DRAFT of Seth Giddings **,** Simulation, in Bernard Perron & Mark J. P. Wolf (eds), *The Routledge Companion to Video Game Studies*, New York: Routledge (forthcoming).

Abstract

This essay outlines the conventions and pleasures of simulation games as a category, and explores the complicated and contested term *simulation.* This concept goes to the heart of what computer games and video games are, and the ways in which they articulate ideas, processes, and phenomena between their virtual worlds and the actual world. It has been argued that simulations generate and communicate knowledge and events quite differently from the long-dominant cultural mode of narrative. This raises a thorny question: how, and what, do simulation games simulate?

Defining simulation games is a challenge. Whilst most seasoned video game players will have their own idea of what this category of games looks like –and perhaps some favorite examples— these games share no easily identifiable conventions. Classic simulation game series including *SimCity* (Maxis, 1989) and *Civilization* (Microprose, 1991) are easily identified by their bird's-eye — or "God's eye" — perspective, with the player gazing down on simulated territories and their denizens. But this perspective, and its associated interface devices and gameplay, overlaps and blurs with military strategy games such as the *Command & Conquer* (Electronic Arts, 1995) and *Age of Empires* (Microsoft Studios, 1997) series. The category often includes vehicle simulators from *A-Train* (Maxis, 1985), very similar to *SimCity*, to *Flight Simulator* (Microsoft Studios, 1982), quite different in viewpoint

and gameplay. If it includes biosphere or evolution simulators such as *SimEarth* (Maxis, 1990) or *Creatures* (Mindscape, 1996), then why not their ancestor John Conway's *Game of Life* (1970)? And, as *Game of Life* began its own life on sheets of graph paper in a university Math department, could non-digital games be included –*Monopoly* (Parker Brothers, 1934), perhaps– or other scientific simulations not intended for entertainment? For many games contain simulations of physics (gravity, friction, collision) but are not thought of as "simulation games".

The closest simulation games have to a defining generic characteristic is their open-ended structure, a "sandbox" format that gives players latitude in experimentation or in devising their own game tactics and goals. Flight and driving simulators, for instance, offer a relative freedom of movement in an expansive virtual environment. In direct connection to scientific and other non-entertainment computer simulation applications, simulation games allow players to test the system, to see what will happen in a particular strategy is adopted, or if certain variables are tweaked. They rarely have a clear ending or winning state —a feature that has led some to argue that they are not really games at all (Juul, 2003). A simulation gameworld is what Mimi Ito calls "a structured space of possibility" (Ito, 1998, p. 303). This is for example a feature downplayed in first-person shooters, but is central to the expansive urban environments and action of the *Grand Theft Auto* games (Rockstar, 1997).

To add to the confusion, many game scholars would argue that *all* games are simulations regardless of their generic categorization or the presence of the *Sim-* prefix in their title. For Espen Aarseth, "the computer game is the art of simulation":

> Simulation is the key concept, a bottom-up hermeneutic strategy that forms the basis of so many cognitive activities: all sorts of training, from learning to pilot a plane to learning to command troops, but also the use of spreadsheets, urban

> planning, architectural design and CAD, scientific experiments, reconstructive surgery, and generative linguistics. And in entertainment: computer games. If you want to understand a phenomenon, it is not enough to be a good storyteller, you need to understand how the parts work together, and the best way to do that is to build a simulation. Through the hermeneutic circle of simulation/construction, testing, modification, more testing, and so forth, the model is moved closer to the simulated phenomenon (Aarseth, 2004).

So as well as shedding light on the specific conventions and pleasures of simulation games as a category, the complicated and contested term *simulation* goes to the heart of what computer games and video games are, and the ways in which they articulate ideas, processes and phenomena between their virtual worlds and the actual world. As Aarseth argues, simulation organizes, communicates, and enacts knowledge and events quite differently from the long-dominant cultural modes of mimesis and narrative. This raises a thorny question: how, and what, do simulation games *simulate*. Or, as we'll see, whether they necessarily simulate *anything* at all.

My first encounter with a "god game" was in the early 1990s, with *Populous* (Electronic Arts, 1989), running on a friend's Commodore Amiga. I was enchanted not only by the (for the time) lush and detailed graphics, but also the sense of a dynamic, complex world unfolding on the screen, beyond the edges of the screen, and —importantly— semi-independently from the actions of the player. As I remember it, my friend directed his tribe to doggedly conquer surrounding lands and other tribes, but this action was effected not through the precise control of individuals or groups of individuals, but through his broader instructions and directions. Deploying an approach now familiar to simulation and strategy games, but then (to me at least) utterly novel and charming, we could issue instructions (for

colonization, assault, construction, etc.), leave the game for hours at a time, returning to see what had happened in this autonomous microworld in the meantime.

The *SimCity* series epitomizes some key aspects of computer simulation in general as well as computer simulation games in particular. Unlike *Populous*, with its fantasy setting of gods and conquest, *SimCity* appeared to divert the scientific world of computer simulation into entertainment, as urban planning, policy, and management were transformed into extremely popular gameplay. Like *Populous*, it has a God's-eye viewpoint and a dynamic, semi-autonomous world. It is this latter feature that closely connects games with non-entertainment computer simulations: the computer can handle and articulate a range of dynamic variables on the fly, beyond the capabilities of the human brain. Thus, the simulated city is the product of interactions between zoning, infrastructure, taxation, public works and spending, policing, and so on. The player then experiments with these variables, finding optimum relationships between, say, raising taxes (upsetting the citizens, or Sims) to spend on police (reducing crime and appeasing the Sims). If the experiment fails, the player can reset the game, or rewind to a save point and try different tactics and different relationships. This is not far from a computer science understanding of (instrumental not entertainment) simulation:

> Rather than simple computing, the solution to a set of equations, a simulation produces a *synthetic history* of the process. Beginning with a set of initial conditions, the simulation plays through the various kinds of events which might occur (Principia Cybernetica Web [*my emphasis*]).

Or as Mark J. P. Wolf has put it, simulation is the "embodiment of a theory, it can document what *could be*, *would be*, or *might have been* […] Thus the simulation documents possibilities or probabilities instead of actualities" (Wolf, 1999, p. 28). As we'll see later, we

could add to these synthetic histories phenomena that *couldn't be*, but are experienced as if they *could be*.

As noted, god games (or mayor/planner games) are characterized by their presentation of an expansive territory: they look like maps, but maps that are animated, temporal. Ted Friedman argues that games such as *Civilization* and *SimCity* are maps-in-time:

> Representing flux and change is exactly what a simulation can do, by replacing the stasis of two- or three- dimensional spatial models with a map that shifts over time to reflect change. And this change is not simply the one-way communication of a series of still images, but a continually interactive process. Computer simulations bring the tools of narrative to mapmaking, allowing the individual not simply to observe structures, but to become experientially immersed in their logic (Friedman, 1995).

Gonzalo Frasca has explored the notion that simulation marks a break from the narrative and representational underpinnings of longer-established media, from the novel to cinema. For him, the salient concept is not Friedman's space-time but the modeling of behaviors:

> to simulate is to model a (source) system through a different system which maintains to somebody some of the behaviors of the original system. The key term here is "behavior". Simulation does not simply retain the – generally audiovisual– characteristics of the object but it also includes a model of its behaviors. This model reacts to certain stimuli (input data, pushing buttons, joystick movements), according to a set of conditions (Frasca, 2003).

I will return to both behavior and models/systems. For now, I want to note the significance of the *dynamic* and non-linear nature of computer simulation. Let's explore the implications

of this emphasis through two case studies. The first returns us to the worlds of *Civilization*, the second to a less obvious choice, the Nintendo DS game *Lego Battles* (TT Games, Warner Bros. Interactive & LEGO Group, 2009).

Civilization has proved a popular and productive object of study for game scholars. Frans Mäyrä summarizes and synthesizes key arguments in his book *An Introduction to Game Studies* (Mäyrä, 2008; see also Tyler, 2007). The game's canonical status within game studies is not only due to its popularity and success as a game, but also, Mäyrä suggests, with the resonance of its political and historical themes. The game invites the player (or players, in multiplayer versions) to collude with it in simulating world history through expansion, colonization, and the exploitation of the natural world. There is by and large a consensus amongst these *Civilization* scholars that the game is structured around an ideologically dubious model, more or less steeped in a Western narrative of history as driven by conflict, technological progress, and domination. These debates get particularly interesting when they ask whether these ideological aspects actually *matter*. Firstly, whether and in what ways an ideological framework might be reinforced and transmitted through the playing of the games. The ideological workings and effects of popular screen media, particularly cinema and television, have been discussed and argued over since their inception, but, game scholars ask, does the interactive and simulational character of the computer game demand that we rethink the workings of signification between players/viewers and screen images and dramas? Secondly, in what ways might the simulational form of the video game demand a different way of thinking about the machinations of ideology itself in contemporary digital media culture? This second question has itself been addressed in a number of different ways. Mäyrä summarises David Myers's argument that it is a mistake to understand games such as *Civilization* as representations of

politics and history in the first place. In a move familiar in game studies, Myers asserts that the symbolic or narrative elements of *Civilization* as a media object are secondary to the abstract configuration and values of the game structure. For the experienced player,

> The factories, fossil fuels and nuclear power plants no longer refer to their real-world referents. Instead, the 'aesthetics of play' will provide each element a new gameplay-related value that is completely independent of the history books that *Civilization* might ostensibly appear to be simulating (Mäyrä, 2008, p. 99).

Discussions of the meanings and implications of other simulation game series, notably the *SimCity* and *The Sims* games, have followed similar lines. *SimCity*, it has been argued, presents North American urban development and capitalist economics as a given. For Stephen Kline, Nick Dyer-Witheford, and Greg de Peuter, *The Sims*, with its suburban world of home-building and decorating, teaches its players

> that one must negotiate the daily events and crises occasioned by a life in which commodity consumption is the *raison d'etre*. Although the game is open-ended and has no explicit definition of winning or losing, it is not devoid of structure. That structure is provided by getting and spending … (Kline et al., 2003, p. 276).

It should be clear that the player's accumulation of virtual worldly goods is a quite different media experience from watching a film or TV program that portrays drama within the material comfort of middle class suburbia (Australian soap operas spring to mind). The game is in itself a dynamic economy or market that must be played, manipulated, and experimented with. In Frasca's terms, this is the *simulation* of acquisition not (or not only) its *representation*. This returns us to the key point: does this new mechanism for engaging media audiences with ideas, dramas, action, processes, and characters imply a tighter ideological grip than that of pre-simulational media? That is to say, is the player of *The Sims*

more thoroughly seduced by the appeal and logic of consumer capitalism (or the *Civilization* player by the appeal and logic of geopolitical dominance) because of their immersion and investment in dynamic models of these systems? If so, then the relationship between the game simulation and the system it models becomes a significant cultural-political object of enquiry. Making a direct comparison with the military's adoption of video game software for combat training, Kline *et al.* argue that *The Sims* is a "civilian simulator training for yuppies" (Kline et al., 2003, p. 276).

From this perspective, it matters whether *SimCity* allows its players to experiment with alternative economic or social systems, whether, for instance, the flexibility of the gameworld makes possible synthetic histories (or synthetic futures) that explore sustainable or collective economic and social organization. Or we might address this issue from a different direction: the open-ended "sandbox" structure of simulation games encourages a range of possible playing styles, strategies, and outcomes, and players might find their own alternatives beyond those anticipated by the games' designers. Even Kline *et al.*'s pessimistic reading of the politics of video games recognizes the possibility that players might "subvert symbolically" the digital capitalist logic of the Sims as simulation.

Whilst they argue over the mechanisms and implications of simulation as a media form, these video game scholars assume a fundamental connection between a source system and its simulation, between the city and the SimCity. The video game scholar is then susceptible to "simulation fever", Ian Bogost's useful, and playful, diagnosis of anxiety about the relationships between virtual and actual systems:

> The nervous discomfort caused by the interaction of the game's unit-operational representations of a segment of the real world and the player's subjective understanding of that representation (Bogost, 2006, p. 136).

To ameliorate the symptoms of simulation fever, let's return to the idea that the representational elements of a video game are, once the game is in play, secondary to the abstractions of its rules, structure, and gameplay. What if this idea were taken further: that simulations needn't simulate anything, that they are dynamic systems in their own right whose representational/modeling aspects are incidental or residual, that they are not copies of something else. To explore this idea, we might look at these systems as *computer* simulations, as informational and procedural systems for practical ends rather than *games* for popular entertainment. Computer simulations model space, time, and dynamic nonlinear systems. They are algorithmic and mathematical and so any behaviors they model, from weather systems to economies, must be processable and expressible in mathematical terms. This in itself opens up a gap between any model and its putative source system. For example, Mitchell Resnick's *StarLogo* program is designed to allow children to experiment with various kinds of bottom-up emergent behaviors. *StarLogo*'s simple cellular automata (called "turtles" but presented as points on the monitor screen), can be variously figured as traffic jams, slime moulds, or termite colonies. To play with them is to generate knowledge that is not representational (it isn't specific knowledge about the actual systems of insect colonies or traffic flows) but simulational (knowledge about the dynamism of the simulation as a nonlinear system). As Resnick puts it,

> The real world serves only as an inspiration, a departure point for thinking about decentralized systems … I am more interested in investigating antlike behaviors than the behaviors of real ants … The goal is not to simulate particular systems and processes in the world. The goal is to probe, challenge and disrupt the way people think about systems and processes in general (Resnick, 1997, p. 49-50).

Here then the simulation simulates *nothing* in the actual world —it doesn't aim to

accurately simulate traffic jams and slime moulds; rather, it uses these artificial and natural phenomena as cues for grasping the workings of dynamic systems in general. As Mark J. P. Wolf points out, simulations don't require data from the outside world to operate, they can be "used to image real or *imaginary* constructs, or some *combination* of the two" (Wolf, 1999, p. 280). And so the attenuated connection with actual world systems is broken (see also Giddings, 2007c).

Cellular automata are paradigmatic here, a kind of simulational stem cell. Conway's *Game of Life* has been mentioned already. The scientists who first translated Conway's paper grids and pebbles into computer code were entranced both by the possibilities of modeling complex emergent behavior from simple rules for understanding actual biological processes, and by the new artificial systems and behaviors the program generated. The principles of cellular automata drive games from *SimCity* (Ito, 1996), to war sims (Giddings, 2007b), and back to biological evolution in games like *Creatures* (Kember, 2003).

So the question "what do simulation games simulate?" can be answered three ways: Answer 1 is "not always what we might first think"; Answer 2 is "nothing" —or rather something imaginary and hence "nothing actual"; Answer 3 is simply "they simulate themselves".

The apparent paradox of Answer 3 resonates with philosophies of simulation and artifice, philosophies that can be dated back to questions of the nature of reality and artifice in classical antiquity. In recent decades, and in response to contemporary media culture, the simulation is "a copy of a copy", or "a copy without an original". The three answers above echo Jean Baudrillard's stages of the precession of the simulacra (Baudrillard, 1983 –for detailed discussion of the relationships between simulation as a critical concept and as a technocultural form, see Lister *et al.*, 2009, p. 38-44; and Giddings, 2007c).

Some video games are particularly vivid illustrations of this notion of simulation as procedural and as a model of nothing in the physical world. The Nintendo DS game *LEGO Battles*, for instance, demonstrates the self-referential character of much of contemporary media culture. It offers three different fictional worlds —with pirate, castle (medieval knights and kings), and space themes. Each of these fictions is a copy of a copy, not of any historical reality. The pirates are the eye-patch wearing and cutlass wielding romantic figures familiar from theme parks, children's literature and film, the knights inhabit a world of magic derived from broad generic tropes in medievalist / fantasy culture, and the spacemen from the speculative realms of science fiction. Moreover, of course, they are all copies of actual LEGO sets, virtual copies of toys that are in turn drawn from archetypes from the diffuse semiotic realm of popular children's culture. The gameworlds are permeable too, so the player can set up fights between, say, spacemen and pirates. The openness of simulation as a space of possibility here opens onto the phantasmagorical nature of popular culture and children's play (Sutton-Smith, 1997). It models a world, but a world of its own making.

As a computer simulation, *LEGO Battles* is similarly promiscuous in its referentiality. It borrows its top-down perspective and exploration/combat gameplay mechanic from simulation games in the tradition of *Populous* and *Civilization*, and their close relatives, turn-based games and real-time strategy games. Again, the artifice and conventionality of the simulation presents itself over any reference to actual world systems. If we can still argue that *Civilization* meaningfully simulates history and geopolitics, then it is impossible to see *LEGO Battles* as simulating anything actual although it uses very similar mechanisms and processes, and offers similar gameplay challenges and pleasures.

By their very nature, the workings and effects of open-ended play and bottom-up

emergent artificial systems (from *Game of Life* to *SimCity*) cannot be predicted by simply analyzing the rules or software. Their conventional, subversive, or simply ludicrous possibilities are only realized in events of play. As Mimi Ito puts it, the closure of video games

> is constantly subverted by unexpected refractions and recombinations, unorthodox identifications that threaten the containment of the microcosm. This analysis is driven by these suspicions of recombinant meanings and unforeseen interlocutions with a virtual imaginary (Ito, 1998, p. 301-2).

Ethnographic studies demonstrate anticipated, "preferred" play, but also all kinds of phantasmagorical action and recombinant meanings, events that cannot be contained by the microcosm of the gameworld. In a move familiar to *Sims* players, a friend's daughter repeatedly removed the steps from her Sim family's swimming pool. Unable to leave the water, the characters die. This is in itself is an example of emergent behavior (at least on the part of the players —it is not clear if this is a possibility intended by the game designers), however, it transpired that the young player was not so much destroying her Sims as exploiting a game feature to create ghosts. She had built her house near the virtual graveyard for precisely this purpose. Ito's study of one boy's playing of *SimCity 2000* (1994) charted the interplay of cheat codes, the player's preference for destruction and disaster over (educationally validated) construction and planning, and the role playing of an "evil warlord". Whatever the intentional or unintentional politics of *SimCity* as a simulation, as a piece of soft technology in everyday life it can be put to quite different political ends (Ito, 1996; for accounts of phantasmagorical play with video games, see also Giddings, 2007a, Weber and Dixon, 2011; and Kember, 2003).

These games are computer simulations at the service of entertainment. They offer

experimentation with settings and variables, and encourage reflection on the dynamism and processes of their worlds and economies. Yet, one of the great pleasures of simulation play is the generation of unexpected, emergent events within the world. The "sandbox" tag neatly brings together the mapping and totalizing viewpoint of the war room with the child's free play with sand and water. In this sense, simulation games are at once the most ideological and the most creative video games.

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