Being and Time (Final Fantasy Edition)

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Abstract

In this paper we elaborate the standard problems of truth in fiction (TIF) by working on truth in videogames (TIV). After outlining the differences between TIF and TIV, we proceed in modeling space and time of videogames, finding out unexpected analogies in different kinds of videogames (e.g.: Doom and Tomb Raider have the same spatiotemporal model).

Introduction

Videogames are, in so many ways, similar to novels. An engaging game is as much a threat to your social life as a good novel: videogames become addictions incredibly fast, as we end up caring for the characters (Aeris, you were indeed sorely missed) and wishing the story never ends. Still, videogames, like novels, are just *fictions* – and this is where our journey begins.

In *this* work we are going to explore the logical structure of videogames drawing from tools and analogies in philosophy of language, modal logic and formal ontology: the *liet motiv* of the work will be that many parts of the contemporary formal ontology toolkit can be fruitfully applied to videogames. In the first part of the paper, we analyze games (so to speak) 'from outside' – the way *we* talk about games and make sense of what happens *there*: more precisely, we shall

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[1] Università degli Studi di Milano (Milan). The author wish to thank all the patience of friends, relatives etc that heard one of his "[name here], I'll come to you in a minute… let me just reach a save point" and then waited more than half an hour. A special thanks goes to Federico Meloni for his comments on an earlier draft of this paper, as well as for his attempt to compromise my Ph.D when, with a bunch of friend, he chose *Starcraft II* as my birthday present.
[2] iLabs (Milan). The author wish to thank his cousin Paolo for the 8-bit Nintendo he got many years ago. Without videogames, he would have probably become a more serious scholar, but *this* paper would not have been written.

analyze the concept of truth in videogames (henceforth TIV) in close analogy with David Lewis' treatment of fictional discourse. In the second part we offer some sketch of a formal theory 'from inside' – the way the structure of the space *within* a game constraints its own dynamics: in particular, some insights from mereotopology will be used to analyze the difference between, say, the space Super Mario lives in from the rich universe traveled by Cloud Strife in Final Fantasy VII.

While *this* work should be read as a first, preliminary step in a largely uncharted land, we *do* believe that videogames may be a fertile territory to develop sound and interesting philosophical theories.

I. Truth in Fiction, Truth in Videogames

In contemporary philosophy it is widely acknowledged that fictions have a rich, non-trivial, logical structure. Consider for example the following true sentences related to fiction:

1) Holmes lives in Baker Street.

2) Holmes lives nearer to Paddington than to Waterloo.

3) Holmes is a fictional character.

They are true for different reasons: (1) is true *in* the fiction, (2) is *implied by* the fiction together with some background beliefs, (3) is a truth *about* the fiction; are there corresponding notions for videogames? The theory presented in Lewis (1978) is built around the idea that sentences such as (1) have an hidden modal operator, the *in the fiction* operator:

> TIF$_{def}$) '*In the fiction* P' is true only if P would be true if the fiction was told as known fact rather than fiction.

(TIF$_{def}$) gives us (1*):

1*) *In the fiction,* Holmes lives at 221/b of Baker Street.

The truth conditions for (1*) are thus the following: (1*) is true if 'Holmes lives at 221/b of Baker Street' would be true if the fiction was told as known fact; given a standard – such as Lewis (1973) – semantics for counterfactuals, we can further unpack the conditions with possible worlds: (1*) is true if, in the closest world *w* where the story of Holmes is told as a fact, Holmes in *w* lives at 221/b of Baker Street (which is certainly the case).

Now that, thanks to Lewis, we got enough experience points on truth in fiction, we can develop a first sketch of TIV by substituting the act of storytelling with the act of simulating:

TIV$_{def}$) '*In the game* P' is true only if P would be true if the game's events were real rather than simulated.

A statement such as

4) Sephirot kills Aeris.

would then be true if in the closest world *w* where Final Fantasy VII is reality and not a simulation, Sephirot in *w* kills Aeris (which is certainly the case).

However, as soon as we start thinking about videogames' peculiar features, there are *prima facie* difficulties in applying that analysis: first and foremost, videogames are *open-ended* in a way novels aren't – if reading a novel is a passive activity, playing a game is a highly interactive experience: what happens in the game is, at least in part, dependent upon the actions of something outside the game (i.e. the player). Exploring this (and other) peculiarity is the task of the next section.

2. Truth in Videogames (level: beginner)

The nature of games opens up interesting variations on the basic theme of (TIF$_{def}$): as soon as we start playing we notice that some events may or may not happen in the given "session", while others are somehow fixed – no matter how we play, what happens to our characters, how many times we saved the game before that particular point: there are some events that just *need* to happen for the game to advance. Sticking to our favorite *FF VII*, an example of a *contingent fact*

is how many Chocobos are captured in the game; on the contrary, an example of a paradigmatic *necessary fact* is Aeris' death.

Prima facie, we may be tempted to pursue the analogy with fiction further, and analyze contingency in games pretty much as Lewis (1978) analyzes unspecified features in a novel: was Joelle van Dyne (aka Madame Psychosis) left handed?[3]

However, the two cases cannot be explained in the same fashion: in fiction, unspecified features (whether important – was Joelle van Dyne really disfigured by acid or is she still The Prettiest Girl of All Times? – or unimportant – what was Holmes blood type?) cannot change in any way what is specified: no matter how much fans speculate on Harry Potter's plot, in an important sense every time you read it, Harry Potter is *the same* book. Games are different, since many contingent facts *affect* directly how the story unravels: if you finish *FF VII* two times Cloud Strife will possibly end up living quite different experiences. In other words, notwithstanding the fact that Aeris is going to die necessarily, there are countless paths bringing Cloud from the explosion of the Mako Reactor to that tragic event. To semantically grasp these intuitions, we need to add some more structure to our intensional operator *In the game*.

To avoid confusion, let's say that a particular session of *FF VII* is a *run*. Now, let's collect the set of all *complete* runs of *FF VII*, that is, any sequence of events going from the first screen of the videogame to its end: this is the space of possible events for *FF VII*. Any such sequence will contain exactly one Aeris' death, but most of them will contain a different number of Chocobos. Accordingly, we can re-adapt Lewis' modal framework for our purposes, where '*In a run* P' and '*In the game* P' exhibit the typical duality of modal operators. In particular, given the space of possible runs, we can define TIV as truth in all possible runs: '*In the game* P' is true only if P is true in all possible runs; in turn, truth in a run can be analyzed as a case of TIF: '*In run R* P' is true only if P would be true if the events in *R* were real rather than simulated.

So far so good – but we are just scratching the surface of the logic of videogames. There are at least three phenomena that need to be addressed:

TIV$_i$) as mentioned above, a defining feature of fiction is that books actually tell you only a dim portion of what is happening in the story: understanding the implicit dynamics behind a good novel is actually a huge part of a reader's fun (not to mention the fact that literary critics make a

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[3] This, and many other fictional oriented example comes from David Foster Wallace's *Infinite Jest*.

living out of what authors did *not* write). This is also true in videogames: how should we analyze this feature? How far can we go in speculating about variations of a fiction/videogame ('What if Anna Karenina survived?' vs. 'What if Aeris survived?').

TIV_{ii}) The agency of the characters in the game is determined by the actions of the human players (Lara Croft and Mario die because I fail in jumping properly, Cloud dies because I made the wrong choice). The difference with fiction is obvious, as the following pair of sentences proves:

5) Cloud died because I pushed the wrong button.
6) Anna Karenina died because I turned the page.

TIV_{iii}) When we talk about games and fictions we are able to switch between reality and videogames without effort. For example, we may quantify over different fictional universes or we may compare fictional entities to real individuals:

7) There are more planets in Star Wars than Star Trek.
8) Harry Potter is more like the perfect husband than Edward Cullen.

How can we handle world-fiction and cross-fictional comparisons within the theory so far developed?
The next section will briefly discuss each of this important issue.

3. Truth in Videogames (level: experts)
To discuss (TIV_i) let's consider the following statement:

9) Shinji was secretly in love with Asuka/Rei.[4]

(9) will be debated in the fandom forever: fans will argue for or against a certain thesis by way of projecting their *eidos* and interpretation of the whole story, characters and so on. Using Lewis

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[4] Here we move to another fictional universe we like a lot, the one of *Neon Genesis Evangelion*. The example included both objects of Shinji's secret love due to endless debate in the Evangelion fandom.

(1978) analysis, although (9) is not affirmed nor denied in the fiction, we can still figure out its truth value by considering the closest world to actuality when the story of Evangelion is told as a fact (of course, since modal knowledge is sometimes shaky, there is much space for disagreement between fans). Consider now:

10) Cloud Strife was secretly in love with Red XIII.

Although (10) is not affirmed nor denied in the game, we can still figure out its truth value by considering the closest world to actuality when the story of *FF VII* is told as a fact. While the analogy between fictions and games helped us a lot, it is still important to point out that videogames like *FF VII* involve a pretty structured and precise *modal space* for agency: at a given point in a given session, the actions that are available to Cloud Strife makes a huge, but finite and precisely enumerable, set. With enough patience and enough time, we would not have any case of modal ignorance, since every statement of the form 'Cloud could have done *X* instead of *Y*' can be verified by looking at the source code. No such sharp line can be drawn for *what-ifs* in fiction: while Lewis' analysis gives us where to look, things are usually so messy that it's not clear what we are looking at (that is maybe the reason we have Freudian readings of novels but not of videogames).

(TIV$_i$) is likely to be the most distinctive feature of videogames when we compare them to other kinds of fictional discourse: while (5) may well be true, (6) doesn't even make sense – almost by definition and with very few exceptions, novels are somehow causally isolated from the reader's world.[5] According to our analysis of TIV, (5) would not be true *in the game* since there are complete runs where (5) is not true:

5*) *In run R*, Cloud died because I press the wrong button.

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[5] A few exceptions are the following: realistic novels or documentary in which what is narrated is somehow "caused" from the reader's world (war diaries for instance: think about Primo Levi's memories for the readers of 1947 when *Se questo è un uomo* appeared); gamebooks in which the reader can make different choices "causing" different stories.

However, the semantics of (5*) is clearly wrong: in the scope of the intensional operator we have both Cloud and the player (so, from (5*) we couldn't infer that a player exist since the operator would block the existential generalization). The same problem is actually at the heart of (TIV$_{iii}$):

11) Ortho "The Darkness" Stice won less matches than Michael Stich.[6]
12) It's harder being a major in SimCity than in a real city.[7]

In (5), as well as (11) and (12), we have quantifiers binding different kinds of entities: individuals from a fiction and individuals from the real world – however, putting an intensional operator *in front of* the sentence will erase this crucial difference.

This problem was also known to Lewis, who acknowledged that some Meinong-style treatment may have an advantage over his approach on this point,[8] since a literal reading of quantifiers would avoid the issue. Sure, we could say that context helps us choosing when and how to put the intensional operator to our fictional discourse – but this isn't much if we can't even say what the proper structure of these mixed sentences is. Let's consider again (5) and make explicit the scope of the operators (we substitute the indexical element with a general "player" to avoid unnecessary complications at this point):

5) *In run R*, Cloud died because *In the actual world @* the player did *X*.

In (5) we have a world *R* (taken from the set of all complete runs of *FF VII* as defined above) in which Cloud dies; we have also a world @, *our* world, in which a player performs some action: clearly, @ is not in the same set as R. Moreover, 'because' suggests a causal relation, signaling that there may be a counterfactual reading of (5):[9]

5') If the player had not done *X* in @, Cloud would have been alive in *R*.

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[6] Again, this comes from Wallace (1996).
[7] Everybody loved to ~~mess up~~ build a city. Back in the '90s we tried our best with Sim City 2000. You may run another example with Sid Meier's Alpha Centaury: "Being the UNO President is much harder on Alpha Centaury than in real life".
[8] Lewis himself credits this point to Meinonongians quoting Parsons (1974; 1975) in the first page of Lewis (1978)
[9] On this see the sweet old Lewis (1973) as well as the more recent Woodward (2005).

Again, with a standard semantics for counterfactuals, the truth conditions of (5') should be the following: (5') is true if in the closest world where the player does not do *X* in @, Cloud is alive in *R* − which has no clear semantic interpretation, given the appearance of other-worlds-quantifications *inside* a world. Unfortunately, we cannot even look at TIF for some insight, because interaction between the universes is what makes videogames different from novels.

A cheap way out would be to consider the set of runs − and Cloud's life − as *part of* the actual world: in this way, however, videogames would be technological artifacts of our world rather than virtual worlds we'd like to get lost in. Whatever the merits of this suggestion, a proper assessment of this problem (and, hopefully, some convincing solution) needs to wait for another work.

Finally we wish to conclude the first section of *this* work with a brief note on how the evaluation of cross-fictional sentences differs in TIF and TIV. True, the reader has different kinds of novels that challenge him in different ways. Despite the reader can only turn the pages, *Harmony* is different from *Infinite Jest*. Nonetheless, cross-fictional comparisons are quite hard to be solved upon some objective ground only. Is *Infinite Jest* more difficult than *Ulysses*? Which of the three canticas of Dante's *Comedia* is the best one? To answer these questions we have to engage a deep struggle in defying beauty and difficulty in aesthetics. In videogames the interactions between the player and the game are easier to figure out: sometimes you push the wrong button or take the wrong choice. On the other hand, as a reader, you can only turn the page. Often you have the extra constraint of turning the paging without missing one. Sure, you can give up the book. But that is not part of the game of reading. Even admitting you finish the fiction, it is quite difficult to really figure out how much you understand out of it. You read *Animal Farm*, *The Neverending Story* and the *Little Prince* when you were eight, and you perfectly enjoyed its narrative… what's wrong? Whereas with TIV you can say that, in some sense, a first-person shooter is easier than a full RPG. Sure, there will be lines difficult to be drawn − is *Aero Fighters* easier than *Space Invaders*? But we have more data to figure out the question: lives available, levels to be played, number of planes or alien to fight… Even with games with the same structure, we may have very different ways to realize that idea (and so, we can come up with some metrics to quantify that

diversity). Even the most stupid game – say, only pressing a button once in a while – can be tremendously difficult if you have just one single attempt to finish it.

4. Pause: A Formal Ontology of Videogames

As we have seen in the previous sections, the logical structure of games is indeed very rich. In what follows we are going to explore games 'from the inside', i.e. we are going to directly model videogames as if they were independent, autonomous worlds. The theory sketched here is just a first step towards what we may call a *Formal Ontology of Games*: drawing from recent works in formal ontology (such as, for example, Casati, Varzi (1999)), we try to make explicit the formal structure of *space*, to (hopefully) shed some new light on the fundamental "metaphysical ingredients" of videogames. As a last *caveat*, we chose to use plain English for the axiom of the theory: the geeky reader who would like first-order formulas is encouraged to explore the ontology of digital universes through the literature collected in the footnote.[10]

5. Resume: Mereotopology 101

It's now widely acknowledged by many scholars[11] that the union of *mereology* (the formal theory of *parts* and *wholes*) and *topology* (the formal theory of *connection*) provides a rich framework to model spatial entities and spatial relations. Due to obvious constraint, we can only offer a small introduction of classic mereology and its extension; however, the concepts introduced in this section should be enough to follow the final part of the work.[12]

We start by introducing some uncontroversial facts about parthood – the lexical part of the theory:

  PL.1) Everything is part of itself.
  PL.2) Two distinct things cannot be part of each other.
  PL.3) Any part of any part of a thing is itself part of that thing.

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[10] Such as Casati, Varzi (1999) and Galton (2000).
[11] Casati, Varzi (1999) or for example Smith, Brogaard (2002).
[12] Please consider that the following is based on Tagliabue (forthcoming).

Armed with (PL.1)-(PL.3) we can also add definitions for other useful mereological predicates, such as *overlap*, *underlap*, *proper part*:

O$_{def}$) Two objects *overlap* iff there is an object that is part of both.

U$_{def}$) Two objects *underlap* iff there is an object of which they are both parts.

PP$_{def}$) Any part of an object is a *proper part* iff it is not identical to that object.

Although simple, the theory developed so far already allows us to model the basic patterns of mereological relationships (asterisks mark symmetric relations):
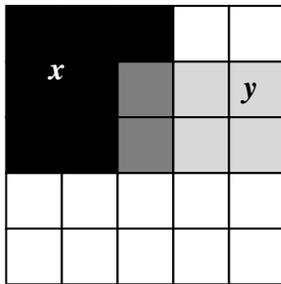
x *overlaps* y*
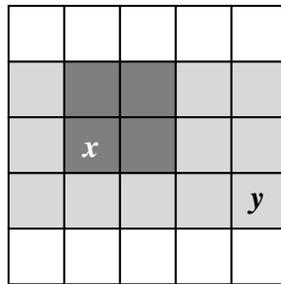
x *overlaps* y*
x *underlaps* y*
x *is part of* y
x *is propert part of* y
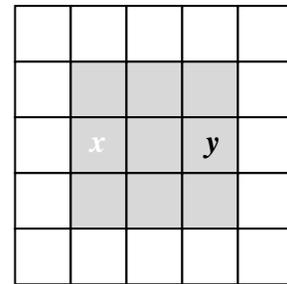
x *overlaps* y*
x *underlaps* y*
x *is part of* y
y *is part of* x
x is identical to y*

However, to get a full-blown picture we need to supplement these core axioms with 'principles asserting the (conditional) existence of certain mereological items given the existence of other items'[13]. In particular we start with a "supplementation principle":

PS) If an object is not part of another, some part of the former does not overlap the latter.

(PS) formally encodes an important intuition about spatially extended objects: if one thing is not part of another, there must be something in the universe that accounts for that fact; for example, if France is not part of Italy, there must be some part of France that does not overlap

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[13] Casati, Varzi (1999), p. 38.

Italy. From a philosophical point of view, the important thing is that from (PS) (together with (P.1)-(P.3)) a form of extensionality can be derived, that is:

PE) Two objects are identical iff they have the same parts.

As a second addition, we add closure principles (*Sum* and *Product*) to the effect that:

PC.1) If two things underlap, there is a smallest thing of which they are parts.
PC.2) If two things overlap, there is a largest thing that is a part of both.

Finally, we need an axiom for a maximal element (i.e. the universe) and an axiom to model the fact that space in videogames is discrete (i.e. there is only a finite number of places Mario can be in his adventure to save the princess):

U) There is a maximal element of which everything is part.
A_{def}) Any object is *atomic* iff it has no proper parts.
AT) Everything is ultimately composed by atomic objects.

Now that we have mereology, it is time to introduce *topology* – we start again from some uncontroversial facts about connection:

TL.1) Everything is connected to itself.
TL.2) If one thing is connected to another, then also the latter is connected to the first.

Of course (TL.1)-(TL.2) are uncontested, but how exactly are we to understand their relationship with (PL.1)-(PL.3)? The first and most obvious suggestion is that *parthood* is a form of monotonicity, so:

TL.3) If one thing is a part of another, everything connected to the first is connected to the second.

(TL.3) doesn't look troublesome: since Nevada is part of the U.S.A., everything connected to Nevada (Utah, California, Arizona, etc.) is connected to the U.S.A.. Armed with (TL.1)-(TL.3) we can define *enclosed* and other important topological predicates:

E$_{\text{def}}$) One thing is *enclosed* in another iff everything connected to the first is also connected to the second.

IPP$_{\text{def}}$) One thing is an *internal proper part of* another iff the first is a proper part of the second and everything connected to the first overlaps the second.

TPP$_{\text{def}}$) One thing is a *tangential proper part of* another iff the first is a proper part of the second and something connected to the first does not overlap the second.

SC$_{\text{def}}$) One thing is *self-connected* iff any two parts that make up the whole of it are connected to each other.

The enriched vocabulary allows us to finally express more complex spatial relationships between regions of space in a digital world:
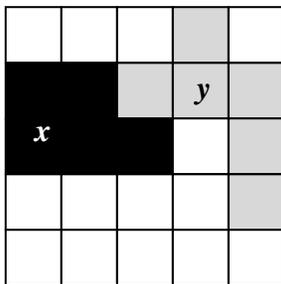
x *is connected to* y*
x *is self-connected*
y *is self-connected*
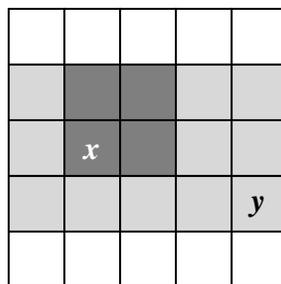
x *is connected to* y*
x *is self-connected*
y *is self-connected*
x *is enclosed in* y
x is a tangential proper part of y
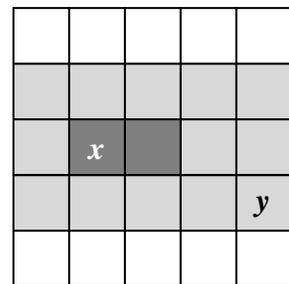
x *is connected to* y*
x *is self-connected*
y *is self-connected*
x *is enclosed in* y
x is an internal proper part of y

6. Space In Videogames

Now that we (hopefully) gained some fancy words and solid principles to reason about regions and spatial entities, we are ready to model the space of videogames. Let's start with a very simple example: *Super Mario 1*, the king of platform games.

If we ignore for the moment the fact that Mario can jump, the space of the game is one-dimensional:

At any given point in time, Mario is in one, and only one "block" of the game. Moreover, we can single out two "special points" in Mario space: the *beginning* and the *end* – the only two points in this space that are connected to just one cell. These special points are connected trough what we may call a *path*:

> PH_{def}) A *path* from cells c_1,c_n is a sequence of cells, $c_1...c_n$, such that for each c_m in the sequence (except the first and the last element), Cc_mc_{m-1} and Cc_mc_{m+1}.

However, this is clearly not enough to capture the distinctive dynamics of the game: first, we need a way to express the fact that Mario is in position *p* – so we need an axiom for *location*:

> LL.1) A character is located in only one cell at each point in time.

Second, we need to say that cells are not just connected, they have a *linear ordering*: Mario can only go *forward* because winning the game is in fact tantamount as travelling the whole universe. What we need is a strict ordering on cells: for the sake of convenience, let's just use natural numbers, where cell 1 is the start, cell E is the end of the game and the cells in between are assigned a number in the natural way (so, if two distinct cells are connected, either one is the successor of the other or *vice versa*). We can then state a constraint on location that holds for Mario (and other platforms such as *Metal Slug*, *Castlevania*, …):

LP.1) If a character at t_n is in cell k, the character at t_{n+x} will be in cell p, where $p >= k$.[14]

While the theory developed until (LP.1) is likely to be "universal", the last axiom captures a very important feature of Mario vs., for example, *FF VII*: typically, RPGs do not force on the player any such constraint, as you can travel through the game's universe in (almost) any way you like. Games like *Tomb Raider* are another story: usually, characters can explore *a given level* in any way they like, but there is no way to go back to the cells of level 1 once you reach level 5.[15] In other words, games *like Tomb Raider* behave like several small *FF VII* one after the other:

While in each colored part of the space characters may move freely, a linear ordering is required at the edge of each region, i.e. when you end one level and begin the next: in that case a "topological miracle" occurs –there is a connection between two cells in two colored regions but you can only go forward (the connection – so to speak – falls down as soon as you reach the new level like a suspension bridge from *Indiana Jones*). Obviously enough, many other types of games can be modeled in this framework: while driving simulation games (such as *Gran Turismo* or *Ridge Racer*) usually allow the player to go backward, a "normal" session would look pretty much like *Super Mario* – winning the game means travelling the cells of the universe in a precise order. Before moving forward, it is important to point out that the structure of space crucially influences the causal structure of games: Super Mario is basically a "Markovian" game, i.e. a game where the set of action available at any point in time depends on events which generally just happened some moments before; on the contrary, *FF VII* has a much richer causal structure, so that choices you made in a long forgotten past still may influence the present.

As a final note, if we couple our remarks in *Section II* about necessary/contingent events with a more formal treatment of *agency*, the result is a very strange causal metaphysics. In particular, let's say that a character C in run R is free to do A if and only if there is run R', accessible from R, where C does A', e.g. Cloud is *free* to use his sword because he could have used a potion

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[14] This is just to sketch an intuition. In fact, it is possible to go back admitting that the screen is still there. We leave these subtleties to a future work on that topic.

[15] Levels can be easily modeled as an equivalence relation on cells, partitioning the universe of the game in separate regions – we leave aside this… from the main exposition.

instead. If we consider this definition in the modal universe of *FF VII*, the result is a mixture of free decisions and inevitable Fate (resembling very much the world of Homerus): characters develop their traits, build their strength, accumulate experience points in a largely "free", "undirected" fashion; however, at some particular points in their life, they face events over which they have no control whatsoever: Cloud could have used a potion, but, sadly, couldn't have saved Aeris life.

Conclusions

In *this* work we applied some tools from philosophy of language and formal ontology to the (relatively new) field of videogames.

In the first part of the work, we pursued in some detail the analogy between games and fiction: following Lewis (1978) we tried to make sense of videogames' talk using an intensional operator; however, we also found that some of the problems that originally plagued Lewis' proposal for fiction are even worse in the realm of videogames. In the second part of the work, we sketched some preliminary ideas for a formal ontology of games: in particular, we applied insights from mereotopology to some paradigmatic examples of games and discussed the relations between space, causality and agency.

In both our explorations the tools borrowed from "standard philosophy" came up short, for some reason or the other (or maybe – just maybe – we played too many videogames to actually have time to properly learn "standard philosophy"). However, not everything is lost, as our partial failure may well just mean that videogames can be a fertile area to test and develop *new* philosophical tools.

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