

Fact, Fiction, and Virtual Worlds

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Abstract: This paper considers the medium of videogames from a goodmanian standpoint. After some preliminary clarifications and definitions, I examine the ontological status of videogames. Against several existing accounts, I hold that what grounds their identity qua work types is *code*. The rest of the paper is dedicated to the epistemology of videogaming. Drawing on Nelson Goodman and Catherine Elgin's works, I suggest that the best model to defend videogame cognitivism appeals to the notion of *understanding*.

Once technically rudimentary and confined to a marginal sub-culture, videogames are now ever more sophisticated and a multibillion-dollar industry. This, quite inevitably, has changed much regarding how we think and talk about this brand of digital artifacts. While it was still, not too long ago, frowned upon to consider videogames as something more than a mindless form of entertainment, they progressively became respectable objects of study within the academia. Philosophy is no exception to the rule, as a number of recent studies have tried to account for the peculiarity of the medium¹.

In this paper, I will argue that videogames raise interesting challenges from the standpoint of Nelson Goodman's aesthetics. The latter, of course, never wrote a single line on the topic. When *Languages of Art* was published (1968), videogames were still, to say the least, at the early stage of their development. It is only decades later, after a complex history made of technological innovations,

¹ See especially Lopes (2001; 2010), Robson & Meskin (2010, 2012a, 2012b, 2016), and Tavinor (2005, 2008, 2009, 2011). Several games designers have also devised interesting studies on the topic : Bogost (2007, 2011, 2016); Juul (2005, 2010, 2013); Koster (2004).

design experimentations, commercial successes and failures², that they started to become the mature and popular cultural phenomenon we know today. This said, I presume that, had videogames been what they are nowadays when Goodman wrote *Languages of Art*, the book would probably have dedicated some length to the topic³.

Leaving counterfactual speculation aside, I will try to show that it is fruitful to study videogames in the light of Goodman's pioneer work in aesthetics. Note that I will not address the problem of deciding whether videogames are, or can be, artworks. This question has actually been widely answered by the affirmative in the recent philosophical literature (Smuts 2005, Tavinor 2009). Dwelling on this issue would suppose, however, to address the problem of the definition of art, that I am happy to leave aside in this paper.

My inquiry will start by some general considerations on the definition of videogames and their relation to more traditional game forms. I will then consider a number of peculiar ontological issues raised by this digital medium, and advocate a rather novel position regarding the identity conditions of videogames. Finally, the latter will be shown to be particularly interesting objects of study for aesthetic cognitivists. Goodman and Elgin's notion of "understanding", as I will argue, allows to understand more carefully the epistemic functioning and relevance of these digital artifacts.

1. What are videogames ?

1.1- Electronic games among other games.

Videogames, clearly enough, are but mere instances of the more inclusive category of games, which includes a great variety of sports, tabletop games, parlour games and role-playing games. It seems rather obvious, for instance, that the classic arcade game *Pong* (Atari, 1972) and the actual game of tennis table have

² Kent (2001) or Wolf (ed., 2007) are helpful resources on the history videogames.

³ It is perhaps worth reminding the reader that Nelson Goodman authored several multimedia artworks. Given this personal interest, and his works' close focus on the relationships between different types of artforms, it does not seem implausible to guess that Goodman would have been interested in the topic.

much in common –indeed, the first has often been conceived as a kind of abstract simulation of the second. In the same vein, a number of games, such as chess or poker, are “transmedial” (Tavinor, 2009, 30), in the sense that they possess digital counterparts, which seemingly differ from their original versions merely by the medium in which they are played and displayed. Therefore, given this proximity between traditional games and videogames, an intuitive starting point to understand the latter might be to ask what is a game *simpliciter*.

Answering this question, however, is no easy task. While all of us are able to recognize a game at first glance, we would be at pains to say what all games *must* share, that is, to provide a list of necessary and sufficient conditions governing the concept of a game. It could therefore seem vain, as Wittgenstein (1953, §66-67) famously claimed, to look for something other than “family resemblances” between individual games. Despite this somewhat skeptical conclusion, several generic definitions of games have been proposed by historians, game designers, philosophers, and anthropologists over the years⁴. For reasons of time, I will simply consider one recent proposal. According to game theorist Jesper Juul, a game is :

“(1) a rule-based formal system with (2) a variable and quantifiable outcome, where (3) different outcomes are assigned different values, (4) the player exerts effort in order to influence the outcome, (5) the player feels attached to the outcome, and (6) the consequences of the activity are optional and negotiable” (2003, 35, numbers added)

Juul’s definition, which he terms the “classic game model”, seems to successfully accommodate videogames among the broader class of games. In order to see that this is so, let us take the classic arcade game *Pacman* (Namco, 1980). In *Pacman*, you control a sort of yellow blob in a maze-like structure, the point of the game being to eat all of the “Pac-dots” paving the maze, while escaping four colored ghosts chasing after you.

Pacman is indubitably (1) a rule-based system. It is built in the game code that your avatar moves at such and such speed, that each ghost chasing after it possesses a different behavior, or that the eating of a “power pellet” will allow

⁴ See, for instance, Avedon & Sutton-Smith (1981), Caillois (1962), Crawford (1981), Henriot (1969), Huizinga (1938), Parlett (1999), and Suits (1978). A number of these classical views on the definition of games are discussed in Juul (2005) and Salen & Zimmerman (2003).

Pacman to become invulnerable. This game also possesses (2) a variable and quantifiable outcome, as the player can either succeed or fail each successive level, but also, perform better or worse depending on the score she will achieve. Obviously enough, (3) it is preferable to complete the level rather than not, just like a high score is preferable to a low one –reaching 10000 points even rewards the player an additional “life”. Some outcomes are thus intrinsically more valuable than others. Now, because failure and underperformance are possible, (4) the player will struggle to influence the outcome of her playing. To that extent, she will (5) feel rewarded by success and frustrated by failure. Finally (6), the typical playing of *Pacman* will have negligible consequences. Unless the game is played for money or under the threat of a gun, winning or losing will cause no harm and will be devoid of any serious impact on the player’s existence.

Pacman, then, answers all the demands stated in Juul’s model, which would, presumably, perform as well with other examples.

1.2- *Video games vs. traditional games.*

The problem is that none what precedes explains what is *specific* to videogames. Moreover, and as Juul himself reckoned (2005, 43-55), the latter can be shown to disrupt the classic game model in several ways.

First of all, consider the first requirement of Juul’s model, according to which games are “rule-based formal systems”. While there is no contest that all videogames meet this demand, they nonetheless diverge from traditional games in the way they *implement* the rules. In a videogame, it is a computer or a game console that manages the rules, rather than human brains (think of chess) or human brains *plus* the laws of nature (think of tennis). And this make videogames depart from traditional gaming in several ways. Firstly, it allows them to have more complex rules, some which couldn’t be remembered or implemented by human players. Secondly, the digital medium makes it possible for electronic games to simulate their own physics, and thus, to create rules which deviate from the actual laws of nature. Thirdly, the fact that the computer enforces the rules frees the players’ attention and lets them focus on other dimensions of the game, in particular their narrative or aesthetic features. This configuration allows some videogames to leave the player ignorant of the rules or objective(s) of the game

(Tavinor, 2009, 29), something that would be awkward, if not impossible, in more traditional games forms. The digital medium in which videogames function, then, can imply significant departure from traditional gaming⁵.

Another important difference between videogames and traditional games bears on Juul's notion of "quantifiable outcome", which is supposed to cover the fact that it must be clear whether and when a game is won, lost, or drawn. But some videogames revoke this sort of demand. This is generally quite clear in the genre of MMORPGs ("Massive Multiplayer Online Role-Playing Games"). In MMORPGs, such as the infamous *World of Warcraft* (Blizzard Entertainment, 2004), the players never reach a final outcome. The player's avatar can never truly die or disappear entirely, as it can always be resurrected at a cost. Moreover, the multiplayer dimension of this type of videogames make it that they possess no proper ending. The game's universe, indeed, persists even when one logs out of the game, so that other players will, at all times, continue changing the face of the game-world events. In MMORPGs, players can therefore stay indefinitely in the game, constantly pursuing new objectives, getting involved in player-to-player wars or social interactions. Surely, there are quests to complete, items you might want to obtain, and achievements a given player or community may favor over others. Yet, there is no high score, no "game over", no final boss to defeat. To that extent, it is clear that some videogames –in MMORPGs and other genres– disrupt the notion of quantifiable outcome.

Lastly, let us consider Juul's third requirement, according to which, in games, "different outcomes are assigned different values". In chess, for instance, winning is better than losing, a draw is better than a loss, and certain moves are contextually more efficient, elegant, or subtle, than others. But a number of videogames, here again, cancel out this demand. Consider *The Sims* (Maxis/Electronic Arts, 2000), which was advertised as a "People Simulator". In this game, the player designs an avatar (or "Sim") and shapes its personality entirely, before designing its house, deciding of its career, hobbies, and so on. As many have noticed, this game is interesting in that it lacks any well-defined goal. You can

⁵ This is why it seems wrong to claim, as Robson & Meskin do, that "the fact that videogames are run on a computer doesn't seem to tell us anything significant about them" (2016, 166).

decide to play a very successful Sim career-wise or a total slob. It is up to you to determine whether your avatar is social and friendly or lonesome and grumpy. You may even unscrupulously try and make your Sim unhappy, or worse, decide to kill it in a number of cruel ways. What matters here is that the game does not prescribe any course of action, does not describe some outcomes as better than others. As Juul would put it, *The Sims*, like many other games, lets the player assign different values to different outcomes.

The previous considerations should be enough to hint that videogames – perhaps certain more than others– depart from traditional gaming in several respects. Then, and even if electronic games certainly share some features with their more traditional counterparts, we cannot stick to the classic game model if we want to understand what is peculiar to them.

1.3- Defining videogames.

A specific definition of videogames, that is, one taking into account the peculiarity of the medium, is needed. The most promising attempt made towards this goal in aesthetics, to my knowledge, is that of Grant Tavinor (2008, 2009). According to him, something is a videogame if:

(1) it is an artifact in a visual digital medium, (2) [it] is intended as an object of entertainment, and (3) [it] is intended to provide such entertainment through the employment of one or both of the following modes of engagement: (3a) rule and objective gameplay or (3b) interactive fiction (2009, 26, numbers added)

The first condition stated in this definition is a reminder that videogames have the peculiar feature of being displayed on screens or monitors –this is, after all, whence they take their names. Video games are a brand of digital media, in the sense that they are computer-based simulations of visual elements (*graphics*), dynamical moving within a fictional space-time. The second condition in Tavinor's definition is required in order distinguish games from other sorts of digital media. Driving simulators in driving schools, websites such as Wikipedia or Google, or computer software such as PowerPoint, are certainly digital media. Yet, they do not qualify as videogames, since their point is not primarily to entertain the user.

Tavinor takes the two previous requirements to be necessary conditions. Still, they are not sufficient. Indeed, it is simply not true that all digital media intended as objects of entertainment are videogames. Some YouTube videos, virtual-reality attractions in amusement parks, or computer-animated movies, could meet the conditions (1) and (2) without being videogames by the same token. This is why Tavinor adds a further (disjunctive) criterion.

The first disjunct rightly stresses the fact that without rules, there is simply no game at all⁶. It is only after an objective has been stated, alongside with the specification of legal and illegal moves –that is, of factors which will guide, complicate, or constrain the player’s efforts– that we are in presence of a *bona fide* game. Tavinor’s notion of “objective gameplay” can then be understood as the pursuit of goal-oriented actions which emerge from the rules of the game. Now, although Tavinor sees (3a) as a sufficient condition for something to be a videogame given the prior presence of (1) and (2), it is certainly not a necessary one, since some videogames fail to feature rule and objective gameplay as just defined. Many of them lack clear-cut objectives and explicit prescriptions about legal moves, as we hinted above⁷.

This is why the condition (3b) can, additionally, be required. Most videogames are fictions⁸, in the sense that they narrate stories about fictional characters, places, or events. Videogames, *qua* fictions, prompt us into what Walton (1990) called games of “make-believe” or pretense. But fiction, of course, covers a very broad range of cultural artifacts. This is why Tavinor wants to add videogames are a *specific* brand of fiction, what he calls “interactive fictions”. The concept of “interactivity”, of course, is central here, and it has often been considered as the

⁶ This is, incidentally, what grounds the difference between *play* and *games*. All play need not be the playing of a game. My activity of mindlessly bouncing a ball on the wall, for instance, would not normally be described as the playing of a game, for objectives and rules have not been explicitly stated. Once they are, though, the game of the Ball Bouncing against the Wall is born, a sign of this being that becomes possible for others -or myself- to engage and re-engage into individual playings of that game.

⁷ A number of so-called “indie games” have been challenging this idea of “objective gameplay”. *Dear Esther* (The Chinese Room, 2012), for instance, has been criticized as being less a videogame than a “walking simulator”. This title, indeed, requires minimal activity from the player, who simply walks around, seemingly without purpose or constraint, while listening to a mysterious voice narrating a story.

⁸ Let us remark, however, this condition is neither necessary nor sufficient, as some videogames involve little to no fictional content. See Meskin & Robson (2016, 166) and Tavinor (2009, 24) for discussion.

most defining feature of videogames. But what does this idea of “interactive fiction” amount to ?

1.4- Interactivity

As Dominic McIver Lopes remarked, interactive media have generally been defined “as those that allow users to control the sequence in which they access content” (2001, 67). Thus understood, it is clear that many things are interactive, aside from videogames. The table of content in a Wikipedia entry, hyperlinks on a webpage, the “chapter” interface on a DVD, or the shuffle button on an *iPod*, among other things, allow the users to control in which order a certain content is accessed. This, Lopes calls *weak interactivity*, before arguing that games (electronic or not) are interactive in a more robust sense :

Games are "strongly interactive" because their users' inputs help determine the subsequent state of play. Whereas in weakly interactive media the user's input determines which structure is accessed or the sequence in which it is accessed, in strongly interactive media we may say that the structure itself is shaped in part by the interactor's choices. (Lopes, 2001, 68)

Making a certain move in a game of chess, or pressing a button on the controller while playing *Super Mario Bros* (Nintendo, 1985), does not amount to deciding to access of a predetermined content in some given order instead of another. Rather, the player’s move shapes the course of the game. It individuates a particular playing of the game being played by actualizing a certain structure rather than another⁹. True, one may wonder counterfactually what another move would have produced, but it is, in that case, a different playing of the game that is being considered, and not “an unplayed part of the game that was played” (Lopes, 2001, 70). If (video)games are interactive, then, it is in the sense that their display changes dynamically in response to the players’ actions. The game’s structure, which consists both in audio-visual presentations and narrative events in the case of a videogame, does not preexist the player’s input.

This, I believe, meets common parlance regarding interactivity. Two items are

⁹ “Structure”, in the present context, is meant to refer to “whatever intrinsic or representational properties [a work] has, the apprehension of which are necessary for aesthetic engagement with it –sound sequences in the case of music and narrative content in the case of stories” (Lopes, 2001, 68).

said to interact when the action or behavior of one will impact that of the other and vice versa. Interactivity, then, can be understood as an iterative process of reciprocal action, mutual effect, and entwined influence¹⁰. In the case of a videogame, the two relata in this “feedback loop” are the player, on the one hand, and the computer or console system which implement the rules, on the other.

Given these clarifications, we can have a better grasp of Tavinor’s notion of “interactive fiction”, featuring in condition (3b). In traditional forms of fictions, such as typical novels, plays, or movies, the fictional content is entirely determined by the authors, directors, actors, and so on. The audience gets acquainted with this content after it has been written, staged, or shot. The fiction is therefore a *result*, set once and for all, that the audience can only register or spectate. But in videogames (which, admittedly, are not the only existing forms of interactive fictions¹¹), the fiction is partly in control of the player, in virtue of the strongly interactive nature of the medium.

The videogame player is not simply offered a result, but joins the process of fiction-making, within certain limits. A particular playing of *Warcraft III* (Blizzard Entertainment, 2002), can make it the case –make it fictionally true–, say, that the orcs defeated the night elves. But this result is contingent on the players’ particular actions, as the contrary outcome was equally possible. Videogames, then, are interactive fictions in the sense that the players are able to have a say about what is (or becomes) true in the fiction. As Tavinor puts it, videogame players contribute, at least partially, “to the content of the fictional world” (2005, 33). Videogaming, could have said Goodman, is yet another example of worldmaking.

We have now said enough to understand that videogames share some features with traditional games, while differing from them on other levels. I will retain, for the rest of this paper, Tavinor’s proposal, according to which videogames are digital artifacts designed for entertainment, which allow for objective gameplay or interaction in a fictional setting.

¹⁰ See Lopes (2010), Preston (2014), Tavinor (2009), Saltz (1997) and Smuts (2009), for a more thorough discussion on the notion of interactivity.

¹¹ Meskin & Robson (2016) discuss examples of interactive fictions outside of videogames, from interactive plays, to role-playing games and “chose your own adventure” books.

2- The ontology of videogames.

It is generally agreed that Goodman was one of the first to thoroughly address questions that would now be regarded as pertaining to the “ontology of art”. The latter consists in explaining “the matter, form, and mode in which art exists” (Davies, in Levinson, 2005, 155). As I will show, in the line of Lopes (2001) and Tavinor (2011), videogames invite to refine, and even revise, traditional accounts in the ontology of art. A goodmanian approach to the ontology of videogames, I contend, could prove an interesting addition to these current debates.

2.1- *Types and tokens.*

It is common, in the ontology of art, to differentiate between multiple and singular artworks, or even, artforms (Davies, in Levinson 2005). Novels, movies, plays, operas, or photographs, for instance, typically belong to the former category. They do come in –and allow for– a multiplicity of exemplars, copies, executions, and reproductions. Others artworks, such as paintings and buildings, do not normally come with –nor allow for– a multiplicity of instances¹².

The difference between singular and multiple artworks or artforms has frequently been explained in terms of the *type-token* distinction (Lopes 2001, Tavinor 2011). A type is here understood as an abstract or generic entity, while a token is a particular (or concrete) instance of the type¹³. Take examples of multiple artworks, such as Tolkien’s *Lord of the Rings*, Ridley Scott’s *Alien*, or Beethoven’s *Fifth Symphony*. The type-token distinction allows to consider these artworks as abstract entities or generic structures –types– which can be tokened by an indefinite number of particular reproductions, projections, or executions. A work type, while not being identical with any of its particular instances, is the normative

¹² The multiple-singular distinction is closely parallel, but altogether distinct, from Goodman’s differentiation between *allographic* and *autographic* artworks (Goodman 1969, 113). When the identity of an artwork depends on its authenticity, it is *autographic*, and it is *allographic* when it does not. In other words, there is, for autographic but not of allographic artworks, a significant distinction between original and forgery. This distinction does not exactly mirror the one presently discussed, for there are multiple artworks which are autographic (Goodman, 1969, 115).

¹³ Given his nominalistic commitments, Goodman was reluctant to use the type-token distinction. The latter, indeed, presupposes that types are abstract entities (Goodman 1969, 131). A similar distinction between an artwork *qua* generic structure and its particular instances, however, was made possible by Goodman’s investigation on the different types of “symbolic systems” to which multiple artworks pertain.

standard which rules what will count as a correct instance of the work. The foremost value of the type-token distinction, for that matter, is that it makes possible to understand how and at which conditions different items can be instances of one and the same work.

Videogames, obviously enough, belong to the category of multiple artworks, as they allow for an indefinite number of reproductions of the same work. Then, and just as we can differentiate between, say, a musical piece and its particular executions, we should be able to differentiate a videogame, understood as a work type, from its instances. The multiple artform of videogames, ontologically speaking, would therefore be readily understandable in terms of the traditional type-token distinction.

2.2- Games and playings

Things, however, are not so simple. The relation between a game, understood as a type, and particular instances of playing the game –what I have been calling, following Lopes, its *playings* –, can indeed be problematic.

Consider chess. The rules of this game are simple and easy to learn. Yet, the number of possible distinct playings of chess defies imagination (“Shannon number”, places it around 10^{120}). Now, and as Tavinor (2011) stressed, there is a telling case to show that videogames complicate even further the traditional distinction between work types and their particular instances or tokens. Consider the case of so-called “sandbox” or “open-world” videogames. What characterizes this genre is the very minimal limitations imposed onto the player. Sandbox games are non-linear, in the sense that they leave open different possibilities regarding what –and in which order– the player will be able to do.

This latitude in the gameplay of sandbox games, interestingly, correlates with a certain leeway within the fiction itself. This genre of videogames try to maximize an impression of freedom by letting the players’ choices and actions impact on the game’s narrative. In *Skyrim* (Bethesda Game Studios, 2011), for instance, you are to join either the Imperial Legion or Stormcloaks –the choosing of one faction automatically making you an enemy of one of the other. This simple example is

enough to understand that different playings of a typical sandbox can set in motion non-equivalent plot events. It becomes true in the fiction of *some* playings of *Skyrim* that your avatar joins the Imperials and becomes inimical to the Stormcloaks, or vice-versa¹⁴.

All of this should make clear that defining the identity of videogames over several instances is no simple task. In the case of sandbox games, but actually of most videogames, no two particular playings will be exactly alike. Player A will invariably do and chose something different than player B –going west instead of going north, buying health potions instead of weapons, upgrading this one skill over that other, etc. Some events occurring in the playings of Player A, therefore, won't be occurring in that of player B. Even the events occurring in both playings will likely take place in different orders.

This entails that there is generally no sameness of “representational structure”, to borrow Tavinor's expression (2011), between different playings of a sandbox game. While there will be, of course, an important number of similarities between two playings of *Skyrim*, it is statistically unlikely that they will depict exactly the same events, and thus, that they will consist exactly in the same fiction. The reason behind this, of course, is the strongly interactive nature of videogames. In a typical novel, play, film, or musical work, the structure of the work is what it is independently of how you access it¹⁵. But if you are playing *Skyrim*, the narrative and audio-visual structure of the game is, at least partly, determined by your actions. This game, then, seems less a story than a set of possible stories, which await the input of the player to be instantiated or actualized. But this creates a deep problem regarding the videogame's identity over its different playings. For

¹⁴ There are other design tools which allow to maximize the player's impression of freedom and to give an appearance of consistency to the game world. In *Skyrim* different non-equivalent dialogue lines are usually available when you talk to the Non-Playing Characters (NPC) managed by the computer. Some of these alternative dialogue choices matter for the narrative. Random events can also take place, that is, happen in some, but not all, playings. Finally, a number popular sandbox videogames (although not *Skyrim*) possess several different endings, whose realization depend on the player's choices throughout the game.

¹⁵ Surely, one can decide to read a book or listen to a CD in reverse (or any arbitrary) order. Yet, the content and structure of the work –how many chapters or songs there are, what properties they possess– does not change in function of this decision.

what does it mean to say that players play the same game if they are not doing the same things, or if they are not experiencing the same fiction?

A this point, we might be tempted to think that there is no single structure shared by all playings of a typical videogame. Individual playings of *Skyrim*, for instance, would not be different tokens of one and the same work type, but, rather, be themselves different work types. Videogames, under this view, would not be works but rather, “work generators” (Tavinor, 2011).

While tempting, this claim has unacceptable implications. Designers, players, and game critics, talk and act in way that presupposes that they are playing the same videogames, however different might be their individual playings. It would seem mad to pretend that each playing of *Super Mario Bros* or *Skyrim* is, by itself, a distinct and idiosyncratic game, rather than the instance of one and the same work type. Saying the contrary would ruin the purpose of game criticism and competition, for people would simply never talk about the same games, nor play twice the same game. For this reason, among others¹⁶, we should save our intuition that non equivalent playings can obviously be instances of a single videogame, or tokens of a single type. But how are we to prove that point ?

2.3- *The identity conditions of videogames.*

That games must possess identity conditions is clear once we recall that the concept of “game” –electronic or not– is *sortal*, in the sense that it allows to individuate or count things pertaining to that kind. It is built in the concept of a game that it is possible to determine when two persons play the same game (even if they do not play together or at the same time) and when they don't. *Something*, then, must ground our talk of items being instances “of the same game” or as being “different games”.

It might be useful, here, to look at precedents of this issue in the ontology of art, regarding other brands of multiple artforms. If one asks what makes novels and written narratives instances of a same work type, a possible answer is what

¹⁶ Tavinor rightly stresses that “the realization that [a videogame] is a single work with many displays seems crucial to its appreciation because part of what one appreciates about the game is the range of instances it generates. Certainly one can play through many games in a shallow manner intending merely to get to the end and unconcerned with the scope of possible variation, but increasingly games encourage multiple interpretive playing” (2011).

Goodman called “sameness of spelling” (1969, 115). My exemplar of *Lord of the Rings* and yours, for instance, would be instances of the same work, as long as they possess exactly the same characters (letters, spaces, punctuation marks) in exactly the same order –other aspects, such as the font used in your own copy, failing to qualify as the work’s constitutive properties. In the case of musical works, or at least in traditional notated music, what grounds the identity over multiple instances could be thought to be “compliance to the same score” (Goodman 1969, 117). I am not interested, here, in the adequacy of these proposals, as I simply want to point out that it is a criterion of the like that an ontology of videogames should be looking after.

So what is it, exactly, that grounds the identity of videogames over multiple instances ? Dominic Lopes (2001) has proposed that it is *rules* which should play this part :

The rules of a game lay down what counts as a correct playing of the game. Thus two playings are correct instances of the same game only if they conform to the same rules. It is not state-sequences that must be identical across of playings of a game but rather the rules to which the state-sequences of the playings conform” (2001, 75-76).

A game (electronic or not), understood as a type, could be identified with a set of rules, or, as hinted elsewhere in Lopes’ work, an “algorithm” (2010, 106). Particular playings, then, would count as tokens of a same work type, as long as they are produced by interactions with the same rules. One advantage of this view is that provides a unified ontology of games. Rules (or algorithms) are functional, and therefore medium-independent, items. Playings of chess and computer chess, for instance, could be seized at once as instances of a same work typ. As they share the same rules (or algorithm), the medium in which the rules are implemented becomes irrelevant. Lopes’ proposal, more importantly, explains how individual playings, however qualitatively different, still count as instances of the same game. Under this view, it does not matter what the players will chose to do, in which order, nor what other peculiarities their playings might have. As long as their playings follow just the same rules, they are playing the same game¹⁷.

¹⁷ For space purposes, I simplify Lopes’ account, by omitting his amendment according to which games also have a “genetic component”(2001, 76). This precision is required to cover (1) the

Despite its theoretical virtues, the main worry with Lopes' proposal is that it takes the risk of making the audio-visual, aesthetic or narrative aspects of videogames irrelevant, on the ontological level. Indeed, if videogames *qua* types consist in certain sets of rules, it could be argued that the plot, the graphics, the animations, and all other "front-end" aspects of videogames, do not matter to their identity at all. But fictional elements, the objection runs, are *bona fide* constituents of the game's identity.

A simple example can make that clear. Take again *Pacman*. Now, let us say that you keep the rules and mechanics of this game unchanged, but modify its visuals, so that Pacman now looks like a famous politician. Say, additionally, that the things which your avatar eats, in this imagined videogame, are not "Pacdots" but rather dollar bills, while the things chasing after it are not ghosts but Financial Fraud Enforcement agents. Now, surely this game would drastically differ from the original *Pacman*, notably in its aesthetic properties or intended meaning. It would, for instance, be a sort of political satire, something that the original game (presumably) fails to be. Yet, Lopes could not account for this fact. The rules, therefore, do not seem enough to identify a (video)game, or to ground our talk of different things being the same game or different games.

Following a similar line of objection, Tavinor (2011) argued that, while rules are indeed necessary to a videogame's identity, they are not sufficient. What would be required is the further idea that the game's algorithm is "interpreted in terms of a set of representational aspects, such as art, character, level, and environment design, because changes in these qualities impact on identity in videogames" (2011). We would therefore have to say that a videogame's identity depends on its rules *plus* certain aesthetic, narrative, or other representational features. This new proposal has the virtue of explaining why *Pacman* and its imagined counterpart described above, while possessing the same rules, differ considerably in other respects, to the point of being distinct videogames.

Tavinor's "representational assets" are intended to cover of large class of discrete components. They should include, he contends, things as diverse as

possibility that individuals could be following the same rules while not playing the same game ; and (2) the fact that the rules of a game can change without making it so that the playings under the new rules become playings of a new game. None of what follows hinges on these complexifications.

“polygonal 3D models, animations, virtual cameras, physics, environmental sounds and music, dialogue, 2D elements, and graphical artifacts like shaders”. But it could be objected that representational assets, thus defined, end up covering all there is to a videogame both on the audio-visual and narrative levels. The consequence, I suspect, is the trivialization of the proposed ontological criterion, as one ends up saying that a game consists in its rules plus *everything* that make up its display or gameplay. Moreover, the trouble with Tavinor’s proposal is that it implies to ground, if partly, the identity of a videogame on its fictional or narrative content. But I fail to see how Tavinor answers the aforementioned difficulty, according to which individual playings can depict non-equivalent narratives, while still being instances the same videogame. If “representational assets” ground, even partly, a videogame’s identity over various instances, what are we to say about playings whose representational assets do not perfectly overlap ?

2.4- Videogames and code.

Lopes and Tavinor’s views are certainly interesting, although they are not, as I hinted, without complication. Now, it seems to me that there is another available move to tackle the problem under discussion, which hasn’t been really taken seriously in the debates so far.

The essence of this proposal starts from the remark that, if we look at videogames at the lowest possible level, all there is to them –their graphics, narratives, sound effects, animations, rules, and so on– is ultimately made of one and the same thing : code. While the latter, of course, can take various forms, it is factually true that videogames (along with other brands of digital artifacts, such as computer software or internet websites) are constituted of code lines. Videogames are created by a process of digital *encoding* on various supports, such as disks, CD-ROMS, or hard drives. This is what grounds their industrial distribution : the original encoding plays the part of the normative standard out of which subsequent copies will be produced.

For this reason, I believe that the ontological criterion we are looking after could

be sameness of code¹⁸. Under this proposal, the work type corresponding to a videogame would consist in the set of ordered code lines present in the original encoding. Any replica of this set run on the proper piece of hardware will count as a correct instance of the game. What would allow to identify different artifacts as instances of the same videogame, or individual playings as playings of the same videogame, then, would simply be the fact that they share or are produced by the same code.

This proposal, however, faces several problems.

First of all, we could object that that is empirically false that, to every videogame understood as a work type, corresponds one unchanging set of code lines. As Tavinor rightly stressed (2011), one and the same videogame can be run on different platforms (PC, various sorts game consoles or smartphones, etc.). The problem is that this change of hardware will generally imply one of code, without entailing that these varying software architectures are themselves different work types¹⁹. One benefit of Lopes and Tavinor's views, of course, is that they are able to dodge this problem altogether. Indeed, since algorithms or rules receive a functional definition, they are indifferent to the medium in which they are implemented –and therefore allow for multiple realizability.

A second sort of objection could be made by considering the trend of “patching” in the videogame industry. A patch is an update of the game's code, intended to fix bugs, optimize the gameplay, or introduce new rules and content. But now, what I said previously entails that every patched videogame would simply be a different work than its prior version(s), as the code changes with each of these updates. And this seems like a strange claim. A online multiplayer game like *Heroes of The Storm* (Blizzard Entertainment, 2015), for instance, has been patched about eighty times

¹⁸ This should not be understood as meaning that videogames are to be identified with the physical artifacts containing the encodings –such as arcade machines, disks or CD-ROMS–, for most videogames are now dematerialized and be downloaded directly from the internet. It should also be noted that none of what follows implies that the players should actually get acquainted with the game's code –something which is, indeed, the exception rather than the rule.

¹⁹ A variant of the objection could take the form of a thought experiment. Imagine two videogames which would be qualitatively impossible to tell apart, but with only one single difference in their code. We would, naturally, want to consider these two items as instances of the same videogame. But my considered proposal would forbid that. Indeed, if, since video games must warrant sameness of code to preserve the works' identity, what we would have here would, simply, be two different games –a result which sounds highly counterintuitive.

since its official release. Identifying videogames to their code would therefore lead to the implausible claim that *Heroes of the Storm* players would have, unbeknownst to them, played that many different games over this period²⁰.

A last major objection stems from the fact that most –if not all– videogames are such that some parts of their code aren't actually relevant to the gameplay itself. Certain portions of code can be dedicated, for instance, to the management of the graphic card, CPU, and so on. Others (“Easter Eggs”) may correspond to hidden levels, characters, or various game elements, which require the use of cheat codes or special maneuvers from the player to be accessed within a particular playing. There is, finally, the case of “dead code”, which is data that is never actually used within an actual running or playing of the game. Pretending that a videogame's identity is integrally determined by (or grounded in) its code, then, would mean that all of the unused or irrelevant content within the code is an essential constituent of a videogame's identity. But this sounds unacceptable, for it is as if unpublished chapters in some author's drawers were defining the identity of the book they were at first supposed to feature into.

These objections, however, are perhaps not as strong as they seem. Here are some possible rejoinders :

Firstly, regarding the “porting” or running of games on different platforms, I am not so sure that the difference of software implied by the variation in hardware can be seen as entirely irrelevant to the identity of a videogame. Titles advertised as the same videogames but running on different platforms may exemplify perceptible differences in their visual display, gameplay, and a large number of other dimensions²¹. This becomes obvious when one compares a videogame running on computer with its counterpart on a smartphone, or again, when one measures how certain platform-specific constraints (such as the type of game controllers they use) actually impact the gameplay. This phenomenon of cross-

²⁰ A similar objection could be have been made by other means. We could have considered, for instance, how some classic arcade games were modified by “enhancement kits”, which are essentially pieces of hardware which change the game's graphics or mechanics. The case of “DLC” – additional downloadable content– also closely rejoins the problem just discussed.

²¹ For an example of the type and range of differences that the “porting” of videogames on different platforms can introduce, see : <http://gta.wikia.com/wiki/Console_and_PC_Differences>

platform variation was actually acknowledged by Tavinor (2011), although he did not dwell on its possible ontological implications. But then, granted the fact that games running on different platforms are never exactly alike, one does not see anymore what precludes to speak of *The Witcher 3 for Playstation 4* and *The Witcher 3 for PC*, for instance, as being different work types, although obviously very similar in many respects.

Secondly, I see no principled reason to refuse the idea that patches may introduce such drastic changes that the patched or updated version of a videogame could count as a new work type. Admittedly, players rarely follow this line of reasoning, and it is true that a videogame does not normally change its name after being patched²². Yet, the introduction of new characters and game mechanics, the fixing of certain bugs, or the “nerfing” of some unbalanced interactions, may actually change a videogame beyond recognition²³. Although the difference from one patch to the other may be difficult to perceive, it generally becomes striking once we compare a videogame during its early version (generally termed “alpha”) and after a consequent series of patches. I believe that it is only in a lax use of the word “same” that current players of *Heroes of The Storm*, for instance, can be said to be playing the same game as the alpha-players from several years ago. Of course, I do not wish to claim that *all* patches should automatically be counted as the producing of new work types. But if I am right to hold that *some* can, it provides support to my proposed identification of videogames to their code.

Finally, an answer to the last objection would be to identify videogames to the specific portions of code which are relevant to the actual playing of the game. But I confess that this rejoinder seems rather fragile. We would perhaps be better off biting the bullet and reckon that every part of a game’s code is essential to its identity as a work type. This isn’t as mad as it seems. After all, without the segments of its code dedicated to management of the CPU, the graphic card, and so on, a videogame would not exactly be what it is. Moreover, the case of “Easter Eggs”

²² *Heroes of the Storm*, however, received such a drastic patch in April 2017, that it was named, thereafter, *Heroes of the Storm 2.0*.

²³ Tavinor (2011) discusses a similar problem from the example of *mods*, which are player-induced modifications of the code of a videogame.

fails to work as a genuine counterexample. Imagine a videogame which would feature a hidden level, the latter corresponding to a specific portion of code. If a player doesn't discover the hidden level, should we say that she didn't play the same game as the ones who did? This seems far-fetched. What matters, indeed, is not what the player actually accesses or not in her playing, but rather, what the code virtually allows (or would allow) her to access. Lastly, regarding the question of dead code, hidden remnants of the development's phase within the code often become regarded as important if not defining features of the considered work, even granted that they are not normally visible in the playings nor known to the players²⁴.

All this said, I should stress that my proposal is goodmanian in spirit. Sameness of code for videogames, indeed, mirrors Goodman's "sameness of spelling" and "compliance to the same score", in the respective case of literary and traditional musical works²⁵. Interestingly, the appeal to these criteria gave rise to similar objections as the ones I have been discussing above. Goodman, indeed, was led to claim that the performance of a musical work with a missing or wrong note, or the copy of a novel with a typographical error, should not count as an instance of the same work as the flawless execution or reproduction. While most critics objected to this²⁶, Goodman answered that what we are interested in the ontology of art isn't ordinary language and its lax use, but technical discourse relative the identity conditions of artworks (Goodman, 1968, 186-7). The same move could be available to us here.

Goodman, additionally, argued that allowing the preservation of a work's identity in spite of one-note or one-character errors (for musical and literary

²⁴ For instance, given the appropriate software, you may find out and even play an unfinished level in *Golden Eye 007* (Rare, 1997). I see no principled reason to claim that the portion of the code corresponding this level, although it wasn't supposed to be accessed by players and was abandoned by designers mid-development, does not contribute to the videogame's identity.

²⁵ Additionally, I believe that code has the characteristics of what Goodman calls a "notational system". Indeed, the symbols out of which the code is made, be it numbers, words, or other things, are syntactically and semantically disjoint and articulate. Code, after all, needs to be treated or run by a computer. It cannot, for this reason, be ambiguous. Proving that code is entirely notational, however, would suppose to go into a lot of technical detail about the nature of encoding and Goodman's theory of notation -something that is beyond the scope of this paper.

²⁶ See Davies (in Levinson, 2005), Dutton (1983), Levinson (1980) and Pouivet (2010) for a critical discussion of Goodman's view on these matters.

works, respectively) would lead, in virtue of the transitivity of identity, to count as correct instances of a same work progressively differing structures, up to any arbitrary point (Goodman 1968, 187). If that is right, we could, in the same vein, build a sorite argument in order to show that allowing the preservation of a videogame's identity in spite of progressive alterations in the code would terminally imply to see any two videogames as correct instances of any work type.

Still, and as what precedes hints, I will not be so bold as to claim that the "videogame = code" equation is without problems²⁷. I think, however, that this proposal deserves further examination, principally because it possesses the advantage of packing up the strengths of both Lopes and Tavinor's views.

Recall the objection made to Lopes with the example of *Pacman*, the point being that one should not reduce videogames solely to their rules or "algorithm". This problem is tempered if we revert back to the identification videogames to their code. For rules, after all, are embedded within the code –they are *made* of code²⁸. The same goes for narrative, audio-visual, or aesthetic features of videogames, which Tavinor (rightly) wants to consider as constitutive properties. Indeed, the running of two replicas of the same code on a same piece of hardware, will get you exactly the same graphics, the same rules, the same narrative, and for that matter, the same videogame.

Seeing the identity conditions of videogames as determined by their code, finally, tackles the aforementioned issue of non-equivalent playings. All playings of a videogame, however qualitatively different, are indeed made possible by, and conform to, the same code. Consider *Skyrim* once more. Surely, the playing of player A can feature an event absent from the playing of player B. But it must be, in any case, written in the code that this or that event might happen or be realized in some playings. In other words, even if what is displayed in a given playing can be

²⁷ Although I will leave this topic for another paper, I think that my view need to be supplemented with what Lopes (2001) called "genetic components", in to order to account, notably, for the status of forgeries in videogames.

²⁸ It could be objected that we thereby lose one advantage of Lopes' view, namely that his theory could accommodate all games (electronic or not) under the single notion of algorithm. Lopes' proposal should perhaps be accepted in the case of traditional games. However, I follow Tavinor (2011) in thinking that the representational content of videogames matters greatly to their identity *qua* artifacts, to the point that an ontological schism between traditional games and videogames becomes legitimate.

dependant on the player's initiative, or even if it can be somewhat random, the code itself isn't.

The digital medium of videogames, as shown in this section, raises a number of peculiar ontological issues. Although promising steps have been made towards their resolution, I believe that further discussion is needed to devise a fully satisfying account of what provides the identity conditions of videogames. The relation between their code, rules, and audio-visual or fictional aspects, in particular, needs to be addressed in more detail. At any rate, I hopefully managed to convince the reader that videogames would have been a nice *addendum* to Goodman's pioneer work in the ontology of art.

3- The cognitive value of video games.

I will now consider a distinct, but equally fascinating, topic. It not unfair to say that videogames have been, for a long time, considered a mindless, to not say downright stupid, activity. This sort of discourse, however, has become less frequent as electronic games became increasingly sophisticated and studied in their own right. One result of recent studies is that the playing of videogames, or at least some of them, does have educational benefits or cognitive virtues. Yet, we are still lacking a unified philosophical model to account for this epistemic impact and relevance of videogames. As I will briefly try to show, Goodman's cognitivist stance towards aesthetics could prove an inspiration to that end.

3.1- Videogames and skills.

Playing a videogame is a formative experience in many ways. Most if not all of them feature challenges to overcome, puzzles to solve, patterns to recognize. For this reason, the majority of videogames have, and even are, a learning curve (Koster 2004, Juul 2013). As a player, you will try and try, and often fail, until you finally succeed and overcome the game's challenges²⁹.

²⁹ This, incidentally, is connected to what we could call the "fun curve" of a videogame. Once we don't learn anymore while playing, the game generally ceases to be rewarding and becomes boring. See Juul (2013) and Koster (2005) for discussion.

In order to complete or master a videogame, the players need to develop what I would call *in-game skills*. Their nature, complexity, and number will depend of the type of videogame under consideration³⁰. The in-game skills of fighting games, for instance, essentially consists in manual dexterity –getting to perform the right combo at the right time. Strategy games will rather require the successful management of resources or units, the development of long-term thinking, or the adapting to the opponent’s plans. In online multiplayer games, performance can even be comprehended in terms of role-playing and social interaction skills.

Although in-game skills vary greatly in function of the considered videogames, the process of their training and obtaining can be thought to always follow the same pattern. Borrowing a model devised by game designer Daniel Cook (2007), I propose that in-game skill acquisition can be schematically be understood as a feedback loop involving four successive steps. (1) What the videogame player sees, in the first place, are moving pictures on a screen. Confronted to this, she will always try to *do* something via the hardware or input device, be it by pressing keys, mouse clicking, pressing a button on the game controller, and so on. This, one may call the player’s *input*. (2) Then, comes *simulation* : the computer or game console, following the rules embedded in the code, answers to the player’s input and enters into a new computational state. (3) From this results the *feedback* (or *output*) : something new is displayed on screen in response to the player’s input. (4) Lastly, the feedback either validates or negates the player’s intent and expectation, who can thereafter analyze the outcome of her action, increasing her understanding of the game’s rules and purpose. This final step is what Cook calls the “update of the mental model”. I believe that it is here that the player, either directly or with enough repetition, comes to acquire a new skill or ability.

Cook’s model, which is simply an illustration of why videogames are “feedback loops”, offer a nice overview of how skill-learning takes place within videogames. This four-step process, of course, can be repeated just as many times as necessary, until the prescribed skill is acquired. In theory, it must also be iterated as many times as there are in-game skills in the game.

³⁰ In-games skills mastery may even reach professional level, at the growing phenomenon of “Electronic-Sports” indicate.

There is, however, a bit more to say regarding skill acquisition in videogames. The mastery of in-game skills is generally heavily dependant on the use of more fundamental cognitive skills, such as memory, selective attention, imagination, anticipation, problem-solving, information treatment, and motor ones, such as hand-eye coordination or reflexes. I will call these various abilities *background skills*. What matters here is that empirical studies have found that videogames can appeal to, and more importantly improve, these various aptitudes (see Eichenbaum, Bavelier, & Green, 2014 for summary). And background skills, of course, are useful beyond the narrow context of videogames³¹. This is why it is no small virtue that the playing of videogames is able, even if at variable degrees, to impact them positively

Of course, and just like before, to know which background skills are appealed to by videogames will depend of the cases considered. Puzzle, strategy, and role-playing videogames tend to demand higher-order or abstract thinking, planning and anticipation, weighting of short term versus long term benefits, and problem-solving. On the contrary, sports games, car-racing games, or first person shooters, will rather demand dexterity and reflex, coordination skills, and selective attention. Different videogames, then, require and improve different sorts of background skills. And this training is generally multimodal, as the focus is rarely put on one unique ability.

In brief, it seems difficult to object to the idea that the playing of videogames requires the acquisition, training, or mastery of various skills, which rely in turn on more fundamental abilities. This makes this brand of digital artifacts powerful learning tools, which is why, incidentally, they have increasingly been used for educational purposes. And this result, of course, should be of interest for cognitivists programs in aesthetics. Still, and as I will show now, videogames can be cognitively remarkable on yet other levels.

3.2- *Fiction, knowledge, understanding.*

³¹ This, incidentally, allows to understand why animals or small children play. By engaging in seemingly gratuitous activities, they progressively acquire the mastery of skills, gestures, or behaviors, that they will have to reproduce later on in their existence in order to satisfy a number of (vital or culturally favored) goals.

Another point of interest regards the epistemic value of videogames *qua* fictions. Although I will not engage in the technical details of these debates, it seems clear enough that most of what has been said regarding the epistemic value of traditional fictions³² equally applies to videogames. This said, and following a distinction coined by Goodman and Elgin (1988), I will argue that, although videogames generally do not yield anything close to *knowledge* as traditionally conceived, they may increase our *understanding* in several ways.

A number of videogames are susceptible to help players acquire true beliefs, by accurately featuring or depicting non-fictional elements in their gameplay and narratives. The strategy game *Crusaders Kings 2* (Paradox Interactive, 2012), for instance, can teach you a good deal about actual historical events in the Middle Ages. But it needs to be said that this sort of truth-from-fiction, in the medium, is the exception rather than the rule. Educational games and a few individual cases aside, the players are generally not provided with accurate or detailed factual information about the actual world. In the majority of cases, this is simply foreign to the designers' goals and to what the players are looking after. Fiction and fun, although not incompatible with, are generally antagonized to, facts and seriousness in videogames. Now, and even granting that the latter may, at times, help their players acquire true beliefs, the problem is that they do not offer nor bother with anything close to their *justification*. For this reason, videogames seem doomed to remain alien to *knowledge*, as traditionally conceived in philosophy, that is, "justified true belief".

This, however, does not make them cognitively irrelevant. It can indeed be argued, as Goodman and Elgin (1988) did, that knowledge isn't all there is to cognition. It seems clear enough, indeed, that many things can be epistemically relevant or efficient without meeting the demands of the traditional philosophical notion of knowledge. Jokes, mimics, diagrams, thought experiments, questions, models, and artworks, are as many examples of things that cannot be considered true or false and that are unlikely to produce anything akin to a "justified belief". Yet, they can be meaningful, engaging, daring, and more broadly, beneficial on the epistemic level.

³² For a good overview of the current debates on this question, see Mikkonen (2013).

For this reason, Goodman and Elgin held that the traditional concept of knowledge is actually too narrow of a notion, in being confined to the propositional and the assertive. Epistemology, according to them, should better open up to a broader class of epistemic achievements, which they propose to seize under the generic notion of “understanding”. Understanding, unlike knowledge, (1) is not essentially or necessarily linked to truth ; (2) can accommodate non-verbal symbols as much as verbal ones ; (3) admits different degrees, phases, and sorts, and lastly (4), is able to explain why and in what sense artworks may and do have cognitive relevance. It is especially this last point which interests me here, as I believe that video games, *qua* fictions, may advance our understanding in various ways.

A few examples should make this clear enough. Videogame, firstly, may help refine existing categories of thought. Playing *Bioshock* (2k Boston-2k Australia, 2007), for instance, can increase your understanding of what are dystopias, by taking place in one and exemplifying some of their most important features. A videogame can also make the familiar become unfamiliar. The puzzle exploration game *Antichamber* (Demruth 2013), for example, forces you to solve puzzles in a strange non-Euclidean space, highlighting, in return, how ordinary spatial reasoning functions. Finally, and just like other fictions, videogames excel in the exploration of various subjective viewpoints. *Spec Ops: The Line* (2k Games, 2012), to give but one example, is likely to make you understand something about dissociative and post-traumatic stress disorders in war veterans, by letting you play a character suffering from this trouble, a fact progressively revealed during the course of the game.

Space does not allow me to dwell much more on these matters. The essential point is that many examples could be found in order to show that the playing of videogames can make us see or grasp patterns, properties, or structures, that we couldn't detect before, or at least, that we didn't conceive in the same manner. Although they rarely form, fix, or justify belief, and granted that they rarely pretend to bother with accuracy and truth, videogames are therefore susceptible to occasionate various epistemic achievements. As such, they fit well within cognitivists approaches to aesthetics, such as Goodman's and Elgin's. This said and

to finish with, I want to show that the “advancement of the understanding”, as Goodman and Elgin called it, takes up a rather specific form in videogames.

3.3- Video games and pragmatic understanding.

Videogames make possible what I would like to call a *pragmatic* brand of understanding. As a player, you learn by doing, acting, and practicing. This is, I believe, one of the most defining traits of the medium.

True, reading a novel, watching a movie, or listening to a symphony involves the use and mastery of various cognitive abilities. The idea of a purely passive spectator, as Goodman stressed (1968, 241-242), is simply a myth. But videogames go way further in this pragmatic demand, in virtue of their strongly interactive nature. As stressed before, these digital artifacts do not simply reconstitute a predetermined content, but let the player manipulate the structure of the work itself, albeit within certain limits. In videogames, stories are not simply told but need to be acted or set in motion. This greatly matters regarding the cognitive functioning of the medium. Indeed, challenges and puzzles are not abstractly presented but need, on the contrary, to be addressed contextually, through practice and action. And this, I think, gives rise to a special form of understanding.

Let me consider an example. Take the principles of mechanics in classical physics, and especially the orbiting of bodies around planets. This is something you could learn about in a physics book or in a classroom. But you will also get acquainted with them if you play *Kerbal Space Program* (Squad, 2011), a simulation game where you build and launch rockets, among other things. An interesting feature of this videogame is that it takes into account actual physical principles of orbiting mechanics, or at least, good approximations of them.

Kerbal Space Program, I believe, can make you *understand* some principles of actual rocket science. This does not imply, of course, that playing the game will or should replace what could be learnt in a book or classroom, or that it will be enough to apply for a job at NASA. What I mean is that *Kerbal Space Program* does is to show you in practice and contextually why some things actually work, and why some others don't. This is what I call pragmatic understanding. You get the experience, albeit a simplified version, of what is it like to launch a rocket and to make it orbit appropriately –which is, probably, something that you would never

have experienced otherwise.

Additionally, the fact that *Kerbal Space Program* is a simulation yields several benefits. (1) It gives you the opportunity to try various things in a risk-free environment. In this game, you can parameter the launch of your rocket as you please, something space agencies would never, and thankfully, allow. But in doing this, you may learn a lot about orbiting, and why some parameters are simply better than others. Videogames, more generally, tend to encourage this sort of risk-taking, allowing by the same move a brand of inductive learning out of one's mistakes. (2) Another important point is that the learning experience built in *Kerbal Space Program* goes straight to the point. You can launch rockets in a time-span which would be practically infeasible in real life, the benefit being that you can focus on the launching mechanics, ignoring all the economic, mechanical, or other types of issues which make rocket launching a painfully complex activity. (3) It should be stressed, lastly, that the game obviously implies a good deal of simplification, abstraction, deformation, or even caricature regarding the actual principles of rocket launching. But this is less a flaw than a very efficient –and perhaps medium-specific– way of highlighting important features and mechanics, which can be grasped easily by the players (Koster, 2004). *Kerbal Space Program*, for that matter, is less supposed to mirror real life than to be a mirror in which we can see real life afresh. By abstracting certain phenomena, and reducing them to repeatable, predictable, and controllable patterns, the game may highlight features which would otherwise have been ignored or much more difficult to seize and apprehend.

For these reasons, I argue *Kerbal Space Program* delivers a pragmatic understanding of rocket launching and orbiting mechanics, among other things. None of this, of course, does not mean that the game comes even close to being a replacement for actual rocket science. Still, it can make the players understand some of its core principles. Understanding, in this case, need not lay in sentences or equations, for the game makes you grasp some significant feature through practice, and with non-verbal symbols. This is perhaps why this simulation game can deliver insights which could, probably, not be acquired so easily by other means. Now, although we could give countless other examples of what I called “pragmatic understanding”, the core idea is this : the interactive and pragmatic dimension of

video games makes it so that learning, within this medium, is connected to a practice and trial. Challenges and issues are embodied, rather than abstractly exposed. It is probably the main reason why videogames are powerful learning machines.

One central claim of Goodman and Elgin's "reconception" of philosophy is that artworks do and may contribute to the advancement of understanding. I have argued that videogames grant further support to this view. For that matter, and while aesthetic cognitivism has been discussed at length in the recent years (see Gaut 2006, Lopes & Kieran 2006, Young 2001), the medium of videogames still demands further exploration.

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The reader will perhaps realize that I have left aside several important "goodmanian" themes and topics unexplored. Among them, are the question of knowing how videogames refer and with which sorts of symbols, the possibility of analyzing them as notational systems, the nature and range of emotions they may produce, their contribution to the idea of "worldmaking", or again, the framing of a notion of "rightness" which would befit the medium. Much is left to be said on these topics, assuredly. But what has been presented here, hopefully, should be enough to show that the study of videogames has the potential to shed new light on a number of issues at the branching of aesthetics, epistemology, and ontology. Nelson Goodman, I like to think, would have agreed.

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