



**THE
VIDEO
GAME
THEORY
READER 2**

edited by Bernard Perron and Mark J. P. Wolf

The Video Game Theory Reader 2

The Video Game Theory Reader 2 continues the exploration begun in the first *Video Game Theory Reader* (Routledge, 2003) with a group of leading scholars turning their attention to a wide variety of theoretical concerns and approaches, examining and raising new issues in the rapidly expanding field of video games studies. The editors' Introduction picks up where the Introduction in the first *Video Game Theory Reader* left off, considering the growth of the field and setting challenges for the future. The volume concludes with an appendix presenting over 40 theories and disciplines that can be usefully and insightfully applied to the study of video games.

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Contents

Foreword <i>Tim Skelly</i>	vii
Acknowledgments	xxi
Introduction <i>Bernard Perron and Mark J. P. Wolf</i>	1
1. Gaming Literacy: Game Design as a Model for Literacy in the Twenty-First Century <i>Eric Zimmerman</i>	23
2. Philosophical Game Design <i>Lars Konzack</i>	33
3. The Video Game Aesthetic: Play as Form <i>David Myers</i>	45
4. Embodiment and Interface <i>Andreas Gregersen and Torben Grodal</i>	65
5. Understanding Video Games as Emotional Experiences <i>Aki Järvinen</i>	85
6. In the Frame of the Magic Cycle: The Circle(s) of Gameplay <i>Dominic Arsenault and Bernard Perron</i>	109

7. Understanding Digital Playability <i>Sébastien Genvo</i>	133
8. Z-axis Development in the Video Game <i>Mark J. P. Wolf</i>	151
9. Retro Reflexivity: <i>La-Mulana</i> , an 8-Bit Period Piece <i>Brett Camper</i>	169
10. “This is Intelligent Television”: Early Video Games and Television in the Emergence of the Personal Computer <i>Sheila C. Murphy</i>	197
11. Too Many Cooks: Media Convergence and Self-Defeating Adaptations <i>Trevor Elkington</i>	213
12. Fear of Failing? The Many Meanings of Difficulty in Video Games <i>Jesper Juul</i>	237
13. Between Theory and Practice: The GAMBIT Experience <i>Clara Fernández-Vara, Neal Grigsby, Eitan Glinert, Philip Tan and Henry Jenkins</i>	253
14. Synthetic Worlds as Experimental Instruments <i>Edward Castronova, Mark W. Bell, Robert Cornell, James J. Cummings, Matthew Falk, Travis Ross, Sarah B. Robbins-Bell and Alida Field</i>	273
15. Lag, Language, and Lingo: Theorizing Noise in Online Game Spaces <i>Mia Consalvo</i>	295
16. Getting into the Game: Doing Multidisciplinary Game Studies <i>Frans Mäyrä</i>	313
Appendix: Video Games through Theories and Disciplines	331
Bibliography	389
About the Contributors	401
Index	417

Foreword

TIM SKELLY

One of the early innovators working in the video game industry during the 1970s and 1980s, Tim Skelly has a number of notable accomplishments which influenced the growing video game industry. While working at Cinematronics, he designed and wrote vector games, the first of which, Starhawk (1978) saved the company from going bankrupt (Starhawk was also one of the earliest games to breach the boundary between the diegetic and non-diegetic aspects within a video game; see his description below). Skelly's second game, Sundance (1979), for which he also designed the cabinet artwork (as he did for all his games), had a switch that could set the display to either English or Japanese, making it one of the first multi-lingual games produced. Next Skelly wrote Warrior (1979), the first one-on-one fighting game which began the fighting genre. Warrior featured a top view of two knights sword-fighting, and it was the first game to use inverse kinematics, a computer animation technique which determines the positions of joints based on the endpoints of the jointed figure (in Warrior, the points of the swords), rather than requiring the movements to be calculated segment by segment. In addition to inventing the fighting genre, Skelly also designed the first true two-player cooperative game, Rip Off (1980). (An earlier two-player game, Atari's Fire Truck (1978), came close, but was really a single-player game operated by two players.) After three more vector games for Cinematronics, Armor Attack (1980), Star Castle (1980), and War of the Worlds (1982), Skelly created Reactor (1982) for Gottlieb, which became the first video game in which the game company agreed to feature the designer's name onscreen. Skelly would create two more games for Gottlieb (later renamed Mylstar), Insector (1982) and Screw Loose (1983), before going on to co-found a company, Incredible Technologies, which designed and developed interactive software. After working with clients including Williams

Electronics, Bally/Midway, and Capcom, Skelly joined the Sega Technical Institute, and later became a member of the Microsoft User Interface Research Group.

There are compelling reasons to play video games, but the most important of these have little to do with the apparent content of the games themselves. For instance, short of watching paint dry, *PONG* has got to be the baseline of entertainment, at least on its surface. In the early years of video games, why was it that *PONG* and its offspring were so outrageously successful and why were bars and restaurants suddenly filled with them? Bars have welcomed pinball games ever since there were pinball games, so it is not surprising that they would welcome video games as well. When the first wave of video games washed over the world, they were suddenly everywhere. Early video games were not just in bars and amusement arcades, their ancestral homes, they were in barber shops and beauty salons and everywhere paper money could be changed for quarters. Why? I have an explanation for this that does not require invoking the paranormal, black ops or alien invasions. Businesses that operate at a level that requires making change (A) have quarters and (B) are usually operating on a shoestring. Early video games were an income supplement, and for as long as the craze lasted they were a friend to small businesses. After the first wave, video arcade games continued (and still continue) to provide support to movie theaters, Ma and Pa arcades, boardwalks, etc. In 1983, I wrote and illustrated a book of cartoons about video games called *Shoot the Robot, Then Shoot Mom* (though I am *not* a sociopath!). In it I had a running gag called “One of fifteen remaining places you haven’t seen a video game.” One of those places was a jogging path, another was a bathtub. I had a difficult time coming up with fifteen.

That is my economic theory of *PONG* and other early video games, which takes as given that there were hordes of players eager to fill coin boxes with quarters. This tells us nothing about why the hordes wanted to play the game. For all we knew at the time, it was just a fad or fashion like the Wonderbra. (Not exactly like the Wonderbra, of course.) Still, why were such large numbers and varieties of people playing these things, especially the earliest, most primitive machines like *PONG*? Questions like that weighed heavily on me from the moment I was put in the position of inventing a video game that would earn its keep and, by fortunate extension, mine.

Between 1978 and 1982, I designed eight successful video arcade games and programmed all but one myself. The exception was *Star Castle*, which I designed, and Scott Boden programmed. I designed the cabinet art for these games as well. Doing the math, I averaged two successful games a year. What was my secret? What had I learned from my experience that

I could use myself and pass on to others? Almost nothing, I'm ashamed to say. I had been lucky. I credit myself with some good intuitions, but I also worked in an industry that was beginning to burn as bright as the Sun. For the sake of my ego, I will say that there were only a few designers like myself who had such a strong string of hits, but it all came down to intuition, constraints and a few lucky hunches. Looking back, I would have to describe those hunches as successful theories. For instance, I can now tell you why I think *PONG* and its clones were so successful, and I promise to do just that. But first, let us dive into the past.

“A man walks into a bar with an orange box under his arm.”

Is this a shaggy dog story or the beginning of a text adventure game? It is neither. It is how I came to be a programmer and designer of video games. One evening in 1977, I was wondering whether to go see the movie *Star Wars* for the fifth time. I worked at the restaurant next door to the bar I just mentioned and the fellow with the orange box had this wacky idea. He wanted to run an arcade featuring computer games, not video games. He had nothing against video games. He just felt that they weren't as multi-purpose as computers. (I would like to insert here that Douglas Pratt, the man with the orange box under his arm, went on to found some seminal game company that you would recognize in a heartbeat, but I cannot. Sometimes people who are ahead of their time are just too far ahead of their time.) Together, Doug and I began the Cyborg Computer Gaming Center in Kansas City, Missouri.

A game program that came with our orange boxes (The PolyMorphic Systems Poly 88 computer) was a version of the classic text game, *Oregon Trail*, created by Don Rawitsch, Bill Heinemann, and Paul Dillengerger. *Oregon Trail* was an exercise in resource management. If not the first, it was certainly one of the forerunners of today's simulation games. The version we had was text-based and like most games of this type, it assumed that the player would find balancing resources to be interesting and perhaps fun. For many, that would be true, but I hated *Oregon Trail*. I really, really, hated it. It was all about trade-offs and the arbitrary nature of life. I especially hated Doc, the game's frontier physician. About every third turn, Doc would inform you that you had contracted some hideous frontier disease. Or, just as bad, you were randomly wounded by arrows or stray shots. Alright, don't shoot the messenger, as they say, but Doc demanded cold hard cash for his services and that was in short supply. Fresh wild game, protection from raiders and indigenous peoples, etc., these should have been enough payment for him, but no, Doc wanted hard cash on the barrelhead.

Of course, “Doc” wanted nothing. “Doc” was a text string attached to some simple branching code and print commands. The game was not

capable of changing its mind, nor could it offer me alternatives to the bits of language that were embedded in the game. I had been emotionally aroused by text, but not in the conventional, literary manner. The authors of *Oregon Trail* probably did not intend to negatively arouse the emotions of the game's players. Even so, my frustration was on a par with a man assembling a bicycle from instructions translated into English from Cantonese via the original Tagalog. My intention to live a carefree frontier life had been frustrated, and frustrating the intentions of a computer user was then, and still is, one of the worst things any game or interface designer could be responsible for. I would revisit this scenario many times over the years and it inspired me to coin this catch phrase: "The effect of any interface is to affect the user." I would return often to that phrase as theory.

I will give this to "Doc," he motivated me to write my own games. My first game mod was to alter the code for *Oregon Trail* so that the player could "SHOOT DOC." Oh, sure, the next time I was wounded I died of sepsis because Doc was no more, but I died knowing that the old bastard went before me.

So, back to my question, what made *PONG* and other early video games so popular? Text adventures like *Oregon Trail* were usually displayed on light emitting CRTs, but the text did not move. The functional effect was virtually the same as reading text on paper. But even a non-moving source of direct light attracts the eye with a pull greater than reflected light. Add motion, a survival cue for us mammals, to a light source and you almost have a video game. Does adding motion to a direct source of light explain the popularity of *PONG*? I am tempted to say yes, but if that were the case we would be talking about the theoretical aspects of Lava Lamps. Determining what makes any particular video game successful requires looking at business models (see above), novelty of design, timing (being at the right place at the right time) and yes, gameplay. But, almost as important as those other factors, the "ball" and "paddles" of *PONG* were rendered at a refresh rate of sixty frames per second, fast enough to pass the flicker fusion threshold, fast enough to give the player the impression that the glowing white square was something tangible. Combine that with tightly synchronized interaction between real knobs and virtual paddles, and for a quarter, you could luxuriate in a sense of efficacy. And, if you cared to, you could even play a game of Ping Pong. That was my theory when I was making games at the Cyborg Computer Gaming Center. After that, it held up quite well at the first real game company I worked for, Cinematronics.

In the area of video arcade games, I am best known for those I created at Cinematronics in the late 1970s. Between them, the owners of Cinematronics, Jim Pierce and "Papa" Tom Stroud, had years of experience

with a wide range of coin operated devices, many of which were the mechanical forerunners of the video game. These men were long time friends of pinball games, darts, skeeball, and the like, but they were not game players. They were businessmen who, because of the monstrous success of *PONG*, sensed that the future of their families and perhaps their families' families was bound up with video arcade games. Operators ran cash businesses and to them games were games and video games were just another way to fill their home freezers with silver dollars. Suddenly, I was in the Wild West.

Before Cinematronics, I had been working within the constraints of the Polly 88 graphics display which had a pixel resolution of 128×48 . I often had to use punctuation marks and other built in characters to add detail. Screen refresh cycles were slow enough to be visible, giving me a way to add a sense of animation to the scene. The Cinematronics hardware and display systems, created by Larry Rosenthal, could not have been more different. The Poly 88 was a big brush with a small canvas. The Cinematronics hardware system was ultra fast (compared with the Poly 88), had a huge canvas and a fine line pen that kept running out of ink. Or, put another way, the vector display was a short, stiff string that had two states, floating on or hiding below a sea of black. The cathode ray tubes used by Cinematronics were literally a blank slate. There was no raster. There was nothing but a screaming beam of electrons being shot in the direction I specified in my program. Unlike "real" vector displays, there was no display list. There wasn't even a flag that would tell me that a line had finished drawing. I had to work out a rule-of-thumb algorithm based on line length to tell me when it was safe to move the beam again. I was always refining that code, trying to get just a little more line time on screen, more pointing and moving, relieved by blackness when the beam needed to jump to an area not contiguous with the current visible line. As a game designer, what can you do with that, especially when so little can be displayed?

During the years I worked at Cinematronics, we almost always used the same make and brand of cathode ray tube in every game, even though it was sometimes difficult to obtain. The reason for that was the specific decay time of the phosphor after the beam had moved on. The electron beam left behind a visible motion blur, or more accurately, a motion glow. Other tubes had a decay rate that was too short, causing flickering. Most others, designed for raster scanned devices, had a much longer decay rate which made lines streak in uninteresting ways. In the sweet spot, one particular make of cathode ray tube gave us a perfect motion blur that punched up the sense of reality. With this, added to the fixed frame rate of 60 frames per second, the player had a sense that they were reaching

through the looking glass. Today I hear gamers using the words “buttery smooth” to describe the effect of high refresh rates. We have yet to go beyond the glass, but the desire to get there has always been strong.

In the case of Cinematronics, which based its hardware on the MIT mainframe game *Spacewar!*, I could display fine detail and rotations that could not be found in raster games at the time. I made it a point to keep my lines short and close together because that reduced the distance the beam had to travel, thus giving me more time with the lights on, as it were. It was a strategy, a working theory, that had functioned well for *Space War* and it proved to be useful for me. My games *Rip-Off*, *Warrior*, and *Armor Attack* all benefited from it. Unfortunately, I was not always mindful of this rule. My own game *Sundance* and *War of the Worlds*, for which I designed the screen graphics and animation, both failed partially because I had not taken my own observations into account. The ultimate proof of my theory came when Jim Pierce forced a new programmer to create a vector version of an LED handheld game. It was called *Barrier* and it is perhaps the worst vector game ever made. By negative example, this game confirmed the correctness of my theory. It had no rotations, moves were in discrete jumps and vectors were long and static.

The play action of my first Cinematronics game, *Starhawk*, was informed by its predecessors from the midway. Functionally, *Starhawk* was nothing more than a video version of the shooting gallery games you would find at any carnival. But, rather than emulate the bull’s-eyes, ducks, and clay pipes of the midway, I naturally looked to *Star Wars* for my thematic material. (My primary source was Tom DeFanti’s computer graphics readout which he created for that movie. Tom was a friend of mine in Chicago and at one point he offered to send me one of his students if I wasn’t able to master the Cinematronics hardware. I managed.) *Starhawk* featured a background similar to the trench run, with a few different ships that could be targeted and destroyed for various point scores. Unlike what was to become the standard “three tries and you die” method of terminating a game, I gave the player an initial time to play of sixty seconds and awarded additional time when a certain number of points were scored. One particular enemy ship, if not destroyed quickly, would attack the digits displaying the player’s time remaining, replacing those with a new, lower number of seconds left. My small way of letting the player know that there was a “man behind the curtain,” the game designer. *Starhawk* could be played by one or two players, each represented by a crosshairs on the screen. Few video games had high score tables at that time, so the real goal for the player was longevity, seeing how much entertainment could be had for a quarter. Though *Starhawk* was not designed to be played in this manner, a single player could select two-player mode and

use both joysticks at once, each stick collecting its own score. Crazy fun, even if it usually meant a very short game. A game designer should keep in mind that the player is a subversive collaborator. There are gamers of every stripe and kind that believe rules are there to be tested, broken, and rebuilt to suit their own idea of fun. This sort of behavior is not always welcomed by designers, but it is understandable.

One of the primary reasons to play games is to gain a sense of being effective in the world, even if that world is on the other side of a window through which we cannot pass. Our need for efficacy is powerful. We crave a sense of tangible effectiveness and we are made anxious if we are denied it. Fortunately, it is quite easy to give game players a feeling of efficacy and a little bit goes a long way. A surprisingly subtle example is the high-score table. As I just mentioned, high score tables were not present when the era of video arcade games began, but many game designers thought it would be a good idea to have them, myself included. Games of all kinds, well before video games, used various ranking systems to establish hierarchies amongst players and to give onlookers something to talk about. Early on we did not add them to our machines simply because memory chips were relatively expensive and game operators, as a rule, were tight with a dollar. When we were finally given enough memory to display top scores, we discovered that the high-score table was an extraordinarily popular feature. Here's my idea of why that was. If you just walk away from an arcade game without setting a high score, the game resets to its original state. It is as though you were never there. But if you get your name on the high-score table, it stays until it is pushed off by higher scores. For some period of time, however short, everybody who can see the game can see your name. You can bring your friends to the machine and show them your score or you could let your friends and competitors find out for themselves. You have made a tangible mark on the world and for the tiniest fraction of eternity you have affirmed your existence.

Speaking of efficacy, what is my all time favorite fun thing to do? First, design a video game that features balls of glowing energy bouncing between two walls. Then, late at night, go down to the factory floor after about 200 of those games have been manufactured, ready to be shipped the next day. Make sure that the "Sound in Attract Mode" switch has been set to "on" for all of them. Hit the coin switches and bask.

I wish everyone could do that.

The game was *Sundance*, my second for Cinematronics. Besides the amazing sound of those bouncing balls of energy, *Sundance* had vectors with variable levels of intensity and a switch that allowed the word "BONUS" to be displayed in Japanese as well as English. Unfortunately, nearly half of all *Sundance* games that were manufactured suffered damage

because of faulty parts, so the run was very small. Whatever the fate of the game might have been, that night in the warehouse I enjoyed a powerful sense of efficacy that I never had before or since. I know, it's nothing compared to childbirth, but I'll take it.

Vector graphics were great if you wanted smooth rotation, finely detailed tracings of glowing lines, and a fast refresh rate. I wanted these things very much and I was happy to have them. The big trade-off was what I could not have in my game graphics; that would be anything that wasn't a short, glowing piece of stiff string. When I chose to make a game about two sword-fighting knights, *Warrior*, I knew I had a few design problems to deal with. The player-characters had to be viewed from the top down to help computation speed and simplify hit testing. Although the Vectorbeam system was capable of generating accurate representations of 3-D objects, this was quite expensive computationally. For his game *Speed Freak*, even Larry Rosenthal, the designer of the Cinematronics hardware, made extensive use of restrictions and simplifications to create the first true 3-D views of objects in a video game.

Hit testing was not a simple matter in a vector environment either. Raster games had many fast, simple ways to indicate when objects collided because of their cell-like structure. Whenever a pixel or group of pixels changed state, that information became available to the program, which would then take these changes into account when the next refresh cycle occurred. I had only one method for detecting collisions between objects. I knew the X and Y values of the endpoints of each line because that was the information I used to draw lines. I wrote a very simple, very fast piece of code that determined if two lines crossed. Not all lines had to be tested, so I was able to test just the lines that made up a sword edge or the area around the head of a player's knight.

That worked out well, but having concentrated so much of my glowing string in two small areas, what could I do about that big, empty wasteland on the screen? The large number of vectors that made up the knights ate up so much of my string's length that the figures were quite tiny. Not a small thing if you are trying to affect the emotions of your players, or at least give them some eye candy to relieve the grim blackness of the screen. Taking a cue from the multitude of mechanical shooting games that made use of black lights and mirrors, I designed *Warrior* with a half-silvered mirror in mind. It reflected a day-glow top-down view of medieval stairways and pits onto the screen. This was not just for decoration. The reflected art indicated the areas the player should avoid if they were not to fall into a pit, a fall that would give points to your opponent. For this game I relied on the craft and theory of coin-operated amusement device designers, who in turn owed much to stagecraft centuries old.

By now, my theories regarding the Cinematronics hardware were well tested and proven, but each game I designed came embedded with its own need for theory. For instance, how was I to enable the players to engage their opponents? If you have a novel design problem and no one has come up with a solution before you, you have to be inventive. So, I asked myself, “What is the most important point in a sword fight?” “The tip of the sword” was my theory. In fighting games that came years later, like *Street Fighter II*, gameplay would take the form of a slightly complex version of Ro Sham Bo, also known as Rock, Paper, Scissors. That was not a bad idea as it turned out, but much earlier, when I made *Warrior*, I had the opportunity to use vector graphics, which allowed me to do things that could not be done with sprites and character blocks.

My knights and their swords were made up of endpoints that my program would organize within the constraints I assigned to it. Recall that the view of the game was from the top down. If a player moved a single endpoint, the tip of their sword, towards the top of their character’s head, the visual effect was to see a sword raised vertically. If the sword tip was pulled away from the body of the player’s knight, the sword would extend and rotate based again on the position of the sword tip. This scheme of mine might be described as analogue inverse kinematics. My program saw to it that the lines stayed connected in a meaningful way, and by manipulating just two crucial points, the sword tip and the center of the player’s head, the player was able to control all meaningful aspects of



Figure 0.1 For the game *Warrior* (1979), static artwork was reflected over a vector display, an ancient illusion in the service of video games. (Photograph by Archer Maclean.)

the figure. I have to give much credit and thanks to fantasy artist Frank Brunner who made real the great hall of the game. Also to his credit, Frank executed the magnificent art for the side of the cabinet, a feature that helped to flesh out the bits of string. Given the abstract nature of vector graphics, or many early primitive video game graphics for that matter, cabinet artists did us all a great service by illustrating for the player just what the hell we thought they should think they were playing.

Not counting *War of the Worlds*, an exercise I began for new programmer Rob Patton, *Rip-Off*, *Star Castle*, and *Armor Attack* were the vector games I created and completed after *Warrior*. They all had special elements and each was a success. My theories about vector graphics and gameplay were holding up well. Especially successful was *Rip-Off*, my cooperative play game inspired by market research. Not research for any game company, but a tip I got from my girlfriend, a disc jockey at a radio station with a large and broad market. This is what she heard and repeated to me: “People like to cooperate,” “people” being listeners to mammoth radio stations, not “people” being arcade game players. Not a sure thing, but a theory worth testing. Because of repeated application and refinement, in all aspects *Rip-Off* was the most true to my own theories. Adding “people like to cooperate” was a bonus. Over the years there has been ample proof that the game and its embedded theories were successful. First, it was fun to play. I would have settled for that alone. Second, it was financially successful, nothing wrong with that either. And third, the proof of theory that still means the most to me, I continue to get e-mails from players who fondly remember the great fun they had playing *Rip-Off* with a friend.

You would think that by this time I knew a few things about what made a great video game. Maybe I did know a few things, but there are always more factors to success and failure than you can imagine, especially in the Wild West atmosphere of arcade games in the 1980s. Before going freelance as a game designer, I briefly worked for Gremlin/SEGA in San Diego. There they were experimenting with color vector graphics, which were not much of an improvement over black and white vector graphics. I did a few experiments with color vectors; simulating interactive light sources was one idea I tried. But color vectors were just as skinny as white ones, black was still black and there was too much of that to make a colorful display. The theories I formulated at Cinematronics still held true and were transferable, but raster graphics were clearly overtaking vectors. The raster hardware at Gremlin/SEGA supported a relatively wide color palette which could be animated by changing values in the color registers. Other hardware helpers were the “sprites,” discreet bits of artwork that could move over the primary background image at a motion resolution similar to what I had at Cinematronics. But rotating raster art was clunky at best because

raster sprites did not actually rotate. A rough version of rotation could be had by creating multiple sprites of the same object, each pre-rendered at a different angle. If the sprite image was symmetrical, more space could be saved by flipping and flopping the images. With these resources I prototyped a game that featured a scrolling background with a third-person point of view. The player's ship rotated around a central point. One control swung the ship in a circular path. Another moved the ship in and out around the center, decreasing the ship's size as it moved to the center, growing in size as it pulled back. This gave the illusion that the player was moving forward and backwards. That was on the sprite plane. On the background plane I designed a scrolling terrain which shifted from a top-down view to a view looking at the horizon as the game progressed. For the player, it was a shift from bomber to jet fighter. Still, for all the bells and whistles, the game play was essentially a shooting gallery like *Starhawk*.

My explorations at Gremlin/SEGA were cut short when Cinematronics chose to sue me for allegedly passing along trade secrets. It was a nuisance suit which was quickly dismissed, a token of how much they missed me, I like to think. But I felt bad about not being able to finish my game. If I had been farther along it might have been finished by another programmer, but it wasn't. Still, I was able to walk away with the results from my experiments combining vector style motion with bitmap graphics, another useful bit of theory applied. *Reactor*, *Insector*, and *Screw Loose*, the games I would create for Gottlieb/Mylstar, all benefited from my work at Gremlin/SEGA.

In the early 1980s, almost every video arcade game had its own gameplay and most were running on hardware that had some new and unique method for producing cool graphics. No one was interested in reflection or nostalgia. It was crackling good fun to create new games with new rules. No one in the arcade game business ever said to me, "Maybe game players want to play the same game for a longer time. Maybe they want more familiarity and depth." For those who wanted that, there were home console games. If you wanted to play the games with the coolest sounds and graphics, you had to play the latest arcade games. Arcade games had another unique thing going for them, the allure of the arcade itself, a place where you probably shouldn't be, young man! (And they were, mostly, young men.) What video arcade games in the early 1980s needed was not novelty. There was too much of that already. Players had a wide range of new games to choose from, with even more titles popping up on a regular basis. For a few years I spent a good part of each weekend playing games in arcades and traveling to competitors' testing locations when word came around that there was a new game to check out. Games with novel gameplay weren't scarce and almost without exception weekly coin counts



Figure 0.2 Sales flyer for *Rip-Off* (1980), illustrated by Frank Brunner who had earlier enhanced *Warrior* with his outstanding background and cabinet art.

seemed to favor novelty. That might have been a reflection of how few sequels were being made, or it might have been a warning sign. Were there only a few sequels because few games were able to last longer than a month or so in the coin reports? Or, were players simply happy to enjoy novelty for its own sake? There was no way to know for sure. Within Gottlieb/

Mylstar, designers labored to create unique games, each different than the one the team across the room was developing. It seemed like every game that was introduced enjoyed at least a few moments at or near the top of coin collections, but with the amount of competition that was erupting, how long any game would stay there was unpredictable. It was not a good time for theory. There were too many variables and the data was chaotic. Perhaps it just seemed that way. When asked, a doctor friend of mine used to reply to the question “How are you?” with “I’m too close to the patient to make a diagnosis.” That was definitely my situation. It was, I felt, a good time to find a place where I could step back and observe. I joined up with some friends and fellow game designers when they formed Free Radical Software, which became Incredible Technologies. I chose initially to work with them as Art Director, not as a game designer, because I believed that I did not have enough fundamental knowledge about game design. Truthfully, the chaotic times of the 1980s left me a bit scarred, and I was not eager to dive back in. But I kept my promise to myself and eventually formed some solid ideas about what What Makes Games Fun, some of which I have just shared with you.

Today, I look at my game design years as a time of data collection, with me in the role of an Arctic scientist, examining ice samples collected on expeditions taken years earlier. Perhaps some of what I have written here will serve a similar purpose for you.

Tim Skelly
April 7, 2008

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xxii • Acknowledgments

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Introduction

**BERNARD PERRON
MARK J. P. WOLF**

It need not be said that the field of video game studies is now a healthy and flourishing one. An explosion of new books, periodicals, online venues, and conferences over the past decade has confirmed the popularity, viability, and vitality of the field, in a way that perhaps few outside of it expected. The time has come to ask not only how the field is growing, but in what directions it could or should go.

Looking Back, Looking Ahead

Our “Introduction” in *The Video Game Theory Reader* left off in 2003, and since then, video games have gone through further important developments.¹ Among them, two new handheld video game consoles have been marketed, the Nintendo DS (2004) with a built-in microphone, wireless support, and a stylus used on the bottom touchscreen, and the PlayStation Portable, known as PSP (released in 2005 in North America), with its wireless and multi-media capabilities. A new generation of home video game consoles has also appeared. Microsoft’s Xbox 360 (2005) and Sony’s PlayStation 3 (PS3, 2006) brought increased engine power to the game industry, along with bigger, richer, and graphically-superior game worlds like the land of Cyrodiil in *The Elder Scrolls IV: Oblivion* (2K Games and

Bethesda Softworks, 2006) or the cities of the Holy Land of *Assassin's Creed* (Ubisoft, 2007). The Nintendo Wii (2006), with its primary handheld pointing device, the Wiimote, has transformed the way people play games.² Following in the long line of innovative interfaces from early steering wheels and handlebars to the dance pad of *Dance Dance Revolution* (Konami, 1999 in North America), rhythm games like those of the *Guitar Hero* series (Harmonix/Nerversoft, 2005–2007) have popularized the use of other types of peripherals like the guitar-shaped controller used to simulate guitar playing. Harmonix Music Systems's *Rock Band* (2007) went a step further, combining guitar, drums, and voice inputs into a multi-player music game. Online gaming continues to grow in importance. With the appearance of Microsoft's Xbox LIVE, Sony's PlayStation Network, and Nintendo's Wi-Fi Connection, all the major corporations have consolidated their online services. Online multiplayer versions and customization facilities have become common features of first-person shooters, such as *Call of Duty 4: Modern Warfare* (Infinity Ward, 2007) or *Halo 3* (Bungie Studios, 2007). While MMORPGs were already popular, *World of Warcraft* (Blizzard, 2004) found incredible success with its current 10 million subscribers worldwide. And today, the average game *player* is now 33 years old and has been playing games for 12 years.³

All these changes are worth considering from the outset because video game systems and games themselves are the starting points of theories. They have influenced and will continue to influence the methods of looking at video games. Undeniably, the field of video game studies did not undergo quite as much progress; technological revolutions often outstrip and happen more often than intellectual ones. But the field did evolve, and continues to accelerate.

Our approach to this new collection of essays on video game theory reflects these changes. The first *Video Game Theory Reader* was largely concerned with justifying the existence of video game theory in academia. We wanted to establish that there was already a history of writing about video games, from the early writings of computer enthusiasts and hobbyists, to the trade journals and in-house company journals of the 1970s, and that the video game had begun to be examined more substantially in the 1980s and 1990s, with books like Chris Crawford's *The Art of Computer Game Design* (1982); Marsha Kinder's *Playing With Power: Movies, Television, and Video Games from Muppet Babies to Teenage Mutant Ninja Turtles* (1991); Leonard Herman's *Phoenix: The Fall and Rise of Home Video Games* (1994); Espen Aarseth's *Cybertext: Perspectives on Ergodic Literature* (1997); Janet Murray's *Hamlet on the Holodeck. The Future of Narrative in Cyberspace* (1997), and others. Perhaps we should have emphasized the work going on in the 1980s even more strongly, for as Jo Bryce and Jason

Rutter point out in *Understanding Digital Games* (2006), this era is often neglected:

Unfortunately, this resource of digital games analysis is often not fully credited by contemporary authors. For example, Wolf and Perron (2003) suggest that their collection would not have previously been possible because of a lack of academics working on digital games and Newman (2004) suggests that academics have ignored digital games. The trope that digital games have been neglected by researchers and marginalized by the academy is problematic given the lack of substantive evidence provided. There is, of course, a difference between a topic being overlooked and being ignored—there is no malice or intentionality in the former. Suggesting that digital games have not received the academic attention they deserve because they have been framed as “a children’s medium” or “mere trifles” (Newman 2004: 5) is difficult to accept without sources for these accusations.⁴

Part of the reason for possible omissions is the multidisciplinary nature of video game studies, even back then. For example, Bryce and Rutter (2006, 1) cite “the case report by McCowan (1981) of ‘Space Invader wrist’ (a minor ligament strain which we would probably now refer to as repetitive strain injury [RSI])”, an essay by medical student Timothy McCowan, which appeared in *New England Journal of Medicine*, and was more concerned with the malady than the game. Thus, the amount of research one finds pertaining to video games depends on the criteria one has for what constitutes “writing about video games,” and the degree to which essays refer to games or actually discuss them. But Bryce and Rutter do make the valid point that such broader searches must be made. And there is without a doubt substantive research to conduct on the history of the study of video games, one which would acknowledge its continuities and discontinuities.

In *VGTR1*, our survey of video games studies ended in 2003, the year the book was published (Bryce and Rutter also include, on page 3, a chart following the release of writings on video games, and 2003 is the start of a sharp increase in the number of publications). Since 2003, many scholarly books have appeared, such as *Rules of Play: Game Design Fundamentals* (2003) and *The Game Design Reader: A Rules of Play Anthology* (2005) by Katie Salen and Eric Zimmerman; James Newman’s *Videogames* (2004); *Handbook of Computer Game Studies* by Joost Raessens and Jeffrey Goldstein (2005); *Half-Real: Video Games Between Real Rules and Fictional Worlds* by Jesper Juul (2005); *Computer Games. Text, Narrative and Play* by Diane Carr, Andrew Burn, Gareth Schott, and David Buckingham (2006); Jo Bryce and Jason Rutter’s *Understanding Digital Games* (2006); and Wolf’s *The Video Game Explosion: A History from PONG to PlayStation and*

Beyond (2007), among others. More often than not, these books (including *The Video Game Theory Reader*) begin with an attempt to define what a video game is, and distill its essential features, some (for example, *Rules of Play* and *Half-Real*) with more length and depth than others. Naturally, all these books show an appreciation of the video game as a new medium, a new art form, and a new popular cultural force. They all demonstrate that it is possible to apply existing terms, ideas, concepts, and methods to the video game in a useful and interesting manner, while pointing out that new theoretical tools are needed.

The definition of its object and the vindication of its examination are certainly representative of the first phase in the defining of a new field of research. For the most part, while textbooks with more refined perspectives have appeared (for example, *An Introduction to Game Studies: Games in Culture* by Frans Mäyrä, and *Understanding Video Games* by Simon Egenfeldt-Nielsen, Jonas Heide Smith, and Susana Pajares Tosca), video game studies has passed beyond this phase.⁵ Books, such as Edward Castronova's *Synthetic Worlds: The Business and Culture of Online Games* (2005); Geoff King and Tanya Krzywinska's *Tomb Raiders And Space Invaders: Videogame Forms & Contexts* (2006); and Ian Bogost's *Persuasive Games: The Expressive Power of Videogames* (2007) have shed light on the cultural, political, and ideological dimensions of video games. As a list of conferences and their online proceedings, even from just the last five years, would be far too large to include here, suffice it to say that the number of topics, approaches, problems, and questions being considered is staggering.

At this time, video game studies seems to have moved into a second phase, in which, having set its foundations as an academic field of study, it must now attempt to articulate its exact nature and scope, codify its tools and terminology, and organize its findings into a coherent discipline. In a sense, the field has met the conditions set in 2005 by Frans Mäyrä, then president of the Digital Games Research Association (DiGRA). Stressing the overwhelming popularity and societal impact of video games as opposed to their feeble presence in the universities or educational system, Mäyrä highlighted the following essentials:

Thesis one: There needs to be a dedicated academic discipline for the study of games.

Thesis two: This new discipline needs to have an active dialogue with, and be building on, existing ones, as well as having its own core identity.

Thesis three: Both the educational and research practices applied in game studies need to remain true to the core playful or ludic qualities of its subject matter.⁶

There is no doubt that video game studies has formed its own identity apart from other disciplines. While dealing with what Espen Aarseth has called “colonising attempts,”⁷ the field has begun to explore its connections with other areas and what it shares in common with them. The richness of abundant theoretical overlaps is described in great detail in the Appendix of this book, which looks at video games through a wide variety of theories and disciplines.

Of course, the consolidation of a new field of research does not come without pitfalls. In the first issue of *Games and Culture*, Tanya Krzywinska, current president of DiGRA, writes:

What I fear however is that if all game research is done within dedicated departments a kind of new orthodoxy of approach will crystallize. This may be the price of the development of our subject. It might mean blindsiding those who are for example engaged with philosophy or political economy because they are not essential, apparently, to running practical game design programs. There must always be room in the research community for newcomers from whatever background, who may bring ideas that challenge new orthodoxies.

... Academia is now industry focused, funding hungry, and biased toward empiricism and entrepreneurialism; as a result, speculative and idiosyncratic work that values intellectual inquiry is becoming an endangered species. If experimental thinking is devalued, academia becomes a less interesting place to work and study. All approaches have their strengths and weaknesses, and each formulate issues and perspectives according to particular rhetorics. Power and pleasure are not therefore simply a dynamic at work in the playing of games. Speculative approaches have their place and are essential components in making game studies a rich, evolving, and multifaceted entity.⁸

Given the current wide variety of approaches, and the inherent playfulness (in both a literal and figurative sense) of the field, it may be hard to imagine a rigid orthodoxy arising and crushing its opposition. But any kind of limited resource, be it university funding, classroom time, page space in a periodical, or book contracts at a publishing house, forces decisions as to the acceptance and rejection of scholarly work and pursuits. At the same time, video game studies is tied closely to, and perhaps the most practiced by, the generations who grew up with video games, and whose outlook differs from that of previous generations. The field, then, may represent the possibility of new approaches that may be taken. As Frans Mäyrä wrote in 2005:

There is a generation of young academics emerging who have grown up surrounded by digital games, and whose attitudes to life have been formed by simultaneous changes in culture and society. They are part of the post-scarcity experience, where the utilitarian morals of the 20th century generations are

giving way to new priorities in life. Game studies is a discipline that is going to play a part in this change, directing attention also into the ways in which we organise our own work. Only by coordinating the research work and course-work in ways that will keep the qualitative core of games and playing visible to researchers, informants and students alike, will the discipline be the innovative, yet passionately and uncompromisingly pursued field it has every opportunity of becoming.

Through a conscious effort such a vision may be realized. And that will mean walking the line between rigid, uncompromising orthodoxies that seek to crush their opposition, and a collection of loose, vague wide-ranging approaches that operate with little knowledge of each other and fail to cohere into a community of shared ideas and concepts (which at times seems the more likely fate of the field in the absence of meta-theoretical discussions of the field's direction). With collaborative coherence in mind, we present a number of challenges facing video game theory today.

Seven Challenges for Video Game Theory

The concept of challenge is common to almost all video games, and encountered by anyone considering or playing them. It is one of the few objects of study that actively resists analysis by withholding itself from those who do not have skills to keep their avatars alive long enough to see all of a game's areas, states, or levels, and discover all of its secrets. Higher levels and Easter eggs may elude even skilled players who have devoted many hours to a game. And plenty of challenges exist outside of the games themselves, such as the finding of copies of old games and the systems needed to play them, the finding of information on long-defunct companies, attempts to send requests for information or permissions through the convoluted hierarchies of huge corporations, and the tracking down of details and gameplay specifics on individual games, which may vary from one platform to another, or one release to the next. And after these research challenges are met, there are further challenges facing the video game scholar, as so many theoretical issues surrounding the video game are far from being resolved. Seven of these challenges, which we find to be the most pressing, are listed below.

1. Terminology and Accuracy

A set of agreed-upon terms has been slow to develop, even for the name of the subject itself ("video games", "videogames", "computer games", "digital games," etc.).⁹ For the field, both "game studies" and "game theory", although often used, are broad enough to include board games, card

games, sports, and so on, which they usually do not; at the same time more specific names are less likely to gain consensus, and may be thought to narrow the field as well. Nor is terminology used by gaming communities consistent or rigorous enough for academic application and usage. Other terms like “interaction” are problematic but their persistent usage seems to have made them become standard. The fact that the field is so multidisciplinary may also slow down the codification of terminology, as the variety of approaches slowly converges on definitions and terms. Since terminology is still in flux, current writing must be careful in choosing its wording, not only for clarity and precision, but also to aid the search for acceptable and appropriate terms.

The same is true for journalists who write about games. Authors David Thomas, Kyle Orland, and Scott Steinberg have sought to solve this problem by writing *The Videogame Style Guide and Reference Manual*, which asks for consistent style and vocabulary and accuracy regarding names and terms. In that book’s Introduction, Kyle Orland argues that consistent style engenders trust and legitimacy, and is even important in preserving video game history. He also goes on to say:

It’s a reflection of the industry’s current state. Has our industry evolved from its component parts of “video” and “game” to become “videogame,” a one-word cultural idiom unto itself? What about “interactive entertainment?” Is the term “man”—as in “eat the mushroom to gain an extra man”—sexist? How are “life” and “death” defined in a videogame? Is “karaoke simulation” its own genre? As the industry evolves, these and other questions about self-perception deserve consideration and meaningful attempts at answers.

Finally, with the proliferation of the Internet, it’s more important than ever to hold all videogame writers—yes, even FAQ writers—to a higher standard. With website message boards that drip with egregious violations of the English language and videogame FAQs that practically require a translator, flaunting one’s ignorance is dangerously close to becoming fashionable on the Internet. Writing well, even in informal forums like Internet message boards, should be celebrated and valued.

Bearing all of this in mind, we have one more principle to add: This guide is by no means written in stone. As the title implies, this volume is simply a suggested guide to navigating previously uncharted waters. No rule featured here is without exception, and we don’t expect readers to agree with all our decisions.¹⁰

As much as one can admire what they are trying to do, it is indeed inevitable that disagreements will arise, and despite its usefulness, parts of the guide could have been thought out a bit more. For example, their decision to go with the one-word “videogame” seems to have been arbitrary. The choice seems to run counter to one of their criteria, “Common Usage and

Accuracy”: in a March 4, 2008 search on the top three search engines, Yahoo found 207 million hits for “video game” but only 36.1 million for “videogame”; Google found 71.3 million hits for “video game” and only 15.0 million for “videogame”; and on MSN.com there were 43.9 million hits for “video game” and only 9.38 million for “videogame.” Clearly, the two-word version appears to be more commonly used!

But the idea behind the style guide is a good one, and both journalistic and academic realms are in need of consistency and accuracy. And admittedly, accuracy involving even names and release dates can be tricky. Different games can have the same names or ones that are close: for example, there is “*Spacewar!*” (the mainframe game from MIT), vs. the arcade games “*Space War*” (by Vectorbeam), “*Space War*” (Sanritsu’s bootleg of *Space Invaders*), “*Space War*” (by Leijac/Konami), not to be confused with “*Space Wars*” (by Cinematronics). Names can include capitalized letters and punctuation or other symbols. Some games, like *PONG* and *M.U.L.E.* and *NARC* and *SWAT* are all uppercase, while some, like *Shark JAWS* or *S.T.U.N. Runner*, mix uppercase and lowercase. Some have intercaps, like *HiGeMaru* or capitalize the second half of hyphenated words, like *Pac-Man*. Nintendo’s “GameCube” is one word, while “Game Boy” is two words. *SWAT* uses no periods even though it is based on an acronym, while games like *Spacewar!*, *Qwak!*, and *Spaceward Ho!* include exclamation points, and some even have two exclamation points, like *Punch-Out!!*, *Super Punch-Out!!*, and *Whoopee!!*. A few names include other symbols, like *Dead or Alive++*, *Who Shot Johnny Rock?*, or Neo•Geo. *Wolfenstein 3-D* appeared originally with a hyphen, but later sometimes appeared without one. Usually images from the game’s packaging or the game itself can clear up uncertainties, but not always; for example, Exidy’s *Mousetrap* has the game’s name broken into two words (“Mouse Trap”) on its game cabinet above the screen, yet the game’s title screen has the name as one word (“Mousetrap”); in such a case it seems more prudent to go with the game imagery, since it is an integral part of the game (however, even this can be misleading; the title screen of the arcade game *Tempest* gives a copyright date of 1980, but the game was released in 1981). With the potential for errors to multiply quickly on the Internet, one has to be quite careful when verifying such details. And both academics and journalists will only add to this problem unless their work is able to avoid these errors and correct them where they can.

2. History

Most academic writing about video games tends to be limited to home video games and online games from only the last five years or so. Relatively little is written about handheld games and older home games and their

systems, and very little about arcade games. Part of the reason for this is practical; newer games are contemporary, easier to find, known to a wider audience, more detailed and cinematic than earlier games, accessible, and more to the liking and experience of many writers. Yet, knowledge of older games provides a historical context and background from which more recent games have evolved and on which their own forms, genres, and conventions rely. More attention should be paid to older games, and the way in which genres, conventions, franchises, series, and so forth all developed over time, rather than merely on the latest incarnations of these things as though they have no past or predecessors.

While it is true that older games can be harder to find, and there are no institutional archives yet in the most formal sense, there are an increasing number of venues for researchers to find information about them, or even find the games themselves. Keith Feinstein's Videotopia has been around since 1996, although it still has no permanent home where it can be visited by the public. Feinstein also started the Electronics Conservancy, whose mission is described at the Videotopia.com website:

The Electronics Conservancy is an organization dedicated to the preservation and restoration of artifacts and information detailing the history of the electronic medium, as well as the use of these artifacts in informing and educating. . . . Having witnessed the destruction of the majority of these games and fearing the loss of their historical importance, we have spent years assembling a collection of over 400 rare machines, forming what may be the most complete collection in the world. We have also gained and will continue to seek information and artifacts from many first-hand sources in order to catalogue and preserve the history encompassing this art form. The Electronics Conservancy also maintains a collection of every home system ever released in the United States, as well as classic and important personal and industrial computers, and an extensive library of software.¹¹

Several US universities in association with the Library of Congress have begun the Preserving Virtual Worlds project, which will be working to “develop mechanisms and methods for preserving digital games and interactive fiction.”¹² Video games are also part of the Internet Archive, a San Francisco-based non-profit institution, which was established in 1996 “with the purpose of offering permanent access for researchers, historians, and scholars to historical collections that exist in digital format.”¹³ Even on websites like YouTube one can find footage of older games being played, including arcade games. Although such video clips are often limited in their usefulness in regard to gameplay, they do provide some sense of the games' sound and movement that still images cannot convey. Emulators provide even more of a sense of a game and its gameplay, though they

must be used with caution, since they often do not recreate games completely and accurately due to technological differences between systems.

Despite all the new opportunities available online, first-hand experience remains essential to video game research. Old home systems and their games can be purchased at on-line auction websites like eBay, and a large collector community exists for all kinds of games. Organizations like VAPS (Video Arcade Preservation Society)¹⁴ provide contact information for hundreds of collectors who have working copies of arcade games, and who can potentially answer questions regarding gameplay. Some even allow visits to their collections.

And there are now fewer hurdles to video game research. Permissions for game screenshots are no longer necessary, thanks to the 2000 landmark case, *Sony v. Bleem*, which established that the use of video game screenshots falls into fair use, even when that use is both *commercial* and *hostile*.¹⁵ There has never been a better time for researching and writing about the history of video games, and even those concerned mainly with theoretical aspects should have some foundation in the medium's history.

3. Methodology

Lacking formal academic studies before the 1960s, film theory took a while to get beyond the exploratory stage exemplified by Arnheim's *Film as Art* (containing essays from 1933 to 1938) and Bazin's *What is Cinema?* duology (with essays from the 1940s and 1950s). This ontological theoretical approach, as Francesco Casetti came to call it,¹⁶ aimed to define its object of study, draw attention to the constitutive elements considered as fundamentals, and reach an all-encompassing knowledge about it. Once the essence of film had been uncovered, a second paradigm "radically" modified the field, a paradigm Casetti called the methodological theory. With it, the attention shifted to the way in which research was planned and conducted; the "correctness" of the methods of inquiry used in the study was at stake. As mentioned earlier, the video game studies field has moved quickly from the ontological to the methodological paradigm.

Of course, video games still need a more thorough and accurate examination. A glance at the Appendix of this book (which itself contains an entry on methodology) demonstrates how methodologies will vary depending on the purpose of the research being conducted, and even on the researchers themselves as gamers. There are still many discussions as to the implications of these variances, or to what degree they undermine the applicability and usefulness of findings. The need here is not for a strict codification of procedures, but rather for more awareness and acknowledgement of the way in which they operate, and the limitations they will inevitably involve.

The video game is really a complex object of study, and one that involves a performance. This has led Espen Aarseth, in his “Playing Research: Methodological approaches to game analysis”, to ask:

should we expect game scholars to excel in the games they analyze? . . . As game scholars, we obviously have an obligation to understand gameplay, and this is best and sometimes only achieved through play. . . . More crucial here than skills, however, is research ethics. If we comment on games or use games in our cultural and aesthetic analysis, we should play those games, to such an extent that the weight we put on our examples at least match the strata we reach in our play.¹⁷

Before exercising analytical or interpretative skills, one has to draw on one’s ability to play a game (or know someone with ability). One has also to ask what exactly is being analyzed, since the video game is such a multi-layered phenomenon.¹⁸ Players can have very different experiences of a game not only due to their own abilities, but because some games, like MMORPGs, are too large for any individual to see in their entirety. And many games remain unfinished by players. Even when games are finished, portions of them may still go unseen or not be experienced. How much of a game is it necessary to see to draw a conclusion? What is being analyzed—the graphics and sound, the interface, interactions, the structure of the game’s world, the storyline or lack thereof, the experience of the player, the sociocultural impact of the experience, even the physical impact of the experience? How is analysis affected if one or more of these is left out?

The notion of intertextuality has helped in the understanding of the complex interrelationships between texts and how meanings in a text are affected by them. While intertextual considerations are relevant to video game studies, the textual examination itself is crucial, because analysis “must rely on an intrinsic comparative study of the *in-textual*, that is, from the text in itself.”¹⁹ With the multi-linear, open, and emergent dimensions of video games, gameplay rarely occurs without players considering possible alternatives in actions and storylines. In the case of MMORPGs, vast and persistent, textual examination is inevitably incomplete. Without access to development documents or behind-the-scenes access, analysis tends to shift toward methodological approaches centered on the player experience.²⁰

As the history of the video game interface (and more recently the Nintendo Wii) demonstrates, one has to consider more than just what is happening on-screen. The space of play has always been beyond the frame, involving the player’s body, the proxemics of players, even the social space of the arcade or home. Games themselves have begun monitoring more of

this space, with eye tracking and skin conductance and heartbeat monitoring devices that observe the gamer's psychophysiological responses and can allow the game to adapt to them. As games evolve so will methodologies, and an awareness of how they change is necessary.

4. Technology

An understanding of technology and its development is needed to understand why games look and play as they do, and have developed as they have. Graphics, sound, algorithms, processing speed, storage capability, accessing speed, peripherals, and so forth all exert an influence on both hardware and software design, which in turn limit programming and shape game design and gameplay experiences. How artistic decisions are shaped by technological compromises needs to be understood by game researchers before assumptions regarding game design can be made.

These issues also become apparent when one considers games ported across a variety of platforms, and emulators which attempt to simulate arcade games and home games on computers. For example, many arcade games and home video games use NTSC video cathode-ray tubes, which differ from computer monitors due to differences in pixel aspect ratios, color reproduction, sound, and so forth. Vector graphics, which use a vector-scan monitor, cannot be simulated on a raster monitor with complete accuracy. Thus, specific hardware is often necessary for a game to be accurately represented in its original form. For certain kinds of analyses, such details may not be relevant, but without knowing what those details are, and what has been lost in the technological translation between systems, researchers will be unable to determine whether or not the differences are relevant in the first place. A technological context, then, is necessary for understanding games and also for researching them, even for those whose main interests in video games lie elsewhere.

5. Interactivity

The problematic nature of the term “interactive” has been frequently noted, but use of the term has been persistent and it seems to have stuck. Since it is such a broad concept, a comprehensive theory of interactivity is needed to look at how the interaction of a game is designed, and how a game's options and choices are structured. Wolf's essay “Assessing interactivity in video game design”, in *Mechademia*, suggests how the synchronic and diachronic nature of interactivity forms a kind of grid which can serve as a starting point of analysis:

In order to compare interactive structures, we can first consider mapping how

a player's decisions are related. The smallest unit of interactivity is the choice, which consists of two or more options from which the player chooses. Choices are made in time, which gives us a two-dimensional grid of interactivity that can be drawn for any game. First, in the horizontal direction, we have the number of simultaneous (parallel) options that constitute the choice that a player is confronted with at any given moment. Second, in the vertical direction, we have the number of sequential (serial) choices made by a player over time until the end of the game. Obviously, the choices a player makes will alter the options and choices available later in the game in both of these dimensions, and in most cases a game's complete grid would be enormous. Even board games like Chess and Checkers have huge trees of moves which have never been mapped in their entirety. But one does not need to map the entire tree of a game to get an overall sense of how its interactivity is structured.²¹

Other dimensions of interactivity to be considered include the historical (the hardware, software, and cultural constraints determining what was possible, or at least typical, at the time when the game was made), the physical (the game interface, the player's ability to use it, and other factors such as reaction time and stamina), and the mental (player speed and game familiarity, the ability to recognize affordances (to use J. J. Gibson's term), pattern recognition, puzzle-solving ability, and so forth). Interactivity also occurs within the onscreen game space yet outside of the game's diegetic world; for example, the choosing of avatar attributes or the setting of other customizable factors such as difficulty level. Decision-making can also be influenced by both short-term and long-term goals within a game, as well as the degree of irreversibility that accompanies a choice (for example, consider the differences between arcade games that cost a quarter a play, home games that can be replayed for free, and MMORPGs which are ongoing and cannot be restarted by the player.) The same game can sometimes be played with a variety of input devices (for example, in 2004 the Interaction Design Institute Ivrea used a large ball that the player sat upon as an input device for *Pac-Man*), and in a variety of different contexts as well. As new controllers, like the Wiimote, new screen formats, and new peripherals appear, they will shed new light on the unacknowledged assumptions of older devices, and will change the relationship of players and games, and between players as well. Are there universal statements and claims about interactivity that will hold up in light of all future innovations?

6. Play

Discussions regarding the ludological vs. the narratological aspects of video games have raised interesting questions as to their nature and drawn attention to their constitutive properties. Just as digital cinema has brought about a re-examination of what it means to be cinema, the rapid technological

evolution at the core of gaming will also stimulate new insights. With a growing number of platforms and venues, player modifications, and new intersections with other cultural forms, general statements about video games as a whole will be harder to make. As a result, a more developed notion of “play” becomes increasingly important.

Joost Raessens has pointed out that we are experiencing a “ludification of culture” and that many activities are now engaged with a playful attitude.²² While classical definitions of play like Huizinga’s might still have some relevance, play occurs in many new contexts which must be considered. The theme of the DiGRA 2007 Conference in Tokyo was “Situated Play”, and the call for papers stressed this clearly:

Games are not isolated entities that one can effectively study *in vitro*. Games are situated in culture and society. To truly understand the phenomenon of digital games, it is not enough to merely study the games themselves or short-term impacts as described by laboratory experiments—these are only part of the story. Their context begins when the games are marketed and circulated, and they reach the hands of players.²³

Though Roger Caillois’s division of play into *paidia* and *ludus* are a good start, a theory of play, playing, and players needs further elaboration to account for new contexts. Different styles of play, modes of play, motivations for playing, and the interweaving of play and game with everyday life reconfigure boundaries between person and persona, natural and digital, real and virtual. For instance, pervasive games are interweaving play and game with the everyday life and pushing us to question the blurred boundaries between the real and the virtual. Serious games make us exploit games for more than just pure entertainment. Virtual worlds like *Second Life* have become a great channel for communication between players, and even institutions. Likewise, much of contemporary life has taken on game-like qualities that make theories of play more widely applicable than they were in the past, but at the same time harder to generalize and bring to coherence. Many of the spectra that need to be considered—contemplative reflection vs. reflex action; new players vs. experienced players; competition vs. cooperation; casual vs. serious play; and so on—will have greater relevance when applied to larger contexts.

7. Integration of Interdisciplinary Approaches

Video games are best understood when they are viewed through a multiplicity of perspectives. As Jesper Juul has noted, these perspectives sometimes find themselves becoming divided between the humanities and the social sciences, in an antagonistic relationship.²⁴ While the achieving of a

multidisciplinary outlook may be the easiest challenge to define, it may also be the hardest to achieve. As the field grows and divides into a wide range of subdisciplinary areas, the interconnections with other fields will strengthen and the field as a whole will be enriched. The challenge of bringing all this together into a coherent discipline of its own will take time and effort, but will bear much fruit. Frans Mäyrä's essay in this volume takes up this topic, and the Appendix lists some of the disciplines that have something to contribute to video game studies.

From Philosophical to Practical: The Essays

The essays in this anthology exhibit a wide variety of theoretical approaches, with perspectives ranging from the philosophical to the practical, from disciplinary points of view to an interdisciplinary dialogue, and the combined effect once again underscores the richness of video game studies. From the outset, Eric Zimmerman takes a stand for the whole field in "Gaming Literacy: Game Design as a Model for Literacy in the Twenty-First Century," which extends the notion of literacy (and of being educated in a society) to games. As games grow more important in our complex, playful world, knowing how they work and being able to understand their significance becomes essential. As a cluster of practices, gaming literacy revolves around three interlinked concepts for Zimmerman: systems, play, and design. Whereas *systems* draw attention to the interrelations among elements producing a significant whole, *play* expresses how players engage within and with the systemic structures, and *design* underlines the creative nature in the production of meaning. Lars Konzack also stresses the importance of design in "Philosophical Game Design," and suggests that game designers need to think beyond the creation of immersive experiences, but strive to express philosophical ideas in game systems and their design. Just as game designers need to know the history of ideas and how to present metaphysical ideas through consistent game constructions, game theorists are likewise required to exert an effort to appreciate the attempts, to grasp the manifestations, and to discuss them properly. Konzack does this, giving careful consideration to ethical, political, and philosophical aspects of games, such as the classic *Dungeons & Dragons* pen-and-paper role-playing game; commercial video games, such as *The Sims* and *BioShock*; and propaganda games, such as *Kabul Kaboom* and *Jennifer Government: NationStates*.

Moving a step in the direction of the practical, David Myers examines the concept of play in "The Video Game Aesthetic: Play as Form", which argues for a formalist approach to the study of play. He identifies three categories of characteristic game forms, each with its own set of rules:

physical forms, encompassing the sensory relationship (the interface) between player and game; semiotic forms, encompassing contextual relationships (values) among game signs; and social forms, encompassing interpersonal relationships (communities) among game players. His analysis demonstrates the degree to which play behavior is rooted in cognitive and perceptual mechanisms existing prior to and yet beyond the influence of language and its related significations of culture. In “Embodiment and Interface,” Andreas Gregersen and Torben Grodal further explain how play is rooted in our biological embodiment. As one of the most fundamental conditions that govern our experience of the world, embodiment affects the way we influence the environment; the way we are affected by other agents’ actions or events unfolding around us; and the way we play games. Gregersen and Grodal discuss how different types of interfaces and different game worlds mold players’ embodied experiences. Focusing their attention on the games *Wii Sports*, *Eyetoy: Kinetic*, and *ICO*, they analyze how the body and player actions are mapped onto or into video game spaces. Aki Järvinen shifts the notion of embodiment to game design for the purpose of studying emotions in “Understanding Video Games as Emotional Experiences.” Järvinen suggests that psychological studies in cognition, emotion, and goal-oriented behavior have to be taken into account when trying to understand video game aesthetics. Accordingly, he develops a systematic method for analyzing how so-called eliciting conditions for emotions are embodied into game designs, for example, which game elements and features potentially trigger emotions that are significant in the light of the play experience as a whole. Järvinen pinpoints emotion categories and different variables affecting their intensity, each element shedding light on design techniques which potentially could be used to explore and design more diverse player experiences.

As video games will always be defined by what the player is doing, Dominic Arsenault and Bernard Perron tackle the concept of gameplay in “In the Frame of the Magic Cycle: The Circle(s) of Gameplay.” Opposed to the spatial metaphor of Huizinga’s “magic circle” of gameplay, they conceptualize the partaking in a game as a cognitive frame, as an ongoing process. To cast off the implications of redundancy or stagnation contained in a circle, they resort instead to the figure of the spiral, which accounts for the gamer’s progression through the game. Their gamer- and gameplay-centric model features three interconnected spirals which represent the cycles gamers have to go through in order to answer gameplay, narrative, and interpretative questions, in both heuristic and hermeneutic fashion. They also underscore the fact that gamers cannot access a game’s algorithms directly and must instead construct an image of the game system, whose degree of fidelity towards the actual rules of the game may

greatly vary (depending, for instance, if the gamer is playing to progress through the game, as opposed to playing to master the game mechanics). In “Understanding Digital Playability”, Sébastien Genvo examines how a player is brought to play a game and engaged in it. By first considering the ludic attitude required to play a game, Genvo defines the notion of “ludic mediation,” that is, the process of transmitting the will-to-play to an individual. Based on elements of narrative semiotics introduced by Algirdas Julien Greimas, such as the Canonical Narrative Schema, he proposes a semiotic model of gameplay which looks at both the paradigmatic axis and the syntagmatic axis of a digital playable structure. Taking into account the conditions of meaning production set during a game, and illustrating it with an analysis of *Tetris*, his model also exposes the circularity at the core of gameplay.

Unlike the images found in other media, such as painting, photography, or cinema, the video game image contains an interactivity that brings new challenges to the development of audiovisual representations. Mark J. P. Wolf’s “Z-axis Development in the Video Game” traces how technical and graphical limitations were overcome in regard to depiction of an implied z-axis (that is, the dimension of visual depth in an image), and the different methods used to construct it. The essay discusses the relationship of the z-axis to the x-axis and y-axis, as well as its relationship to color resolution, perspective, and the game world itself. In addition to examining the z-axis’s development, Wolf considers how games used the z-axis, and how game design was affected by the availability of greater depth in the video game image, and the effect this has on the player. Graphical limitations are also discussed in Brett Camper’s essay “Retro Reflexivity: *La-Mulana*, an 8-Bit Period Piece,” but he looks at them as self-imposed restrictions in the making of a retro game. To introduce the work of independent developers outside of the traditional commercial industry and emphasize how such indie retro game design helps the medium of video games to mature, Camper takes an in-depth look at *La-Mulana*, a puzzle-centric platform-adventure, which was created by a Japanese amateur development team called the GR3 Project and released in 2005 for Windows PC, but which was designed to look, play, and feel like a game for an older system, specifically the MSX, a Japanese hybrid console-computer from the 1980s. He describes the recognizable “8-bit” retro visual style of the game, analyzes its aesthetic and cultural references, and discusses how the game’s visual style and paratextual markers relate to the MSX and its games.

Issues related to home video game systems are also addressed by Sheila C. Murphy in “‘This is Intelligent Television’: Early Video Games and Television in the Emergence of the Personal Computer.” Using the

promotional campaign of Mattel's Intellivision system, she places the history of video games into the context of digital media theory and the histories of computers and television. Murphy traces the connections between television sets, video games, and personal computers during the first home video game craze in the late 1970s, and investigates the ways in which these new technologies promise to remake and reframe TV. In doing so, she questions how productive the rhetorics of convergence, change, emergence, novelty, and innovation are for video game theory and new media studies. Moving the discussion to contemporary corporate practices, Trevor Elkington explains the complexities of licensed adaptations in "Too Many Cooks: Media Convergence and Self-Defeating Adaptations." He differentiates three different forms of adaptations: direct ones like *Van Helsing*, ones integrated into existing franchise storylines like *Enter the Matrix* and *The Lord of the Rings: The Third Age*, and ones pursuing a separate narrative not directly reliant upon film events like *The Chronicles of Riddick: Escape from Butcher Bay*. Analyzing comments about the games and review statistics compiled on Metacritic, Elkington elucidates and explains the bad critical reception of film-to-game adaptations. While he points out the problems in the licensed-game production cycle and in its procedural issues, he also ends by suggesting a solution, which is the creation of central project management.

Failure of a different sort is explored in the next essay, Jesper Juul's "Fear of Failing? The Many Meanings of Difficulty in Video Games," which examines the role of failure and punishment in single-player games, and the paradox of how the potential for failure makes players enjoy a game more. Juul distinguishes between different types of punishment and two separate perspectives players can have on games: a goal-oriented perspective wherein the players want to win, and an aesthetic perspective wherein players prefer games with the right amount of challenge and variation. Moving into the arena of the practical, Juul describes a game prototype he has designed (which contains two different game modes, one with *energy punishment* and one with *life punishment*) in order to test his hypothesis, to gather data on how players perceive failure, and to illuminate his thoughts and theories. Along the way, Juul demonstrates the efficacy of exploring video game theory through the building of game prototypes and the usefulness of an increased interaction between game studies and game development. The goal of designing games which apply, test, and illustrate concepts from video game theory animates the work of the Singapore-MIT GAMBIT Game Lab, which is presented in "Between Theory and Practice: The GAMBIT Experience" by Clara Fernández-Vara, Neal Grigsby, Eitan Glinert, Philip Tan, and Henry Jenkins. The authors describe how this five-year project is trying to erase the line between

theory and practice, and to engage more directly with the game industry. Referring throughout to games designed at the lab, the essay is a fascinating analysis of the methods used by student and faculty researchers to build games in an academic context.

Another academic group working on game development is the Synthetic Worlds Initiative, whose work is described in the next essay, “Synthetic Worlds as Experimental Instruments” by Edward Castronova, Mark W. Bell, Robert Cornell, James J. Cummings, Matthew Falk, Travis Ross, Sarah B. Robbins-Bell, and Alida Field. Making reference to the Petri dish, the shallow circular dish used to culture bacteria or other microorganisms, the authors methodically demonstrate the value of conducting research in virtual worlds. Their essay provides concrete examples of how synthetic worlds are being and could be used as social studies laboratories. Also concerned with the social aspects of video games, Mia Consalvo turns to Massively Multiplayer Online games (MMOG) in her essay “Lag, Language, and Lingo: Theorizing Noise in Online Game Spaces.” At first, aside from structuralist and formalist approaches, Consalvo calls for the use and adaptation of other theoretical lenses from established fields and disciplines in order to better understand the multifaceted nature of games, and their production and reception. Consequently, she revisits classical and more contemporary communication theory with the goal of theorizing the concept of “noise” as a critical component of online game communication. Drawing on data from an extended virtual ethnography of *Final Fantasy XI Online*, Consalvo explores three types of noise that emerged through extended gameplay and experience with the player community: a technical form (lag) and two cultural/semantic forms (language and lingo).

The need for theoretical lenses and tools from other fields and disciplines is the topic of the last essay in the collection, as well as the Appendix that follows. From his experience as the leader or partner in over twenty different research projects into games and digital culture at the University of Tampere, Frans Mäyrä maps out the benefits and pitfalls of interdisciplinary research in “Getting into the Game: Doing Multidisciplinary Game Studies.” Through practical examples, he emphasizes judiciously the potential of game studies as a radical, transformative form of scholarly practice. Finally, our Appendix at the end of the book, compiled from the work of many contributors, looks at video games through a wide variety of theories and disciplines, with entries discussing some of the conceptual tools each field has to offer video game researchers.

Video game studies has proven to be an exciting and thought-provoking new field of research, and a challenging one as well—and one that is fun—and while this fact may cause outsiders to question the seriousness of the field or its validity, it certainly has not discouraged a

wide range of scholarship and scholars from taking part in it. The field has proven itself, and as it expands and reflects upon itself, it will continue to grow in relevance, significance, and excellence. In some ways, the field is also anticipating a third phase in which video games studies' research and findings will provide new insights that will be usefully applied in other fields and contribute to other disciplines, rather than merely taking from them. Though it is probably foolhardy to prognosticate about the advent of such a phase, it will suffice just to suggest that it may be sooner than we might expect.

Notes

1. Mark J. P. Wolf and Bernard Perron, eds. *The Video Game Theory Reader* (New York: Routledge, 2003); hereafter cited as *VGTR1*.
2. A list of home video game systems appears in the Appendix of the *VGTR1*.
3. According to the Entertainment Software Association. See <<http://www.theesa.com/facts/>>.
4. Jo Bryce and Jason Rutter, "An Introduction to Understanding Digital Games," in *Understanding Digital Games* (London: Sage, 2006), 1–2; hereafter cited as Bryce and Rutter. Bryce and Rutter refer to James Newman, *Videogames* (London: Routledge, 2004).
5. However, discussions are still continuing. An interesting exchange of views on "What is a computer game?" appeared in November 2007 on the Games Research Network.
6. Frans Mäyrä, "The Quiet Revolution: Three Theses for the Future of Game Studies (Hard Core Columns 4)," *DiGRA.org* (2005). Available online at <<http://www.digra.org/hardcore/hc4/>>; hereafter cited as Mäyrä.
7. "Games are not a kind of cinema, or literature, but colonising attempts from both these fields have already happened, and no doubt will happen again. And again, until computer game studies emerges as a clearly self-sustained academic field." From Espen Aarseth, "Computer Games Studies, Year One," *Game Studies* 1, no. 1 (July 2001). Available online at <<http://www.gamestudies.org/0101/editorial.html>>. In 2000, Jesper Juul made a peer-reviewed game about defending games against "the imperialism of a thousand theories," which is available online at <<http://www.jesperjuul.net/gameliberation/>>.
8. Tanya Krzywinska, "The Pleasures and Dangers of the Game. Up Close and Personal," *Games and Culture* 1, no. 1 (January 2006), 120.
9. As many authors have noted (including Perron in *VGTR1* and Wolf in *The Video Game Explosion*), the field needs to come to terms with its terminology before common understanding and discussion are possible.
10. David Thomas, Kyle Orland, and Scott Steinberg, *The Videogame Style Guide and Reference Manual* (London: Power Play Publishing, 2007), 5–6. Also available online at <<http://www.gamestyleguide.com>> (accessed November 13, 2007).
11. See <<http://www.videotopia.com/ec.htm>>.
12. See Preserving Creative America: Preserving Virtual Worlds. Available online at <http://www.ndiipp.uiuc.edu/pca/?Home%3A_Preserving_Virtual_Worlds>.
13. See <<http://www.archive.org/about/about.php>>.
14. See <<http://www.vaps.org/>>.
15. See <<http://caselaw.lp.findlaw.com/scripts/getcase.pl?court=9th&navby=case&no=9917137&exact=1>> for a summary of the case.
16. Francesco Casetti, *Theories of Cinema, 1945–1995*, translated by Francesca Chiostrri and Elizabeth Gard Bartolini-Salimbeni, with Thomas Kelso (Austin, TX: University of Texas Press, 1999).
17. Espen Aarseth, "Playing Research: Methodological Approaches to Game Analysis," in *Proceedings of the Digital Arts and Culture Conference*, Melbourne, Australia, 2003. Available online at <<http://www.spilforskning.dk/gameapproaches/GameApproaches2.pdf>>.

18. For instance, Lars Konzack writes about his analytical method that: “The method is based on seven different layers of the computer game: hardware, program code, functionality, game play, meaning, referentiality, and socio-culture. Each of these layers may be analysed individually, but an entire analysis of any computer game must be analysed from every angle. Thereby we are analysing both technical, aesthetic and socio-cultural perspectives.” From “Computer Game Criticism: A Method for Computer Game Analysis,” in *CGDC Conference Proceedings*, ed. Frans Mäyrä (Tampere: Tampere University Press, 2002), 89–100. Available online at <<http://www.digra.org/dl/db/05164.32231>>.
19. Dominic Arsenaault, Bernard Perron, Martin Picard, and Carl Therrien, “Methodological Questions in Interactive Film Studies,” forthcoming in *New Review of Film & Television Studies*, 2008.
20. This is why Arsenaault, Perron, Picard and Therrien have introduced the notion of “actional modalities” as opposed to the structures of interactivity usually studied. Actional modalities are “the principal frames of action envisioned by the gamer or player from the conditions of performance, progression, and exploration he is experiencing. These actional modalities are defined by three parameters: sequence of actions, frame of actions, and skills.” See Dominic Arsenaault, Bernard Perron, Martin Picard, and Carl Therrien, “Methodological Questions,” in “*Interactive Film Studies*,” forthcoming in *New Review of Film & Television Studies*, 2008.
21. See “Assessing Interactivity in Video Game Design,” *Mechademia 1: Emerging Worlds of Anime and Manga*, of the series *Mechademia: An Annual Forum for Anime, Manga and The Fan Arts* (December 2006): 78–85.
22. Joost Raessens, “Playful Identities, or the Ludification of Culture,” *Games and Culture* 1, no. 1 (2006): 52–57.
23. See <<http://digra2007.jp/Overview.html>>.
24. From an e-mail from Jesper Juul to the authors, April 28, 2008.

CHAPTER 1

Gaming Literacy
Game Design as a Model for Literacy in the
Twenty-First Century

ERIC ZIMMERMAN

Introduction: Literacy and Games from the Inside-out

Gaming literacy is an approach to literacy based on game design. My argument is that there is an emerging set of skills and competencies, a set of new ideas and practices that are going to be increasingly a part of what it means to be literate in the coming century. This essay's proposal is that game design is a paradigm for understanding what these literacy needs are and how they might be addressed. I look at three main concepts—systems, play, and design—as key components of this new literacy.

Traditional ideas about literacy have centered on reading and writing—the ability to understand, exchange, and create meaning through text, speech, and other forms of language. A younger cousin to literacy studies, *media literacy* extended this thinking to diverse forms of media, from images and music to film, television, and advertising. The emphasis in media literacy as it evolved during the 1980s was an ideological critique of the hidden codes embedded in media. Media studies' scholars ask questions like: Is a given instance of media racist or sexist? Who is creating it and with what agenda? What kinds of intended and unintended messages and meanings do media contain?

Literacy and even media literacy are necessary but not sufficient for one to be fully literate in our world today. There are emerging needs for new