Rules in Computer Games Compared to Rules in Traditional Games

Chris DeLeon
Georgia Institute of Technology
85 5th Street Northwest, Atlanta, GA 30308
816-351-5557
cdeleon3@gatech.edu

ABSTRACT
Michael Liebe argues that Salen and Zimmerman's interpretation of Huizinga's magic circle does not apply to computer games. Liebe's insight reveals not only a different relation for computer games to the magic circle, but also hints at a difference in the nature of rules in computer games. Jesper Juul's comparison of non-digital sports to simulations of those sports highlights a missing aspect in understanding how rules in computer games are of a different nature than those of non-computer games: rules as flexibly defining real-time spatial interactions. Rules in computer games are more like laws of physics, rules in non-computer games are more like laws of society.

Besides meta rules such as tournament arrangements, only a handful of "rules" - as the word is applied to non-computer games - exist for nearly all computer games. Moreover, such rules are largely the same: use standard input, and don't alter the game.

Keywords
rules, game design, board games, sports, computer games

INTRODUCTION[1]
Definitions for the word rules in the context of game design vary by source and purpose. My intent here is not to argue that we should or should not use the word rule in certain ways, nor is my aim to suggest that some particular definition of rule is somehow superior to another. I aim to highlight instead that no matter how we choose to use terms, there is a difference of kind between rules in computer games and rules in non-computer games, and that because this is a difference in kind there may be issues with automatically extrapolating what we know from the study of one to the study of the other. I will begin by conveying through example precisely what use of the term rule I am attempting to contrast between computer games and non-computer games.

If I lay tape on the ground to create a large, intricate maze of lines, I can then declare as a rule that you, the maze runner, are not allowed step over or move any tape. To add interest, I might then put a prize at one far corner of the maze – let's say an Atari 2600 autographed by Nolan Bushnell – that will be yours if and only if you can reach it without violating the rules. I'll then walk you directly to the opposite corner, right across the tape, because since the game has not yet started, while putting you in position I am not yet enforcing our one rule. After the game begins, crossing the tape will result in your being denied the prize, even if you manage to physically reach it. To add challenge to the game, we'll add a second rule: you have 45 seconds or less after the start of your motion to reach

Proceedings of DiGRA 2013: DeFragging Game Studies

the prize - without crossing or moving any tape of course - and if you take too long, you'll again have no rightful claim to the prize. We just made a simple game with two rules.

These rules are artificial. Note that in this scenario you, as the maze runner, are fully capable of stepping over or pulling up tape. You can even pick up and walk away with the prize after taking more than 45 seconds to reach it, ignoring my desperate pleas to please play by the rules we agreed upon. I might then report your act of theft to the police - they serve, after all, as referees for similarly artificial, agreed upon rules, in the role of connecting rule violators to a system of assessment and application of artificially imposed penalties. To clarify that distinction: if a police officer pulled you over for speeding and handed you a ticket, you in that situation received an artificial punishment for violating an artificial (at least in this sense) rule; by contrast had your car rolled over and exploded as a consequence of speeding, that would instead constitute an actual punishment having more to do with laws/rules of physics than with artificial laws and artificial punishments.

Adhering to the two rules in this game is a matter of choice: a pact for the player to accept with either me as the referee and/or with his or her own self by a sense of honor and sportsmanship. For the maze runner, there is temptation to cheat, and the possibility of acting on that temptation is real because the game's rules are artificial. Meanwhile as referee, my role in enforcing the rules is also a matter of choice and ability. I perhaps could be bribed to take advantage of the artificiality of these rules by selectively overlooking their enforcement, just this one time. Even if both player and referee fully intend to respect the rules, both may yet fail to do so on account of imprecise judgment: due to a moment of lapsed attention we both may be genuinely unsure of whether you accidentally stepped on or over a line, or unable to agree with any certainty on whether the run took 44.8 or 46.2 seconds based on when, fumbling with a stopwatch, the timer started or stopped in relation to the runner's actual start or completion of the maze.

How would an activity like this one be different were it not artificial? Now for comparison let's make the "prize" in question boarding an airplane before it taxis onto the runway for takeoff. Instead of tape on the ground that the runner has to pretend is impassible, there are now real, physical obstacles in the form of other travelers, walls, and miscellaneous other blockages that cannot be trivially moved through nor removed without significant work and time-consuming effort. No one needs to referee this game. Whether we even accept calling this real-life situation a game is a matter of semantics. However what is not a mere matter of definitions is that this experience has several important differences for the runner when compared to the artificial tape maze, and those differences are at the core similar to the differences between what we casually call rules in computer games in contrast to what we casually call rules in non-computer games.

RULES, PLAYER KNOWLEDGE, AND EFFORT TO NOT CHEAT

In running through the tape maze, the runner needs to understand up front that crossing the tape is forbidden, and care must be taken to avoid crossing these lines. This restriction reflects one of the aspects that Bernard Suits (1978) identifies as a central quality of a game: rules (in the terms Suits uses, "constitutive rules") are introduced to force a player to use inefficient means to achieve their goal. Soccer players are not allowed to simply pick up the ball and run with it, but this rule is necessary because physically, they are capable of doing this. A golfer must move the ball using a club, rather than lifting and dropping the ball into the next hole to progress toward a state of completion. A simple rule prevents our maze runner from running straight toward the prize, and that rule is necessary only because the player is capable of crossing over tape. The need for players

to accept this restriction against the most efficient means of reaching the end state is what Suits refers to as a lusory attitude.

In running through the airport, the runner does not need to respect an artificial rule about not going through walls. Mental energy is not required to recognize and accept a "rule" for this because constraints provided by physical obstacles cannot easily be cheated nor overlooked. These are the laws of physics, not laws made and enforced by a governing party. The main constraints used to define this situation are not artificial, but actual. Such limits are not subject to flawed, inconsistent, subjective interpretation, as in the case of human referees, umpires, and competitors attempting to keep a player's action in alignment with rules. There is no temptation to cheat, because it isn't out of mere good conscience nor fear of being caught cheating that the runner avoids going through walls, teleporting, halting time, nor boarding the plane after it departs.

If we look closer at the airport situation for rules, there are indeed some of the same type as those from the tape maze, meaning that the player is capable of breaking these certain rules, and player understanding plus self-regulation is necessary to avoid such violations at the risk of facing artificially imposed consequences for doing so. These rules exist before and outside of our airport game. Examples include social convention (don't scream in people's faces to make them move out of your way), government law (don't assault anyone blocking your path, and obey any requests made by security agents), and airport policy (don't hop gates, don't attempt to break through glass or drywall, present a proper boarding pass and approved form of ID at the appropriate stations prior to boarding). Though, at least as I defined the task here, the runner still technically succeeds in the airport game by merely getting onto the plane before takeoff, even if as a result of their actions he or she then promptly gets arrested before taxi or right after the plane lands.

In terms of the player's interaction with the rules playing a computer game has more in common with running through an airport than navigating taped lines. The walls in *Pac-Man* (Namco 1980) are not imagined to have significance, in the way that we respect tiles on a chessboard or playfield boundaries in a sport; the player is no more able to move through *Pac-Man* walls than through airport walls, even less so in fact since the game offers no capability akin to smashing drywall. It is not out of respect for rules that players decrease in-game health when avatars stand too close to explosion events, nor out of a sense of sportsmanship and voluntary submission to rules that we return to the start of a level when a game's level timer runs out. The limitations are actual, not artificial, in that the player may be truly, physically unable to access the game's next content on account of being unable to work around the inflexible constraints. Rather than a plane taking off at a fixed time, rendering a late runner unable to board it, instead the computer game's state in memory changes after time or health runs out, such that the player is unable to access whatever content or in-game action and opportunities are programmed to follow.

In "There is No Magic Circle: On the Difference Between Computer Games and Traditional Games", Michael Liebe (2008) argues that Salen and Zimmerman's (2004) application of Huizinga's (1938) magic circle does not apply to computer games. His argument is centered on an observation similar to the one presented in this paper's opening example: whereas in a non-computer game, in Liebe's case solitaire played with a deck of cards, the player has to understand, accept, and abide by the game's rules in order to play, for a digital adaptation - computerized solitaire - the only virtual actions possible are those consistent with the non-digital game's artificial rules. This makes it an option for players to learn how to play by probing a computer game's "rule" system

through trail and error, feeling out limitations. As Liebe puts it, "the computer adaptation of the game transforms the theoretical restrictions into practical ones." The Suits concept of lusory attitude is therefore unnecessary for a computer game; players need not accept rules to be subject to them. However as a side effect of selecting for his key example a turn-based game of discrete decision (solitaire/cards), rather than a real-time game of continuous action (sport/real-time), though his point is well-made the case does not reveal some of the significant differences and properties arising from computer rule automation.

RULES LIKE LAWS OF NATURE, NOT LIKE LAWS OF SOCIETY

In *Half-Real*, Juul (2011) makes a critical distinction, that I will argue here is correct but expressed backwards, between rules in real soccer compared to those of virtual soccer:

> "Though the rules of soccer only state the dimensions of the playing field, the ball's specifications, what the players can and cannot do, and the conditions for winning, the game of soccer is also governed by the laws of physics - the air resistance of the ball, gravity, the condition of the grass, and the limits of human anatomy... the video game adaptation requires that the laws of physics and the human anatomy be explicitly implemented in the programming *on the same level as the explicit rules of the game:* a computer-based soccer game needs to implement the physics of the players and the soccer pitch as well as the rules of the game."

In other words: when we describe physical soccer as a collection of rules, such rules will include goal measurements, time intervals, and scoring conditions, in addition to constraints on possible player action - such as a non-goalie position touching the ball directly with hands - and defining in-game penalties or consequences in the event of such rules being violated and caught. Real soccer rules would not, as Juul points out, include precise description of how an air-filled ball behaves when rolled over grass, how a player's body coordinates muscular action to run or kick, and the properties of vision in 3-dimensional space. Juul's solution to this incongruity is to conclude that these physical circumstances must be implemented at the same level as the game's rules. What is subtly lost in making this distinction is that within a computer game, a game's explicit rules operate at the same level as physical laws. Rather than framing it as indicating that physics must be implemented as though these dynamics were explicit rules, in terms of the underlying properties and player experience what happens is closer to saying that the explicit rules must be implemented at the same level as physical and biological dynamics. Like the laws of physics or anatomy, rules in computer games are not subject to imperfect detection by corruptible referee, and with relatively few exceptions specific to sport simulations, they generally cannot willfully be cheated by the player[2].

An observation made by Karen Sideman's Game Design address in 2000, as documented in Salen and Zimmerman's *Rules of Play* (2004), is that because rule enforcement is automated in a computer game, the rules can be learned through playing experimentally. In some computer games, such as Candy Box (Aniwey 2013), playing to learn how to play is a core part of the game experience, rather than simply a way to skip the need for a period of reading instructions or receiving explicit guidance on how to play. In Chris Crawford's *Art of Computer Game Design* (1982), he noted that in computer games there's little or no room for dispute of rule enforcement or interpretation as tends to happen in board games, and further that because computers can perform many orders of magnitude more more precise, consistent, and objective evaluations per second than a

human player or observer, a computer game can support rule definitions much more complicated than those of a board game (or written rules for sport) that need to be basic enough to be fully grasped and enforced by humans. This doesn't simply create the possibility for a much faster or more complex board game, however, it introduces the potential for completely different implementations of physics, or differences in the behavior of vision (camera, rendering) affecting what information is available to the player, in ways that non-computer games cannot necessarily replicate. Rules that are easy to learn may have value in non-digital games, since players must learn all the rules, whereas digital game rules can be complex beyond expected comprehension without posing a problem, as with AI rules for ghosts (Birch 2010) in *Pac-Man* (Namco 1980).

Because of this speed of rule execution, the differences between game design for computer games may be rules at a much more granular level. The fundamental nature of vision and information representation, in the sense of what feedback the player receives to respond to, doesn't need to be implemented to match the real experience of vision and other senses available for non-computer games. Time does not need to be implemented in a realistic way, as is central to a digital game like *Braid* (Number None, Inc, 2008). "Physics" interactions in *Breakout* (Atari 1976) include the ball moving through bricks after each collision until hitting the paddle or back wall, reflecting vertically even from hitting brick sides, ball speed changes with no physical explanation, and paddle-ball collision responses segmented to enable ball control while promoting risky play. At the time these may partly have been compromises to limited hardware, however as they have gameplay implications different from an accurate physical simulation, a contemporary designer might still prefer similar feature implementation by choice rather than necessity.

Differences in the most fundamental behaviors of collision interactions in computer games distinguish the core gameplay of many classic platformers. Differences include whether characters can move through one another, or stand on one another character's head as in *Super Mario Bros 2* (Nintendo 1988) and what happens when the character underneath moves. Player characters respond differently to being hit by enemy projectiles while jumping over dangerous gaps in *Castlevania* (Konami 1986), *Ninja Gaiden* (Techmo 1988), *Mega Man* (Capcom 1987), and *Code Name:Viper* (Capcom 1990). In some cases the player avatar gets knocked backwards, in others there's an immediate loss of horizontal speed causing the player to drop straight down, and in others still the player continues along the same trajectory while temporarily flashing to indicate a brief protective state. In Steve Swink's *Game Feel* (2008) considerable attention is given to investigating the sensation created for a player based on a player avatar's physical movement behaviors and camera motions relative to player position, neither of which are game aspects that can be reasonably varied for a non-computer game.

While it's true that Mario in *Super Mario Bros* (Nintendo 1985) and Sonic in *Sonic the Hedgehog* (Sonic Team 1991) can both defeat many enemies by jumping on them, articulating that specific rule about a collision event is far less revealing about the primary differences in playing these two games than investigating the more granular computer "rules" at the level of physical pseudo-simulation, driving the different nature of running, jumping, and midair movement control of these iconic characters. This is again not a type of rule differentiation possible for a non-computer game, in which jumping by a human being will (aside from games on special surfaces, like trampoline dodgeball - and even then, happening within the same "physics engine") be subject to the same physical laws of the universe and same mechanical functionality of human anatomy. As Sherry Turkle explained in *Video Games and Computer Holding Power*

(1984), whereas a physical game such as pinball is limited to the physics of reality, digital games are not subject to the same constraint, and this opens up greater variety in gameplay possible within computer games. See Table 1 for a brief summary of comparison between computer game rules, more like laws of nature/physics, in contrast to non-computer game rules, more like laws of society/government.

	Laws of Nature (Physics or Anatomy)	**Computer Game Rules (Console, Web, PC)**	**Non-Computer Game Rules (Sports, Board, Card Games)**	**Laws of Society (Police, Legislators)**
Players need to explicitly learn the rules and consciously obey them to avoid disallowed actions	No	No	Yes[3]	Yes
It's possible for the player to violate the rule, by accident or by strategic intention	No	No	Yes	Yes
Rule definition and rule violation must be at a pace and fidelity fully knowable and detectable by human perception/attention	No	No	Yes	Yes
Players of the game could enumerate the game's rules well enough for someone else to recreate it	No	No	Yes	Yes, at least to the extent they affect us day-to-day

Table 1: Comparison between Laws of Nature, Computer Game Rules, Non-Computer Game Rules, and Laws of Society

The first and last rows in particular have potential implications on the idea, growing in popularity among researchers and independent developers, of using a computer game to convey a complex system by embodying the system in a game's programming. Because a player can play a computer game without explicitly knowing its rules - the computer will bear the bulk of "understanding" - it's often possible for a player to discover a successful strategy or technique that removes the need for deeper, more detailed knowledge of the system. This leads to achieving a win or a completion state for the game without learning many of the automated rules programmed into the system. For example if the player determines that repeatedly performing a certain special move fairly consistently leads to victory, or that simply being able to find and repeatedly use a specific item consistently leads to victory, other aspects of the game may go without being experienced or directly learned in action. Even though a computer game may fully embody a complex system of relations in its programmed rules, the player may be able to learn through trial and error

the minimum necessary to win without knowing or reasoning about of the game's underlying behaviors. The full exploration and discussion of this particular issue in relation to computer rules is beyond the scope of this paper, but it's my hope that I or someone else may investigate it more fully on another occasion.

"NON-COMPUTER GAME RULES" ATOP COMPUTER GAMES

If I'm playing a videogame with friends, or in a tournament setting, and we decide then that (depending upon the game) playing as Voldo, using the BFG, or spawn camping are not allowed, those are examples of rules in the same sense as we describe rules for non-computer games. Players are capable of violating such rules, and a penalty might be determined for anyone caught in violation. Consequently players have to be aware of these kinds of rules, and must consciously devote some amount of attention or habit development toward obeying them. If instead we toggle an option in the settings for a game cart to disable a character or weapon that we deem unfair, as *Super Smash Bros.* (Nintendo 1999) allows players to do for which power-ups appear during play, while this can be described metaphorically as a rule change note the structural difference in relation to player experience: since using the forbidden item in play is no longer possible, players do not need to be made aware of this rule nor allocate any attention toward adhering to it.

Notwithstanding these meta rules created by players applying special restrictions for house rules or tournament regulations, computer games have only a handful of rules that are of similar nature to those of non-computer games. Players have the ability the ignore or deliberate violate these rules, and doing so might lead their achievement in a game to be regarded as illegitimate by peers:

Rule 1. The game is to be interacted with only by standard input controllers[4], in other words, not for example via the use of a memory intercept tool (Game Genie, Pro Action Replay, Game Shark, GDB) or a network message intercept/modification tool (spoofing submissions to a global high scores leaderboard), special emulator abilities (Save State, Load State), or physical hardware hacking (custom adjustments to an arcade board) to manually alter memory states or skip/redirect program execution relative to that experienced by other players limiting their interactions to those with standard controllers.

Rule 2. The physical integrity of the hardware is not to be violated. The player should not open up the game controller, game cart, game system, television, speaker, or other peripheral in any attempt to gain an advantage through wiring changes or automation.

Rule 3. The player should be directly and independently responsible for the actions made during the game, not having some other person (a substitute player, akin to cheating on a standardized test by having someone else take the exam in ones place) or a programmed bot perform gameplay actions on their behalf (as for example using an aim-bot to improve the ease of successful gameplay maneuvers). In games involving strategic decisions, even having another player offering assistance with choices during play could fail this test by proxy, though in games emphasizing quick reactions a corner coach akin to one from boxing or collegiate wrestling might be considered fair if available to both players and known as an option in advance.

Rule 4. If playing against other players, the other players should not be disturbed outside of the game (blocking his or her view of the screen, physically taking away or unplugging his or her controller), nor unfairly distracted within the game by meta commands that are not part of the core gameplay (ex. repeatedly toggling pause during a local game).

Rule 5. Mod community notwithstanding - and even then only when all players involved have identical installations of the modifications - the computer game should be played as released and/or patched by the developer (no modifications made to local textures or level data to aid visibility), and save data files should be affected only through gameplay within the game (not using hex editors nor trainer programs to spoof progress in a game).

Each of these reflect rules, established loosely by social convention among peers or by explicitly written regulations for tournaments, that players are capable of violating to achieve an advantage likely to be regarded as unfair and in violation of the game as designed. Outside of a tournament circumstances or online play, adhering to these types of rules is a matter of personal choice, guided for example by a sense of personal pride in accomplishment or social pressure over being considered a cheater, but certain social contexts or player types may accept indulging in violating them for sake of novelty.

Other than these rules listed, however, as long as the player interacts with the game only by pressing buttons on the controller, it's unlikely that the player even has the option of violating any rules of the game, at least in the same way that a player of a board game or real sport may attempt actions disallowed or not specifically allowed by game rules. The computer game presents a simulated universe in which the only actions possible through the input are those actions that constitute valid maneuvers within the game's construction. To return to the Suits notion of rules as forcing inefficient play by making a golfer rely on the golf club to achieve the goal, the central rule of computer games is then that the player is supposed to rely only on the controller during play to achieve the goal state. Within the game, the player does not need to know nor accept any artificial inefficiency imposed by the rules. Such inefficiencies are real in their constraining of player actions, no less than an athlete's inability to run untouched through another player's body.

From this perspective, in which the player can for the most part freely experiment with the available means of input without concern for learning nor accidentally violating the rules, playing a videogame might be understood more like untangling a blacksmith puzzle. Blacksmith puzzles, a style of folk toys, present challenges such as removing a steel ring from horseshoes chained together, or separating steel nails twisted into a knot. Short of physically breaking a chain or hacksawing rings and nails, players are free to experiment with testing the full range of possible actions, until win state is achieved. This relationship may seem like a stretch, especially between such a simple mechanical puzzle and a modern cinematic digital game, however the connection is somewhat more easily made between a simple LCD handheld game like the early Nintendo Game-and-Watch series of toys, in which the player fiddles with relatively few input actions (all, by construction, allowed by the game) in response to the visually countable number of states displayed directly on the device until an end state in the game's memory is achieved.

CONCLUSION

This distinction is, I believe, mostly relevant to computer games that take input in real-time (rather than turn-based) while simulating motions in continuous virtual space. As observed earlier in the paper about Liebe's choice of comparing a non-computer version of a card game to a computerized version of the same game, relatively few of the potential implications of a machine's speed of rule evaluation become evident when investigating a game genre that artificially mimics rule scenarios understandable and (self-)enforceable by human participants. By shifting the focus to simulation of a sport, building off of Juul's comparison between real and virtual soccer, I sought to stress the

importance of variability in physical simulation within digital space. This is of interest because, as Turkle noted, this variability is often only possible within digital games.

Major qualities and aspects of a player experiences with what we refer to as rules for non-computer games seem to be unlike those qualities and aspects of rules in computer games. Whether the player needs to learn all the rules to play, whether any rules can be violated by choice or even accident, and whether the rules need to be written at a pace and level of simplicity perceptible and enforceable by human attention roughly parallels the difference between a person's experience with physical laws as compared to a person's experience with society's laws. One possible effect of this is that how we think about, design, and discuss rules for computer games, at least for real-time parts that take place in simulated continuous space, may bear more similarity to the ways that we understand and work with physical laws at a continuous mathematical level, having somewhat less to do than is widely assumed with the authorship and discussion of rules for games of pure probability and turn-based decision-making, that being the usual context for board, card, or other paper game rules. Even comparisons drawn to rules for sports may be generally inadequate due to those sports rules always being built atop the same physical, temporal, and representational foundations, around actions within the same limits of bodily dexterity, and the need for rules that can be fully comprehended by players and officials.

I'm hopeful that with the interest and engagement of other researchers on this matter of the differences between rules in computer games and rules in non-computer games, additional implications for how we practice or study computer game design might be further be developed. To the extent that aspects of computer games can simulate many aspects of non-computer games, I do not mean to doubt that study of non-computer games has relevance and value as an approach for understanding certain qualities of computer games. My interest is only in adding to the conversation additional investigation into this other more alien side of game construction as a matter of deliberately designing to explore the potential for unreal physical, temporal, and spatial flexibility in the simulation medium, not merely as a historical anomaly to work within technological limitations but also as a matter open to design choice by game developers.

ACKNOWLEDGMENTS

I would like to thank Dr. Janet Murray, Dr. Celia Pearce, Dr. Brian Magerko, and Patrick Coursey for their encouragement to pursue researching and writing about this topic.

ENDNOTES

1 The opening argument of this paper and a few related points are repurposed and adapted from two entries I wrote in early 2011 for my blog, HobbyGameDev.com, titled "Games Are Artificial. Videogames Are Not. Games Have Rules. Videogames Do Not." and my follow-up entry, "Videogames and Rules."

2 One genre in particular tends to have exceptions to this: in sports-based games, players are often given a way to perform maneuvers that are in violation of the real game's rules, yielding in-game consequences. This better simulates events that take place during the non-computer game, where such forbidden actions are possible and occasionally executed. In a basketball game this might include goal tending, or fouling from overly aggressive attempts to steal the ball. However the digital game player still cannot violate rules that lack well-defined consequences within the game activity, for example removing one's clothing, counting a shot for more points than the rules indicate it's worth, or

secretly putting petroleum jelly on the ball to affect its properties during play. Likewise in a computer game simulating hockey players overly aggressive in their attempts to steal the puck may wind up in the penalty box, or in a simulated fistfight on the ice. Because these types of violations tend to be fairly genre specific, I have not attempted to address them further here, although I think it's a subject for further exploration. If hockey had been originally authored as a computer game, rather than as a non-computer game, would player input have even been allowed that would land anyone in the penalty box?

3 A common argument in response to this point is the possibility that a player of soccer could, in theory, walk onto the field knowing nothing about the game, and then try to play based on observation of other players, or in response to referee punishments. This option to observe other players in action is still a form of learning from others - if on the other hand every player came onto the field with no knowledge of the sport, such a strategy would be less likely to yield a sensible scene based solely upon referee interruptions. On the other side of this argument, special techniques in a fighting game or techniques in a real-time strategy game may be more quickly learned from another player or by reading an instruction guide rather than sheer trial and error. There is admittedly a continuum at work in terms of what types of rules need to or typically are learnt upfront rather than through experimentation. The main point is that there is a difference in the practicality, frequency of, and expectation of learning to play only through trial and error as opposed to learning from another person, the former being more common in the case of computer games. This is likely made more feasible from the significantly reduced number of actions possible with a controller than with the full human body in play. This may have roots in product design dating back to arcade games where a player had to be able to quickly understand the bare minimum of how to play (in pinball for example, learning that the ball should be kept on the field, and how to operate plunger and flippers), after which trial and error or simply messing about can be used as a way to learn more specifics about the particular game's motions, scoring, and causal event relationships.

4 Whether the use of a controller with turbo settings, a mouse with superior resolution and extra buttons, or more expensive and elaborate hardware (ex. high-end flight sticks and throttles with yaw peddles for flight simulators, arcade sticks for fighting games) constitutes cheating is an area of disagreement among players, particularly when players are using input devices that have different capabilities. The SN ProgramPad by InterAct for Super Nintendo represents one extreme on this spectrum. That controller features programmable buttons which, with a single press, execute for a player any pre-recorded sequence of input events to execute special moves in fighting games like *Street Fighter II* (Capcom 1993) without room for player error while trying to perform the sequence under pressure. Similarly in *Quake* (id Software 1996), online deathmatch players, myself included once, used specially prepared configuration files with keys bound to perform macros with timed sequences so that a single key could be used to consistently execute actions such as rocket jumping (the act of propelling oneself to a higher platform by jumping up and firing a rocket down with the right timing to be propelled by the explosion while taking minimal damage), though since this was somewhat more common then among online PC players it seemed a little less questionable than using an SN ProgramPad to play *Street Fighter II*. For input fairness, symmetry in capability between player equipment or configuration, or perhaps offering all players the same choices (ex. between standard gamepad or arcade stick for fighting game competitions), might be more important than necessarily reflecting the hardware's default input or original

developer's intention. Further exploration of this question is outside the scope of this initial research, however as it's a central part of thinking about rules for computer games of the sort that can be knowingly violated by players, it's another subject I believe ripe for further contemplation. Such work might begin with investigation of e-sports regulations.

BIBLIOGRAPHY

Atari (1976) Breakout [Arcade] Atari.

Aniwey (2013) Candy Box [PC Computer, Online Game] Aniwey. Played 1 May 2013.

Birch, C. (2010) Understanding Pac-Man Ghost Behavior. Available at http://gameinternals.com/post/2072558330/understanding-pac-man-ghost-behavior (accessed May 2013)

Capcom (1990) Code Name: Viper [NES], Capcom. Japan.

Capcom (1987) Mega Man [NES], Capcom. Japan.

Capcom (1991) Street Fighter II [Super Nintendo, Console Game] Capcom. Japan: played 2 May 2013.

Crawford, C. (1984) The Art of Computer Game Design. Berkeley, CA: Osborne/McGraw-Hill.

Huizinga, J. (1938) Homo Ludens: A Study of the Play-element in Culture. Boston: Beacon.

id Software (1996) Quake [PC Computer game] GT Interactive.

Juul, J. (2005) Half-Real: Video Games between Real Rules and Fictional Worlds. Cambridge, MA: MIT.

Konami (1986) Castlevania [NES], Konami. Japan.

Liebe, M. (2008) "There Is No Magic Circle: On the Difference between Computer Games and Traditional Games." Proc. of the Philosophy of Computer Games. Available at http://opus.kobv.de/ubp/volltexte/2008/2459/ (accessed May 2013)

Namco (1980) Pac-Man. [Arcade], Namco. Japan.

Nintendo (1985) Super Mario Bros. [NES], Nintendo. Japan.

Nintendo (1988) Super Mario Bros. 2 [NES], Nintendo. Japan.

Nintendo (1999) Super Smash Bros. [Nintendo 64], Nintendo. Japan.

Number None, Inc. (2008) Braid [XBox 360], Microsoft Game Studios.

Salen, Katie and Eric Zimmerman (2003) Rules of Play: Game Design Fundamentals Cambridge, MA: MIT.

Sideman, K. (2000) Game Design Address.

Sonic Team (1991) Sonic the Hedgehog [Genesis], Sega.

Suits, B. (1978) The Grasshopper: Games, Life, and Utopia. Toronto: University of Toronto.

Swink, S. (2009) Game Feel: A Game Designer's Guide to Virtual Sensation. Amsterdam: Morgan Kaufmann/Elsevier.

Tecmo (1988) Nina Gaiden [NES], Tecmo.

Turkle, S. (2003) "Video Games and Computer Holding Power." In New Media Reader, edited by Noah Wardrip-Fruin and Nick Montfort, 499-513. Cambridge, MA: MIT.