FCJ-108 Virtual-World Naturalism

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2 Videogames tend to channel their players down spatial and behavioral paths. The virtual worlds of games are constructions and, as such, they necessarily have ultimate boundaries. The internal boundaries and barriers of games work to contain players in certain ways. Depending on one's perspective, these barriers either offer the player guidance about how to reach goals or encourage passivity, stifling a player's desire to explore, and thus to discover more about the constitution of, game worlds. Games, and especially games that seem to promise their players relative freedom of movement, are often criticised for their excessively linear construction. To play within such a framework is to enact a series of movements and decisions that has been set up by the creators of the game, to engage with games as sites for structured play and for the fulfillment of narrative arcs.

3 Sometimes, though, a player will stray from the path described by a game, moving into new spaces, developing new possible modes of interaction, and often discovering the rougher edges of the game world, where physics models break down, textures become incongruous, and the pieces don't quite fit together. Gameplay that seeks out these spaces and these phenomena, that searches for such clues to the underlying construction of the virtual environment, is a kind of virtual-world naturalism, at once a return to an investigative urge that has been subsumed to the exhaustive mapping and description of the real world and a form of resistance to the very idea of pre-defined paths of action, of externally imposed limits, in virtual worlds as well as in our own.

4 Any game overtly affords its players some freedoms of action and not others. It is this selective limitation, necessitated by the limits of technology, that distinguishes a game from something more like a life-simulation. Complete freedom would be unsuitably chaotic to the nature of gameplay; the limitations imposed by a game facilitate its thematic content and allow players to react to its challenges in systematic ways. Virtual-world naturalism is a form of counterplay that remakes a game, in a more free-form, exploratory way, out of its own raw materials. In so doing, it highlights some of the 'natural' properties of, and the design decisions behind, those materials.

5 By 'naturalism', in this sense, I mean both an activity and an attitude of approach to action. It is the orientation and the vocation of a naturalist, in the most identity-based sense of that term, a personal philosophy of 'Nature first, then theory. Or, better, Nature and theory closely intertwined while you throw all your intellectual capital at the subject' (Wilson, 1994: 191). This is the pervasive curiosity about, and the drive to explore, one's surroundings that gave rise to the discipline of natural history and that, in the 19th and 20th centuries, effected enormous changes in our understanding of the constitution and the origin of the world in which we live.

The Decline and Rise of Naturalism

6 2009 saw the 150th anniversary of the publication of Charles Darwin's *On the Origin of Species*, in which Darwin infers, from his far-flung voyages in and observations of the natural world, many of the bases of a theory of evolution that persists to this day. It had been over 100 years, also, since the popular discovery of Gregor Mendel's 1866 paper on genetics, 'Experiments on Plant Hybridization', republished in 1900, had turned biology decisively inward, to a consideration of smaller structures in the organism, as well as indoors, into laboratories and away from the naturalist pursuits that had largely characterised the discipline until that time. Natural history was in decline, in fact, across many disciplines in the 20th century. Geography, having explored and mapped the physical world in somewhat exhaustive detail, moved toward a consideration of cognitive and cultural relationships to physical spaces, or of spatial epistemology. Physics, since Max Planck's development, also around 1900, of quantum theory, had been chiefly occupied with observations of and calculations about low-level events.

7 The unaided senses have been largely left behind as observational, cartographic, and descriptive tools; technologies are more closely tied than ever before to our ability to describe the world. Microscopes and telescopes extend our sense of sight and the range of our perceptive capacity. Powerful imaging devices allow us to observe the inner workings of the human body, from precise information about the extent of a knee injury to visualisation of patterns of activation in the neural pathways of the brain. Computers sequence genes in huge numbers and give us models of behavior, motion, and thought that reveal patterns previously beyond our ken. A proliferation of

surveillance cameras allows us, for better or for worse, to reconstruct events in the past with a previously unthinkable degree of accuracy. Such tools are extensions of individual power and, it has been argued, they are inseparable from our understanding of who we are and what we can do. 'Consider', writes Aldous Huxley,

8 > The change in his being which the scientist is able to induce mechanically by means of his instruments. Equipped with a spectroscope and a sixty-inch reflector an astronomer becomes, so far as eyesight is concerned, a superhuman creature; and, as we should naturally expect, the knowledge possessed by this superhuman creature is very different, both in quantity and in quality, from that which can be acquired by a stargazer with unmodified, merely human eyes (Huxley, 1958: 9).

9 This 'superhuman creature' has become not only the source of cultural knowledge but also the arbiter of what is 'worth' knowing. Bodily engagement of the physical world has been all but replaced by technological scrutiny of its structures and patterns, on scales large and small. As direct sensory exploration has declined, a kind of methodological control has set in; an implication of the claim that there is nothing left to see is that it is not worth bothering to look. This leads to both a unidirectionality of vision, with the public being looked at but not being encouraged, by and large, to look back, and to an internalised, self-imposed restriction of access to both spaces and behavior. Encouraged along a path and rewarded for being in the 'right' places and doing certain things at certain times, one might understandably continue along that path, unquestioningly, until one day that path becomes the whole conceivable world.

10 This begins to explain why so many modern forms of personal, identity-based resistance involve exploration of physical space, and especially of 'off-limits' urban or developed spaces. Graffiti artists, *traceurs*, urban exploratory photographers, skateboarders, and political demonstrators occupying restricted spaces gain their transgressive power in part from ignoring just such 'paths' and allowing for a rediscovery of the investigative urge, the naturalist impetus to cross into unseen spaces and to thereby not only map physical spaces, but also to lay bare the organising principles behind those spaces. For some naturalists, such investigations were a way to look for evidence of divine intent; for others, they were a way to look for naturally-occurring structure in order to facilitate thought about the laws governing the behavior of matter. For the modern, transgressive urban explorer, they represent a window into the obscure, institutional, intentional structures that construct the spaces we occupy, the paths we are encouraged to follow, the patterns of behavior we are rewarded for adopting. The revelation of such structures denaturalises their product, reminding us of the possibility of other ways of doing, other ways of being, other ways of moving. 'Our nature is movement', writes Pascal (1965: 34), 'complete repose is death' .Partial repose, one might add, is partial death; to unquestioningly accept spatial restrictions is to sacrifice part of what makes us alive.

Virtual Worlds

11 Some of the very technologies that have facilitated increasingly microscopic scrutiny of the natural world (lenses, microprocessors, visualisation tools) have also given rise to new, fictional worlds. Film, so powerful at documenting events, is also effective, through assemblages of shots and moving of the camera, at creating the impression of seamlessly unified diegeses. Computers, which can quantify, look for patterns in, and model aspects of the natural world, are also platforms for navigable, automatically-reactive fictional spaces in which objects persist, optical points of view are relative, and events unfold in diachronic time and in chains of cause-effect relationships. A key difference between virtual worlds and the real world, of course, is that virtual worlds have been conceived of by human minds and designed by human hands. Their spaces and textures, their raw physical materials, their built and 'natural' environments, their physics, their cause-effect structures, the behavior of their objects and inhabitants, their manifest rules, and their societal laws are all products of conscious design decisions, each made with the cumulative effects of all of these decisions in mind.

12 Since the 1970s, such virtual worlds have proliferated. The popularity of arcade video games in the late 1970s, and of home video game consoles since the early 1980s, has given rise to uncountable virtual worlds of varying complexity and detail. An early game as simple as *Pac-Man* (Midway, 1980), with its single-screen world and its simple object and character behavior patterns, can give rise to a compellingly complex perceptual experience. The gameplay of *Galaxian* (Midway, 1979)

takes place in a single-screen environment, in which the player's spaceship battles a squadron of enemy ships approaching from above. The background of *Galaxian* is a star field; the gameplay occurs on a single plane in the depth represented onscreen. The orientation of the gameplay strongly implies something below the screen being protected; that is to say, planet Earth. Both *Pac-Man* and *Galaxian* create virtual worlds with simple graphical means and a paucity, by contemporary standards, of processing power, and yet their representations of those worlds manage to imply larger causal, psychological, and physical structures at work. Especially in earlier games like these, those forces tend to be left implicit. As games have become more representationally complex, character psychologies, object behaviors, and physical boundaries have become more overt.

13 With this increased complexity of representation has come an increasing range of ways in which the games can be navigated. Roger Caillois makes a valuable distinction between *ludus*, or regimented, planned, rule-governed play, and *paidia*, or free, investigative, and improvisational play (2001/1961: 27). Virtual-world naturalism is a turn from *ludus* – from the local and global structuring factors of the game – to an ad-hoc *paidiac* form of engagement with the same texts. This way of playing represents a transformation and a de-structuring of the game. Many recent games, the *Grand Theft Auto* series (DMA Design/Rockstar Game, 1997-) being perhaps the most-cited example, have pursued an 'open-world' style of gameplay in which players are allowed to roam the game space without dictated goals, but this 'structureless' format is still, in fact, quite structured; players must perform a particular series of actions in order to progress through the game's narrative, and the 'random' events that give rise to the 'open' world are, in fact, not random at all but rather designed to *seem* random. If anything, complexly emergent representational structures such as those that underlie *Grand Theft Auto IV* (Rockstar Games, 2008) only seem to encourage more intense 'naturalist' play, as gamers try to gain access to the off-limits areas, and to the constitutional secrets, of the games. If a certain desirable vehicle tends to appear at a particular time in a particular place, for instance, this tendency will soon be noted and capitalised upon by players, possible loss of diegetic verisimilitude notwithstanding.

14 This is an instantiation of a human tendency to investigate the salient properties of the environment, a tendency that has weathered the proliferation of technology and the rise of the built environment, and is now extended to the navigation and consideration of virtual worlds. As Edward O. Wilson (1993: 31-32) writes, 'when human beings remove themselves from the natural environment, [instincts] persist from generation to generation, atrophied and fitfully manifested in the artificial new environments into which technology has catapulted humanity'. A naturalist engagement with the material world persists, despite the overwhelming displacement of natural processes. In virtual worlds, the only 'natural processes' we encounter are the products of design decisions; naturalists of the virtual world seek out not only patterns and structures, but clues to the decisions behind those structures. They are at once engaging an environment and subverting an illusion. This is counterplay.

Virtual-World Naturalism

16 As videogames have grown more complex and their worlds have expanded, the possibilities for exploration of those worlds have grown. This has led to a widespread call for larger worlds for games (tempered by aversion to the functional inconveniences that too-large worlds might entail for players) as well as to time-honored player fetishes such as hidden rooms and items ('collectibles') and Easter eggs, often placed in games by developers to encourage players to spend more time in the worlds of their games, to 'bond' with their fictions through extended exposure to the spaces in which they take place. In many gaming cultures, there is value placed on 'getting 100 percent' – that is, finding all of the possible items and power-ups in a game, completing the storyline and all of the side quests, and so on. Beyond even this, many players find themselves compelled to look for secrets in games: places to which the primary narrative doesn't lead the player, areas to which it is difficult to gain access, glitches in the game that allow for unexpected enactive possibilities.

17 Richard Bartle, in his taxonomy of players of Multi-User Dungeon games, identifies a kind of player he calls the 'explorer'. Explorers, writes Bartle (1996), 'delight in having the game expose its internal machinations to them. They try progressively esoteric actions in wild, out-of-the-way places, looking for interesting features (i.e. bugs) and figuring out how things work'. In the rule-

governed virtual environments of games, we can see the naturalist / cartographic urge to exploration playing out. As Bartle's explorers experiment with the input-output parameters of text-based MUDs, virtual-world naturalists seek out and push the behavioral and especially the physical limits of the virtual worlds of games, often seemingly transcending the boundaries of these realities and in the process doing something that may well prove to be impossible in the real world: delineating the structures that underlie reality. In so doing, they reverse-engineer these worlds from within, exposing the representational logics, the assumptions, and the systems of control behind them.

18 Henry Jenkins (2005: 182) has argued that 'expansion of capacity' – the feeling that one has been given the ability to 'run faster, shoot more accurately, jump further, and think smarter than in their everyday life … accounts for the emotional intensity of most games'. While this observation is certainly applicable to many (if not 'most') games, I would argue that an appeal that underlies this – and one that is applicable to a broader array of games – is *extension* of capacity: the granting of the ability to effect some kind of change in the virtual world of a game. While some games promise the feeling of superhuman ability, it is common for games to trade in the restriction of ability as a core element of their gameplay.

19 These restrictions can take many forms; although 'freedom' is perhaps the most-touted virtue of games in recent years, the player's ability to 'act' through his or her virtual-world avatar is actually intensely proscribed. The button-based interface of most games dictates a limited number of 'verbs' available to the player. As Stephen N. Griffin (2005) writes, 'the button is an artifact of automation. It reduces gesture to symbolic action. Used for jumping, punching, grabbing, rapping and even raping in video play-spaces, the button reduces complex action to a matter of choice'. In-game physics and physical boundaries often provide the framework for and principal challenges of the gameplay. Certain events may only be possible at certain points in the game; *The Legend of Zelda: The Ocarina of Time* (Nintendo, 1998) was one of the earliest popular games to use a context-sensitive controller setup, in which the buttons do different things depending on where the character is in the game's physical space; this technique remains popular and can be seen in the more recent *Bully* (Rockstar Games, 2006). Commands can become available to players at certain points in a narrative, as well; the 'Quick Timer Events' that introduce a degree of interactivity to the cutscenes of *Shenmue* (Sega, 1999) are an example. These two forms of context sensitivity are combined in, and provide the primary means of control for, *Heavy Rain* (Quantic Dream, 2010).

20 One limit that is common to all games is the spatial boundary of the game world. Discussing the boundaries of the fictional worlds created by films, Stanley Cavell writes:

21 > The fact that in a moving picture successive film frames are fit flush into the fixed screen frame results in a phenomenological frame that is indefinitely extendible and contractible, limited in the smallness of the object it can grasp only by the state of its technology and in largeness only by the span of the world (Cavell, 1979: 24).

22 Cavell is here extending to film an argument that he has made about the difference between photographs, which he deems 'of the world' – selections from what is phenomenologically perceived as a larger environment beyond the edges of their frames – and paintings, which he deems worlds in themselves: 'the world of a painting is not continuous with the world of its frame; at its frame, a world finds its limits' (Cavell 1979: 24). Video games, I believe, fall somewhere between the two. Like films and photographs, they carry the promise of more space beyond the edge of what is presently observable. Like paintings, they are constructions and they have the limits of physical scope that this implies. If a painting is a world and a photograph or a film is of *the* world, perhaps it is most appropriate to say that a video game is *of a world*. Game worlds, by necessity, have ends; in the aesthetic presentation of the worlds, the necessity for boundaries is a design problem that has been addressed in myriad ways. Techniques for enforcing these boundaries have developed apace with game technology. New representational capacities have called for new ways of depicting, and justifying, restrictions on the game space.

23 In text-based games, designers can simply not offer the option of moving in a particular direction. At the easternmost edge of a game world, the option 'go east' will no longer be available. In these games, spaces are maximally paradigmatic (cf. Altman, 1981: 123). A single 'screen' of one of these games is largely left to the imagination; what matters most is what can be done in each area. Single-screen games have boundaries built into their aspect ratios; the edges of the screen are the

functional ends of the universes of the games. There are some variations, such as *Pac-Man* (Midway, 1980) and *Asteroids* (Zaccaria, 1979), in which the action wraps around the edges of the screen, but in these games, too, there is no significant part of the game world that is offscreen.

24 The spatial limits of two-dimensional side-scrolling games often also correspond to the edges of the screen. In *Super Mario Bros.* (Nintendo, 1985), the player is free to move forward at his or her own pace (albeit prompted by a time limit for the completion of each level) – the screen scrolls along with Mario or Luigi's motion – but it is impossible to retrace one's steps, as the screen will not scroll back. Thus, the farther a player progresses in a level, the less space and the fewer possible actions are available. Progress forward in the levels of *Super Mario Bros.* actually *shrinks* the functional world of the game as it is played. As it turns out, the back edge of the screen in *Super Mario Bros.* can be a useful tool; the 'chimney technique', employed by players since soon after the game's release, is a way of wedging one's avatar between a vertical row of bricks and the left side of the screen and then jumping repeatedly to scale the resulting 'chimney' and reach otherwise unreachable areas. The technique is phenomenologically complex, as it represents an interaction between the (non-diegetic) edge of the screen and bricks that are part of the world of the game; players' eagerness to discover and use any potential tools at their disposal points to a perception of game worlds and their mechanical or technological contexts as whole units of use. The chimney technique is an example of a kind of endeavor I will examine at more length later: the exploration of the gameplay properties of the physical boundaries of game worlds.

25 With three-dimensional virtual spaces came new design challenges as regarded the edges of game worlds; as games moved away from their early visual iconicity to forms that increasingly resembled our own reality, new contrivances were developed for the blocking of the player's paths. Endless rock faces or contiguous buildings might form the 'walls' of the game world. In games such as *Tony Hawk's Pro Skater* (Activision, 1999) and *True Crime: Streets of LA* (Activision, 2003), a player who goes too far in one direction is merely warped back into within an invisible perimeter. The freedom to 'roam' around the worlds of these games is often cited as one of their primary appeals, so it is perhaps predictable that encountering their physical boundaries might cause player frustration. If enjoyment of games comes largely from the extension of capacity, as I argue, the physical point at which a player is no longer *capable* will logically also be a point at which his or her enjoyment is confounded.

26 In-game freedoms should not, however, be mistaken for radical freedoms. A player's capacity to act is not expanded into a game world so much as it is extended through a *channeling* process. A player may quickly adapt to the limitations of action imposed by a game, but it can be difficult to make further adjustments when that set of possible actions is altered, as it is when player motion is suddenly curtailed. Counterplay in the form of virtual-world naturalism does not usually seek to establish radical freedom of motion, nor does it necessarily seek to reestablish, even, the kind of motion that was available to the player before a spatial or behavioral boundary was encountered. Its intent seems to be less libertarian than it is investigative; it seeks to explore, through examination of the contours and the flaws of that boundary, why it is there, how it got there, and what its essential properties are.

27 In his discussion of the gameplay possibilities of *Grand Theft Auto III* (Rockstar Games, 2001) and *The Legend of Zelda: The Wind Waker* (Nintendo, 2003), Ian Bogost argues that the spaces of video games are fundamentally tied to player experience of games as enactive systems:

> 28 In *GTA*, the player can choose from a multitude of functions at any given time, each chosen in reference to specific transitional cues the environment provides. When sailing the vast ocean of *Wind Waker*, the player has few choices, save which direction to sail, and whether to fight or avoid sea monsters when they crop up. *Wind Waker*'s sea is enormous, and the game offers a wider variety of objects and tools than *GTA* … but the game offers fewer inspirations for the player to reorient his current activities and make meaningful use of those tools. The size of the world and the quantity of possible actions matter less than the significance of those actions (Bogost, 2006: 159).

29 Bogost, here, is not arguing that players do not explore the physical spaces of virtual worlds nor that the exploration of those spaces is not meaningful, but that places in games are experienced in terms of the enactive possibilities that they offer. This point can be clarified by Bogost's analysis of *Grand Theft Auto III* – gamers say they enjoy the 'freedom' afforded by the game design; Bogost argues that this feeling of freedom is less about the actions that are possible in the game (as these

are actually quite limited and are almost exclusively criminal in nature) than it is about the fluidity between possible actions that the game allows:

30 > Fire a gun, steal a truck, explore a hidden building, bludgeon a cop, explode a car: although important to the [game's] appeal, the specificity of these actions is subordinate to the ease of transition between them, and the conscious player decision associated with that gap (Bogost, 2006: 155).

31 Bogost emphasises the importance of behavioral freedom; I think that freedom of motion (a subset of behavioral freedom) has its own singular pleasures. When Henry Jenkins (2005: 180) writes of the 'emotional appeal' of games, he provides 'moments of … visual spectacle' such as 'the big skies that can suddenly open before you as you ride your snow board in *SSX*'. Great vistas and hidden spaces are enormously appealing in their own right: seeing them – being there – can be reward enough for getting there.

32 Because freedom of motion is such an important appeal of games, and because the constructed nature of games imposes limits on this freedom, it is to be expected that players would devote some of their energies to finding ways to push the physical limits of game worlds, an endeavor that often results in revelation of some of the processes and decisions underlying these worlds. This pushing, testing approach to the fabric of in-game reality is a form of counterplay that engages the text, simultaneously, on diegetic and extra-diegetic levels. As the material structure of the game world seems to break down, so, too, does the illusory unity of the construction of the space begin to unravel. To flesh out this notion of exploratory counterplay, I will look at three examples of ways in which players have transcended the boundaries of game worlds. The first is drawn from the side-scrolling platform game *Super Mario Bros.*, the second comes from the first-person shooter *GoldenEye 007* (Nintendo, 1997), and the third comes from the three-dimensional 'free-roam' game *Grand Theft Auto: San Andreas* (Rockstar Games, 2004).

Minus World

33 *Super Mario Bros.* was enormously popular from the time of its release. With gameplay innovations and imaginative visual style, it, along with the Nintendo Entertainment System with which it was packaged, was largely responsible for 'saving' the home console market after the video game crash of 1983. The game offers a world more complex in its physical structure and its emergent dynamics than those typically seen in previous games. With this new complexity came new opportunities for exploration. We have already seen an unexpected gameplay element – the chimney technique – that emerges from the interplay between the static left edge of the frame and brick walls in the game world. Perhaps the best-known of the game's unanticipated elements is the Minus World, a hidden level in the game that is the result of a combination of glitches in the programming. The Minus World is intriguing in that it is a physical environment within the game, though it was not anticipated by the programmers, and in that once you get there, there is not much that you can do; the level is a continuous loop, which means that the player can only swim though it over and over until time runs out.

34 Players, though, often make the Minus World their goal destination, even with the knowledge that to arrive there is to sacrifice any chance of conventionally 'winning' the game. The Minus World represents an alternative kind of victory. It is a tool for social one-upsmanship, as the object of a privileged form of knowledge; to know about it and to be able to get there gives the player cultural leverage over friends who are not in on the secret. It is also a subversion of the programmers' intentions for the game. Progression through *Super Mario Bros.* can take a number of different paths, but overall progress is unilinear. A full game ending in a 'win' starts on level 1-1 and ends on level 8-4. Levels along the way may be skipped, but there is no moving backward to earlier levels, and no straying from the slightly forking paths of the game as outlined by its creators. The Minus World, however, was not part of the game's creators' intentions, although it does arise from the code that they produced.

35 To avoid the possibility of a player getting stuck inside a wall, the game propels Mario (or Luigi) forward when he is overlapping with a brick. This functional fix leads to an interesting development, as it can be used to advance to a warp zone – a set of pipes that, if entered, transport the player to other levels of the game – in world 1-2 of the game. Normally, the player must walk across a long platform and then backtrack in order to get to the pipes; by passing

through the wall, the player gets to the pipes without crossing the platform, an action that is necessary for the game to properly load its instructions for what the pipes are supposed to do. Entering the first pipe after passing though the wall takes the player into a warp that is not fully loaded; due to the underlying architecture of the game, the player ends up in a level that is identical to world 7-2 but that is designated as world −1. This level does not have full functionality in that the pipe that is supposed to take Mario out of the underwater part of the level at its end instead deposits him back at the beginning. [1]

36 The Minus World offers a host of subversions to a player who seeks it out: a violation of the physical laws of the game world, seeming reversal of the sequential flow of levels through a jump 'back in space', as it were, and access to a cohesive accidental space that arises from the game code and yields clues about the deeper structures of that world and about the design decisions that gave it its shape. For example, that the destinations of warp pipes are loaded when Mario crosses a particular point on the platform might not have occurred to any player had the process not broken down with the discovery of Mario's ability to glide through the wall and thus access the pipes without crossing the platform.

37 For a generation of kids who could finish the regular game with a single life, the Minus World represented a new challenge as well as an intriguing reminder of the constructedness of the game world. There wasn't much to *do* once you were there, but getting there – and being there – were their own rewards.

The GoldenEye Citadel

38 *GoldenEye 007* remains a phenomenally popular first-person shooter more than a decade after its release. Level design, gameplay, and multiplayer functionality combine in the game to give it a lasting appeal, even as newer generations of similar games far surpass its technical specifications. With any game of such enduring popularity, extensive player exploration of its world is inevitable. The game was released in 1997, as internet fan culture was spreading and solidifying. The websites and online discussions that sprang up around the game facilitated new kinds of collaboration, allowing players to cooperate in numbers on shaving time off of level speedruns and finding new secrets and strategies. It allowed, too, for new forms of collaboration between virtual-world naturalists.

39 While the discovery of the Minus World in *Super Mario Bros.* surely sprang from an emergent situation in gameplay (as the Minus World is not there by design but must have been discovered organically – probably many times over – by players who happened to jump against the right wall in just the right way), the discovery of the partial, and non-playable, Citadel level in *GoldenEye* was uncovered through player research and exploration of the game's code. Soon after the release of the game, players began to notice that certain codes used on the GameShark 'game enhancer', a device that allows players to tinker with the game's code, would change the names of characters and locations in the game to 'Citadel'. A search for a missing 'Citadel' level in the game ensued. [2]

41 The means used for finding the Citadel level are a significant departure from the exploration of the in-game world that might lead a player to try to access the Minus World in *Super Mario Bros.* Viewed from a 'virtual-world naturalist' perspective, this is closer to laboratory science, as it engages first with a constitutive underlying layer of the world, the game code, rather than with the world on its manifest, bodily accessible level, and then builds a model for engagement with the virtual world from the bottom up. The initial clues came from semi-directionless tinkering with the game; unexpected results were observed that led to questions and theories about their origins.

42 Through exhaustive searching, bits and pieces of the Citadel, scattered around the game's code, were unearthed. Over time, a partially-functional model of the game space was assembled, navigable but not playable. Mia Consalvo (2007: 131) notes the power to be found in 'breaking and reconfiguring' code 'to the specifications of the player'. This model revealed information about the level-planning inclinations of the game designers and about the development process of the game, in which ideas were discarded half-realised, leaving vestigial passages in the game code and vestigial structures in the game world. These transitional forms are relics of the process of creation; like fossils, they record a moment in the game's origination, an aid to our understanding of the game in its final form. It is significant that players wanted not only to reconstruct a Citadel map, but to devise a way to inhabit and examine, first-hand, a navigable build of the level. The

breaking and reconfiguring of code, though potentially satisfying in its own right, is validated in this case through the higher-level activity it enables: namely, the exploration of a previously-inaccessible game space.

43 Clues to the Citadel's existence resulted from manipulation of the program itself, a kind of meta-exploration that uses an approach from outside the game world to open up new exploratory possibilities within the world of the game. Both in-game world exploration and out-of game code investigation would factor in one of the largest-scale searches for hidden game environments to date: the search for the hidden interiors of *Grand Theft Auto: San Andreas*.

Hidden Interiors in the Sky

44 Among the freedoms afforded players of the *Grand Theft Auto* games is the freedom to alter the game's rules. Numerous 'cheats' have been built into recent incarnations of the series, some of which give the player gameplay advantages and some of which offer novel challenges or simple aesthetic variation. The inclusions of these cheats allows a player the option, not cast by the game as morally neutral, to change the rules of the game to suit his or her tastes, impulses, or needs. A combination of these cheats, it was discovered, can allow the player to transcend the intended boundaries of the game world in a way that recalls, at once, both the Minus World of *Super Mario Bros.* and the Citadel level of *GoldenEye 007*. As with the Citadel level, the discovery of the hidden interiors had its origins in observations of unusual phenomena in the game.

45 One of the cheats gives the main character, Carl, a jet pack; along with this comes a simple meter that puts a running display of the character's altitude in the game onto the screen. The altimeter consistently reflects the character's altitude in the game world when he is atop a building or a mountain or in a plane or helicopter, but players noticed that the meter jumps to very high levels when Carl is inside one of the game's buildings. Players of the earlier *Grand Theft Auto III* had discovered, though exploration and use of cheat codes, that some structures were hidden in the game world, so that they could be easily loaded for rendering in cutscenes that took place elsewhere. The altimeter readings in *San Andreas* seemed to indicate that the models for the interior spaces of the game are hidden in the sky, somewhere well above the flight ceiling of the highest-flying airplane in the game. This geographical separation of the exteriors and interiors of building models allows considerable flexibility in the design of game spaces, as the interiors of buildings would not have to fit precisely, in size or in shape, within the exteriors of the buildings as rendered in the outside world of the game.

46 Because of the upper limit to airplane flight in the game, it is impossible to get to the hidden interiors by flying up into the sky. However, a combination of a series of discoveries by players, some of them unearthed through gameplay and some through examination of the game's code, eventually revealed that it is possible to move, high in the sky, between the interior spaces of the game, not by approaching them from outside but by breaking out into them from within. To enter a building in *San Andreas* is to be teleported, upon crossing its threshold, to a realm high above the world. A boxing gym in the Ganton neighborhood of the fictional city of Los Santos has a missing ceiling tile. By using a cheat code that gives Carl a jet pack, a player can fly out through this hole in the ceiling and into a dark void. [3]

47 Landing on the invisible roof of the gym, a player who surveys the area will see that the hidden interiors remain hidden; they are invisible from the outside, even as one approaches them. The only way to locate the interiors, which are spread across the large area of the *San Andreas* map, is to fly around in the dark, hoping to bump into something or to pick up on some clue: faint voices, the sound of music, a small floating arrow indicating a passable doorway. Despite the fact that Carl is quite literally flying blind around this space in the sky, and despite the fact that if he descends too low, he will be sucked into a free-fall, crashing to the ground and necessitating another trip to the Ganton boxing gym to start over again, players have exhaustively mapped the interiors of the game and devised strategies for moving safely between them. Again, from persistent collective investigation of unexpected phenomena have come increasingly fine-tuned methods for description and navigation of a virtual world.

48 As might have been expected, exploration of the hidden interiors has revealed a number of spaces not used in the final version of the game. Among these is a tattoo parlor in which Carl can get tattoos unavailable in the 'real world' (a mark of distinction for players who have been able to get

them); also present are interiors for the homes of some of Carl's possible girlfriends in the game. The discovery of these hidden spaces motivated a hunt for their utility, which culminated in the discovery of a discarded but partially coded sex minigame that was considered for inclusion in *San Andreas*. Methods were soon developed for unlocking and playing the sex game informally dubbed 'Hot Coffee', and the ensuing media panic cost Rockstar, the game's developer, untold millions of dollars, a very real negative corporate consequence of players overstepping virtual-world boundaries.

Structures and Processes

49 While a game may offer more or less 'freedom' to its players, the limited number of actions available and the necessary physical limits of the game world inevitably make this a *contained* freedom, a demarcation of the spaces within which players can explore. By pushing against boundaries, players can not only unveil the hidden structures of game worlds, with their cut corners, pragmatic fixes, and forgotten ideas, but can also gain insight into the real-world processes that give rise to games. The constructedness of the game is made visible; so, too, is its 'producedness'.

50 Rockstar, a studio that fosters an image of irreverence, saw fit to back off from including a graphically sexual minigame in *San Andreas*, for instance. If the hidden interiors of the game had not been discovered by virtual-world naturalists, we would not have the insight that the company considered, but decided against, the depiction of graphic sex in one of its high-profile games. Such an idea, entertained and rejected, is an illustration of the limits and constraints that the company puts on itself. The angry reaction of some media-watchdog groups to the revelation of the content shows Rockstar's understanding of the limits of public tolerance, an understanding that, when acted upon, is the very opposite of the corporation's well-constructed public persona. When it comes to graphic sex, Rockstar, that irreverent company, errs on the side of caution.

51 'Naturalist' exploration of virtual worlds can take many forms and can occur at any number of levels of representation within and outside of the imaginary world of the game and can be conducted with or without the use of cheats or external devices. Ultimately, though, virtual-world naturalism comes down to first-person observations made as a player moves through virtual space. Passage to previously unreachable game spaces may be achieved through any combination of diegetic and nondiegetic actions and tools (and certainly through the extradiegetic activities of players and game communities). Navigation of these spaces, however, remains tactile, haptic, textural. A player's character must *actually* walk across the floor of a half-completed room to learn if, and to what degree, it is solid. It may take a number of attempts by a large community of players before a passable route across such a floor is discovered. This is closer to natural history – to classical cartography, to stargazing – than it is to Huxley's 'superhuman creature'.

52 The edges of these worlds, with their frustrations and their unexpected utility, come to seem less like the ends of the world than the ends of the *known* world. Virtual-world naturalism lays bare the structures and processes that underlie video game environments. Unlike the real universe, the world of a video game can definitively be said to have been created by a designing force and set into motion. As in the real world, the closer we look, the more the microstructures at play make themselves known to us. A seemingly unified virtual world, assembled to appear seamless and to channel players through it in a way that preserves this narrative, temporal, and spatial illusion, can often be coaxed into revealing the interacting rules – physical and metaphysical – that give it shape. Investigations into the systems and boundaries at work in virtual worlds can give us varying forms of insight into their constitution, glimpses of 'truth' that compel people on one of the deepest levels imaginable: they reveal the hand of the creator.

Notes

[1] I am relying here on a technical explanation by 'Barubuary' that appears to have been carried out over an instant message connection. A transcript can be found at: https://nintendope.iodized.net/minusworld/minus.php

[2] This account of the search for and discovery of the Citadel level comes from https://goldeneye.detstar.com and https://www.goldeneyeforever.com

[3] The best surviving account of the discovery of this method, and of the process of mapping the hidden interiors, can be found in an 111-page (and counting) discussion at GTAForums: https://www.gtaforums.com/index.php?showtopic=166773

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