This paper approaches the issue of the '*invention*' of video games – that is, the birth of a text that would mark the advent of a new medium – from a semiotic perspective, through the analysis of early games such as *Spacewar!* (Steve Russell et al., 1962), *OXO* (A. S. Douglas, 1952) and *Tennis for Two* (William Higginbotham, 1958). Research in this particular field may help to shed more light on much-debated issues about their nature as a medium, their characteristics as *semiotic texts*[1], and the role of the empirical authors in their relations with the semiotic processes of *enunciation*[2]. In addition, this may improve our comprehension of the role of semiotics in the study of video games, as well as about just how much we should believe in a real need for new disciplines that are willing to focus exclusively in this medium. *Inventorship* will ultimately imply a reflection about the role authors play in video games, a crucial issue today for the definition of the artistic, expressive and cultural status of games. We shall focus on 'primordial' interactive texts that game historians and scholars have considered so far as the "first video games" ever. However, nostalgia doesn't play a role in this decision, nor is historical interest in such titles the only reason for choosing them. They are, in fact, more important from a semiotic standpoint because they trace a line in the continuum of entertainment, appearing different from other kinds of technological experimentation that in many ways anticipated video games. These texts, in other words, mark the critical edge beyond which a text is popularly regarded as a "true video game" and are distinguished by characteristics in their interactivity and interface that are acknowledged as 'typical' of this relatively "new species"[3]. This essay should thus be seen as a semiotic take on this subject, as much as a historical, socio-cultural and *human* account. It is true that semiotic analysis demands that one should not too easily escape from the boundaries of a text. But our research is one of those cases in which it would be impossible for one to just look at one game at a time or to ignore the multitude of agents producing them. The reason why we delve so much into the *human* dimension of these texts is because a number of perspectives – the semiotic and the historical, the technological and the socio-cultural – are not necessarily self-excluding and are sometimes even necessary.

While the issue of the birth of video games is no virgin land, we shall try to understand more about *the nature of an electronic text; a family of texts and what makes it one*; *the shared culture and techniques that produced and 'use' the texts,* and *the authors enunciating these works*. The latter will be seen as *creators* in a problematic sense and we shall enquire about the very conditions under which actual people, not schemata, handle technology and turn it into unique works of digital entertainment. This, we hope, might help us think about not just why we define something as a game, but about the meaning and limits of authorship in video games.

Marco Benôit Carbone

1. *OXO, Tennis for Two, Spacewar!*: game texts as acts of *bricolage*

For years, the "very first video game" has been the label attached to Spacewar!. It was conceived by Steve Russell in 1962 with the support of other students. Later on, however, the primacy of place was attributed to Tennis for Two, a game conceived at the Brookhaven National Laboratory by William Higginbotham. More recently, another spin at the wheel of historical studies proclaimed one more candidate as the very first video game: OXO[4].

1.1 *OXO*: the first video game conversion

A. S. Douglas, an English student from Cambridge University, decided in 1952 that he would write a human-machine interaction code as his graduating thesis. Thus, he developed OXO, a digital take on Noughts and Crosses that originally ran on an EDSAC, an overwhelmingly large system that only existed as a single specimen. So OXO, as an original code, never actually 'migrated' to any other computer. While many versions have been reprogrammed and emulated, OXO has long remained in oblivion, part of the obscure experimentations that led the species of entertaining to the birth of video games. OXO's graphics were displayed on computer's CTR monitor, while the interface had been obtained by adapting the wheel of a common mechanical telephone: numbers from 0 to 9 tell the machine where to place the player's move. OXO is very much the work of a *bricolage* author, one that has no specialized or industrial-made tools to operate with, and instead uses many pre-existing 'pieces' of technology for a new purpose: to try and compose a kind of interaction that is different from the functions those pieces were originally intended for[5].

OXO is no original game on a formal level, Noughts and Crosses being a very classic, easy to replicate, medium-adaptable and 'portable' game that you may

even play on sand. OXO is, however, the very first and demonstrated emulation and re-mediation of an existing game form into the domain of electronic entertainment, precisely the first port to a valve computer. At least, until prior ports are discovered. But *is* OXO the *first* game ever? An objection might go like this: OXO doesn't invent anything, it just exploits the easy-to-convert characteristics of Noughts and Crosses to make way for other, more original electronic texts that will take *new* and original paths, thus defining the nature of video games.

1.2 *Tennis for Two*: simulation by para-text

Six years after OXO, Tennis for Two came along. This "tennis simulator" had been developed mostly by William Higginbotham in 1958 at the Brookhaven National Laboratory, a facility designed for the study of reactors and particle accelerators destined for research in nuclear energy. Higinbotham had witnessed the very first nuclear tests, but he evidently needed more, and decided he would enter the world's *Guinness Book of Records* by creating, together with David Potter, what many historians consider today as the very first video game. Tennis for Two was displayed on an oscilloscope, while his game structure was provided with a figuration by a ball of pixels passing over a rudimentary line of dots. In the intentions of the creators, these rudimentary formants stood for the theme and look of a tennis game. Whence the title. The interface, as in the case of OXO, had been integrally made "by bricolage", i.e. using existing materials such as a couple of joystick-controlled potentiometers plus two buttons that were used to orientate the direction of the ball and hit it. Something similar to *Pong* years later, and made without even purposely-dedicated hardware.

Tennis for Two started as a mere *divertissement* in Higginbotham and Potter's work day at the Brookhaven. The unusual tennis simulation worked on valve hardware and analogic controls that had originally been designed for use in cryptography and military ballistics. Tennis for Two, however, did something more than OXO: it was a never-before-played game even though it tried to simulate a real sports game. The title of the game is a key para-textual and meta-textual metaphorical strategy to make a setting at a time when graphics would hardly resemble any 'natural' object. Tennis as a logical set of rules and physical interaction is converted by Tennis for Two into a highly-simplified, ideal and stylized, yet working formula. At that time, not only could you not find a more 'realistic' tennis game, you couldn't find any other game working like Tennis for Two at all. And it would seem that this would mark something more important than the "mere conversion" of Noughts and Crosses accomplished by OXO. More, however, was yet to come.

1.3 *Spacewar!*: forging a new medium

Before OXO, and before Tennis for Two, Spacewar! had already found many supporters claiming that it should be regarded as the first ever video game. Like Tennis for Two, it is a system that tries to generate "extra meaning" through a metaphor: in this case, a space battle. The game ran on a *mainframe* computer the same size of a car, with a black and white cathode-tube screen. On the screen, two spaceships battled by firing missiles at each other as they moved across a background that resembled outer space dotted with stars. Programmed by Steve Russell and a bunch of other technicians, Spacewar! would go down in history as a landmark in the use of technology for entertainment by introducing the Three Position Display technology that hackers at MIT had nicknamed Minskytron after his developer's name. Like OXO and Tennis for Two, Spacewar! is not the product of a single creator, produced single-handedly from his or her personal and psychological genius, but the result of a work of assembly, brought together by a group working with pre-existing materials, techniques and technologies conjuring up ideas for using them in new and *entertaining* ways. Each of these primordial games used pre-existing materials to make its original *purposed programme* 'explode', thereby going against the original grain on the way to a new vision.

All of these games, and Spacewar! in particular, highlight the relevance of the role of the technological *bricoleur*[6]. Spacewar!, in particular, would later undergo a number of revisions and new implementations that would make it a game with a much more sophisticated set of 'moves' and control gradient. Part of the difference relied on the fact that the MIT programmers did not stop at phone discs and oscilloscopes, although they didn't appreciate the existing buttons provided with the machine. The hardware controls were unfit for good use and they made the two-player match uneven because one of the players had to rely on less efficient ones than the other. Thus, the team started working on a custom-made controller, the very first example of something that would later evolve into a very varied and popular family of interfaces: the game controller. Once again, this was obtained by assembling existing material. Two metal switches were used for ship controls and a red button would launch missiles. The team allegedly wanted to use a cloche or a lever, but couldn't find it. The logic with Spacewar!, thus, was the same as the acts that brought into existence Tennis for Two and OXO. This time around, however, it was taken to a new level because the newly-thought-of *interactive programme* demanded custom-assembled tools, made from existing pieces, instead of merely asking for existing tools to be adapted. As with previous games, the team at MIT worked on the basis of a shared technological and scientific background and actually brought into being a new gaming species along with its interface. It was in fact the *interactive programme* that they thought could
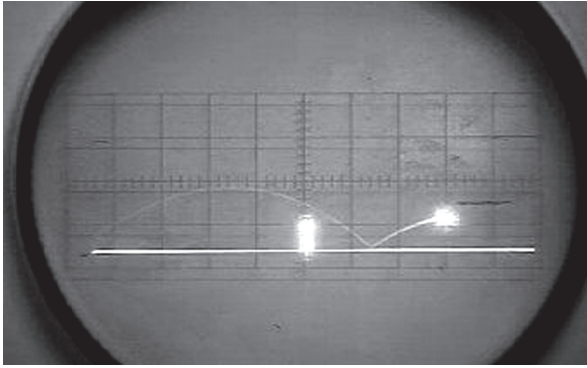
push the development of an interface, not the other way around. The key to Spacewar!'s success was clearly a powerful and simple interface[7], a success so great that the game started to be bundled along with the PDP-1 hardware, with students requesting controllers.

2. Towards a "non-creationist" explanation for the birth of video game

What we have seen about OXO, Tennis for Two and Spacewar! shows that it is not possible to declare the "world's first video game" merely by a chronological criterion. It's the textual characteristics of these works that count, and the different ways they count will lead us to different conclusions. In the theoretical debate it is now clear too that any definition of a 'new' medium has to deal not just with an assumedly new technology, but with the emergence of a new social practise that might emerge from a new use of an *existing* technology, as well. It is practises and uses that make a medium, not its mere technology, even though the technological and social contexts represent the premise for these practices[8]. In this sense, none of these games actually created new and real social and gaming practises, even though Spacewar! indicated the path for this revolution in entertainment. Later projects, such as *Computer Space*, *Baer's Home TV Games* and Pong, tried with different means and degrees of success to transplant the critical innovations of OXO, Tennis for Two and Spacewar! into a commercial paradigm that would transform the newly-distinguished video game medium into a mass phenomenon. Focusing either on the formal, aesthetic or interactive characteristics of these games would prove that the first ever video game is just an idealization. The birth of this medium has to be considered in the complexity of its evolution, and with the awareness of the *creative role of the very researcher* who is working out its taxonomy. We have chosen to move 'out' of a single case study and to take a look at the evolution of these games as semiotic texts, authors, the technological continuum and the historical context play a joint role.

3. The ghost and shell of video games as texts

From our perspective, inspired by Hjelmslev's (1961) theory about meaning, we see video games as multi-faceted systems that coordinate interaction between humans and machines through metaphors and interfaces, using a large array of materials to translate the whole of these substances in uses, practises, meanings, languages and games. From a technological standpoint, OXO, Tennis for Two and Spacewar! might even make us smile today, but at the time they were pure *avant-garde*, creating *new rules as they went along* from rough materials, at the cutting edge between consolidated technology and pure inspiration that ran counter to their original uses, to integrate their limitations for new purposes and sometimes create processes *ex novo*. If we think of OXO as the very first video game, we may face a contradiction if we admit that the simple conversion of an existing game to a new technology doesn't make a new form of gaming. In fact, the conversion is actually a disadvantage to the original game: it is less efficient and more space-consuming than a more traditional piece of paper. If we think about Tennis for Two, we might forget the importance of the technological basis which is clear in OXO as well, just by focusing purely on "game structure". Spacewar!, then? Probably, but that would be approaching the issue with a back-masked, deterministic approach, *i.e.* by simply noticing that it was the first all-around project conjugating a partially original interface and an original game structure. At the same time, we would lose track of which step truly 'makes' the game. The conclusion, then, is simple: it is possible to consider any of these games as the very first, for the birth of the video game is a pure abstraction, or a heuristic event, which depends on the premises one brings to it. Gerard Genette's (1979, 1982) well-known definition of the many 'areas' we can observe in our idea of semiotic texts can be very useful to our research. The textual nature of video games oscillates from the very beginning of their history from a supposed *core* level of textuality to one that is actually less predictable and identifiable, and that is more fuzzy and dependent on the diversely 'thick' para-textual, peri-textual ad epi-textual levels that surround it. In other words, it is *our* slicing up of meaning that produces the illusion of a solid identity of a text, which as a matter of fact does not exist "in nature". To dissolve the textuality of games is an impervious, but necessary task, not devoid of risks.

If we had to mindlessly view video games through an extreme, radical notion of para-textuality, we would be led to think that while any digital text is 'present' to us purely by means of its para-text, its 'true' form would reside exclusively in its formal (or binary) code. However, even to place the nature of games in their purely formal code would prove to be a simplification and an abstraction. These games start from different pieces of technology, pursue different interactive programmes, and seek diverse aesthetic strategies, but they have in common a new kind of use and interaction by a combination of 'code' (without forgetting that this is mostly analogical technology), interfaces, and plays.

On a practical level, the identity of these game specimens can't be found by separating interface and formal structure since the para-textual and peri-textual components that might at first appear as if they were 'external' or 'subordinate' to the formal level, are those that actually *make possible and define* the experience. Even if we can try out emulations of these analogic games without their original support, it is always our new supports that make up for that experience by recreating it on the same formal basis. On a theoretical level, moreover, even the code itself is a metaphor, and a substance on which textuality as a pure condition of meaning operates. The conclusion is that the questions about the nature of video-ludic texts and their definitions are legitimate, but they have to be made by a full critical awareness of the fact that meanings and media don't "exist in nature": it is always uses that define the medium, and theory that creates its own schemes. The medium is *just a part of the messag*e.

4. Shared technique and the creative agent

We've been trying to seek the invention of video games with two complementary aims in mind. The first has been to preserve the complex and negotiated semiotic properties of texts from the risk of anthropomorphism, while avoiding a much-too-easy belief in some sort of romantic role of the author. These obsolete ways of looking at texts wash out the complexity of the authorial notion (and game making) to mere biographical accounts or psychological mists. On the other hand, we have been trying not to deny the presence of real persons at work, being aware that next to the processes – although never to be confused with them – lie one or more subjects: the empirical authors[9].

It is our belief that in order to conduct an analysis which does not deny the empirical author by looking at the textual process, while not falling short in romantic *visions of geniuses*, it is extremely useful to have in mind the semiotic notion of *enunciation*[10]. The classical version of the theory of enunciation has guided semiotic interpretations according to the principle of the *immanence* of the text, helping them to avoid falling into psychological analysis that would forget that texts don't just come as they are out of the black boxes of their authors' minds, but develop through a series of collective, impersonal, complex processes that a studied analysis needs to account for. By mediating and converting deep structures of signification and the super-structural manifestations of meaning, the logical notion of enunciation is an indispensable tool. Furthermore, it is possible to recall this notion as it has been developed in the context of the *enunciative praxis* introduced by Fontanille (1994), who considered enunciation, via-Greimas, as a process by which the *virtualities* in meaning are converted to their manifestations not only by logical process but through the empirical uses of meanings shared by communities. The study of the complexity of video games does and always will need a subject-oriented version of this theoretical tool because it makes it possible to reflect on the relationships between the expression of an individual, the impersonal semiotic processes and the technical backgrounds. If used in an elastic way, this notion doesn't just force creation into an impersonal scheme, but it explains the limits of individuality when confronted with the creative background and the pragmatic process of reception. The inventor-author can thus be considered as a *liaison*, as a territory in which the actual person and the impersonal mechanisms of sense take place together.

Perspectives

The analysis of the invention of games from a semiotic perspective shows the weakness of hard 'creationist' and 'authorial' visions in games: there is no Adam and no Author, for there can be as many as there are variables eligible as conditions for its determination. It appears clear that a 'hard' notion for *inventorship* in video games (as well as of authorship) proves useless. A totally creative or autonomous creator is never to be found, for even when he or she works alone he or she works on the basis of means and languages. On the other hand, a 'light', fuzzy consideration of inventorship (and authorship) may look closely at these processes. What the theory of enunciation suggests is that the *invention* of games should be considered as a guiding concept, as a question mark. The inventor and the author, albeit not identical notions, share their properties in a heuristic sense, as litmus papers for the discussion of game creation, as picklocks to delve into game creation's processes and discourses.

The focus on the edge of what makes the 'first' game from a textual standpoint also shows an important issue for much of today's mounting proliferation of games-related studies. While many of today's theories are interested in recognising the identity and diversity of games as a medium, and are even willing to found new disciplines, it is becoming increasingly clear that to find a unique definition for the complex family of electronic games will prove quite a troublesome task. Do we really need new and bombastic schemes or definitions for video games? Is there actually a need for new branches or disciplines in order to understand games?

While there are many reasons why ludologists are continuing to study games as an individual medium, especially focusing on their formal logic, it shouldn't be forgotten that games produce meaning through a larger series of strategies and that, because they are not self-referential systems that need a specialized analysis, they share part of those with the other media from the family of the arts, requiring external sources for the production of meaning and implying a complex production of sense and diverse possibilities for its interpretation[11]. Sometimes, it is this very openness that makes the games, not their internal logic: any text is 'open' in a way that requires the user to complete it and defies the mere internal schemata many are trying to distil. Digital games are also part of a digital landscape, of a polymorphous continuum in which media, languages and practises have never been hybridising as heavily as today. While there are reasons to demand a specialized analysis, it would be anachronistic to ultimately try and look at the medium of video games as an ideally separated form of textuality. Semiotic studies have the advantage of an already developed epistemic consciousness about what is needed to understand this media-scape: they don't deal with *particular systems of meaning*, they discuss *the conditions under which any of them exist*. A sign from a semiotic standpoint is not a given, it is 'placed': it is a methodological choice to see that, in a certain portion of reality, somebody, under some circumstances, is placing some meaning; and it is a premise for looking in continuity at phenomena that look and mean differently (Eco 1984). This is essentially the reason why semiotic approaches are capable of dealing with the specificity of games while not necessarily feeling the need to create new analytic tools. The semiotic awareness of the role of empirical authors might also be instrumental in understanding the commercial strategies of author-oriented hype that have found their way into video games after developing in other media. Even though the rhetoric of authorship in marketing and press coverage of games is not as big as in other media products, advertising strategies, sometimes fuelled by ingenuous critics, do try and increasingly turn industrial products into "signed works of an author" who has become a mere sticker. The development of a conscious critical eye is in an important element to the much talked about *revolution in gaming culture* many are waiting for. Semioticians interested in video games, and critics and theorists alike, will better understand that their role might be much more appropriate, and *sensible*, back where it ought to stay: in the dissection and social criticism of meaning, rather than in an attempt at integrating theory with the processes of creation. It is weak to stand with one foot on either side of the divide because even though we all play a role in this ultimately enormous game, each of its levels has its complex, time-consuming rules.

Notes

[1] By referring to video games and texts we are, of course, thinking from the standpoint of semiotic disciplines, implying any kind of medium in this meaning-oriented definition, regardless of modality. For a definition of the notion of semiotic text see Eco, 1984; Greimas and Courtés, 1979.

[2] Not to be confused with the branch of phonetics studying the empirical act of speaking. By enunciation is here meant its definition in semiotic studies. The notion, which will recur in this essay, has developed into one of this discipline's most useful analytic tools. See Genette, 1979. About enunciation in computer games see also Agata Meneghelli's contribution to this volume.

[3] As in the case of cinema and any other kind of expression and medium, video games developed as a "unique" and "independent" medium from a history of experimentation in the field of electronics that might still be in need of proper exploration. See Bittanti, 1999.

[4] For a historical account of OXO, Spacewar!, and Tennis for Two see Kent, 2001 and Bittanti, 1999.

[5] The philosophical importance and evolution of technology, and the degrees by which it defines the creative horizon of the individual are thoroughly discussed in Carboni and Montani, eds., 2005.

[6] Jacques Derrida extended Claude Levy-Strauss' use of this notion in anthropology to any discourse, underlining the constant need for borrowings and heritage from one discourse and modality to another. See Derrida, 1967.

[7] Later on, Bushnell's Computer Space tried to reach commercial success by converting Spacewar! into a fascinating, sci-fi oriented commercial cabinet: but the project failed on the basis of a less effective interface, and the underestimation of the quality of the original. See Bittanti, 1999 and Kent, 2001.

[8] The problem of technological determinism, a critical view on the concept of "new media", and a reflection on the relationships between technology and practises are highlighted and discussed in Cosenza, 2004.

[9] Model and Empirical Author and Reader are presented and explained as part of the strategies of texts and as models for the analysis of textuality in Eco, 1979.

[10] As we have stated before, enunciation as it is intended here is not a branch of phonetics: it is in fact a way to look of looking at the way texts emerge in their superficial manifestation from a series of deep structures expressed by a series of processes independently of the empirical authors. See Fabbri and Marrone, eds., 1999; Floch, 1985; Greimas, 1979.

[11] A close examination of the debate between semioticians and ludologists is reported in Ruffino, 2006/7.

Bibliography

Bolter, J. D., Grusin, R., 1999, *Remediation*, Cambridge, MA, The MIT Press.

Bittanti, M., 1999, *L'innovazione technoludica – L'era dei videogiochi simbolici (1958-1984)*, Milano, Jackson Libri.

Carboni, M. & Montani, P., eds., 2005, *Lo stato dell'arte. L'esperienza estetica nell'era della tecnica*, Roma-Bari, Laterza.

Cosenza, G., ed., 2003, *Semiotica dei nuovi media*, *Versus*: 94-95-96, Milano, Bompiani.

Cosenza, G., 2004, *Semiotica dei Nuovi Media*, Roma-Bari, Editori Laterza.

Derrida, J., 1967, *L'Ecriture et la Différence*, Paris, Seuil; En. tr. *Writing and Difference*, London, Routledge, 1980.

Eco, U., 1979, *Lector in fabula*, Milano, Bompiani; En. tr. *The Role of the Reader: Explorations in the Semiotics of texts*, Bloomington (IN), Indiana University Press, 1979.

Eco, U., 1984, *Semiotica e Filosofia del lingaggio*, Torino, Einaudi; En. tr. *Semiotics and the Philosophy of Language*, Bloomington (IN), Indiana University Press, 1984.

Fabbri, P., Marrone, G., 1999/2001, *Semiotica in nuce*, vols. and II, Roma, Meltemi editore.

Floch, J. M., 1985, *Petites mythologies de l'oeil et de l'esprit*, Paris-Amsterdam, Hadès-Benjamin.

Fontanille, J., 1994, "Des Simulacres de l'enonciation à la prais ènonciative", in *Semiotica*, n. 99.

Genette, G., 1979, *Seuils*, Paris, Éditions du Seuil; En. tr. *Paratexts: thresholds of interpretation*, Cambridge, Cambridge University Press, 1997.

Genette, G., 1982, *Palimpsestes. La littérature au seconde degré*, Paris, Éditions du Seuil; En. tr. *Palimpsests: Literature in the second degree*, Lincoln, University of Nebraska Press, 1997.

Greimas, A. J., Courtés, J., 1979, *Sémiotique. Dictionnaire raisonné de la théorie du langage*, Paris, Hachette; En. tr. *Semiotics and language: an analytical dictionary*, Bloomington (IN), Indiana University Press.

Hjemslev, L., 1961, *Prolegomena to a Theory of language*, Madison (WI), University of Wisconsin.

Kent, Steven L., 2001, *The ultimate history of videogames*, New York, Three Rivers Press.

Ruffino, P., 2007, *Sovversioni del testo videoludico: un'analisi semiotica*, Master Thesis, Università di Bologna.

Computer games

Computer Space, by Bushnell, N. & Dabney, T., 1971, Nutting Associates.

Home TV Games, by Baer, R.H., 1968, Sanders Associates.

OXO, by Douglas, A.S.F., 1952.

Pong, by Bushnell, N. & Alcorn, A., 1972, Atari

Spacewar!, by Russell, S. et alter, 1962.

Tennis for Two, by Higinbotham, W., 1958.