral outcomes. Additional empirical explorations aiming to unpack the mechanism of the narrative involvement are expected.

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