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Gore Galore: Literary Theory and Computer Games

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Abstract. Computer games have not been adequately theorized within the humanities. In this paper a brief history of computer games is presented as a starting point for developing a topology of games and a theory of computer games as rhetorical artifacts suitable for critical study. The paper addresses the question of why games should be treated seriously and suggests a theoretical approach based on Bakhtin's poetics of the novel where the experience of time and space (the chronotope) provides a framework of questions for discussing computer games.

Key words: Bakhtin, computer games, interactive, literary theory, multi-media

1. Introduction

> Games are popular art, collective, social *reactions* to the main drive or action of any culture. Games, like institutions, are extensions of social man and the body politic, as technologies are extensions of the animal organism. Both games and technologies are counter-irritants or ways of adjusting to the stress of the specialized actions that occur in any social group. As extensions of the popular response to the workaday stress, games become faithful models of a culture. They incorporate both the action and the reaction of whole populations in a single dynamic image. (McLuhan, 1964)

If McLuhan is to be believed, games are extensions of our social body similarly to the way mechanical technologies are extensions of our physical body. These extensions represent aspects of our culture back to us in a way that relieves and relives the stress of social interaction or conflict. Today, many of the most popular games are designed to be played on the computer. Computer games are the most popular form of fiction consumed through the computer, if by fiction one understands artifacts intended to delight rather than inform. Consumption of computer games far surpasses that of electronic texts or the refined works of hypertext fiction. It is surprising therefore that computer games have been, by and large, ignored by the humanities computing community. This may be, in part, due to the adolescent audience intended by most computer games, the violent and sexist character of many games, and the general failure of traditional disciplines to deal with games of any sort as a form of human expression worthy of study. In this paper, I will look at some of the ways multimedia games have been dealt with in the past

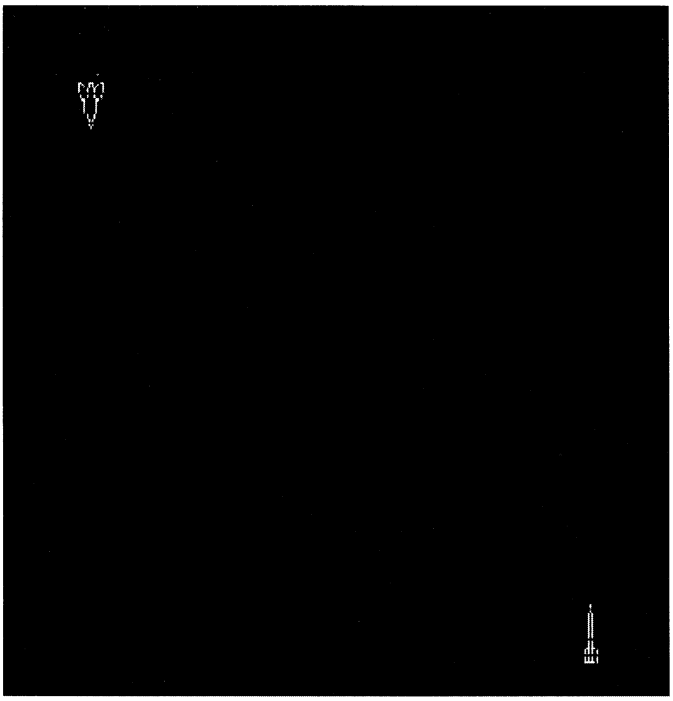

Figure 1. Partial screen shot of *Spacewar* from the online reimplementation.

and propose a theoretical framework for the future based on Bakhtin's dialogical theory. Specifically, I intend to do the following: present a brief history of computer games with a view to a preliminary topology of games; discuss the problem of the interpretation of computer games; discuss three approaches to games and their limitations; and propose a theoretical framework based on Bakhtin's discussion of dialogical genres.

2. A Brief History of Computer Games

Reputedly, the first computer game was *Spacewar.*[1] In 1962, when the first PDP-1s from *DEC* with CRTs (screens) arrived at MIT, Steve Russell and his friends created the game for their amusement. *Spacewar* was later enhanced by others and widely distributed to other PDP users, providing a new way of inspiring graduate students to neglect their studies and play. In *Spacewar* two players guide spaceships and fire torpedoes at each other. It was the first widely distributed example of a major type of computer game, the action or arcade game.[2]

Nolan Bushnell was one of the students elsewhere who, distracted by *Spacewar*, was inspired to try to re-implement it on a smaller and cheaper computer. While his implementation was a failure, he founded *Atari* in 1972 and released *Pong*, which was the first commercially successful arcade game.[3] *Atari* was the major producer

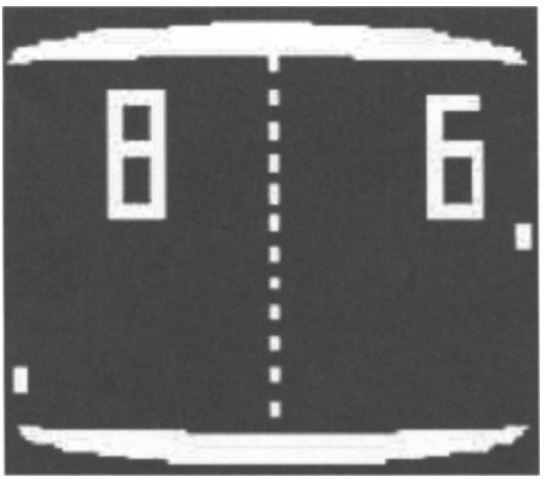

Figure 2. Pong screen from classic gaming. A Java version is available at: <http://www.classicgaming.com/museum/pong.shtml>

of arcade games in the classic period of computer games before the market crashed in the mid-1980s and was also one of the companies along with *Magnavox* who created the market for TV game consoles (Burnham, 2001; Morrison, 1994; Hafner and Lyon, 1996; Classic Gaming, 1998).

Adventure, a very different type of game, was created in 1976 by Will Crowther on a PDP-10. Inspired by the exploration of caves in Kentucky and the role-playing board game *Dungeons and Dragons*, he developed *Adventure* for his children.[4] Crowther's FORTRAN code was reworked significantly by Don Woods (another graduate student), who was at Stanford at the time. *Adventure* was, like *Spacewar*, distributed freely. It was not an action or arcade game, but what we today would call a text-based "adventure" game where the user types commands to move around a fictional world solving puzzles and finding treasures. Games like *Adventure* often place the player in a Tolkien-like fantasy world where he or she has to perform a quest. *Zork,* which came out in 1981 for the Apple II, was the first commercially successful implementation of a game of this type.

With multimedia and networking now available for most personal computers, the line between these two game genres – action/arcade and text-based adventure – has become blurred. The adventure type of text-based game has inspired MUDs (Multi-User Dungeons or Domains) where many players can interact and explore fantasy worlds over the Internet. Games like *Myst* (released in 1993 and, according to the Cyan WWW site, the best selling CD-ROM game of all time, having sold over 5 million copies) and *Riven* (released in 1997 as the sequel to Myst) are evolutions of the adventure game in which the world explored is presented graphically and one navigates by clicking rather than typing commands.[5] The adventure type of game has lost its textual roots, but the labyrinthine pace and atmosphere of mystery and puzzles are still there.

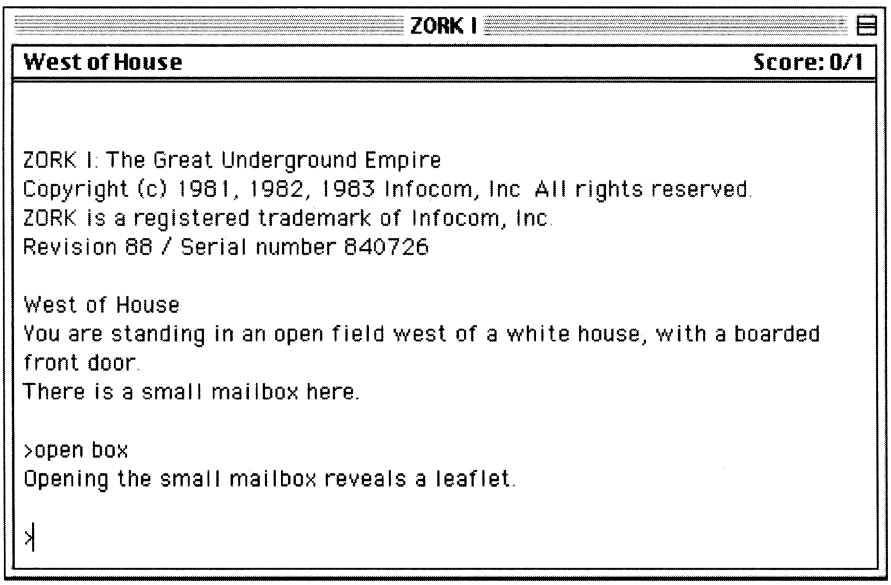

Figure 3. Opening screen of Macintosh version of Zork 1.

As a last note about the history and typology of computer games, I draw your attention to the release of the *Tamagotchi* in Japan in 1996 and in North America in 1997 by the Japanese toy company *Bandai*. This computer game does not fit into either the action/arcade or adventure categories of game. Its pace is different and it is portable.[6] It has spawned a third type of game that we can call digital pets.

To conclude this brief history, we can outline a simple taxonomy of games from [1] action and arcade games to [2] adventure games and [3] digital pets. More complicated taxonomies such as that proposed by Chris Crawford in *The Art of Computer Game Design* include further subcategories, but I believe his two basic categories (Skill-and-Action Games, Strategy Games) work well with my categories – with the addition of digital pets as a recent innovation.[7]

3. Why Should We Theorize about Computer Games?

While computer games have evolved considerably since the time of the early systems, there has been little critical attention paid to them as forms of fiction. The MLA Bibliography (from 1981 to 1998) lists 4 records when one searches for the Subject Keyword "computer-games" and 8 records if one searches for "interactive-fiction". (This search was performed in December of 1998.) My next question, thus, will deal with **why** we should be interested in computer games in the first place. It could be argued that computer games are either not important, or that they are not works of literature and, thus, are not an interesting subject for literary theory.

Figure 4. Screen shot from start of Myst taken from Cyan WWW site at www.cyan.com

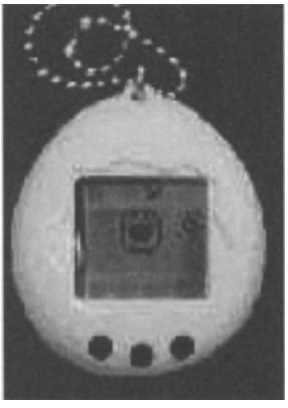

Figure 5. Picture of Tamagotchi.

There are at least four reasons for developing a poetics of computer games: [1] computer games are a significant form of popular entertainment; [2] they are the form in which most people are exposed to hypertext fiction; [3] computer games are important for hypertext theory; and [4] theory can provide the players with the theoretical tools with which to think critically about the games.

Computer games are now a significant form of entertainment, especially for children. According to Provenzo for February 1989, "16 of the 20 top selling toys in the USA were video games or video game-related" (Provenzo, 1991, p. 12). In the same year, while *Microsoft* had sales in the neighborhood of 800 million dollars, *Nintendo* had sales figures twice that (Provenzo, 1991, p. 26). In a recent

column in the *Financial Post* (May 17, 1999, C3), Don Tapscott writes "This [the computer game] industry is growing at an astonishing pace. Video game revenues in 1999 in the U.S. will top $8-billion [all USD], which is $1-billion more than Hollywood box office receipts." He continues to note that "A new survey by Nielsen Media Research shows that nearly 75% of the 63 million people using video game systems in the U.S. are 18 years or older. Women over the age of 18 make up 31% of players." If this research is accurate, computer games are no longer an adolescent male fad. Computer games are, rather, one of the most popular forms of entertainment artifacts available.[8] The time children (and adults) spend on them and the amount of money invested in such games alone should alert us to their importance. These are texts we should critique, if only for the sake of engaging our students. Given that games are played as a form a entertainment we need a critical framework that allows us to discuss games and compare them to other types of entertainment, like books and movies.

A second reason for paying attention is that computer games, as Robert Coover points out in his essay/review of hyperfiction in the *New York Times Book Review* (Coover, 1993), are the forms in which most people are exposed to hypertext fiction. If we are to take hyperfiction seriously we have to look at the hyperfictions that are selling – namely the computer games. In his review essay, "Understanding (hyper)Media: Required Readings," Allen Renear argues that "Literate culture at the end of the 20th century is thoroughly electronic, and soon will be thoroughly hypertextual – and that's a difference that makes a difference" (Renear, 1995, p. 389). He believes that the humanities computing community has ignored hypermedia in its focus on electronic text and text-analysis tools. Hyperfiction, and I would argue computer games, are the type of electronic literature that makes a difference, which is why we should be studying them.

A related reason why we should be studying computer games is the importance of computer games to hypertext theory. Hypertext theory has become a recognized area of literary studies. If games can be treated as hyperfictions, then hypertext theory should evolve to deal with them. I believe that once we take computer games seriously as the most popular form of hyperfiction, we will need to change the way we theorize about hypertexts. As I will argue, hypertext theory as found in Landow's works does not adequately deal with the multimedia character of computer games.

Perhaps the most important reason for developing a theoretical perspective on computer games is to provide players of these games with the theoretical tools with which to think critically about them. Even if most games are violent and sexist, and hence not worthy of attention as "great" works of fiction, well articulated theories can give critics a way of discussing these issues. People like Provenzo have provided a psychological criticism of games and what they promote. The humanities should provide the literary theoretical structure to help others criticize them for what they are, not what they do to us. If the academic community is

unwilling to discuss what would make a good game, how can we bemoan the lack of quality of what is out there?

4. Interpretative Approaches to Computer Games

While there is little theoretical literature on games, one can discern three perspectives that are emerging. These perspectives are triangulating on computer games from three different traditions, the psychological perspective, the literary perspective, and the hypertext theory perspective.

Authors like Eugene Provenzo take a sociological or psychological approach to computer games, looking at them as a popular culture phenomenon with dangerous effects. As Provenzo puts it:

> Video games such as Nintendo, through a process of incorporation, have the potential to amplify certain values (for example, women as victims; women as individuals who are acted upon rather than initiating action; women as being dependent rather than independent). In doing so, the games reflect a larger cultural hegemony that functions on multiple levels. ... What is important in the case of video games is how blatant these types of discriminatory attitudes are in terms of the content of the games. (Provenzo, 1991, p. 116)

After the 1999 Columbine High School murders, questions about the effect of video games on teens have become more prominent given that the perpetrators of the murders enjoyed a particularly violent game, *Doom*, which, it could be argued, provided a model for their actions. Anderson and Dill in "Video Games and Aggressive Thoughts, Feelings, and Behavior in the Laboratory and Life," found that, "exposure to a graphically violent video game increased aggressive thoughts and behavior" (Anderson and Dill, 2000).[9] Further psychological and sociological studies of games and their effects, especially violent and sexist games, are clearly necessary.

While Provenzo, Anderson, and Dill may be right about the psychological effects of playing certain computer games, their viewpoint does not present us with a theoretical perspective with which to critique computer games as entertainment. Provenzo is interested in the effects of these games, not how they work as fictions. There is room for a rhetorical examination that comes from the humanities alongside the psychological – specifically, the literary perspective.

Critics like Neil Randall try to save some computer games by showing that a few demonstrate "literariness." This approach builds on a definition of "literariness" by Shklovskij, applying it to selected text-based games. The problem with this approach is that Randall singles out *only* text-based games, the type of game that most closely resembles a work of literature. He is not trying to deal with computer games as they have evolved, but trying to justify reading them as literature. Rather than trying to fit games into theories of literature, I believe we should be adapting theories to games so as to be able to account for what is different about games. Two

features that Randall ignores that I believe are essential to games as games are, first, their interactivity, and, second, the integration of different media including text – i.e. their multimedia and hypertextual nature.

Those, like George Landow, who have inaugurated the field of hypertext theory tend to treat computer games as lesser forms of hypertexts, assuming that what is said about hypertexts applies to computer games (Landow, 1992). Landow, as the subtitle of his book (*Hypertext: The Convergence of Contemporary Critical Theory and Technology*) suggests, is first of all concerned with the way hypertexts provide examples of many of the features other theorists like Derrida and Bakhtin discovered in traditional literature. These features include the reconfiguration of the author, non-linear narrative, and the democratization of control over the text. Landow does not, however, deal seriously with computer games. Instead he presents as paradigmatic the relatively obscure hyperfictions created for educational purposes by himself or those published by companies like *Eastgate*.[10] These works, while interesting, are, like those that Randall considers, primarily textual and primitive in interactive capability. To treat computer games as hypertexts ignores the features that make them games and distorts the direction of hypertext theorizing. There is room, therefore, for theorizing that looks beyond literary hyperfictions to computer games, which are rich in multimedia and interactivity, as paradigmatic hypertexts. Many of the themes Landow develops still apply, but with greater attention to the form of interactivity other than the notion of the hypertextual link.

To digress slightly, I have a second concern with the hypertext theory perspective as applied to games. Landow finds it interesting how hypertexts instantiate many of the characteristics postmodern theorists have found in traditional texts. This point, while useful as a way of connecting theory to hypertexts, does not say much about the hypertexts. It is interesting when postmodern literary theorists point out the fragmentary, authorless, and reader-controlled character of the traditional novel. Postmodern theory has questioned many of our most cherished ideas about authorial unity and intention. It is not, however, interesting to point that out about hypertexts. (If I might provide an analogy, a headline "Man Bites Dog" is interesting because it is unexpected. The news that a "Dog Bites Man" is less interesting, and that is what Landow is announcing, i.e. "Hypertexts Behave the Way Hypertexts Do.") What would be more interesting would be to show how hypertexts behave the way we used to think novels did. And that is what a theoretical framework for the criticism of computer games needs to make room for – the discovery of continuity between genres of rhetoric and entertainment.

An interesting and nuanced position that bridges the work of the hypertext theory community towards the work that needs to be done to theorize games is the position of Espen Aarseth in *Cybertext: Perspectives on Ergotic Literature*. Aarseth, while dealing with electronic texts or cybertexts as he calls them (rather than computer games), recognizes that the interactive character of many cybertexts makes the experience one of playing, rather than reading. The examples he chooses

include graphical computer games, but it is hypertexts and text-based adventure games are the exemplars for which he is developing a theory. He nicely draws out the challenges to literary theory posed by highly interactive works in a way that can be leveraged to deal with computer games in general if we also deal with the multimedia character of games.

5. A Poetics of Computer Games

In this final section of the paper, I will present an adaptation of Bakhtin's work on the dialogue and the novel as a candidate for a theoretical framework for the criticism of the computer games. I call it a "poetics" as a promise for a fully formed theory that should be capable of speaking to the developers of games and contributing to thinking about the design of hypermedia, as much as providing a stand-off critical perspective. That said, I do not have the time here to make the move from critical theory to fully-articulated poetics, though I think it can be done and should be.

In the essays gathered in *The Dialogic Imagination*, Bakhtin traces the evolution of the novel from the Socratic dialogue. Bakhtin's poetics of the novel draws our attention to the way a novel is a dialogue with other genres of literature or a metagenre that is unified by what he calls a chronotope, or the spatio-temporal experience created by the author. We can extend Bahktin's theory of the novel to provide us with a theoretical framework for understanding computer games if we, first, think of games as a hypermedia metagenre that incorporates other genres of fiction and performance and, second, if we substitute interaction for dialogue. Let us look more closely at Bakhtin's thoughts.

In essay "From the Prehistory of Novelistic Discourse," in discussion of the Greek novel, Bakhtin writes:

> What was created was a new and large multi-genred genre, one which included in itself various types of dialogues, lyrical songs, letters, speeches, descriptions of countries and cities, short stories and so forth. It was an encyclopedia of genres. (Bakhtin, p. 65)

The point that runs through his essays on the novel is that the novel is not another genre, but one which incorporates poetic genres into a dialogized artistic whole. The literary critic of the novel must therefore unpack the voices, each with its own language and style, and then show how they are combined into an artistic unity. As he puts it in the same essay,

> The basic tasks for a stylistics in the novel are, therefore: the study of specific images of languages and styles; the organization of these images; their typology (for they are extremely diverse); the combination of images of languages within the novelistic whole; the transfers and switchings of languages and voices; their dialogical interrelationships. (Bakhtin, "From the Prehistory of Novelistic Discourse", p. 50)

I believe this idea can be extended to give us a framework for thinking about hypermedia in general, and games in particular, as the popular form of hypermedia works. The hypermedia work is not just a genre of game or literature, but a meta-media that combines other media including games and literature. The task of the hypermedia critic is then to unpack the types of media, the genres of discourse in those media, and to show how they are combined into an artistic whole.

This leads to a problem of generic regress. If the hypermedia work is a meta-genre that includes the novel, and the novel is itself a meta-genre of other literary forms, is there something beyond the hypermedia work? Could there be an infinite regress of genres that combine other genres? More importantly, does this mean that any theory of hypermedia must recapitulate theories for each of the possible media combined and so on?

No. This is not a problem for several reasons. First, to answer a slightly different question, being a meta-genre that combines others, is not for Bakhtin an indication of the status of the genre; the novel is not necessarily better or above the epic. Rather, Bakhtin believes one needs to adapt poetics to suit a type of work that adapts others. Each genre has its problems and history, likewise the hypermedia work presents us with the problem of critiquing a genre whose major feature is that it is constituted from the combination of other media into an artistic whole. The hypermedia work is not better or higher in a hierarchy of genres for being woven out of other media.

My second response, would be to say, "So what?" Is this a vicious regress? Should the possibility that a theory of hypermedia has to take into account theories of other arts bother us? This is more of a challenge to interdisciplinary openness than a problem. Theories of hypermedia should take into account literary, aesthetic, performative, and architectural theories. The probability that few, including myself, will be able to span the breadth of media theories is an indication of the challenge before us and, more importantly, a call for interdisciplinary dialogue.

To return to Bakhtin, he does not just leave us with an ambitious agenda. He goes on, in his essay "Forms of Time and Chronotope in the Novel," to argue that the chronotope is the defining characteristic of genres and generic distinction. I have concatenated sentences from one of the introductory paragraphs of that essay.

> We will give the name *chronotope* (literally, "time space") to the intrinsic connectedness of temporal and spatial relationships that are artistically expressed in literature. ... we are borrowing it for literary criticism almost as a metaphor (almost, but not entirely). What counts for us is the fact that it expresses the inseparability of space and time ... We understand the chronotope as a formally constitutive category of literature. ... (Bakhtin, "Forms of Time and Chronotope in the Novel", p. 84)

The chronotope provides a concept with which one can compare varieties of the novel, and I believe, by extension, to categorize hypermedia works. Borrowing this near-metaphor from Bakhtin, we should be able to use it to describe the types of games. My brief history of the computer game was actually built on this, in that I

distinguished the action/arcade game from the adventure game and then the virtual pet, i.e. *Tamagotchi*. What distinguishes these types of games – a typology that has emerged among game reviewers – is the pace of the game (its sense of time) and the types of settings. Briefly, action games are fast paced and take place in stressful environments, while in adventure games one is in a labyrinth with plenty of time to solve puzzles. The virtual pet is interesting because it is played in something close to real time; you carry it with you and nurse the pet as if it were a child. It is not played at a desk or console in extended sessions the way other games are.

To return to a framework for the criticism of computer games I suggest that in computer games one should consider the following factors: the types of media and fiction integrated into the multimedia game and the ways they are integrated into an artistic or entertaining whole; the types of characters that interact in the game with special attention to the character the player is allowed to develop; the types of interactions that can be performed in the game with special attention to the interactive possibilities for the player and the ways the player interacts with other characters (this is where Aarseth's perspective on the interactive player can be leveraged to theorize the possibilities for playing available in a work); and the chronotope or spatio-temporal setting that provides the unity to the game (this is more than the physical setting of the game; it includes the experience of time and pace in which the game unfolds).

6. Conclusion

The computer game is as, McLuhan puts it, a popular art form. The seemingly-natural distaste that we have, in the humanities, for tackling popular arts should be set aside in this case because of the importance of computer games to the field of hypermedia. Computer games are driving the design of hypermedia; they are not simply plebian examples of a higher art form called hypertext. For this reason, I believe we must begin to deal with them as paradigmatic works of the electronic age and fashion theories that allow us to discuss them thoughtfully. I have sketched a framework of questions to ask about a game, a framework that draws on Bakhtin's dialogical theory of the novel. It is a framework that can help us theorize our distaste for so many violent games as it allows us to draw attention to the way violent games limit the player to reprehensible actions like killing. This may not be the most complete framework, but it is place to start while we share theoretical perspectives from different disciplines. In the meantime let's play and avoid the gore.

Appendix: Demonstration

How would this framework work when applied to a particular game? When this paper was presented at a *COCH/COSH* session at the *Congress of the Social Sciences and Humanities* in 1999 I provided a tour through *Riven* as a demonstration of how this framework could be applied to a particular game. What follows are notes from the demonstration:

Riven, released on October 31 1997, is a sequel to *Myst* (1993) created by *Cyan Inc.* which was founded by Rand and Robyn Miller.[11] Like *Myst* and many *Disney* animations the game starts with movement through a special sort of book. The opening sequences set the scene for the game providing a narrative within which the game takes place. As Bakhtin points out, such opening and closing sequences frame the game/dialogue and are one of the ways the author(s) provide unity to an experience which can otherwise be different from one player to another. It is also interesting that so many games and animations start with an image of the book as if to connect to the medium re-mediated.

Once the opening sequence is finished, you find yourself, as with many adventure games, in a world with a goal that the player does not understand. The game is to figure out the world and decide what is necessary to do in this world. Being lost is part of the game. In effect, the player has to figure out the rules as he or she plays, especially if the instructions are disregarded.

The space or setting available for the player is one of the strengths of *Myst* and *Riven*. The Millers have created an original space that is not the standard Middle Earth imitation. Instead, they have created a world that combines Victorian ironwork and magical books in an original fashion. (It would be interesting to trace the influences on the Millers and in turn the influence of *Myst* on other games.) The audio tracks, which vary from space to space, are a particularly important part of the mood associated with the world. No critique of *Riven* or *Myst* should ignore the use of audio to build the mysterious and lonely quality of their world.

The navigation system in *Myst* and *Riven* is simple. The player clicks in the direction he or she wants to move, and can click and drag objects to trigger actions. Like many games, the player has an inventory of objects that is carried. The book of notes that was not taken away from you at the beginning is one of the objects you can call up and read. The player's presence in this game is that of the hand/cursor. Action games, by contrast, often dedicate part of the screen to representing a character back to the player in the form of an instrument panel that shows the state (health, weapons, or powers) of the player's assumed character. What is important is the possibilities for action in *Riven*. Unlike many action games, the player is not limited to moving and killing. Instead, the player moves and explores, and there is almost no gore.

The pace of the game is leisurely. Part of the pleasure of *Riven* is taking in the scenery and discovering the multimedia marvels created by the designers. In *Riven*, the player must wander, looking for clues and trying to complete the assigned task as in any other adventure game. Unlike action games, the player does not have to

worry about dying if he or she does not twitch fast enough, though there are false ends to the game.

Riven does not stand alone. It is a sequel to *Myst*, and now there is another game in the series. In addition, there are books that flesh out the world. Like *Star Wars*, the world of *Myst* and *Riven* is becoming an industry for related products. Is the movie far off?

Notes

[1] Actually the honor of being the first computer game goes to *Tennis For Two* which was developed on an analogue system in 1958 as a tennis simulation (by William Higinbotham) and therefore is arguably not a "computer" game. This video game, which predates *Pong* by more than a decade, was not distributed or shown widely and therefore did not have the impact of *Spacewar*. For more on *Tennis For Two* see Burnham, 2001, p. 28.

[2] A reimplementation is available at [http://el.www.media.mit.edu/groups/el/projects/spacewar/] (accessed December 2001).

[3] Arcade games are, almost by definition, fast-paced action games, as it does not make commercial sense to let players play for long periods of time. An action game where players lose quickly and have to pop in more quarters to continue makes commercial sense in an arcade, though not for home systems. I therefore treat arcade games and action games as a common subgenre of computer games for the purposes of this simple typology, though there are interesting differences between the action games in arcades and those for home consoles. Burnham (2001) traces the evolution of arcade and console games.

[4] A history of the game, along with downloadable versions and much related material, is available at [http://www.rickadams.org/adventure/a_history.html] (accessed December 2001).

[5] See the Cyan WWW site at [http://www.cyan.com] (accessed December 2001). Cyan now has another sequel, *Myst III Exile*, and a remastered version of *Myst* with enhanced graphics and "real-time graphics."

[6] For more information, there is a useful site prepared by students of an information science course at [http://www.sims.berkeley.edu/courses/is296a-3/s97/Focus/Identity/FINAL/index.htm].

[7] Crawford's book is available as a PDF from [http://www.erasmatazz.com/] (accessed December 2001). It is a unique work from the perspective of a master game designer. For a taxonomy of traditional games see [http://web.ukonline.co.uk/james.masters/TraditionalGames/index.htm] (accessed December 2001).

[8] The *Toy Manufacturers of America, Inc.* have an online statistics site with industry figures going back to the mid 1990s at [http://www.toy-tia.org/industry/statistics/index.html] (accessed December 2001).

[9] For an earlier review of the literature see Dill and Dill, 1998.

[10] See [http://www.eastgate.com] (accessed December 2001).

[11] For a history of the company, see [http://www.cyan.com/info.ssi] (accessed December 2001).

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