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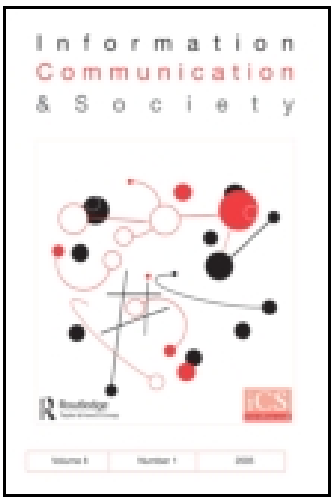

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DIGITAL ECO_LOGY

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Carlos Scolari

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Umberto Eco and a semiotic approach to digital communication

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The objective of this article is to review a series of semiotic contributions to the new media, computer-mediated communication and human-computer interaction research, centring on the works of Umberto Eco. This well-known Italian professor and fiction writer is one of the pioneers of the debate on hypertext and an active interlocutor in discussions on the future of the book. Researchers interested in digital textualities, computer-mediated communication and human-computer interaction have also applied Eco's theories. This article maps the connections between Eco's semiotic and digital field discussions.

Keywords Umberto Eco; semiotics; hypertext; interface; interaction

The spread of information and communication technologies and the advance of 'new media'[1] characterized by the confluence of media languages (multimediality), the intervention of the user in the text (interaction) and, in more recent years, the consolidation of collaborative environments (web 2.0) have been reflected in the theoretical production of semiotics. During the last two decades many semioticians have included 'new media', digital interfaces, computer-mediated communication and human-computer interaction processes in their research.

Why discuss semiotics, which is an 'old' discipline that was at the centre of academic debates in the 1960s and 1970s? Many researchers have proposed applying 'new paradigms' for analysing 'new media'. However, I consider that 'old theories' still have something to say about 'new media': we can't just throw away almost one hundred years of media research or, in this case, the long tradition of linguistics, semiology and semiotics (Scolari 2008c).

The objective of this article is to review a series of semiotic contributions to the 'new media', computer-mediated communication and human-computer interaction research, centring on the work of Umberto Eco. This perspective was not chosen by chance: Umberto Eco is one of the pioneers of the debate

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on hypertext in Europe. Eco has also been an active interlocutor in discussions on the future of the book and the cultural transformations that have resulted from digitalization processes. Last but not least, Eco's theory is one of the bases of the semiotics of interfaces and interaction processes.

The article will be based mainly on Umberto Eco's books, interviews, articles and multimedia productions. This bibliography will be complemented by that of semioticians who have included Eco's theoretical model in their investigations of 'new media', computer-mediated communication and human-computer interaction. It is possible to identify two epistemological paths in this article: (1) the application of Eco's interpretative theory to hypertext, 'new media' and human-computer interaction, and (2) Umberto Eco's own reflections on hypertext, the Internet and the future of the book.

In the first section of this article I will introduce the semiotic approach and Eco's contributions to the field. The second section is dedicated to those scholars who have applied the categories originally developed by Eco from his cathedra at the University of Bologna and the third section presents Eco's personal contributions to scientific conversations about hypertext. This section also includes a synthesis of Eco's participation in the debate about the end of the book. The article concludes with a final reflection and a bibliography that include many references to European and Latin-American semiotic production (the authors who have been most influenced by Eco's theories) about digital communication, human-computer interaction and computer-mediated communication.

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Eco's way of sense production and interpretation

Brief introduction to the semiotic approach

Before discussing 'new media', I shall briefly reflect on the 'old theories'. Semiotics, as many scholars believe, is not the 'science of signs' but a theory of sense production and interpretation. It operates with theoretical models of meaning creation and interpretation strategies. In other words, semiotics studies objects (texts, discourses) to arrive at processes (sense production and interpretation).

Umberto Eco (1975) introduced a division into semiotics. He considered that semiotics could be understood from two perspectives: the *theoretical* approach and the *specific* (or *applied*) approach. The first is known as *general semiotics* and is considered more philosophical, abstract and generalist. It constitutes the central core of complex theoretical thinking with strong relationships with psychology, cognitive science, linguistics, philosophy of language, anthropology and so on. The second approach involves applying the categories and concepts produced by the first approach to different phenomena. Since the 1960s

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semioticians have generated a series of specific semiotics, such as the semiotics of cinema, semiotics of theatre, semiotics of comics, semiotics of photography and so on, which today is very useful for developing a semiotics of digital interactive communications.

Eco (1975) also defined two boundaries or thresholds for semiotic scientific intervention. The *lower threshold* is constituted by basic perceptual activity in which interpretation is still not fully developed; the *upper threshold* refers to cultural systems. In the first case, to understand these phenomena semiotics is confined to a dialogue with the psychology of perception, cognitive sciences and so on; in the second case, the main interlocutors are anthropology and sociology. At the lower threshold we can identify semiotic micro-processes, like the first inference a driver makes when he sees something in the middle of a country road on a foggy morning. The driver thinks... What's that? A car? A cow? These hypotheses demonstrate that perceptual activities may be of semiotic interest, even if interpretative processes are not working to their full extent. For Eco these hypotheses could be defined as a 'proto-semiotic' process (Eco 1997b). At the upper threshold of semiotic pertinence we find the analyses made by semioticians such as Juri Lotman (1990), who is the recognized expert in the semiotics of culture. If we consider culture as a complex textual structure, then semiotic analysis is justified: we can 'read' cultural systems (such as gastronomy, sport, national cultures, etc.) as if they were textual networks.

To sum up briefly, semiotics is an empirical discipline that complements theoretical reflection on sense production and interpretation by applying these models to textual series. Semiotic pertinence moves from basic perceptual (proto-semiotic) processes to cultural systems. Defining boundaries could be very useful for analysing possible semiotic interventions in the digital field. Therefore, semiotic categories can be helpful for describing interactive micro-situations (like in human-computer interaction) or for studying extensive cultural issues in computer-mediated communication.

Umberto Eco and constructing a semiotic of interpretation

Umberto Eco was born in Alessandria (Italy) in 1932. His first best-selling book, *Opera Aperta* (1962), was a reflection on new trends in the poetics of art. Eco showed that interpreting certain artworks – for example, James Joyce's *Ulysses*, Alexander Calder's mobiles or Karlheinz Stockhausen's musical compositions – is an open process: the creator 'does not tell everything' to the readers or performers. Open works encourage and require a multiplicity of readings. Eco's *Opera Aperta*, a book written before the explosion of French Structuralism in the 1960s, is the first step in his reflection on interpretation processes that would reach its final definition 20 years later.

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In the year 1964, Eco published *Apocalittici e Integrati* (1964), a reference in the debate about mass/popular culture. During this period Eco was influenced by the Structuralist French movement – his analysis of Steve Canyon in *Apocalittici e Integrati* should be considered the first example of semiotic analysis of a comic – and, at the same time, he discovered the pragmatic philosophy of Charles Sanders Peirce. Both influences would be present in *La Struttura Assente* (1968).

At the end of the 1960s the first semiology, characterized by an automatic application of Saussure's oppositions (significant/significate, syntagma/paradigm, etc.) to non-verbal systems, was almost exhausted. The influence of C. S. Peirce's philosophy of interpretation on Umberto Eco would open new challenges to semiotic research. For the American philosopher interpretation is a continuous and never-ending process founded on the principle of 'unlimited semiosis'. Eco took up this principle and integrated it into his theory of interpretation.

In the late 1970s, Eco's model reached a final definition in two texts: *Trattato di Semiotica Generale* (1975) and *Lector in Fabula* (1979). In *Trattato* Eco proposed a general theory of codes and a theory of sign production (without refusing the tradition of the theory of information, for example, he still employed the concept of *code*), whereas in *Lector in Fabula* he developed a theory of interpretation as a cooperative process. In this book Eco broke the tradition of the theory of mass communication and theory of information – both models characterized by a lineal conception of transferring information – and refined a new proposal that included the following concepts (Eco 1979, 1984):

- Readers do not 'decode' texts: interpretation is a cooperative process in which the text's author 'provides something', but readers must collaborate in constructing the meaning.
- The text is the home of a conflict between the author's strategy (*model* or *implicit author*) and the reader's strategy (*model* or *implicit reader*).
- Texts are 'lazy machines' that need to be activated by the reader. When interpreting the text, readers apply *frames* or *scripts* to find meaning and make the text work.
- Readers may interpret a text, but they may also overinterpret it, 'putting more' than necessary to make it work. In this case readers are not interpreting but *using* the text (and opening the doors to Peirce's unlimited semiosis).
- Eco proposes a theoretical mutation from the *dictionary* to the *encyclopaedia*. While the dictionary is still based on code logic (one expression = one meaning), the encyclopaedia proposes a complex and networked model of semantic processes.

As we can see, Eco introduced categories from the cognitive sciences into the semiotic paradigm – for example, Marvin Minsky's *frames* (1974) and Roger Schank's *scripts* (1975). This contamination between the science of interpretation

and the science of cognition was not well seen within some semiotic schools, but it has undoubtedly enriched our comprehension of interpretation processes.[2]

Eco's successive contributions to semiotics can be classified into two groups. In the first, we could situate the discussions after *Lector in Fabula*, for example, the debates with the poststructuralist and hermeneutic scholars about the limits of interpretation (Eco 1990, 1995a). In the second, we could place different interventions in classic semiotic conversations, for example, about perception and iconism (Eco 1997b), the search for the perfect language (Eco 1993), literature (Eco 2002), translation (Eco 2007) and aesthetics (Eco 2004).

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Semiotics of digital communication: a map

Semiotics has been studying different kinds of texts (written, oral, iconic, etc.) for over forty years, developing specific applied semiotics. During the last two decades many semioticians have included 'new media', digital interfaces and interaction processes in their research. From this perspective interfaces are not texts, but they could be analysed as if they were texts; by the same logic, interaction may also be considered as a sense production and interpretation process.

Looking at the scientific production of the last 20 years, we see that semioticians have made many contributions to digital media and computer-mediated communication research. Interfaces (Nadin 1988; Zinna 2004), hypertext and information architecture (Bettetini *et al.* 1999) and virtual reality (Bettetini 1991) have been analysed from the perspective of sense production and interpretation. Computer-mediated communication practices like virtual communities (Fraticelli 2004; Mascio 2003; Vittadini 2004), online museums (Piani 2003), online branding (Ferraro 2002; Marmo 2003; Scolari 2008a), web navigation (Cosenza 2004; Santaella 2004) and videogames (Bittanti & Eugeni 2004; Galofaro 2003; Maietti 2004; Scolari 2008b) have also been included in the agenda of recent semiotic research. As it can be easily transported from one text to another and as it is a unique combination of traditional semiotics and cognitive sciences, Umberto Eco's theory of interpretation is behind many of these works.

Nevertheless, if we compare this newborn 'semiotics of new media' with the traditional semiotics of television, cinema or publicity, we see that it is a field that is still under construction.

The semiotics of human-computer interaction, however, has consolidated an interesting *corpus* of researches and contributions. If we consider human-computer interaction as a semiotic process, research should focus on the interface – considered as a sense production device – and should analyse the ambiguous game between signification and interpretation played by designers and users. For semioticians this process is not a linear transmission of information

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(interface → user) but a co-operative one (designers ↔ interface ↔ user): both designers and users, mediated by the interface, participate in this contractual game of sense production. From this perspective semiotics proposes qualitative research that complements traditional quantitative research (Scolari 2007).

Semioticians have enriched human-computer interaction research in many different ways; for example, by proposing a framework for understanding and designing computing systems as sign systems. From this perspective programming is considered as a process of sign-creation and the user's working situation can be seen in an interpretation context (Andersen 1992, 2001). Semiotic research has also been helpful for understanding children's signification processes better to design elements in the web (Baranauskas & Melo 2003), and has improved assessments of expressive power in geographic information systems (Baranauskas *et al.* 2000). It has also contributed to the design of computing systems by placing them in a much broader theoretical and philosophical context (Andersen 1990). Semiotics has provided a characterization of end user programming as an essentially linguistic design activity (de Souza 1993, 2005; de Souza *et al.* 2001a; de Souza *et al.* 2001b).

This last approach, known as *semiotic engineering* and well known in the human-computer interaction community, has some limits that can only be understood if we approach it with Eco's interpretation model. For semiotic engineering interactive systems are devices that propose an exchange between designers and users. This approach focuses on two central ideas:

1. That interactive systems are high-level messages sent from designers to users about how to send and receive other messages in the system in the process of achieving a certain range of goals.
2. That these designer-to-user messages are metacommunication artifacts, performing messages that concretely send and receive a variety of messages to and from the users (de Souza *et al.* 2001b, p. 479).

Even though semiotic engineering was developed in the 1990s, it is still anchored in Eco's theory of codes and sign production as introduced in the *Trattato di Semiotica Generale* (1975). It would be enough to move the bibliography four years into the future to gain another perspective of human-computer interaction. Since *Lector in Fabula* (1979) Eco has developed an interpretation theory based on a set of epistemological movements: from *code* to *encyclopaedia*, from *sign* to *text*, and from *decoding* to *interpretation*. These movements are not just semantic interchanges: going from codes to encyclopaedias means going from a 'flat' notion of sign – understood as a simple substitution of terms, like in a dictionary – to a new idea of sign based on the inferences and dialectics of semiosis. The distance from *code* to *encyclopaedia* breaks the message-sending

lineal tradition that can be found in traditional linguistic, information or broadcasting theories.

From this perspective semiotic engineering is still fixed in a lineal conception of human-computer exchanges:

> Human-computer interaction is a specific type of twofold computer-mediated metacommunication in which computer system designers send system users a *one-shot message*: The message tells the users how to communicate with it in order to accomplish a certain range of effects. It is a one-shot message because, from a design point of view, it conveys a complete and immutable content encoded in and made available by the system's interface. (de Souza 2005, p. 84)

Thanks to Umberto Eco, semiotics abandoned concepts such as *message*, *effects* and *encoding* more than twenty-five years ago. Even though it takes Peirce's theories into account – for example, the concept of *unlimited semiotics* – semiotic engineering does not fully develop the consequences of Eco's paradigm mutation.

Let us look at human-computer interaction processes with a 'post-*Lector in Fabula* approach', which are no longer based on signs but on sense production and interpretation strategies. From this perspective interpretation processes are inscribed within the text (in our case, within the interface). If a text includes a communication programme, a reading proposal or contract that the reader must accept and activate during the interpretation process, then, by the same logic, interfaces include an interaction proposal that the user must accept in order to perform actions in an interactive environment (Scolari 2001, 2004). The designer–user dynamics is similar to the author–reader relationship: users must cooperate in constructing the meaning of the interface.

European and Latin American semioticians have made relevant contributions to human-computer interaction with a post-*Lector in Fabula* approach. For example, Scolari (2001, 2004), Diamanti (2003), Galofaro (2003) and Cosenza (2004) have developed the concept of *implicit user* (or *model user*) to describe the user constructed by the interface; similarly, the designer's sense strategy within the interface may be defined as the *implicit designer* (or *model designer*). Both figures – *the implicit designer* and the *implicit user* – 'live' within the interface and should not be confused with the mental models of the real designers or users. Like the *enunciator/enunciatee* of narrative theories, they are just a simulacrum of real entities. This semiotic device inside the interface could be seen as an *interaction proposal* that the real user may or may not accept. If it is accepted, we could talk about establishing an *interaction contract* between the real user and the interface (Scolari 2001, 2004).

The above approach is founded on the dialogue between semiotics and cognitive sciences. As we have already mentioned, Eco based his interpretation theory on recuperating cognitive concepts such as *frame* and *script*. If readers

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apply frames/scripts when interpreting a text so as to cooperate in constructing its meaning, users, by the same logic, also cooperate in constructing the meaning of interfaces by applying frames/scripts.

Eco (1997b) has also recuperated the concept of *affordance*, a term originally developed by J. J. Gibson (1979) in his ecological model of perception. As every human-computer interaction researcher knows, *affordance* is one of the key concepts of Don Norman's approach to interaction processes (Norman 1988). This dialogue between semiotics and cognitive science works very well because the two fields complement each other: semiotics takes care of the interfaces (texts) while cognitive science analyses the mental processing of information (frames, scripts, etc.). For semiotics the mind is a black box and for cognitive science text is a rather opaque construction. In this context, a bidisciplinary approach is needed and recommendable. Incorporating a cooperative and conflictive concept of human-computer interaction processes would help researchers to go beyond instrumental conceptions ('interface as a prosthesis that disappears' and 'human-computer interaction as a transparent process'). Semiotics, in this context, could be very helpful for deconstructing this superficial vision of interactions and improving the analysis of digital interfaces to go beyond the tradition of usability research (Scolari 2004, 2007).

The name of the hypertext

In this section I shall describe Umberto Eco's theoretical contributions to digital communication and hypertext. Eco has not only lectured and written about these new experiences, like the pioneers of hypertext research in the United States such as George Landow and Stuart Moulthrop, but he has also participated in advanced multimedia projects where he could test his ideas about textual networks.

From *Opera Aperta* to *Encyclomedia*

In the year 1992 in Milan, Eco presented a prototype of *Multimedia Guide* (*MuG*) during the European Conference on Hypertext Technology (ECHT '92). The project was adopted by the Olivetti Group and commercialized as *Encyclomedia Guida Multimediale alla Storia della Civiltà Europea*. This series of cd-roms on European culture should be considered the most ambitious Italian multimedia project in the 1990s. Umberto Eco was personally involved in coordinating the scientific committee of *Encyclomedia* and promoted the project from the beginning.

Encyclomedia – a set of four multimedia cd-roms with articles, images, videos, music and sophisticated databases, search engines and conceptual maps designed between 1995 and 1998 – reconstructed European culture from the

sixteenth to the nineteenth century. The network of 15,000 texts, 70,000 links and 10,000 images included information about history, technology, visual arts, science, philosophy, literature, music, religion and economy. *Encyclomedia* was first distributed in a specific circuit (libraries, schools, universities) and a second edition of 12 cd-roms arrived to the greater public inside the *L'Espresso* weekly magazine in 1999. The *Encyclomedia* project also generated theoretical reflections on hypertext and digital learning in Eco's research group (Barbieri 1993; Bassi 1992, 1994, 1996; Eco 1992).

The roots of Eco's interest in hypertext can be found in *Opera Aperta* (1962), the book that described the multiple interpretations of complex artistic textual machines. Today, *Opera Aperta* is considered an indispensable bibliographic reference by many hypertext researchers. Let's look more deeply into this relationship between *Opera Aperta* and hypertext. The first theoretical reflection on hypertext was developed in the United States in the late 1980s, when a new generation of scholars educated in literature studies discovered the hypertextual technologies created in computer science labs. In the already mythical first paragraph of *Hypertext: The Convergence of Contemporary Critical Theory and Technology*, Landow wrote:

> When designers of computer software examine the pages of *Glas* or *Of Grammatology*, they encounter a digitalized hypertextual Derrida; and when literary theorists examine *Literary Machines*, they encounter a deconstructionist or poststructuralist Nelson. These shocks of recognition can occur because over the past several decades literary theory and computer hypertext, apparently unconnected areas of inquiry, have increasingly converged. (1992, p. 2)

George Landow and many other hypertext experts adhered to Derrida's deconstructionist perspective and to poststructuralist postulates. In that moment in the 1980s the French theories of Michel Foucault, Jacques Derrida and Jean Baudrillard were at the centre of intellectual debates in American humanities. In his well-known book on hypertext Landow (1992) referred to recognized members of the European semiotic tradition such as Roland Barthes and Mikhail Bakhtin, but he did not mention Eco's *Opera Aperta*, a book translated and published in 1989 by the Harvard University Press.

Let us analyse this bibliographic breakdown: Landow's *Hypertext* was originally published in 1992. One year later the editing house Baskerville from Bologna published the Italian edition (*Ipertesto: Il Futuro della Scrittura*); the book was translated by Bruno Bassi, a researcher from Umberto Eco's group and a member of the original *Encyclomedia* team. On the cover of the book there was an image of the prototype of *Encyclomedia*.

In the final note of this Italian edition Landow introduced the concept of *Opera Aperta* into his theory of hypertext:

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> When Bruno Bassi invited me to write some comments for the Italian edition of this book, my first reaction was to ask myself what has happened to my work about hypertext since the publication of this volume. Two answers come immediately to my mind, the first one about the theory and the second one about the mutations in the way I use the hypertext in my didactic activity. First, if I should write his book today, I'd include sections about the relationship of this new technology with Umberto Eco's concept of *open text* and Gilles Deleuze's and Felix Guattari ideas about the *rhizome* and the *nomadic writing*. (Landow 1993, p. 251)

And how did Eco see this intersection between hypertext and the open work?

> We may conceive of hypertexts which are unlimited and infinite. Every user can add something, and you can implement a sort of jazzlike unending story. At this point the classical notion of authorship certainly disappears, and we have a new way to implement free creativity. As the author of *The Open Work* I can only hail such a possibility. (Eco 1997c)

From a semiotic perspective, hypertext may be considered a special kind of open work, an uncompleted text that 'does not reveal everything' to the readers and encourages them to participate in the construction of meaning by navigating the textual network. The link between the *Opera Aperta* and hypertext theory was finally fully established when Landow included a reference to Eco's concept in *Hypertext 3.0: Critical Theory and New Media in a Global Era* (Landow 2006, p. 325).

The relationships between semiotics and hypertext theory have never been easy. For some semioticians (Verón 1999) the discovery of textual networks by hypertext researchers in the late 1980s sounded like an old joke: European semiotics had introduced concepts such as *active reader* and *textual networks* into its scientific discourse at least twenty years before. The active role of the reader was first theorized in the semiotic field by the Italian professor Ferruccio Rossi-Landi in the early 1960s, and at the end of that decade the reader-response theories were already consolidated (Iser 1978; Jauss 1982).[3]

In other words, when semioticians examine *Hypertext: The Convergence of Contemporary Critical Theory and Technology*, they encounter a semiotized Landow that recovers old semiotic concepts such as Bakhtin's or Levi-Strauss's *textual dialogism*, Verón's network of *social semiosis* and Eco's *Opera Aperta*. These shocks of recognition occurred because the exchanges between European and American scholars were not so fluid in the past: everyone was talking about the same thing but speaking different academic languages, applying different dictionaries and talking from different continents. In any case, it should be pointed out

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that Landow's hypertext theory confirmed that interpretation is *also* a cooperative process in interactive environments.

The future of the book: a 'this-will-kill-that' story

As a recognized writer, intellectual and bibliophile Umberto Eco has also participated in the never-ending debate on the future of the printed book. Let us recapitulate this path. The spread of digital technologies and the creation of networks of digital texts led to an apocalyptic discourse on the future of books, considered to be an old species condemned to extinction because of the arrival of a new predator: hypertexts. The challenge and big question of the 1990s was: Would hypertext kill the paper stars?

In the year 1992, Robert Coover opened the debate in an article titled 'The End of Books', published by *The New York Times*:

> Hypertext is truly a new and unique environment. Artists who work there must be read there. And they will probably be judged there as well: criticism, like fiction, is moving off the page and on line, and it is itself susceptible to continuous changes of mind and text. Fluidity, contingency, indeterminacy, plurality, discontinuity are the hypertext buzzwords of the day, and they seem to be fast becoming principles, in the same way that relativity not so long ago displaced the falling apple. (Coover 1992)

In the beginning of the digital age any sort of text seemed to be moving 'off the page'. After 500 years of printed books and 2,000 years of browsing pages the world wide web affected deep-rooted conceptions of knowledge production and reproduction. Traditional paper printed books, like dinosaurs, were to become extinct.

Digital networks also challenged traditional theories and conceptions about cultural industry. Semioticians, obviously, could not stay away from the debate. In the year 1994, at the International Center for Semiotic and Cognitive Science (San Marino) Eco organized a seminar on 'The Future of the Book' that attracted hypermedia experts from around the world. As a result of this seminar Geoffrey Nunberg published *The Future of the Book* (University of California Press 1997). In this seminar Eco introduced his essential ideas on the consequences of the digital textual revolution.

Eco identified a series of themes around the 'end of the book' discourse and tried to go beyond Manichean oppositions such as old/new, good/bad, past/future, life/death and so on. Let's hear what Eco said about the future of the most important device for culture transmission since the fifteenth century:

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Images versus alphabetic culture	Responsibilities and tasks must be carefully balanced. If for learning languages, tapes are better than books, take care of cassettes. If a presentation of Chopin with commentary on compact disks helps people to understand Chopin, don't worry if people do not buy five volumes of the history of music. Even if it were true that today visual communication overwhelms written communication the problem is not to oppose written to visual communication. The problem is how to improve both (Eco 1997c).
Books versus other supports	[...] I am pretty sure that new technologies will render obsolete many kinds of books, like encyclopaedias and manuals [...] Books will remain indispensable not only for literature, but for any circumstance in which one needs to read carefully, not only to receive information but also to speculate and to reflect about it (Eco 1997c).
Publishing versus communicating	People can communicate directly without the intermediation of publishing houses. A great many people do not want to publish; they simply want to communicate with each other. The fact that in the future they will do it by e-mail or over the Internet will be a great boon for books and for the culture and the market of the book. Look at a bookstore. There are too many books (Eco 1997c).
Change versus merging	In the history of culture it has never happened that something has simply killed something else. Something has profoundly changed something else [....] It seems to me that the real opposition is not between computers and books, or between electronic writing and printed or manual writing (Eco 1997c).

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In the following years Eco continued to participate in debates on the end of the book in various conferences and events, but the foundations of his discourse were those presented at San Marino in 1994. In a series of interviews (*A Conversation on Information* by P. Coppock 1995b; *Le notizie sono troppe, imparate a decimarle, subito* by P. Claesson & K. Billinghurst 1996a, *The World According to Eco* by L. Marshall 1997a) Eco described many personal circumstances and experiences concerning computer use and information overflow:

> Once upon a time, if I needed a bibliography on Norway and semiotics, I went to a library and probably found four items. I took notes and found other bibliographical references. Now with the Internet I can have 10,000

items. At this point I become paralysed. I simply have to choose another topic. (Eco 1995b)

Eco's first reflections on digital textualities were focused on cd-roms, but the spread of the world wide web has enriched his discourse on hypertextuality. For Eco the web can be considered as an 'acephalous system', but he also asks 'to what extent can this system remain acephalous?'. Overloading the network at some point 'will impose some filtering and discipline, and at this point we don't know what will happen'. Eco advocated for establishing new 'professional filters', experts that could be qualified as 'information consultants' or 'gatekeepers' (1995b).[4]

In the year 1996, Eco lectured at the Italian Academy for Advanced Studies in America. His talk – entitled *From Internet to Gutenberg* (Eco 1996b) – was an incredible hypertext-like *tour de force* that included Plato, Proust, Victor Hugo, McLuhan, Gutenberg, Mallarmé, Queneau, Napoleon, Descartes, Daguerre, Aquinas, Joyce, Saporta, Kant, Balestrini, Shakespeare, Debray, Allen, Tolstoj, Dickinson and so on. In this lecture Eco once again developed his concept of digital textuality, as he did in his conference at the newly inaugurated Bibliotheca Alexandrina (*Vegetal and Mineral Memory: The Future of Books*, 2003) a few years later.

All of these lectures and interventions were studded with the usual collection of brilliant gems that characterize Eco's discourse. Like Marshall McLuhan, Eco has a great capacity for creating compelling verbal images of cultural transformations:

A mediaeval cathedral was a sort of permanent and unchangeable TV programme that was supposed to tell people everything indispensable for their everyday life, as well as for their eternal salvation. (Eco 1996b)

Were McLuhan still among us, today he would have been the first to write something like 'Gutenberg strikes back'. Certainly, a computer is an instrument by means of which one can produce and edit images, certainly instructions are provided by means of icons; but it is equally certainly that the computer has become first of all an alphabetic instrument. (Eco 1996b)

The WWW is the Great Mother of All Hypertexts, a world-wide library where you can, or you will in short time, pick up all the books you wish. The Web is the general system of all existing hypertexts. (Eco 1996b)

We have three types of memory. The first one is organic, which is the memory made of flesh and blood and the one administrated by our brain. The second is mineral, and in this sense mankind has known two kinds of mineral memory: millennia ago, this was the memory represented by clay tablets and obelisks, pretty well known in this country, on which people carved their texts. However, this second type is also the electronic

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> memory of today's computers, based upon silicon. We have also known another kind of memory, the vegetal one, the one represented by the first papyruses, again well known in this country, and then on books, made of paper [. . .] This place (the Bibliotheca Alexandrina) has been in the past and will be in the future devoted to the conservation of books; thus, it is and will be a temple of vegetal memory. (Eco 2003)

> Even if printed on modern acid paper, which lasts only 70 years or so, (books) are more durable than magnetic supports. Moreover, they do not suffer from power shortages and black-outs, and they are more resistant to shocks. (Eco 2003)

> Please remember that both the Hebrew and the early Arab civilisations were based upon a book and this is not independent of the fact that they were both nomadic civilisations. The Ancient Egyptians could carve their records on stone obelisks: Moses and Muhammad could not. If you want to cross the Red Sea, or to go from the Arabian peninsula to Spain, a scroll is a more practical instrument for recording and transporting the Bible or the Koran than is an obelisk. (Eco 2003)

> After having spent twelve hours at a computer console, my eyes are like two tennis balls, and I feel the need of sitting down comfortably in an armchair and reading a newspaper, or maybe a good poem. Therefore, I think that computers are diffusing a new form of literacy, but they are incapable of satisfying all the intellectual needs they are stimulating. (Eco 2003)

To conclude this section, we could say that Eco's vision of the future of the book is closer to the conceptions of Marshall McLuhan and other members of the media ecology tradition. As we have seen, Eco considers that books will not disappear: they are just redefining their place in the media system. Even if today 'the concept of literacy comprises many media', the book is still 'the most economical, flexible, wash-and-wear way to transport information at a very low cost [. . .]' (Eco 1997c).

The future of Eco's semiotics in the digital field

To conclude this article I shall introduce a couple of interesting paths based on Eco's semiotics for improving research on digital interactive communication. As everybody knows, the relationships and exchanges between different media have increased over the last few years. The media convergence is not only economical but semiotic systems also create dialogues and convergences between each other. Promiscuity seems to be the most relevant trait of today's mediasphere: a successful videogame moves from the interactive screen to cinema, a TV serial

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generates a 60-second mobisode or a comic book, and reality shows start on television but continue their stories in blogs and web pages. Eco's latest reflections on 'intersemiotic translation' (Eco 2007) should be recuperated from the perspective of a semiotics of converged media. If old and new media continue to collide, semioticians will have to deal with 'transmedia storytelling' (Jenkins 2006). The semiotic tradition in general, and Eco's theories in particular, would be helpful for understanding these complex multimodal narrative structures.

Another important field in which Umberto Eco's models could be applied is videogame studies. The new generation of videogame researchers is developing a theory called *ludology* that is based partially on rejecting narrative and semiotic tradition (Wolf 2001; Wolf & Perron 2003; Wardrip-Fruin & Harrigan 2004). Espen Aarseth, a theorist of 'ergodic literature' and the 'cybertext', explains that he is

> [F]ar from convinced that computer-mediated communication is fundamentally and primarily a semiotic domain [. . .] But it must be added here that the field of computer semiotics is still very young and that it is far too early to draw any firm conclusions about its viability. However, the problems and short-comings of the semiotic approaches [. . .] indicate that semiotics is not beneficial as a privileged method of investigation. (Aarseth 1997, p. 41)

For Gonzalo Frasca 'traditional literary theory and semiotics could not deal with these texts, adventure games, and textual-based multi-user environments because these works are not just made of sequences of signs but rather behave like machines or sign-generators' (Frasca 2003a, p. 223).[5] As the many texts demonstrate (Bittanti & Eugeni 2004; Maietti 2003; Scolari 2008b) semiotics has a lot to say about videogames. Applying Eco's concepts, such as *possible world* (Eco 1979), may serve to enrich the study of videogaming. Obviously, semiotics can't say everything about videogames, but it is also true that ludology should include a semiotic point of view in its multidisciplinary theoretical framework.

Finally, another possible path to explore is applying Eco's reflections on semantics, dictionaries, labyrinths and encyclopaedias to discussions on semantic web and artificial intelligence (Eco 2007).

Nevertheless, Umberto Eco's most valuable contribution to scientific research – not only in the digital field – is his curiosity about new phenomena while not rejecting tradition: exploring the 'new' without refusing the 'old' would be an appropriate definition of one of the most important intellectuals of twentieth century.

Notes

1 To talk about 'new media' makes no sense: radio was a 'new media' in the 1920s and television in the 1950s. Blogs and collaborative platforms are

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currently considered 'new media', but in a couple of decades they will be considered another chapter in the handbook of media history (Scolari 2008c). Therefore, in this article I will write 'new media' within quotation marks.

2 For example Paolo Fabbri critiqued the absence of an analysis of passional states in Eco's purely cognitive approach to interpretation. For Fabbri 'the *lector in fabula* executes condensations, movements or temporal references, but does not experience any kind of passion' (1998, p. 107). As the most important representative of Algirdas Greimas' school in Italy, Paolo Fabbri has been the main semiotic counterpoint to Umberto Eco for over forty years.

3 The objective of our analysis is not to establish 'who invented hypertext first' but to describe the dangerous liaisons between textual semiotics, hypertext theory and deconstructionism. The animated debate between semiotics and deconstructionism may be followed through Eco (1995a).

4 Fifty years before Eco, Vannevar Bush proposed the 'trail blazer', an expert in information navigation: 'There is a new profession of trail blazers, those who find delight in the task of establishing useful trails through the enormous mass of the common record' (Bush 1945). [Online] Available at: http://www.theatlantic.com/doc/194507/bush (20 July 2008).

5 It may also be useful to read a brief analysis of the ludology versus narratology controversy in Frasca's *Ludologists Love Stories, Too: Notes from a Debate That Never Took Place* (Frasca 2003b).

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