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Videogame analysis: a social-semiotic approach

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ABSTRACT
The relevance of videogames in the contemporary cultural ecosystem and their social impact make it necessary to develop theories and analytical models to understand the expressive potential of videogame design, and how videogames work as texts, giving shape to certain values, behavioural patterns and ideological visions. To do so, it is crucial to build a bridge between game studies and contemporary semiotics. Thus, with this aim, we present in this paper an analysis model for studying videogames as texts that combines theoretical and methodological elements from social semiotics and procedural rhetorics, a specific branch of game studies. Our model is based on four levels: the narrative, ludo-narrative, system-gameplay and designer-player dimensions. As a case study, the model is applied to the videogame *The Last of Us*.

KEYWORDS
Videogame; signification; social semiotics; game design; procedural rhetoric

1. Introduction

Behind any videogame there is a specific view of the world, a perspective on what certain actions are for, and a point of view about what "victory" and "defeat" mean and how they are attained. Long before the appearance of videogames, the Dutch philosopher J. Huizinga said that "every game means something" (1998 [1939], 32). Today, the importance of videogames in the contemporary cultural ecosystem and their relevance in the processes of the collective imagination evoke his words. But how do they do it? How do videogames convey meaning?

This question has been addressed in recent years in a number of academic works, as we concisely review below; however, the development of theoretical–methodological models to study videogames as semiotic works is a research field that is still very much open and which needs new contributions. Thus, in this article we discuss the basic elements for a social-semiotic theory of videogame design, defining the main semiotic dimensions of videogames and their specific semiotic resources, and then apply the model to a case study: "The Last of Us" (Naughty Dog 2013).

1.1. Previous research related to the semiotic potential of videogame design

In the late 1990s *Hamlet on the Holodeck* by Murray (1998) used a "narrativist" approach to study the expressive potential of videogame design: according to Murray, the future of

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videogames as a means of communication resides in their potential to tell stories and in the new creative resources they can give to the narrators of the twenty-first century. At the same time, *Hamlet on the Holodeck* sparked the first significant theoretical debate in the field of videogame studies:

A group of researchers, including Aarseth (1997, 2001), Frasca (1999) and Juul (2001), proposed using ludology instead of narratology as the theoretical driver for videogame studies. They stated that videogames should be considered games instead of narrative works, or both components could be taken into account but placing the "core" game structure in the foreground.

Rather than an outright rejection of the narrative potential of videogames, ludology was a movement geared towards bringing the distinctiveness of videogames as an expressive medium to the forefront of the research agenda, that is, the game design. Over time the ludologists' position gradually became more moderate regarding the videogame's narrativity (see e.g. Juul 2005). Ryan (2006) suggested developing ludo-narrative approaches in which the polarized positions can be overcome and the complex relationships between narrative and game design can be addressed, a crucial issue for understanding the construction and conveyance of meaning in videogames.

But does game design really convey meaning? To answer this question, Bogost (2006) and Frasca (2007) began to develop a branch in ludology that would come to be known as "procedural rhetoric". This theory postulates that the procedural core of game interaction (the rules and mechanics of interaction) is the main focus of the videogame's signification. Videogame researchers interested in this subject occasionally used ideas from (mainstream) semiotics: Frasca (2001) applied Peirce's and Eco's theories, and Maietti (2004) mainly used French and Italian semiotics (Greimas, Eco, Fabbri).

However, Aarseth (1997) showed scepticism about the usefulness of semiotics for analysing cybertexts (and therefore videogames), without referring specifically to social semiotics, while Bogost disregarded both (mainstream) semiotics and social semiotics in *Persuasive Games* (2006). The absence of social semiotics is remarkable in the latter case, since it is a work addressing not only the "grammar" of videogame design, but also the social and political dimensions of videogame meanings.

Proceduralist theories were initially closely associated with a new wave of "persuasive games": videogames with the direct intention of creating a specific discourse on social issues, in which experiments were made with the expressive potential of the game rules, for example, "September 12th" (Frasca 2009), a criticism of the Iraq War and "McDonald's videogame", a satire on fast-food companies (LaMolleindustria 2006). Over time, the proceduralist approach has also been extensively applied to analyse the representation of social subjects in mainstream or popular videogames: "The Sims" (Maxis 2000) and day-to-day life (Sicart 2003), "Sim City" (Maxis 1989) and urban development (Atkins 2003), "Grand Theft Auto IV" (Rockstar North, 2008) and the American dream (Pérez-Latorre, 2015) etc.

In recent years several works have significantly progressed the study of videogames as an expressive medium. In *Beyond Choices: The Design of Ethical Gameplay*, Sicart (2013) highlights the connection between the procedural core of the game and its audiovisual representation layer, as well as the active role of players in the meaning construction processes. His analytical model is partially inspired by De Souza's semiotic engineering of human–computer interaction (2004); however, in his model, semiotics end up essentially separated from the core procedural structure of the game ("procedural level" versus

"semiotic level") (Sicart 2013, 45–56). Thus semiotics are essentially ascribed to the analysis of the game's audiovisual layer (in a broader sense, to any kind of signifier communicating the rules and mechanics of the game to the player). Nevertheless, semiotics (and, in particular, social semiotics, as we advocate in this paper) can be useful for understanding not only the audiovisual surface of videogame design but also its overall structure, including the game's deep structure: its procedural core, formed by rules and game mechanics.

Flanagan and Nissenbaum (2014) have proposed a theoretical model for "value-conscious design" in videogame creation. It is an interesting work but fundamentally oriented towards game design and development, rather than defining a specific method for analysing videogames. Fernández-Vara (2015) has recently published a work on videogames as "texts" with a more analytical and methodological approach. This is an important contribution that originates from the need for stronger and more precise theoretical models for analysing videogames, taking into account classical references from semiotics and narratology, such as Barthes, Propp and Genette.

2. Towards a social-semiotic theory of videogame design: overview

In accordance with Fernández-Vara's recent work (2015), our aim in this paper is to contribute to the development of sharper theoretical and methodological approaches for analysing videogames as texts, through the combination of game studies (fundamentally, procedural rhetorics) and semiotics (as well as other humanistic approaches). However, unlike Frasca, Maietti and Fernández-Vara, we advocate for a theoretical model based on a specific contemporary branch of semiotics, that is, social semiotics.

We consider that social semiotics is an especially suitable framework for integrating the different theoretical currents and analytical perspectives reviewed in the previous section to form a coherent whole: the "narrativist" approach, ludology and procedural rhetorics, and the call for "ludo-narrative" approaches. Thus, in this article we sketch the fundamental elements for a social-semiotic theory of videogame design.

Firstly, from a social-semiotic approach videogames must be considered multimodal works or texts, where not only audiovisual narrative and game design coexist, but also often other semiotic modes that need to be considered, such as written text, music or 3D design. Indeed, the complex semiotic connections between these expressive modes that occur in videogame design pose a fundamental theoretical challenge for social-semiotic research (see Kress 2010; Smith et al. 2011; Zhang 2014).

Moreover, there is a certain academic consensus regarding game rules and gameplay interaction patterns as the main expressive building blocks in videogame design. While the game rules form the game's system or organizing structure, gameplay refers to the process of playing the game (by its rules), and gameplay patterns should be understood as emergent patterns or "mechanics" of interaction that stand out in relation to particular objectives or final states in the game (we will consider this in more depth later on).

Thus, in social semiotics terms, game rules and gameplay patterns would be the main "semiotic resources" (van Leeuwen 2005, 3–25) of game design. "Semiotic resources" have been defined as "the actions and artefacts we use to communicate, whether they are produced physiologically (…) or by means of technologies" (van Leeuwen 2005, 3). Social semiotics place "semiotic resource" and "signifying potential" above the traditional semiotic notion of sign as "signifier" and "signified", inspired by Halliday's theory of language as

"not a code, not a set of rules for producing correct sentences, but a 'resource for making meanings'" (1978, 192; as quoted in van Leeuwen 2005, 3).

Certainly game rules and gameplay patterns can hardly be defined or understood as "signs"; however, the pairing semiotic resource/signifying potential clearly shows that they can be analysed as significant semiotic elements. The main aim of this article consists precisely in defining specific semiotic resources of videogame design and assessing their signifying potential.

Studying gameplay needs to be approached particularly carefully, since it comprises many emergent and not self-evident semiotic elements. The connection between the game rules and a given objective (imposed by the game or defined by the player) generates a "gameplay flow", which basically consists of a series of gameplay mechanics (e.g. frequent interaction patterns performed by the character/player, such as jumping, avoiding enemies and trying to get coins in "platform" videogames), as well as a set of dominant strategies for solving common types of problems or challenges during the game.

Although gameplay is not directly defined or recorded by the designers, they actually see their own work not only as designing rules but also (and above all) gameplay experiences (designing gameplay through rules): "We reject the idea that gameplay is totally unpredictable and therefore it cannot be designed" (Rollings and Morris 2003, xvii).

Thus gameplay analysis involves identifying the main affordances of game design, in a similar vein to how van Leeuwen addressed the semiotic potential of toys (pram rattles), and Kress analysed the social semiotics of contemporary mobile phones (van Leeuwen 2005, 79–87; Kress 2010, 184–197). This also echoes Eco's theory of the "model reader" (1981) (a notion first applied to videogame analysis by Frasca 2001: "model player"): indeed, gameplay design necessarily presupposes a player with an attitude of minimum cooperation or interpretative consistency with the rules of the game and its overall design (in line with the interpretation of a text by the model reader).

According to social semiotics, in order to be considered a semiotic mode, game design should be able to accomplish the three semiotic functions stated by M. Halliday (Kress 2010, 87): (1) ideational function: represent meanings about actions, states and events linked to the human experience of the world; (2) textual function: form texts, complex semiotic entities which can function as complete messages and (3) interpersonal function: represent meanings about those engaged in communication.

Our application of this theory to videogame analysis is based on Kress and van Leeuwen's grammar of visual design (2006) and Moya Guijarro and Pinar Sanz's proposal (2008): in these works the ideational function is conceived as the visual design use or value for representing actors and processes, it is thus linked to "representational meanings"; the textual function is associated with the picture's basic constitutive elements: layout and formal composition, and their signification potential ("compositional meanings"); and the interpersonal function is linked to the symbolic relationships between author and viewer suggested by the image.

Regarding the representational meanings in videogames, procedural rhetoric studies clearly show the potential of game design to contribute to the representation of subjects, events and worlds, together with audiovisual narrative and other semiotic means.

For the compositional meanings, it must be taken into account that, besides their representational potential, game rules are first of all purely formal constitutive elements of the game that end up shaping a "message" or discourse on victory and defeat, that is relatively

independent from the represented world. The relevance of compositional signification in videogames becomes evident when abstract games such as "Tetris" (Pajitnov 1984) are examined. "Tetris" can hardly be analysed as a representational game (although certain attempts have been made: Murray 1998, 156); however, undoubtedly its composition comprises a particular textuality with an internal value system where "speed" of construction is "good" and "slowness" of construction is "bad", space optimization is promoted, and the "safety versus danger" semantic axis is associated with "empty versus full".

Finally, game design can (and does usually) deal with the interpersonal function, since certain game rules directly shape the relationship between the designer (or "implicit author") and the player (or "implicit user") basically in terms of the display of messages to the user: messages about goals to pursue, new rules or game contents to pay attention to, hints after a failed gameplay session, etc. The designer–player relationship is not only a communication relationship in videogames, but also (and above all) a mentor–pupil relationship, since the design style in guiding the player through learning processes is key to assessing the videogame interpersonal semiotic function. In this article we will focus on the representational and compositional dimensions of videogame semiotics, leaving the interpersonal function for further research due to extension limits.

Lastly, the growing interest of videogame researchers (and creators) in the social resonance of videogame signification (Bogost 2006; Anthropy 2012; Sicart 2013; Flanagan and Nissenbaum 2014) recalls another social semiotics principle, and can be theoretically informed through this theory. According to social semiotics, the meaning of texts must always be placed in connection to social discourses "floating" in the social-cultural landscape of their time. In this respect, social semiotics is inspired by Foucault's discourse theory: discourses as different ways of making sense of the same aspect of reality, which include and exclude different things and serve different interests (van Leeuwen 2005, 95).

Furthermore, different social discourses can coexist in the same text. Hodge and Kress (1988) proposed identifying "ideological complexes" (instead of hyper-coherent and cohesive ideological views) as a significant focus in semiotic analysis. An ideological complex is

> a functionally related set of contradictory versions of the world (…), imposed by one social group to another on behalf of its own distinctive interests or subversively offered by another social group in attempts at resistance in its own interests. (Hodge and Kress 1988, 3)

In his newer theory, Kress (2010, 21) states that contemporary neoliberalism and its rhetoric of choice must be particularly taken into account in the assessment of the ideological complex of contemporary texts (cf. Rose 2012, 142). The connections between videogame blockbusters and neoliberalism have caught the interest of several researchers in recent years (Barrett 2006; Baerg 2009, 2012; Millington 2009, 2014; Redmond 2012; for a context-oriented approach to videogames and neoliberalism, see also: Dyer-Witheford and de Peuter 2014). Although neoliberal traces in blockbuster videogame design can be taken as a cultural reflection "naturally" derived from the agonistic or competitive core in contemporary society, social semiotics advocate for a constructivist approach to discourse analysis. Thus discourses are conceived as active agents in the processes of social construction, rather than just (or not only as) cultural reflections (van Leeuwen 2005; Kress 2010).

Moreover, from Cultural Studies it has been stated that popular media texts, such as Hollywood movies or TV series, do not reflect a particular or univocal social discourse, but rather tend to integrate the ideological tensions of their time, through a plurivocal (usually contradictory) discursive structure (Fiske 1987, 1992; Ryan and Kellner 1990; Kellner 1995). This seems a suitable and relevant assumption also in terms of videogame analysis, especially mainstream or popular videogames, as we will see in our case study.

In Figure 1, we summarize our social-semiotic approach to videogame design analysis.

The audiovisual narrative dimension corresponds to the commonly relevant cinematic component of videogames. It can be addressed through well-known methodological tools, such as narrative semiotics (Greimas and Courtés 1976), film semiotics (Casetti and Di Chio 1996) and narratologic approaches of film studies (Jost and Gaudreault 1995), obviously also taking into account the narrative specificities of the videogame (see e.g. Murray 1998; Juul 2005; Ryan 2006; Planells 2015). The ludo-narrative dimension, which we explore in detail in the following section, deals with the representational value of game design, and its connection to audiovisual narrative ("ideational function"). The system-gameplay dimension, which we also elaborate later on, is based on the frame of the videogame as designed problem-solving (instead of videogame-as-representation) and it focuses on the compositional signification of social-semiotic theory ("textual function"). Finally, the designer–player dimension covers the "interpersonal function" of social semiotics.

In conclusion, our model could be considered a social-semiotic-multimodal-proceduralist approach, since it is based on social semiotics and at the same time it concedes a central significance to game design as the main (or most distinctive) semiotic mode of videogame creation (ludo-narrative and system-gameplay dimensions); however, it combines procedurality with a multimodal perspective: the audiovisual narrative and the designer–player dimensions are intrinsically multimodal, and, as mentioned previously, we conceive the ludo-narrative dimension as a "hinge" space between game design and narrative representation.

In the following sections we define specific semiotic resources of the ludo-narrative and the system-gameplay dimensions. Then, finally, we apply our model to a case study: "The Last of Us" (Naughty Dog 2013).

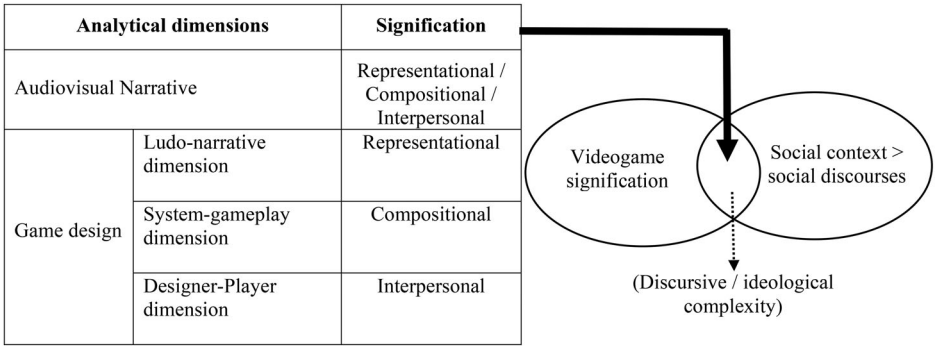

Figure 1. A social-semiotic approach to videogame design.

3. Ludo-narrative dimension

Let us remember that this is a "hinge" dimension between game design and narrative representation. Our proposal to address this semiotic dimension is based on considering the rules and other aspects of game design as elements that contribute to the representation of the main points of reference in the story: the character/player, the fictional world and the core activity or activities represented in the narrative.

Here we define a set of fundamental semiotic resources that clearly illustrate the potential of game design for representing these central features of the narrative. For reasons of article length, this is a limited set of categories that obviously in no way covers the entire expressive potential of game design in terms of its connections to narrative representation.

Starting with the incidence of game design in the representation of the character/player, one of the main semiotic resources is the "rules of action": the repertoire of possible actions the character/player can do and how they affect the game world, their effects or critical functions. A significant example of the semiotic potential of designed links between actions and effects is "September 12th" (Frasca 2009), where the action of "shooting" enemies causes them (has the conventional effect) to multiply instead of being eliminated, which is part of a critical discourse on the Bush government and the "preventive war" against Iraq.

The "rules of state" complement the previous ones, defining the avatar's possible states, as well as the conditions of the game that bring about these states and their consequences in the game. This may imply physical states (e.g. higher/lower level of health), psychological states, sociological variables (e.g. character's level of social prestige), etc.

"Game mechanics" can also contribute substantially to the representation of the character/player. The core game mechanics are a set of actions done by the character (avatar) and linked to certain user skills, that come into play frequently throughout the game to overcome common obstacles or objectives (cf. Sicart 2008). An interesting case of the semiotic potential of the game mechanics is "Papers, please" (Pope 2013). This videogame represents the everyday life of an immigration inspector at a border checkpoint for the fictitious country of Arstorzka. The game mechanics focus initially on a monotonous application of formal protocols, regarding reviewing personal documentation and, eventually, interrogations. However, soon these protocols begin to vary due to the instability of Arstorzkan politics. This, combined with a significant time pressure and disproportionate work demands placed on the character/player by their supervisor (just to earn a measly salary), gives a convincing "Kafkian" tone to this game.

Lastly, it should not be overlooked that sometimes certain rules or sets of rules, mainly incentive and disincentive systems, have the effect of inducing a particular behavioural profile in the character/player in the medium-to-long term. For example, the rules of the classic "prisoner's dilemma" induce a "traitor" behaviour, whereas in certain on-line role-playing games the rules foster team-building, collaborative planning and the search for some diversity of skills in the characters when groups are formed (Krzywinska 2007, 10).

As for the effect of game design on representing the fictional world, the spatiotemporal design of the environment and how this affects the gameplay process can be particularly relevant, for example, requiring adaptability to complex spaces, or incorporating a time pressure factor to overcome challenges. Furthermore, it is interesting to see whether there is an explicit division of areas and/or states in the fictional world, linked to "block/

unblock rules" in the game system. These rules govern the access to certain areas or states in the game world based on specific variables.

With respect to the "inhabitants" and objects of the virtual world, there are game rules that specifically define the behavioural patterns of non-player characters ("NPCs"), and eventually specific operating rules of certain objects or instruments.

To determine the importance of the game design in shaping the main activity or activities represented in the story, we first highlight action patterns linked to final objectives in the game (objectives to end a mission or game level, or the ultimate overall objective of the videogame). Undoubtedly, part of the discursive potential of game design has to do with the way in which actions (action complexes) and objectives are interconnected, giving rise to a prescriptive discourse. For example, in an analysis of "SimCity" (Maxis 1989), Atkins (2003, 129) pointed out that "[in SimCity] 'bigger' and 'newer' always mean 'better' [a better city]". It is evident that this is not a neutral definition of the "successful city" and the way to achieve it, rather it is part of a discursive frame related to a capitalist perspective.

The victory/defeat conditions defined by the game design are also relevant for their semiotic potential. These are specific actions or events that are invariable conditions (identical every time the game is played) regarding victory or defeat. They act as "triggers" for these outcomes, because fulfilling the victory condition(s) in a specific mission would immediately or easily mean getting through the current level, and on the other hand, the defeat condition in the same mission would automatically lead to the event of "game over". Unlike in the system-gameplay dimension, as we will see, in this analytical dimension victory and defeat must be "read" taking into account how victory and defeat are conveyed in the game's representation. The "redundancy versus variability" dialectic in gameplay design is also significant in relation to the representation of activities in the game's narrative. Depending on this, for example, the same activity can be seen as "flexible", open to creativity and one's imagination, unpredictable, or strict, rigid and monotonous. Game mechanics, defined above, may also have a significant impact on how activities are represented in the videogame.

Finally, the design of tactical/strategic structures constitutes another interesting semiotic resource. Any strategy is linked to a certain coupling of opportunities and risks, strengths and weaknesses (compared to other possible strategic approaches), and this opens up a substantial semiotic potential. For example, in the aforementioned critical videogame "McDonald's videogame" (LaMolleindustria 2006) there is a deliberate imbalance between ordinary, day-to-day management actions, and immoral actions related to harming cattle and the environment, corruption, deceitful advertisement, etc. These immoral options have the advantage of accelerating the production chain, which becomes essential for the gameplay to progress. Thus, within contemporary capitalism, "normal" management actions are associated with virtue or at least with a certain degree of ethics, but also to low productivity, while immoral management is linked to high productivity and profits.

As we said, this is by no means a complete inventory of the semiotic resources of game design connected to narrative representation, but we believe the three focal points considered (character/player, world and activities) are useful for organizing this kind of analysis. Furthermore, this model can serve as a flexible point of departure, whereby it is possible to add more analytical categories (or define subcategories based on ours) in an orderly way.

Summary of semiotic resources in the ludo-narrative dimension:
Representation of the character/player

- Action rules
- State rules
- Game mechanics
- Behaviour-inducing rules

Representation of fictional world

- Design of the space-time environment
- Rules of specific areas and states of the game
- NPC behavioural patterns
- Operating rules of objects/instruments

Representation of activities

- Patterns of action-objective
- Victory and defeat conditions
- Game mechanics
- Design of redundancy vs. variability
- Tactical/strategic structures

4. System-gameplay dimension

This analysis dimension is based on the framing of videogames as designed problem-solving. Game design treatises, usually made by professional designers, rely basically on this frame: they approach videogame play essentially as an experience of facing challenges and solving problems, and look carefully at how this experience can be shaped through design in a motivating, stimulating and/or pleasant way for the users (see e.g. Rollings and Morris 2003; Salen and Zimmerman 2004; Rouse 2005; Fullerton 2008; Adams 2010).

Thus, in this analytical dimension, rather than treating game design as a way of representing the character/player, the fictional world and the activities in the story, it is seen in terms of designing challenges and problem-solving processes. The game's layer of narrative representation must be put aside or left in the background in order to focus on the game's system, in an abstract fashion, and the user's actions (relatively independent of the character's actions represented on the screen). This leads us to emphasize certain new semiotic resources and analytical categories, and also to "re-read" some elements, such as game rules, that we introduced previously, looking at them from this new perspective.

This part of the analysis begins with the identification of the main gameplay units in the videogame, understood as challenge patterns (general problem-solving patterns, beyond specific game levels, sublevels or missions). Then each gameplay unit is analysed.

Firstly, structural elements such as the objective, game rules and the ludic roles of the key agents in the gameplay unit must be taken into account from this specific perspective.

This may reveal new nuances of the game's semiotic potential (cf. Ruiz Collantes 2009): for example, as we shall see later, in "The Last of Us" a character's ludic role may be far from their role and characterization in the narrative dimension, even indicating almost opposing values.

In addition to their structure, the development mode of the gameplay units must also be analysed, identifying the fundamental game mechanics needed to progress in every gameplay unit, and where applicable, defining the dominant strategy as well as possible alternative ways of playing or offshoots based on non-linear structures (cf.: "gameplay log": Consalvo and Dutton 2006).

As we said before, to identify semiotic nuances of game design from this perspective it is necessary to "disassociate" or "distance" it from the videogame narrative, focusing on the real user's actions and the abstract system of the game. This approach characterizes this analytical dimension in a broad sense; however, as an illustrative example we define two specific gameplay-representation disassociation operations: (1) looking for potential dissonances between the represented action/activity and the user's actions and (2) disassociating the player/character's actions from the narrative objective or consequence; aligning them with the abstract notions of victory or loss (or a helping versus hindering function in problem-solving processes).

A simple example of the potential dissonances of the first operation is the friction in many blockbuster videogames between epic representations of becoming a hero or raising a fictional empire and quite simple and redundant user actions, consisting of "obsessively" clicking the same button or repeatedly doing the same sequence of actions, as the parodic game "Cow Clicker" (Bogost 2010) tries to show. An illustrative example of the second operation would be that of a videogame ending where the player/character performs certain crucial final actions in order to win. If these actions lead to a tragic or sad ending in the game's narrative representation, there is an evident friction between signification in the representational level and the compositional level, leading to dysphoric versus euphoric connotations, respectively (the same action is linked to both tragedy/sadness and victory).

Addressing the "system-gameplay" dimension requires the system's abstract structure and the user's actions to be placed in the foreground, but this does not mean that game rules and actions should be described on this analytical level in a way that totally excludes any representational value. Actually, the system-gameplay dimension should be understood as an interpretive framework, whereby any kind of game design element can be addressed. However, when a rule or action is addressed taking into account its representational value, its signification must be interpreted not in relation to the rest of the representation but rather to the overall game system in abstract terms, as it can be deduced from our last example: taking that final crucial action as it is represented but linking it to "winning" instead of the tragic ending of the game's narrative. As we shall see in our case study, the disassociation operations can reveal significant implicit ideological views of the game, as well as other kinds of semiotically interesting "contradictions" between different design levels.

Finally, beyond specific gameplay units, the overall gameplay design should also be addressed, regarding cross-sectional elements of gameplay design, throughout the various levels, missions, etc., of the videogame. It can also be connected with strategies to enhance the user's engagement and pleasure experience in the long term. Some

conventional resources in this respect are the design of difficulty curves, competitive or agonistic systems such as scoring systems, experience point systems (common in role-playing games), which enable the character to acquire new skills, and reward systems, etc. (see Salen and Zimmerman 2004, 298–501; and Navarro 2012, 96–103).

Summary of semiotic resources in the system-gameplay dimension:
Gameplay units (problem-solving patterns): structure

Objective
Rules
Ludic roles of the game's agents
(Game-representation disassociation)

Gameplay units (problem-solving patterns): development

Game mechanics
Dominant strategies and gameplay approaches
(Game-representation disassociation)

Overall view of gameplay design (focused on problem-solving)

5. Case study: The Last of Us

In this final section we apply our model to "The Last of Us" (Naughty Dog 2013) as a case study. This game is a mainstream videogame that has achieved success among the critics and also in terms of sales in recent years. We think it is particularly illustrative as a case study because it presents a post-apocalyptic game/story that has interesting but implicit social resonances regarding the current "great recession"; thus, it metaphorically connects with intense contemporary tensions and debates around capitalism, austerity and the ways of dealing with economic crisis (on fiction and popular culture as significant objects of study to understand the social perceptions and discourses around the "great recession", see Boyle and Mrozowsky 2014). However, we are not using this case study as an illustration of general trends or patterns of videogame signification (which would require a much larger corpus) but just as an example of the application of the presented analytical model.

5.1. Audiovisual narrative (a brief approach)

"The Last of Us" tells the story of survival of Joel and Ellie in a post-apocalyptic world. Joel is a smuggler from Boston and Ellie is a girl of around 12 years of age who he has to take to a group called The Fireflies in exchange for a substantial reward. During the journey, Joel discovers that Ellie might be the only person immune to the fungus that has devastated mankind, turning people into a kind of zombie. As the story progresses, a subplot revolving around the personal relationship between the two characters unfolds: this drifts gradually towards a parent–child relationship that creates problems in terms of Joel's wishes and plans concerning Ellie. In fact, when Joel is seriously injured, the roles are

reversed for a time and Ellie takes care of him, saving his life. On reaching the Fireflies' camp, Joel discovers that they intend to use Ellie's brain for scientific research, looking for a cure for humanity, but this would mean sacrificing the girl. Faced with this dilemma, Joel finally decides to flee with Ellie, putting the life of his "daughter" before the salvation of mankind. The interactive narrative of "The Last of Us" follows a linear path in macro-structural terms since this ending is the only possible one.

As for the narrative roles, the role of the main "hero" corresponds to Joel, a white adult male, while a more "passive" role, regarding the character for whom the actions are carried out, corresponds to Ellie, the girl. However, after the discovery of Ellie's healing ability, she then primarily takes on the narrative function of "object of value", as well as Joel's helper in the adventure. Mankind then becomes the story's main "state subject" (cf.: Greimas and Courtés 1976).

In terms of the representation of the fictional world, it is worth noting the spectacular landscapes of a post-apocalyptic United States with shots of huge visual depth showing vast, forlorn landscapes with all kinds of signs of the decay of capitalist civilization: leaning skyscrapers, urban landscapes invaded by wild nature, supermarkets in ruins, traffic jam scenarios with empty, dilapidated cars, etc.

In conclusion, "The Last of Us" presents a story about individualism as a "bitter" yet necessary way of finding some happiness in a world in crisis, in which the protagonist must make a dramatic choice between humanity and "family", and he ends up choosing the latter. It is also a story about the power of love as opposed to materialism, linked to a representation of the characters' process of adaptation to an environment of capitalist decadence, and a story that essentially asserts the importance of austerity and interpersonal solidarity in order to survive in the Boston of 2033.

5.2. Ludo-narrative dimension

In this section we focus on the game design incidence in the representation of the main characters, Joel and Ellie, and their main action throughout the narrative/game: their struggle for survival.

In "The Last of Us", the action and state rules of the character/player follow the general pattern of action/adventure videogames: physical actions related to mobility, athletic skills and handling weapons, with a fundamental state variable related to the health level of the protagonist, Joel, which is visually represented by a progressive de-saturation of colour on the screen as his health deteriorates. In addition, Joel and Ellie's struggle for survival is associated, in the design of the game's interactivity, with five fundamental kinds of game mechanics:

Firstly, there are the "shoot-em-up" mechanics, where the protagonists have to face zombies or other enemies, such as the Fireflies at the end of the game, in shoot-out scenes. A second kind of mechanics, often combined with the previous kind, is that of stealthy infiltration. In many scenes where Joel and Ellie have to cross scenarios plagued with zombies, the player can choose to move stealthily, avoiding violent confrontation. In fact, in the medium-term the game design encourages the user to adopt this behaviour profile: the fact that zombies guide themselves by their sense of hearing, enhanced by the virus, means that using firearms has the effect of "calling" other nearby zombies, thereby greatly complicating things for the character/player. Therefore,

a more suitable approach tends to be that of stealthy infiltration and occasionally strategically throwing objects (bottles and bricks) to certain points of the scenario to make a distracting noise. All this gives the main character the feel of a cunning hero, rather than (or not just) a hero of brute force.

More sporadically, some scenes in the game are based on "puzzle" mechanics in which the character/player must explore the environment in search of one or more elements (e.g. ladders, sticks and planks) and put them in the right place in order to progress further. Frequently this also requires working out a key cooperative action between Joel and Ellie, fostering values such as collaboration and solidarity.

Another game mechanic is related to the development of usable tools and objects that are essential for survival. Throughout the city, the character/player can find all kinds of basic objects scattered around the area: duct tape, gauze, bottles of alcohol, sticks, scissors, etc. These items can be accumulated in the characters' "inventory", in order to create more complex objects and tools with them, such as wound dressings, certain weapons, etc., depending on the basic items available. Moreover, some of these objects and tools get used up (finally becoming wasted), which is a hint that the design is connected to values such as austerity.

A special game mechanic appears in a sequence where Ellie takes care of Joel. This is the mechanic of hunting with a bow and arrow. Following a narrative ellipsis, the user takes control of Ellie, who is chasing a deer with her bow. After learning how to handle the weapon and following the deer through a snowy forest, the character/player must hit the target repeatedly with arrows. The deer is elusive and escapes several times, so that the scene tends to be considerably long and somewhat monotonous; however, it is then revealed that Ellie is doing this activity to get meat for Joel, who is wounded in a shelter. Thus, this somewhat monotonous game design ends up generating appreciation for Ellie's perseverance and spirit of sacrifice for her friend and "father", Joel.

Finally, we should point out that the death of Ellie is a defeat condition in the game. Thus, in "The Last of Us" not only the death of Joel but also that of Ellie means losing the game. In the narrative context, this reinforces the emotional bond between the two characters and the significance of Joel's solidarity and sense of responsibility towards Ellie.

5.3. System-gameplay dimension

In relation to problem-solving processes, in "The Last of Us" there are three basic gameplay units linked to some interaction mechanics previously defined: (1) infiltration scenes, (2) shoot-out scenes and (3) "puzzle" type scenes. Throughout all of these basic challenges of the game, the user usually has a wide range of resources available in their inventory, tools that they create by a process of "recycling". Focusing on the user experience, the abundance of recyclable items and weapons throughout the city (and their replacement by the game system) is remarkable.

The high accessibility of valuable items in the game (in the normal difficulty mode) paradoxically makes the Boston of 2033 a kind of "supermarket" of free objects. Interestingly this seems to contradict the "post-apocalyptic" (and post-capitalist) poetics of the game narrative. In this sense, "The Last of Us" is very different from a post-apocalyptic "indie" (independently produced) videogame such as *DayZ* (Bohemia Interactive 2013),

where the character/player can travel very long distances and play for practically hours without finding basic items of value for survival (a much more crude approach to survival).

Moreover, an interesting characteristic of the gameplay design of "The Last of Us" is its "upgrading" system, whereby the character/player can improve several abilities as they progress in the game, abilities such as listening at a distance, "crafting speed" and "healing speed". This can be linked to the notion of neoliberal enterprising self, since the player is expected to evolve their avatar through reflection and strategic decision-making (see Baerg 2012, 2014).

Another transversal element of the gameplay is Ellie's ludic role as a difficulty-creating factor in the game. As we said before, Ellie's death is a defeat condition, so that, in addition to monitoring the movements of the zombies and eventually confronting them, the user must also be constantly on guard to protect Ellie. Although she occasionally helps Joel get rid of some enemies, in the game logic Ellie essentially plays the role of a difficulty creator. To put it crudely, she is a "burden" that creates problems in the problem-solving processes. Interestingly, in a way this comes into conflict with the game's narrative, where Ellie is characterized as a young woman with a strong personality, determination and independence. This is a clear example of potential frictions between representational and compositional meaning in videogame design: the same rule (defeat condition) can be "read" either as reinforcing the emotional bond between Joel and Ellie, as we pointed out before, or as a negative element in the game's internal logic, whereby Ellie would be essentially a "burden".

Finally, if we dissociate the "recycling" game mechanic from the game's representation, strictly referring to the user's activity it simply consists of accumulating objects and deciding when and how to use/consume them. In fact, a "user-friendly" interface brings together all the available options for constructing tools at all times, so that the user just has to choose what they want to obtain, and the appropriate time to do so. It is an activity involving accumulation and a pseudo-economic management of resources (strategic investment), far from the social framing of recycling as part of a fundamentally cooperative and creative culture.

As a final consideration, in general terms, since individual optimization of resources by the user/player is associated with "survival", "The Last of Us" potentially resonates with a certain kind of discourse of austerity in today's context of the great recession. The game tends to convey the idea that it is the optimal management of the resources available to each individual/family that will enable them to get through the "crisis". This approach contrasts, for example, with discourses on the need for community cohesion, collective activism and rebellion in favour of reforms of the system. In essence, "The Last of Us" puts forward individualistic adaptability as a bittersweet but "romanticized" approach to recession, projecting it as better than a vain, utopian (?) desire to change the world.

6. Conclusions

The main aim of this work consisted of building a bridge between social semiotics and game studies (fundamentally procedural rhetorics) in order to develop sharper analytical methods for understanding the signification potential of videogames. We therefore proposed an analytical model with specific dimensions and semiotic resources, which we have applied to the case study of "The Last of Us".

Throughout this work we have confirmed that social semiotics can (and must) make significant contributions to the study of videogame design as an expressive medium. Thus, we have shown that social semiotics are particularly suitable for integrating different theoretical currents and perspectives in videogame studies into a coherent whole, such as the narratological versus ludological views, and the representation versus designed problem-solving game design frames. This work also shows that multimodal approaches to videogame design are clearly necessary. It is indeed surprising that social semiotics has not yet played a significant role in the field of videogame studies, particularly regarding game design analysis.

Our analysis of "The Last of Us" has allowed us to illustrate some of the main potentials of the social-semiotic based analytical model we propose. This case study showed that there are relationships of coherence and mutual reinforcement to be found between the various semiotic dimensions of the videogame, but also complementary and ideologically contradictory relationships that enhance its semantic complexity: the videogame semiotic potential not as a uniform discourse, but rather as a space full of tensions and interactions between different values and conflicting ideological perspectives.

For example, we have identified relationships of coherence between the narration, extolling the virtues of austerity and solidarity, and elements of game design, such as problem-solving processes that demand the player to infer cooperative dynamics between the two main characters, and the fact that some of the game interactive objects and instruments get used up and may finally become wasted. However, we have also found contrasting or contradicting links between different compositional levels. For example, the contrast between the spectacular visual representation of capitalist decadence and significant patterns of interaction related to the accumulation of items, consumerism and neoliberalism, with positive connotations in the gameplay process. Moreover, we have seen that the mechanics of "recycling" posed by the game are, in the end, the result of a strategic management of consumption by the user, rather than procedures of a genuinely creative/cooperative nature. This implies an interesting discursive friction in the game between austerity and consumerism, and between anti-capitalist approaches involving the culture of recycling and the neoliberal culture of efficiency and productivity.

The presented case study was conceived as an analytical example to illustrate the application of the proposed analysis model. Therefore, it was not our intention to find general discursive patterns in contemporary videogame culture, but rather to provide a methodological tool to deal with this kind of research or similar projects. Although the particular characteristics of "The Last of Us" lead us to focus on social resonances of the great recession, austerity and neoliberalism, of course the model is supposed to be useful for addressing other subjects and social connotations of the videogame, such as the representation of gender, race or social class, as well as moral issues and the ethical complexity behind gameplay design (see Sicart 2013), etc.

Naturally, this paper is just an initial sketch of what could be developed into a fully fledged social-semiotic theory of videogame design. As for the limitations of the proposed analytical model, it is necessary to take into account that we have prioritized the case of mainstream videogames here; therefore, we have given prominence to aspects such as narrative, the representation of fictional worlds, and the component of challenges and problem-solving, which are central in the vast majority of mainstream videogames, but

may not be in other types of videogames. For alternative genres or specific formats of videogames, such as educational games, "serious games" or artistic/experimental videogames, it would probably be advisable to make certain adjustments to the model or to consider or construct other more-specific analytical models.

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No potential conflict of interest was reported by the authors.

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