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Do Computer Games Simulate, After All? Reconsidering *Virtuality*

Veli-Matti Karhulahti
University of Turku
Department of Media Studies
vmmkar@utu.fi

Introduction

Outside computer game research, philosophers have an enjoyable pile of problems with *simulation* (Rohrlich 1991; Humphreys 1991; 2009; Galison 1996; Hartmann 1996; Winsberg 1999; 2001; 2003; 2009; 2014; Schweber & Waechter 2000; Stöckler 2000; Fox-Keller 2002; Morgan 2004; Frigg & Reiss 2008; Parker 2008a; 2008b; Grüne-Yanoff & Weirich 2010; Grüne-Yanoff 2011; Pias 2011; Vallverdúl 2014; see Bostrom 2003; Vidal 2008). For computer game scholars, in turn, the concept appears rather trouble-free; and why wouldn't it, as today "[all] computer games are simulations" (Parker & Becker 2013, 1)—everything nice and clear. Before starting to muck up things, I thus feel a need to briefly justify my rhetorical impeachment.

If the conceptual role of 'simulation' in computer game research is something that computer game scholars widely agree with, one must be careful in its criticism. Consensus of terminology is often an achieved state, and an attempt to unbalance it might easily do more harm than good. Once in a while, however, it so happens that discourse-sharing people end up borrowing words from other discourse groups more and less uncritically; hence standardizing their terminology not via circumspect analytical achievement but via early access language games. That's what almost happened to the computer game as a 'narrative;' and as I argue below, that's what has actually happened to the computer game as a 'simulation.'

Evidently, it's way too late to prevent the damage that this simulation-craze has caused in computer game research (I'm chiefly thinking about the encouragement it has given to the idea of computer games as 'interactive *fictions*'). That said, one can always take solace in the fact that simulation and the need to simulate—"as a major new hermeneutic discourse mode" (Aarseth 2004)—have also been persuasive in the establishing of the computer game as an object of post-literary interpretation strategies.

Through the first two sections I compare the 'simulation' of computer game research to the ways in which other scientific researchers utilize 'simulation.' My claim is that computer game research has found a rather unique use for the term. In the third section I warn computer game researchers about the sloppy usage of the term 'simulation' and endorse *virtualization* as an alternative. In the fourth and final section I separate the noun and the verb (simulation/simulate) in order to propose an intentional philosophy of simulation for the theoretical applications in computer game research.

I—Simulation, outside Computer Game Research

If the organized scientific use of the term 'simulation' is considered to commence from the 1960s (as in Morgan 2004), perhaps the first 'modern' philosophical definition for the term was given by Paul Humphreys in 1991. I should specify that Humphreys' object of interest was actually the

'computer simulation.' While 'computer simulation' has nowadays become somewhat synonymous with simulation in general, there are instances in which one might wish to keep in mind that simulations (according to most simulation theories) need not be computer-based in total, or at all.

Now, what I find more interesting in Humphreys' seminal contribution than its working definition (which he revised in 2004) is the list of what he considers, based on previous simulation research, the central uses of simulation. Instead of the definition, let me cite those uses instead:

1. *To provide solution methods for mathematical models where analytical methods are presently unavailable.*
2. *To provide numerical experiments in situations where natural experimentation is inappropriate (for practical reasons) or unattainable (for physical reasons)…*
3. *To generate and explore theoretical models of natural phenomena*. (1991, 502)

The full significance of the above will unveil later on, but for now it's enough to pick up the key: the generic functions of simulation are first and foremost *instrumental*. In other words, simulations are normally tools that are used to pursue (1) methodological solutions, (2) experimental data, or (3) theoretical validity of an empirical[1] phenomenon, currently existing or not.

The relation between simulation and empirical phenomena is significant here; for instance, the mathematical models of the topmost listing cannot be mere abstract equations but they must always "be applied to a specific scientific problem in order to be part of a computational simulation" (ibid.). That remark correctly respects the word's etymological roots from Latin *simulāre* ('imitate,' 'counterfeit'); namely, one cannot just 'simulate' but *there must always be a preexistent that is being simulated*.

The empirical nature of the preexistent—often referred to as a 'source system' or 'target system'—that's being simulated is likewise the first point of departure in the vast literature on the philosophical enigmas of simulation (recall citations earlier). The basic recipe of such enigma goes something like this: simulations are tools for gaining knowledge about their (existing or possibly existing) empirical source systems, but since simulations are, by definition, imitative counterfeits, how can they offer any significant knowledge?

While there's neither need nor space to tackle those epistemological dilemmas here[2], they allow me to throw in the obvious counter-view that computer game scholars have taken as their founding premise, viz, that the source system of a simulation need not be empirical but it may also be fantastic, imaginary, or fictional, as some like. A proponent of this view could well consult a second pioneering philosopher of modern simulation, Stephan Hartmann (1996), whose oft-cited definition

[1] I prefer the term 'empirical' to 'natural,' albeit it doesn't seem to do much better in its job to signify the 'reality' for which (English speaking) philosophers haven't been able to find a proper word yet.

[2] I cannot resist the temptation to offer a perspective on the quandary between computer simulation and experimentation, which is often (see especially Rohrlich 1991; Fox-Keller 2002; Parker 2008b; Frigg & Reiss 2008) at the center of simulation epistemology: in computer simulation we know almost all functional behaviors of the components that are dealt with (the simulator has programmed them her- or himself), but less about their relation to the targeted system (the targeted system normally consists of a different material matter than the computer simulated component); in experimentation we know almost all about the relationship between the experimented components and the targeted system (the targeted system normally consists of the same or alike material matter than the experimented component) but less about their functional behaviors (the material matter of experimented components is usually biological or chemical and thus subject to an increased unpredictability in comparison to algorithmic components).

of simulation is fairly open for such applications: "a simulation imitates one process by another process" (5). While for Hartmann the term 'process' refers broadly "to some object or system whose state changes in time" (ibid.), he too, nonetheless, emphasizes "the function of a simulation to *investigate* real dynamic system" (5–6, my emphasis).

I could continue displaying how philosophical simulation studies keep on repeating the mantra of simulation as some sort of knowledge machine that produces empirically significant data (those interested see especially Winsberg 1999; Schweber & Waechter 2000; Grüne-Yanoff 2011), but since philosophers of science already know those things and you, the reader, are probably a computer game scholar without such interests, let me just proceed to the actual topic of this article, the computer game.

II—Simulation, inside Computer Game Research

Gaming has been closely tied to simulation since the latter's emergence in serious scientific discourse. Already a decade before the academic journal *Simulation & Gaming* instigated its long-lasting line of publication around 1970, 'games' were discussed as an allied topic with simulation next to 'experiments,' 'models,' and 'computers' (Galison 1996). In that context, nonetheless, the notion of a 'game' operates mainly as a representative of *game theoretical* standpoints, which has little to do with the *computer game theory* of today. I might as well recycle Gonzalo Frasca's (1999) encyclopedic finding, originally written by Lloyd Shapley:

> Although the terminology of players, moves, rules, and payoffs might suggest a preoccupation with sports or recreation, the theory of games has seldom been of practical use in playing real games.

While I don't believe that the computer game really has much in common with such 'real games' (either), its dissimilarity with game theory is an axiom. Thus, to discuss the affair between simulation and the *computer* game, I need to move from the fist steps of simulation studies to the 1980s and Chris Crawford's (1984) still-cooperative opus:

> A simulation is a serious attempt to accurately represent a real phenomenon in another, more malleable form. A [computer] game is an artistically simplified representation of a phenomenon. ... The fundamental difference between the two lies in their purposes. A simulation is created for computational or evaluative purposes; a [computer] game is created for educational or entertainment purposes. (8)

Visibly, Crawford's promising outline is somewhat fitting with the view held by the subsequent philosophers of simulation outside computer game research. Its basic contrast—that simulations are structured for instrumental purposes of gaining knowledge ("computational or evaluative purposes") and that computer games are structured for self-contained ludic purposes ("entertainment")—could be erected as the cornerstone of ludo-philosophical discussion of simulation.

By carelessly adding 'education' as the second purpose for computer games, Crawford moreover reveals the fundamental absurdity of the educational computer game: since the computer game and its components[3] are indeed designed to serve ludic functions, an educational computer game is

[3] 'Component' is my word choice for all the existents in the virtual (more about this term soon) worlds of computer games. The behavioral variety of these components is great. Dragons in *Skyrim* (Bethesda 2011) are existents with multiple interaction options; e.g. you can interact with them by talking and battling. Some

always a compromise in proportion to the delivery of its referential educative 'content' (at least Myers 2003; and Gee 2003 for another viewpoint).

As we know post hoc, Crawford's distinction between simulations and computer games wasn't ever developed to its full potential, though. For that reality (see Simon 2007) it's not least to thank for Jean Baudrillard (cf. Deleuze 1983) and his philosophy of the hyperreal, in which 'simulation' and 'simulacrum' become almost anti-concepts of their imitating ancestry:

> It is no longer a question of imitation, nor duplication, nor even parody. It is a question of substituting the signs of the real for the real (Baudrillard 1994, 2)

In computer game research, and in accord with Baudrillard's *political* rhetoric (see Gane 2006), the original idea of simulation as *imitation* and *counterfeiting* got soon replaced by the idea of simulation as general *structuring* or dynamic[4] modeling; a designation that has little in common with the original notion of simulation as an imitative and deceitful act. While Anthony Niesz & Norman Holland (1984) were still careful to employ 'simulation' only in the imitative sense, it seems that Richard Ziegfeld's (1989) ambitious ludo-ontology becomes the breaking point after which the term starts to appear in its twisted hyperreal form. One of the most sophisticated advocates of this perspective has since become Espen Aarseth (2006):

> Simulation should here be understood as dynamic modeling in general, rather than the faithful mapping of 'real' phenomena: we may simulate a dragon in a computer game, and even if no real-world counterpart exists, the dragon is still a simulated dragon and not a fictional dragon. (846)

Now, if 'to model' is understood here as 'to make to resemble something,' and the dynamic dragon is made to resemble its designer's 'idea' of a dragon, the awkward hyperreality of the dragon simulation seems to resolve: even if a simulation derives from something that hasn't ever existed or will never exist, it could be well said to imitate its designer's mental prototype. Yet still, to recollect simulation studies and Crawford, the purpose of such dragon simulation conflicts quite radically with the time-honored purpose of (computer) simulation: to structure a dynamic dragon isn't about gaining knowledge, but to create an entertaining system. There's of course nothing wrong with structuring entertaining systems, but calling them 'simulations' does lead into an epistemological predicament that was hinted earlier: does one still talk about 'simulation' (imitation and counterfeiting) if the relation between the simulation and the simulated is irrelevant?

III—Simulation and Virtualization

My guess is that philosophers of science, even though they might not realize it yet, will eventually answer my preceding question negatively. Many have already done that in fact; for instance, one the

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flowers in *Skyrim* are existents with multiple interaction options; e.g. you can pick them up and sell them. The sun in *Skyrim* is an existent without obvious interaction options; yet it does still cast a shadow on your avatar and many other existents in Tamriel. And then, there are of course these rocks on the ground that don't seem to behave in any way at all; call them ornaments if you will. See the next footnote.

[4] The notion of 'dynamic' as an element of simulation is fairly ambiguous in the fields of scientific philosophy and computer games, both. While in the former the 'dynamic' tends to be described through temporality—as the "development of the simulated system" (Grüne-Yanoff & Weirich 2010, 23)—in the latter the defining feature is often configurative: "static relations can only be interpreted but dynamic relations allow manipulation" (Eskelinen 2001). I've tried to clarify the concept elsewhere (Karhulahti 2012; cf. Bateman 2014).

leading philosophers of simulation, Eric Winsberg, has recently (2009) analyzed the "useful ways of thinking about what the term means" (835) and none of his submissions fits the dragons of computer games. Just as the critical interrogation of 'narrative' has tough us not to redefine but to take advantage of the term in our ludic applications, a parallel handling of the topic at issue will one day teach us to treat 'simulations' with equal respect. That's where I go next.

To probe the concept of 'simulation' that has developed in the hands of scientists who employ it to gain empirically significant knowledge, I appropriate the term 'virtual' from one of the founders of artificial life research, Christopher Langton (1986). For Langton virtuality is an ontological category; a realm in which models "are so life-like that they cease to be *models* of life and become *examples* of life themselves" (147). This realm isn't a singular 'space' or 'place,' for it's possible for scientists to build there several "artificial universes within which we can embed artificial molecules in the form of *virtual* automata" (148).

I think Langton's concepts of the *virtual realm* (as an ontological macro category), the *virtual universe*[5] (as an ontological micro category), and the *virtual automaton*[6] (as a dynamic unit in those categories) are more proper for the ontological discussion of computer games than 'simulation.' I'm aware that this suggestion isn't a totally new one; for instance, Aarseth (2003) has already made this point clear once:

> [Virtual worlds] could also be called (computer) simulations, but sometimes (e.g., a fantasy world) there exists no real counterpart that is being simulated, and so it cannot be called a simulation, although simulation techniques are indeed used. Let us call these systems 'virtual worlds.' (431)

Yet as the earlier quotes confirm (see also Aarseth 1994), the theory of the virtual is far from finished and clear. In computer game research the monopoly of simulation as *the* onto-theoretical framework is so great that references would read tasteless here. I shall thus dedicate the rest of this section to the distinguishing of 'simulation' from 'virtualization.'[7]

In computer game research 'simulations' are typically defined as some sort of processual or dynamic imitations (e.g. Klevjer 2002; Salen & Zimmerman 2004; Juul 2005; Bogost 2006; Montfort 2007; Fullerton 2008; Dormans 2011; Mosca 2013). These ludo-scientific views may or may not match the ways in which 'simulation' is understood in the universal philosophy of science.

Outside both scientific discourses, simulation has a yet more general meaning, however. As the word's dictionary definition elucidates, simulation in English language isn't primarily about processual or dynamic imitation but *deceitful* imitation by any available means:

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[5] I wouldn't mind replacing the perhaps-too-flamboyant 'universe' with something earthier like 'world.'

[6] As my present criticisms should make clear, we must weigh carefully how faithful we want to be to the consulted context. See Langton's (1986) distinctions between 'physical automata,' 'virtual automata,' 'first-order automata,' 'second-order automata,' 'finite automata,' 'virtual finite automata,' 'Turing machines,' 'virtual Turing machines,' and 'virtual state machines' (130–131). I believe the term 'virtual' hasn't conventionalized academically or colloquially to any extent that would disallow computer game researchers from appropriating the term in the currently proposed way (cf. Ryan 1999; Shields 2006; Lehdonvirta 2008).

[7] You might want to take a look at Clément Vidal's (2003) distinction between 'real-world modelling' and 'artificial-world modelling.' It's a pity that moving pictures emerged before computer games and reserved the term 'animation' for their less animate existents.

> 1. The action or practice of simulating, with intent to deceive; false pretence, deceitful profession. 2. A false assumption or display, a surface resemblance or imitation, *of* something. (OED, *simulation*, n.)

Only the third meaning, first appearing in 1947, includes the processual or dynamic aspect:

> 3. The technique of imitating the behaviour of some situation or process (whether economic, military, mechanical, etc.) by means of a suitably analogous situation or apparatus, esp. for the purpose of study or personnel training. (ibid.)

Fortunately, there's no need to spend much more time on the implicational multiplicity of simulation; it's enough to repeat that what they all have in common and which is important: simulations cannot stand alone, for their conceptual status is dependent on the something *of* which they are imitations.

To be clear, if computer game scholars wish to talk about dynamic imitations as 'simulations' and non-dynamic imitations as 'representations' (see Frasca 2003) or 'fictions' (see Aarseth 2007), I don't consider it a (major) problem. Nevertheless, since both dynamic and non-dynamic imitations match well with the colloquial use of 'simulation,' it might one day be good to separate dynamic *simulazons* or *simzons* (Greek *zo-*, *zōion*; 'living being' or 'animal') from the vast amount of non-dynamic simulations.

What I do consider thorny, on the other hand, is when 'simulation' is associated to computer games and their dynamic components

i. without admitting any imitative functions to it; and as it happens in the worst scenario,
ii. when their deceitful status is additionally rejected in the advocacy of ontological autonomy.

As for (ii), it looks as if that the idea of computer games as ontologically autonomous systems with their own dynamic behaviors is starting to gain stable footing in academia (for some diverse viewpoints: Klabbers 2003; Giddings 2005; Lofgren & Fefferman 2007; Zimmerman 2009; Myers 2010: cf. Karhulahti 2015). And more often than not, computer games and their components indeed seem to be more aptly discussed as ontologically autonomous entities rather than replicas or make-believe. What's notable here is that an entity may be ontologically distinct from 'reality' or some other realm, and still be designed to imitate that other realm to which it doesn't belong (or to which it belongs in a way that's worth an ontological distinction). In this rubric, employing the fake-related term 'simulation' for the ontologically autonomous computer game and its components isn't entirely incorrect—but manifestly misleading.[8]

To ludo-philosophers the even more significant question derives from (i): how to know whether a computer game and its components simulate (i.e. imitate) or not? This question of representational legitimacy is one that epistemologist have dealt with for ages in several contexts, and while I don't even dream of cracking it open here, it's definitely worth pondering over what would be the most resourceful angle for computer game scholars to grasp it.

[8] This is why I can't understand the motives of the suggestion that Seth Giddings (2007) puts forward in his otherwise well-bred article: "A videogame is an automaton … not all simulacra are automata, but all automata are simulacra" (427). Perhaps I'll get cultivated in this conference.

IV—A Simulation and To Simulate

In a fascinating analysis on what its author calls the 'metaphor-simulation dilemma,' Sebastian Möring (2012) poses the question of whether some computer games are better understood as metaphors rather than simulations. He speculates whether "any procedural object or phenomenon can simulate another procedural object or phenomenon" (12), and in a later article continues by saying that "simulations as such also have to persuade the user—namely that they successfully simulate what they pretend to simulate" (2013, 53). These quotes repeat the dilemma at Möring's hand: the conceptual difficulties of determining whether a phenomenon is to be considered a simulation or something else derive mainly from the anthropomorphization of the computer game an entity that 'simulates' and 'persuades.' To make this and other related dilemmas manageable, I adopt a view according to which the computer game and its components cannot simulate anything by themselves, but their *designers* may choose to structure them as simulations *of* something that they wish to imitate (see 64–66).

Just like metaphorization—"the action or process of treating something metaphorically, or making a metaphor of something" (OED, *metaphorization*, n.)—the simulative procedure is most efficiently understood as an intentional act. Yet unlike in metaphorization, in active simulation the projection of intention seems to be connected to the *designer* of the entity (not to the *interpreter* of the entity). The verb *simulate* is never associated to the interpreter, but always to the designer that in case of an anthropomorphic simulator might also be the simulation itself:

> a. To assume falsely the appearance or signs of (anything); to feign, pretend, counterfeit, imitate; to profess or suggest (anything) falsely. b. To have the external features of, to present a strong resemblance to (something). c. Mimic d. To imitate the conditions or behaviour of (a situation or process) by means of a model, esp. for the purpose of study or of training; spec. to produce a computer model of (a process). (OED, *simulation*, v.)

In sum, *to simulate* is to perform an intentional exertion of mimicry; i.e. doing so requires an intelligent simulator with simulative intent.

Historically speaking, there are good reasons why the act of simulation hasn't been related to interpreters 'treating' some things as simulations, but only to designers 'producing' simulations. These reasons are pretty obvious: because simulations (outside computer game research) are tools that are employed to gain knowledge of empirical phenomena, interpretive liberalism is hardly a virtue there. If someone has designed a simulation of Western economy and you interpret it as a simulation Eastern populace, the aftermath is probably eroding for all parties concerned.[9]

In computer games, on the contrary, interpretive and intentional fallacies are rarely an issue. If, for some reason, you wished to interpret *Tetris* (Pajitnov 1984) as a *simulation* of the "over tasked lives of Americans in the 1990s" (Murray 1997, 143), the worst that can happen is someone stamping down your interpretation as reckless. The only setback here seems to be a theoretical one: if players can freely choose the source systems which computer games and their components are simulations *of*, the concept of 'simulation' loses its theoretical value as an intended imitation. So why don't we just let philosophers of art have their metaphors as readers' interpretations, and philosophers of science have their simulations as designers' intentions?

[9] The condition of acknowledging authorial intent is why Winsberg (2003) calls simulations not 'autonomous' but 'semiautonomous.'

What are left for us computer game ontologists are the computer game as a dynamic *virtual universe* (or *world*) and its behavioral components as dynamic *virtual automata*[10]. In this non-subjective discourse of ontological theory, it doesn't matter who has designed what and how is that what interpreted. And not least, it finally enables also the conceptual accommodation of those computer games and computer game components that haven't been made to resemble any empirical, mental, or other preexisting source systems. I've never designed a computer game, but I bet something like abstract expressionism happens among that art too (no—expression isn't the same as imitation).

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Games

TETRIS, Pajitnov, 1984.
SKYRIM, Bethesda, PS3, 2011.

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[10] In future research it shall be important to separate virtual automata (like some dragons and butterflies in *Skyrim*) from those virtual components that are behaviorally dynamic to a lesser degree (like some flowers and house doors in *Skyrim*) and to a different degree (like the avatar in *Skyrim*). These ontological considerations go naturally way beyond the inspirational text of Langton (1986) whose main concern was the 'self-sustaining' (128) and 'self-regulating' (133) vitality of virtuality. Again, Aarseth (2012) has offered some suggestions here ('noninteractable,' 'usable,' destructible,' 'changeable,' 'creatable,' and 'inventible' objects), but in their current undefined state it's hard to tell how much use those categories will come to be.

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