

WHY STUDY LITERATURE?

Edited by

Ian Alber, Stefan Iversen, Louise Brix Jacobsen,
Rikke Andersen Kraglund, Henrik Skov Nielsen
and Camilla Møhring Reestorff

Marie-Laure Ryan

Why study literature? Though formalists and structuralists did not explicitly address the question, we can imagine what kind of answer would derive from their conception of literature as a language within language and as the product of cultural conventions. In a much celebrated book, Jonathan Culler attributes the ability to understand and enjoy literary texts to a specialized “literary competence”:

To read a text as literature is not to make one’s mind a *tabula rasa* and approach it without preconceptions; one must bring to it an implicit understanding of the operations of literary discourse which tells one what to look for. Anyone lacking this knowledge, anyone wholly unacquainted with literature and unfamiliar with the conventions by which fictions are read, would be, for example, quite baffled if presented with a poem...He would be unable to read it as literature...because he lacks the complex ‘literary competence’ which enables others to proceed (Culler 1975, 113-114).

Borrowing a concept from Jurij Lotman, Culler conceives of literature as a “second-order semiotic system, which has language as its basis” (113-114). We don’t learn this system as we learn our first language: if literature is the product of semiotic and cultural conventions, its appreciation must arguably be taught, studied – or slowly acquired through the reading of many texts.

A counterpoint to this position was delivered by Mary Louise Pratt in her 1977 critique of the Russian formalist conception of literary language as separate from ordinary language. She championed a view of literature (and of verbal art) as continuous with the spontaneous practices of conversational storytelling and witty uses of language. Verbal art is everywhere – it is part of our basic social and linguistic competence. More recently, evolutionary approaches (Dutton 2009, Boyd 2009) have stressed the adaptive advantages to be gained through the practice of the arts in general and of literature in particular. Against the view that literature is entirely the

product of culture-specific conventions, this school emphasizes the cognitive universals that make us appreciate the stories and poems of foreign cultures, and it postulates the idea (sacrilegious to postmodern theory) of a "human nature" shaped through hundreds of thousands of years of adaptation to environmental conditions which are basically the same for all of mankind. The differentiations that culture imposes upon the human mind are only the tip of the iceberg, compared to the common features determined by evolution. We learn the ability to understand literature (especially narrative fiction) from the storytelling of mothers, from life experience and from social interactions; there is no more a need to teach people how to appreciate stories, poetry or drama than there is a need to learn our mother tongue from a Berlitz course.

While this position rests on sound premises, too literal an interpretation can lead to an interpretation as fallacious as the attempt to justify the study of literature by claiming that we need a specialized competence to process literary texts. Even if the appreciation of literature comes naturally (at least to most of us), it does not follow that this faculty of the human mind is unworthy of critical or even scientific study. To the curious mind, everything in nature and culture is worth studying, literature included. As long as we place stock in the humanities, we can rely on the Roman playwright Terentius for a reason to study literature: *Homo sum: humani nil a me alienum puto*. But in this argument, literature is no more or no less worth studying than any aspect of culture, whether high or popular, and it loses the privileged pedagogical status that it has enjoyed so far. We would not ask the question "why study literature" if it weren't for a sense that literature has become an endangered species and reading an obsolete activity.

There are two culprits of this sense of decline: one theoretical, the other practical or social. The theoretical culprits are the critical fashions of the past twenty years. Literature has not (yet) disappeared from academic programs, but what is being done in these programs is often not the study of literary texts as a form of art and entertainment. The close reading of texts has been replaced by the study of a particular brand of philosophy, known as "critical theory", that uses the literary text as a springboard for its own self-centered activity; by the study of historical contexts, known as New Historicism; and by the study of cultural attitudes, a project that uses literary texts as documents of social realities and puts them on par with any text used by historians: statistics, testimonies, letters, newspaper

articles, and so on.¹ The approaches that are currently most popular tend to be interested in everything that surrounds the literary text but nothing in the text itself, and they disregard the reasons why we read literature. What is lost in these critical schools is the *pleasure* of the text.

The social culprit of the decline of literature is the proliferation of other modes of entertainment. With the development of film, TV, video games and the Internet, the place of literature as a leisure activity and as a part of intellectual life has been constantly shrinking. We are told that young people don't read books anymore.² Does it mean that the place of literature in university curricula should be proportional to its importance in the lives of students, i.e. minimal? Or should literature be taught as a dead language that allows a glimpse into the intellectual life of former generations, as Latin used to be taught? My suspicion is that literature is still very much a living language, as we can see from the interest generated by writing programs, and by the popularity of book clubs and public readings of literary works. Literature has lost its hegemonic position within culture, which means that it can no longer be imposed on students as something that everybody should know; but I believe that it can acquire new life by being viewed as a member of a complex media landscape, and by being studied from a comparative point of view – a point of view that not only relates the literatures of different languages, but also compares the expressive power of different media. What we need to do to revive literature is to subject it to an operation that the Russian formalists called estrangement or defamiliarization. There is no reason literature could not convey a sense of pleasure and wonderment, once we no longer take its value for granted, no longer force-feed the great authors to students, and focus on its distinctive power of expression, compared to other media.

In this article I'd like to grab one of the so-called enemies of literature by the horns and try to tame it, by showing that it does not threaten to annihilate literature as we have known it for many generations, but on the

1 I find it symptomatic of the current disregard for the artistic nature of literature that courses in literary theory, at least in the U.S., usually consist of a review of ideological approaches, such as Marxism, psychoanalysis, feminism, deconstruction, and postcolonialism, but ignore the key technical concepts of literature such as genre, narrative, fictionality, rhetoric, and the various types of tropes.

2 In *The Shallows: What the Internet is Doing to Our Brains*, Nicholas Carr bemoans the decline of the deep concentration required by book reading, and mentions in support of his argument this remark by the distinguished scholar of digital culture N. Katherine Hayles: "I can't get my student to read whole books anymore" (2010, 9).

contrary, invites us to rethink its nature by offering a different experience of language. This perceived enemy, as my title indicates, is digital technology. The computer is responsible for applications that have seriously diminished the time people spend reading literary works, but it has also produced intriguing new forms of textuality. My guiding question will be: what has the computer done for the word? Since literature is the language-based art, this question really amounts to "what has the computer done for literature?"

When we think of computers, most of us associate them with number crunching, but this wide-spread stereotype has been seriously challenged by the developments of the past thirty years. In 1981, Theodore Nelson, who is best known for being the "father of hypertext", described the computer as a "literary machine". In 1995, as hypertext fiction was emerging as a new literary genre, Jacques Leslie challenged the traditional conception of the computer: "Ambiguity machines. Precision, Hah! Computers are better at poetry than they are at math". In 2002, N. Katherine Hayles celebrated the computer as a "writing machine" in a book by the same title, and more recently she declared that "literature in the twenty-first century is computational" (Hayles 2008, 43) – referring not only to the emergence of electronic texts that can only be experienced through the computer, but also to the fact that most print texts are composed and produced as books on a computer.

From a technological point of view, these claims are supported by the affinity of the computer for language, an affinity that becomes evident when compared to the computer's ability to process images. Words are made of discrete symbols, the letters of the alphabet, and these symbols are efficiently encoded in binary form. The ASCII code uses a string of 7 bits, easily held in the 8 bits of a computer memory byte (with one spare bit used to verify accurate transmission) to encode alphanumeric symbols. This scheme makes it possible to represent 128 different graphemes – far more than needed for the letters, digits and punctuation marks of Western writing systems. A text, consequently, can be held in a reasonably limited amount of memory. Because every symbol used by language is distinguished by a unique bit pattern (homonyms excluded), it is easy to search a digitized text for the occurrence of a certain word or string of words. The discrete nature of linguistic signs also enables the computer to understand language, at least to some extent, and to generate syntactically correct and meaningful sentences. Weather forecast systems, for instance, consist of text generated on the fly by a computer and spoken by a synthesized voice.

Images by contrast are difficult to encode and process because they are

not composed of discrete elements. The computer divides them into pixels – dots of visual information on the screen – and encodes every pixel separately, unless some compression algorithm is used (but compression diminishes the overall visual quality of the image).³ Matthew G. Kirschenbaum (2005, 139) observes that the word "image" can be encoded in 5 bytes using the ASCII code, but when saved as an image using a twelve-point Courier font, and encoded as a bitmap, it requires 192 bytes of memory. A bit-map, moreover, is very difficult to search for representational content. Computers can perform fantastic feats of image manipulation, as every Photoshop user, video game player, and movie aficionado knows full well, but they are only beginning to be able to tell whether a certain face expresses sadness or happiness or to point out all the cats in a series of pictures – a task that a three year old child performs effortlessly.

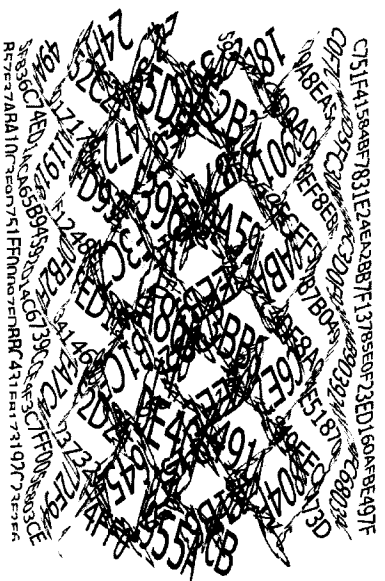
Yet for all their computational inferiority, images have steadily gained ground over pure text in digital culture, thanks to larger amounts of storage and increased processor speed. In 1995, the year of Leslie's declaration, one of the major forms of online entertainment was participating in a MOO or MUD, a text-based environment in which users create virtual personae and build an environment by posting verbal descriptions; now MOOs and MUDs have been supplanted by visually rendered MMORPGs (*World of Warcraft*, *EverQuest*, *Second Life*), and the construction of avatars and objects relies on the limited repertory of features provided by the building tools of the system, rather than on the almost infinite vocabulary that language supplies to the imagination. In 1995, most literary hypertexts were composed with the Storyspace program, an authoring tool that privileged text and imposed a layout on the screen that imitated the printed page; nowadays the few hypertexts that are still written are produced with multimedia tools, such as Flash or Director, and they blend text, sound and image. Meanwhile, two of the most gifted writers among hypertext authors, Michael Joyce and Shelley Jackson, have reverted to writing print fiction. The predominance of the visual aspect of language, or its frequent blending with music and images in the collection of digital texts recently put together by ELO (an acronym that

3 An alternative to representing images as bit-maps is to store them as vector graphics, this is to say, as a mathematical formula whose variables can receive different values, generating different versions of the basic shape. This mode of encoding saves space and allows dynamic manipulation, but it only works for combinations of geometric shapes. A cartoon figure could be rendered as vector graphics, but an impressionist painting could not.

stands for Electronic Literature Organization) confirm what Robert Coover called in 1999 “the passing of the golden age” for literary hypertext: “Even the word, the very stuff of literature, and indeed of all human thought, is under assault, giving ground daily to image-surfing, hypermedia, the linked icon. Indeed, the word itself is increasingly reduced to icon or caption.”

THE SPECTACULARIZATION OF LANGUAGE

If digital art threatens the word, it is not through the invasion of text by images, a productive co-habitation susceptible of endless artistic variations that we observe in print as well, but through the downgrading of language into pure spectacle. Text as spectacle is text that either cannot be read, or that the user is not inspired to read. It is the hallucinating urban landscape of animated signs of Tokyo or Las Vegas, especially for the visitor who cannot read the characters; it is the strings of code that race down the screen in the opening scenes of the film *The Matrix*; and it is the stunning visual patterns of symbols that continually undulate, ripple, explode, or implode into other patterns but offer no readable content in Giselle Beigelman's *Code Movie 1*, a work included in the ELO anthology.



Screen shot from Giselbe Beigelman's *Code Movie 1*

The spectacularization of the word is particularly frequent in digital installations, a form of art intended for relatively short visits. Since installations must maintain a steady throughput, for fear of creating a bottleneck in the exhibit, they cannot afford to let the visitor become immersed in reading. Many installation artists pursue the dream of a total language in which sound, shape, color, animation, spoken voice, and written text respond to the

movements of the user's body. In this language, as Bill Seaman puts it, “the word is not valued in a hierarchy over other media elements or processes” (2004, 231) – it is just one signifying element among many others. But text is often the loser in this semiotic cornucopia. A case in point is Camille Utterback's and Romy Archibut's *Text Rain*:



Snapshot from Camille Utterback's and Romy Archibut's *Text Rain*

In *Text Rain*...the interface of video camera and tracking software allows a viewer's entire body to engage with the text. In the *Text Rain* installation viewers see a mirrored black-and-white video of themselves on a large projection screen. Colored letters in the projection fall down on them from above, like rain or snow. The characters can be caught, lifted, and then fall again. If a person accumulates enough letters along their outstretched arms, or any other dark object, they can sometimes “catch” an entire word, or even a phrase. The letters are not random, but lines of a poem by Evan Zimroth (1993) about bodies and language (Utterback 2004, 221).

The installation can be interpreted as a dramatization and literalization of the themes of the poem, which alludes to the participation of bodies in a conversation that degenerates into “just talk”, but the interactor is too busy trying to catch letters to pay attention to the words – not indeed does the fragmentation of the text into individual falling letters make reading possible. As Roberto Simanowski observes in “Double Coding”, “The letters have left language behind and turned into visual objects as part of a sculpture” It is only through what Simanowski calls a “double coding” stretching over two media that the textual component of the installation can be restored as meaningful text. The player must first read the poem in print form to be able to understand what the digital work is trying to say by using this poem rather than another. Left by itself, the installation is just mere letters.

For all their artistic merit, works like *Code Movie 1* and *Text Rain* do not promote the kind of semantic processing that supports the idea of the computer as a literary machine. But the relations between word and image are much more complex than the contrast of reading *versus* watching would suggest. We can distinguish three degrees of textual visibility, linked by a continuum of intermediary forms:

- (1) Language as pure spectacle – no attention is paid to the meaning of words.
- (2) Visible language: meaning results from an interplay between the graphic appearance of words and their semantic value. (This idea of visibility can be extended to other sensory dimensions, such as tactility and audibility).
- (3) Invisible language: the reader extracts meaning from the text without paying attention to its appearance, besides identifying letters.

Here I take visibility in a literal sense, and I do not regard state 3 as necessarily incompatible with an aesthetic approach to language. We are, for instance, fully capable of appreciating the style of Proust without noticing the font or the layout of the book. Zone 1, which can be considered to lie outside literature, is illustrated by the texts discussed above, though the double coding of *Text Rain* places it further away from the pure spectacle end of the continuum than Beiguelman's *Code Movie 1*. Zone 2 covers most of poetry, with concrete, lettrist and l'a*n*g*u*a*g*e poetry situated closer to the visible pole than lyric poetry. It is also in 2 that I place graphically sophisticated postmodern narratives, such as *House of Leaves* by Mark Danielewski. Zone 3 is occupied by standard print novels, as well as by non-artistic, strictly informational texts. In the print medium, both zone 3 and zone 2 are richly represented, though the former is much more heavily populated than the latter; in the electronic medium, literary activity has increasingly shifted from zone 3 to zones 2 and 1, as the graphic capabilities of the computer have improved. Symptomatic of this trend is the fact that in the ELO anthology, the purely textual zone is mostly represented by older texts.⁴ Why is it that language must fight for survival, and share the spotlight with other modes of signification in the so-called "digital literature"? To answer this question, I

4 For instance *Twelve Blue* by Michael Joyce (1996/97), *The Jew's Daughter* by Judd Morrissey (2000), and *Internet Text*, a project begun by Alan Sontheim in 1994. Two works of interactive fiction by Emily Short (*Galatea*, 2000 and *Savoir-Faire*, 2002) are also text-only, but this is a characteristic of the genre as a whole.

propose to sketch a technological typology of texts, and to adjust my answers to its individual categories.

A TECHNOLOGICAL TYPOLOGY OF TEXTS

If digital literature is to be more than the binary encoding of the kind of text that can be experienced in print form, it should take advantage of the distinctive properties of digital media. The most important of these properties are procedural nature (= code-driven operation), interactivity, multimedia capabilities, networking and what I call volatility of inscription: the possibility of changing the display by changing the value of memory cells. Truly digital texts should exploit more than one of these features, because code-driven operation applies to any text shown on a screen, for instance to this chapter as it is being written with a word processor, and multimedia effects do not require a digital platform, as we know from drama, the opera, film and TV.

The procedural nature of the computer can affect literary texts in at least three ways: how the text is generated, how it is structured for reading, and how it is presented. Generation is either human or computational;⁵ reading structure is either linear (the default procedure) or "database", which means that the reader probes segments of text in a relatively free order, rather than parsing it systematically; presentation is either indifferent or sensitive to digital technology. If we cross-classify these three oppositions, we obtain the table shown on figure 3.

5 In this dichotomy I regard production through a word processor as human. Though there are certainly differences between writing by hand or with a typewriter and writing with a computer, these differences are too dependent on the individual writer, and too difficult to capture systematically to be regarded as inherent features of electronic writing attributable to the agency of the computer.

	Human generated linear text	Human generated database text	Computer generated text
Print presentation	1	3	5
Computer presentation	2	4	6

A technological taxonomy of texts

Category 1: Naturally generated linear texts for print

Neither produced by algorithms nor performed by the computer, the texts of standard oral and print literature are the prime examples of the first category. On this level, the computer's contribution to the text is a matter of thematization and imitation. Digital technology gives authors something new to think about, as the prophetic visions of cyberspace, computer networks, virtual worlds, nanotechnology and ubiquitous computing in William Gibson's and Neal Stephenson's science fiction novels demonstrate, and it gives literature a new post-alphabetic vernacular inspired by computer languages, such as this extract of a text of "code poetry" by the Australian digital artist Mez. Though it is diffused through the Web, it can be easily printed, because – in contrast to most of the works of its author – it makes no use of the properties specific to the medium:

```
($define! force-promise
clammered
($if (not?
glamouring
object
(handle-promise-result x)))
hammered
($define! handle-promise-result
amber
($gene (x y)
chambered
```

```
((not? (promise? y)))
(iambic.pent((up))a)meter
(set-(th)ear(h)! (var x) y);
(set-ear(h)! (var x) ()); delete y)
```

Category 2: Naturally generated linear texts presented on the computer screen

Any text of category 1 can be transposed to category 2, or vice-versa, as the Mez poem demonstrates. But is it still the same text? Katherine Hayles has argued that "the materiality of the medium" (or is it its physicality?)⁶ affects the nature of the text so dramatically that it severs the lines of identity between the print text and the electronic version. "Recreating a text in another medium is so significant a change that it is analogous to translating from one language to another" (2005, 109). The degree of identity between medially transposed versions differs however according to the interpretation of medium. If we give the term a semiotic interpretation, the medium of literature is language, or perhaps written language, just as the medium of painting is the image and the medium of music is sound; but if we give it a technological interpretation, then the media of literature are the various supports and modes of writing: the manuscript, the codex book, and the computer. Transposing a text from one semiotic medium to another, for instance a novel into a film or a story into a musical composition involves a far more radical transformation than translating it into a foreign language, since signs must be turned into other types of signs, but creating a digital version of a print novel maintains the linguistic substance of the text, and unlike language translation it is more accurate when performed automatically. A digital text consists of the same words (or more precisely, of tokens of the same types of signs) as its print counterpart, but it is affected by the computer in both obvious and subtle ways.

The obvious ways are the operations that can be performed on the text, such as word searches, or changing the size of characters. Harder to capture, but in a way more significant (for it cannot be avoided, while the operations

6 For Hayles, the "materiality of the medium" must not be confused with its "physicality". Materiality is an "emergent property" which does not exist "independently of a text's content", and is a "matter of interpretation and critical debate" (2005, 104). Hayles does not elaborate on the relations between materiality and physicality, a property which seems to be a given, but I would like to suggest that, in her view, materiality is the individual ways in which a work deals with, exploits or reflects upon its physical substance.

mentioned above are optional), is the cognitive impact of the computer on the reading experience. When we stare on a screen at the words of a digitized print text, we are not aware of the layers of hidden code that transform binary data stored in memory into a visible display readable by humans. It will take category 6 to bring these layers to mind. With a digitized text, the impact of the computer on reading lies in our sensory apprehension of the display, and not in its technological production; this sensory relation, furthermore, treats all texts alike and does not affect their individual meanings. If I may speak from my own experience, the kind of interface most commonly offered by computers – a rigid screen operated by a combination of keyboard and mouse – is not conducive to the kind of sustained attention that we devote to the lengthy texts of print-based literature. In a detailed phenomenological study of the experience of reading hypertext fiction, Anne Mangen (Mangen 2006, 243–49) points out many features of the standard GUI (graphic user interface) of digital texts that interfere with the pleasure of reading. The most significant of these features, in my view, is the disturbance of the haptic relation that we entertain with a text when we hold a book in our hands. The screen image is intangible, while the computer is experienced as very tangible. The overbearing physical presence of the computer distracts the user from the semantic dimension of the signs on the screen. Whether this difficulty in concentrating while reading from a screen is due to the enduring habits created by the book or whether there is something inherent in the interface that gets in the way of the semantic processing of language is a question that will not be definitely answered until a new generation that grew up with computers becomes the main consumers of digital texts. Unless, of course, a new display technology (Amazon's Kindle? Apple's iPad?) is developed that takes care of the present problems.

Category 3: Naturally generated database texts for print

The texts of this category are the non-digital examples of what Espen Aarseth calls “ergodic literature”. The trademark of ergodic literature is that it requires “non-trivial efforts” to allow the reader to traverse the text (Aarseth 1997, 1). These works are organized as a database of human-created fragments of text, out of which a variety of readings can be created by following a certain protocol. With a story structured as a tree, the protocol consists of choosing one branch out of many options at every decision point; with a text printed on a deck of cards, like Marc Saporta's *Composition No 1*, the protocol tells the reader to shuffle the deck in order to create a “narrative” sequence (I put

narrative in scare quotes because narrativity, as a logical and temporal ordering of events, is incompatible with random ordering); with a design such as Raymond Queneau's *Cent mille milliards de poèmes*, which consists of 12 sonnets cut into strips at every line and bound together at the spine, new poems are created by leafing through the book and combining the fragments. These reading protocols can be compared to the search function that enables users of informational databases to retrieve information; in both cases, the text parsed by the user during a traversal or a consulting session is only a portion of the total information gathered in the archive.⁷

Category 4: Naturally generated database texts performed on the computer

The digital equivalent of the protocol-driven database texts of category 4 is hypertext, a genre which has become almost synonymous with digital literature. As Robert Coover indeed writes: “And I continue to feel that, for all the wondrous and provocative invasions of text by sound and image, all the intimate layering of them and irresistible fusions, still, the most radical and distinctive literary contribution of the computer has been the multilinear hypertextual webwork of text spaces, or, as one might say, the intimate layering and fusion of imagined spatiality and temporality.”

Hypertext depends on the computer for its reading protocol – clicking on so-called hyperlinks to make a new screen of text appear – but in the vast majority of cases, its underlying database is human-generated and static: the author writes all the fragments of text, specifies all the links, and the only dynamic (i.e. run-time) creation lies in the variable sequence produced by the reader's choices.⁸ In contrast to the texts of category 4, the author does not design an original reading strategy; what defines hypertext is a mode of operation implemented by the system, and all the texts of the genre follow the same protocol. The major difference between individual texts, beside their content, lies in the shape of the underlying network of links and nodes: this network may or may not contain loops, it can be more or less densely

⁷ The concept of database, which has been popularized by Lev Manovich (2001), tends to be applied to all digital texts. I believe this is an overuse: of my 6 categories, only 3 and 4, and some texts of 6, rely on a database, a concept that should not be confused with input data. According to the *Oxford American Dictionary*, a database is “a structured set of data held in a computer, esp. one that is accessible in various ways”.

⁸ It is not technically impossible for the database to modify itself under user input, but in this case, the text belongs to category 6.

connected, and it may look like a tree, a wheel, a sea-anemone, or a tangled web, the favorite structure of literary applications.

In the informational domain, hypertext has been a huge success: who hasn't experienced the addictive pleasure of surfing from Web site to Web site, or across Wikipedia entries, gathering instant knowledge about whatever topic comes to mind? But literary fiction and informational writing are different language games. What makes surfing the Web so enjoyable is that the interlinked elements are for the most part textually self-sufficient, and the linking logic transparent, allowing the user to make informed choices; the linking logic applications, linking operates intratextually rather than in but in literary applications, linking tends to be opaque teasers that take textually, and the names of the links tend to be opaque teasers that take the reader to unknown destinations.

Ever since the first hypertext fictions hit the market in the early nineties, the genre has generated lively controversies. Its advocates argue that it offers an alternative to the traditional modes of thinking of Western culture: an alternative whose values are, in the words of Eduardo Kac (quoted by Simanowski 2007, 45), fluidity, non-linearity, discontinuity, dynamism, and of course interactivity. All these ideas can be subsumed by the metaphor of emergent complexity (Strange however that fluidity and discontinuity should contribute to the same aesthetics: the flow must be made of pebbles rather than of liquid!). By fragmenting the text into a collection of recombinant fragments, by organizing them into non-hierarchical networks – the rhizome which grows freely in all directions is preferred to the tree, – and by putting the reader in charge of the sequence of the fragments, hypertext has been said to privilege multiple interpretations over authoritarian discourse, analogical jumps over linear logical reasoning, attention to the local over totalizing apprehension, *flânerie* open to serendipitous discoveries over goal-oriented navigation, and, in a bold claim of its early proponents that is no longer taken very seriously, to turn readers into authors.

The critics of the device wonder what kind of content truly benefits from these features. Lev Manovich (2001, 225) has claimed somewhat hyperbolically that database and narrative are “mortal enemies”, because narrative is based on a linear logico-temporal sequence of events, while database refuses to order its elements. I have argued elsewhere (Ryan 2006, 144) that the relatively free order of hypertext is incompatible with the narrative effects of suspense, curiosity and surprise, all of which require a strong control by the author of the temporal disclosure of information. Far from creating a smooth flow, the jumps from *lexia* to *lexia* inhibit immersion in the story (if there is a story) and turn the text into a jigsaw puzzle. According to

Anne Mangen (2006, 170-78), the link-node structure of hypertext leads to an obsessive need to click that prevents devoting deep attention to the text on the screen. As a result, readers and critics engage either in a “myopic” reading focused on individual chunks of text, or on a “meta-reading” that interprets the text allegorically or “theoretically”. This could explain why close readings of hypertexts concerned with their global meaning are relatively rare,⁹ compared, on the meta side, to discussions of the genre as a whole dealing with its underlying ideology, its alleged effect on the reader, and how it differs from print textuality, or, on the myopic side, compared to extremely detailed techno-philological studies of how individual texts perform under different operating systems. Most recently, Michel Chaoui (2005, 608) has suggested that the more effort readers devote to the physical construction of the text through point and click interactivity, the less attention will be left for its semantic construction and aesthetic evaluation. This would explain why hypertext fiction, despite its seductive aesthetics (who would not prefer, at least in principle, dynamic to static meaning, fluidity to solidity, complexity to simplicity and agency to passivity?) has not become the dominant literary presence that its early advocates prophesized.

Category 5: Computer generated texts for print

Here the text is produced by an automated procedure specified by an algorithm, but the output of this algorithm can be presented in print. An algorithm is not a static formula that guides the writing of the text, as are freely adopted constraints such as writing a poem with a certain metric and rhyme pattern, or a novel without using a certain letter (such as Georges Perec's *La Disparition*); it is rather a dynamic procedure that creates a text through a series of precisely defined operations. In algorithmic writing, the creativity of the author resides in designing the procedure by which the words are selected and the text is produced. Whereas the language of a text composed according to a formal pattern is fully controlled by the author, at least on the level of the signifiers, the language of a text produced by an algorithm should create surprise for the designer of the system.

The authors of text-generating algorithms have a choice of two philosophies: either randomize the output, or seek semantic coherence. The first philosophy is inspired by the “mad-lib” party game, in which blindly chosen words are inserted into templates, producing syntactically correct but semantically incoherent output. The aesthetic appeal of these texts resides in the

9 Two exceptions to this trend are Ciccoricco 2007 and Bell 2010.

“exquisite cadaver” effect cultivated by Surrealism: unexpected encounters of meanings that shake the reader out of her thinking habits and challenge the imagination to construct a new, surreal world, based on connections between ideas that never get a chance to meet in the discourse of everyday reality. An example of the aleatory mode of generation is *The Policeman’s Beard is Half Constructed*, a book supposedly “written” in the early eighties by a computer program named Racter (1984). (Actually, Racter is not entirely responsible for the text, because the human programmer selected the best outputs from many runs of the program). Here is an excerpt:

A hot and torrid bloom which
Fans with flames and begs to be
Redeemed by forces black and strong
Will now oppose my naked will
And force me into regions of despair
(1984, no page number)

Reading such texts initially challenges the imagination to construct meaning by pretending that they are the expression of a human mind (as the philosopher H.P. Grice observed, meaning is intentional), but when one realizes that the “author” is a machine, the text loses any kind of emotional or existential dimension. Most readers will quickly tire of poring over Racter’s creations. “What message can a text have without a sender?” asks Roberto Simanovski of machine-generated texts (“Holopoetry”, 57).

For the true hacker, the interest of aleatory text production does not lie in the output – whose poetic charm is highly dependent on the luck of the draw – but in the originality of the generative algorithm. To remain ahead in the fast-paced game of experimentalism, digital artists must find ever-new ways to produce nonsense and quasi-sense, adapted to the most recent technological developments. The Google search engine has for instance been requisitioned by practitioners of Flarf poetry (a movement dedicated to the exploitation of “the inappropriate”) to collect random words and collate them into poems.

The alternative to making use of aleatory processes is the attempt to create meaningful texts through artificial intelligence techniques, such as placing semantic constraints on the insertion of lexical elements into syntactic templates. Whereas programs designed by the engineers of randomness result in an undifferentiated soup of verbal dysfunctionality, AI algorithms can attain various degrees of semantic coherence. But no text-generating

program has yet succeeded in giving readers the kind of pleasure that one derives from even mediocre naturally produced literary works, except perhaps in the domain of haikus (a genre easily generated by computers, because it uses a very strict and very short formal template, and gives free rein to the reader’s imagination). The achievements of the best of story-generating programs cast serious doubts on the predictions of Ray Kurzweil, a respected computer scientist turned futurologist who claims that by the year 2029, many of the leading authors will be machines (1999, 223). Progress in this area has been so slow since the seventies that AI would have to perform a quantum leap forward sometime in the next twenty years for Kurzweil’s prediction to be fulfilled. Consider this excerpt from a narrative created by Scott Turner’s MINSTREL program:

The Vengeful Princess

Once upon a time there was a lady of the Court named Jennifer. Jennifer loved a knight named Grunfeld. Grunfeld loved Jennifer.

Jennifer wanted revenge on a lady of the court named Darlene because she had the berries which she picked in the woods and Jennifer wanted to have the berries. Jennifer wanted to scare Darlene. Jennifer wanted a dragon to move towards Darlene so that Darlene believed it would eat her. Jennifer wanted to appear to be a dragon so that a dragon would move toward Darlene. Jennifer drank a magic potion. Jennifer transformed into a dragon. A dragon moved toward Darlene. A dragon was near Darlene (Turner 1994, 9).

The story is not as conventional as this unpromising beginning suggests: in a climactic episode that combines a sudden turn with an Aristotelian *anagnorisis* (recognition), Grunfeld, wanting to impress the king, slays a dragon, who turns out to be Jennifer, and the program slyly draws the moral: “Deception is a weapon difficult to aim”. But even if we regard this text as a plot outline to be “post-processed” (i.e. rewritten) by a human author, it makes a reader aware of the complexity of the task at hand and capable of reverse-engineering the underlying algorithm to evaluate the achievement of “The Vengeful Princess”. For the common reader, as Espen Aarseth observed (1997, 139), computer-generated stories are much more enjoyable when a glitch in the program creates a theater of the absurd.

Category 6: Texts generated and presented by computer

Of all my categories, 6 is the site of the most intense, vibrant and diversified activity; but it is also the one in which language is most likely to lose

its hegemony to other modes of signification. Its genres include digitized installation art, video games, online worlds, interactive fiction, interactive drama, and coded poetry (not to be confused with code poetry: while the former is performed by an invisible code, the latter makes code visible and presents it as an artistic object).¹⁰ The vast majority of the more recent texts of the ELO anthology belong to this category.

The difference between categories 5 and 6 lies in the relations between generation and presentation. In 5, texts are generated and stored in a file, which can be later outputted either in print or on the screen. In 6, by contrast, generation and presentation are simultaneous and indistinguishable, because presentation exploits properties specific to the medium, especially interactivity and volatile inscription. When a text's development depends on interaction, it must present something to the user every time it needs input, and generation proceeds as a dialogue between user and computer in the real time of the user's encounter with the text. Similarly, when a text relies on volatility, every change on the screen must be controlled by a separate instruction, and the text must be displayed, or rather played, moment by moment *through*, rather than *after* the execution of the program. The inseparability of generation and presentation means that in contrast to the texts of category 5, the texts of category 6 cannot be taken out of the computer.

The distinction between categories 4 and 6 is much fuzzier, and many texts are located on the borderline between these two types. In both cases a program works on man-made input data and turns this data into a visible display (no program ever creates something out of nothing), but in the case of hypertext the data is pre-structured according to a certain pattern (this is why I call it a database), while in category 6, input data is a collection of building materials which can be stored in a variety of ways. Moreover, the program that handles the hypertextual database is a standardized writing/reading tool, such as the Storyspace software, while in category 6 the text is produced by custom-made code, and it is judged

¹⁰ The common denominator of all code poetry is that it bears a certain relation to computer languages, but this relation is highly variable: some code poems are computer produced, while others are written by humans; some are meant to be executed by the machine and to perform some definable task, while others combine standard alphanumeric symbols with exotic symbols borrowed from computer programming, creating a pseudo-code that makes no sense to the machine, but arguably speaks to the posthuman subjectivity that is being shaped by digital technology. Many of these graphic hybrids of code and human language could just as well be printed on paper as shown on a computer screen. When this is the case, they belong to category 1.

much more on the originality of the generative ideas than on the quality of the writing. The favorite authoring tools are Flash and Director, both of which include their own programming language. Another way to capture the difference between 4 and 6 is through what Chris Crawford calls "process intensity". This scalar criterion concerns the ratio of input data to computer code: in 4 a large body of data is submitted to a simple operation, the "fetch and display the content of a certain memory address" triggered by the hyperlink, while in 6 the input data undergoes operations of far greater complexity and diversity, especially since these operations differ from work to work.

Whereas the generative codes of category 5 consist mainly of invisible symbol manipulation that take place inside the computer, category 6 adds to this vocabulary several visible, output-centered operations. The most important is animation. With Flash and Director, words can be treated as images, this is to say, as bit-maps or as vector graphics, and it is easy to put them in motion, to deform them, to change their color, to make them fade in and out, to explode them into letters, to make these letters gather into other words or to disperse them into nonsense. Another prominent feature is replacement. In the hypertexts of category 4 replacement operates on the level of the whole screen, but with the greater coding sophistication of category 6 it can affect other levels, such as groups of sentences rather than whole pages, or individual letters within words. The palimpsest structure of Flash and Director allows yet another effect, the layering of different images. The working space of the program consists of superposed graphic overlays which can be made transparent or opaque during the run of the program, hiding each other or, on the contrary, revealing what lies below by being temporarily blocked from the display. All of these effects can be either automatic or user-triggered; in the latter case, they can be either the result of a deliberate action of clicking on a visible button or the unpredictable side-effect of a cursor movement, such as mousing over a hidden hot spot.

DYSFUNCTIONAL LANGUAGE

How can the fundamentally visual effects of category 6 affect meaning when they operate on words? It would take an individual examination of the works that use them to do justice to the variety of their particular adaptations, but the most dominant trend is one that is shared by Web art in general (or, arguably, by all avant-garde art): a fascination with the

dysfunctional. Why this fascination? Because it is only in moments of malfunctioning, of rupture, of interference that we become aware of the codes and processes (technological, linguistic, cultural and cognitive) that regulate our social and mental life. Dysfunctionality is intimately related to self-referentiality, the leading concern of postmodern art.

Within language-based works, dysfunctionality aims at the reading process – or rather, at the reading process made familiar by print. Animation can be used to make words appear and disappear too fast for the user to be able to read them, as in *Chemical Landscape* by Edward Falco: the texts that accompany each of eight landscapes created by manipulating chemicals in a dark room fade out so quickly – like the image of an undeveloped film exposed to light – that all the reader can do is grab individual words, or at best fragments of sentences, jumping across the text rather than parsing it left to right and top to bottom. Repeat visits to the same landscape enable readers to capture different parts of the text, and eventually to process it completely, but the individual grabs never gel into a coherent story because of the difficulty of remembering the bounty of the previous visits. Replacement provides another way to frustrate the cognitive processes that allow the global understanding of text. In Judd Morrissey's *The Jew's Daughter*, mousing over a visually marked word causes a few lines within the page to be transformed into a different text. The new passage is not visually marked, and it fits syntactically so well within the old text, that it takes extreme concentration, or even photographic memory, for the reader to detect what is old and what is new – a concentration that detracts attention from the meaning of the text. (Alternatively, the reader can just read the new page without trying to locate the changes). The dynamic, internal self-modification of the page prevents any kind of temporal development on the level of content, and consequently hinders a narrative reading. There is indeed no reason to assume that the events and mental representations related on page 3 follow those of page 2, since the two pages overlap in their content. In both of these examples, the unusual interface brings attention to the reading process by de-automatizing the scanning of the text by the eye.

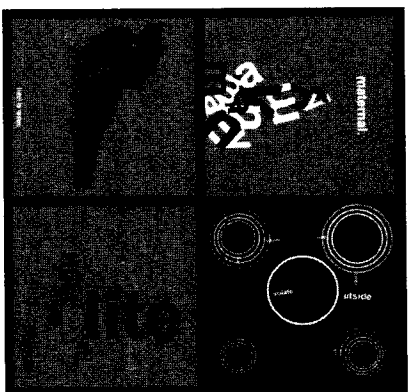
For those who think of language as a means of communication complex meanings through well-formed sentences and coherent texts, yet another form of verbal dysfunctionality typical of category 6 is the simulation of cognitively impaired speech. The incoherence of the text of Stuart Moulthrop's *Reagan Library* hints at a brain suffering from Alzheimer's disease, while the progressive invasion of the input text of Noah Wardrip-

Fruin's and Brion Moss' *The Impermanence Agent* by foreign elements randomly selected from the user's hard drive suggests the memory loss of Nana, the grandmother of the narrator. The prominence of impaired language in digital texts is easily explained by the relative ease of generating nonsense through erasures and aleatory procedures, compared to the difficulty of building logically well-formed discourse.¹¹

One step further in the semantic disintegration of language is the decomposition of signifying units into their non-signifying minimal components. The founder of the Lettrist movement in poetry, Isidore Isou, claimed that the focus of poetry has shifted from the paragraph in Romanticism, to the word in Symbolism, and finally to the letter, starting with Mallarmé and continuing through Dadaism and Surrealism.¹² Lettrism, the culmination of this trend, is well represented in the ELO anthology, especially through the work of John Cayley, its best-known practitioner. In many of his works (for instance *Translation* in the ELO collection), Cayley experiments with an algorithm that morphs words into other words and languages into other languages by operating substitutions on the level of their individual letters. This mechanism limits reading to the occasional recognition of lexically well-formed combinations, or to guessing what the next existing word will be, as letters fill in blanks in a process reminiscent of the game Wheel of Fortune. The reader observes a continuous oscillation between sense and non-sense, waiting, sometimes successfully, sometimes in vain, for the aleatory mechanisms of the generative code to create sentential meaning, but unable to register all the intermediary stages between readable words, either because the letters roll too fast to be individually noticed, or because it is impossible to pay close attention to more than one of the multiple replacement processes that take place simultaneously on the screen. In Brian Kim Stefán's *The Dreamlife of Letters* similarly, but through different means, the user witnesses what Alan Liu (2004, 8-9) would call the creative destruction of textual meaning.

¹¹ Evidence of this difficulty is the MINSTREL program mentioned above, which uses 27000 lines of code [program + tools] to generate a mere dozen well-formed stories.

¹² See selections from the Lettrist Manifestos on Isidore Isou's home page: <http://www.thing.net/~grist/1&d/lettist/isou-m.htm>



Screen shots from Brian Kim Stefans' *The Dreamlife of Letters*

The author took an unconventional creative essay (itself very fragmented in its syntax) by the poet and feminist theorist Rachel Blau du Plessis, selected individual words, presented them in alphabetic order, and made these words dance on the screen in a non-interactive visual show that highlights their common leading letter. As language dissolves into its elementary particles, it becomes a spectacle to watch instead of a text to read.

RETURN TO FUNCTIONALITY

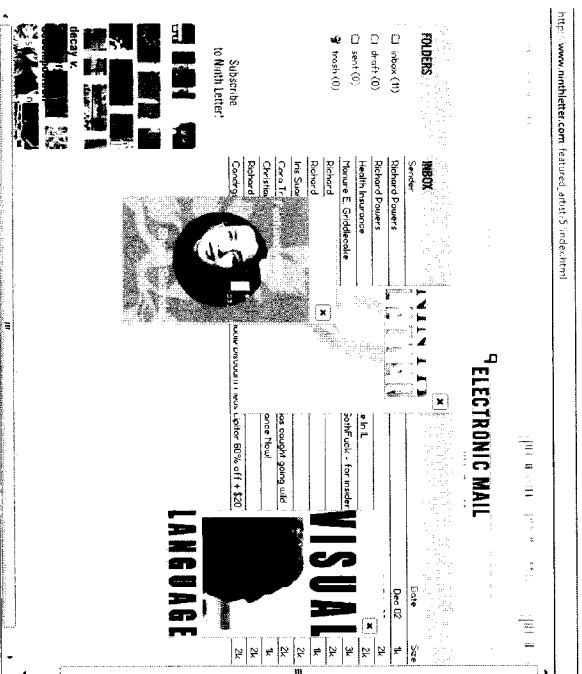
Despite these trends, however, it would be premature to conclude that visuality and dysfunctionality are the only hopes for language to survive as art on the computer screen. Within category 6, there are at least two genres that depend crucially on readability. The first, Interactive Fiction (hence IF), is the only form of electronic literature since the early days of hypertext to abstain from any kind of association with images.¹³ By detailing the multiple facets of IF, the playfully hyperbolic title of an article by Nick Montfort suggests why the genre has been able to attract readers through language and programming alone: "Interactive fiction as 'Story,' 'Game,' 'Storygame,' 'Novel,' 'World,' 'Puzzle,' 'Problem,' and 'Riddle'". In the article, Montfort succinctly defines IF as: "A program that simulates a world, understands natural language from an interactor, and provides a textual reply based on events in this

¹³ There are actually commercial types of IF that rely on cinematic animations, such as the later releases of the Zork adventures, but I am talking here of the more literary form practiced by such author as Robert Pinsky, Emily Short, Andrew Plotkin, Adam Cadre, and Nick Montfort.

world" (2004, 316). The user of IF plays the role of a character who wanders through an imaginary space, usually trying to solve a mystery. The engine that operates IF not only displays text that describes a fictional world and narrates events, it also builds a dynamic model of this world through a code that the user never gets to see. The system's responses to the user's input are based on this model: for instance, if the user types "drink the liquid", and the liquid has been coded to be a magic potion, the system may reply "you shrink to the size of an ant and you fall into the glass". It takes an extreme attention to the meaning of words, and an ability to synthesize the system's responses into a mental model of the topography and temporal development of the fictional world to be able find the answer to the puzzle, or, if there is no puzzle, to follow the story that unfolds in this world. The survival of IF in the age of the invasion of digital media by the image is due to its potential for a successful combination of verbal artistry and literary experimentation with the ludic activities of problem-solving and role-playing.

The other genre that relies crucially on the proper working of the semantics and pragmatics of language is interactive drama, a literary form still in the developing stages whose sole working example, at the time of this writing, is *Façade* (2005) by Michael Mateas and Andrew Stern. Interactive drama is a dialogue system with a built-in plot and a visual environment. The user plays the role of a character in the plot, interacting through language with system-controlled characters who respond with pre-recorded spoken lines. Since there is no real-time language generation, but rather, a matching by the system of the user's input with the best-fitting fragment of stored dialogue, the characters of *Façade* are often unable to respond coherently or promptly to the conversation of the interactor. But this relative and unintentional dysfunctionality is cleverly justified by the thematics of the work. *Façade* tells the story of a seemingly successful couple, Grace and Trip, who invite a guest for an evening. In the course of the conversation with the visitor it becomes clear that the marriage of Grace and Trip is fractured by deep resentments, and that their happiness is a mere façade. As the initially polite conversation with the guest degenerates into a bitter argument of the spouses over the state of their marriage, the frequent failure of AI to process the user's input can be attributed to the self-centeredness of Grace and Trip. Here the occasional dysfunctionality of the system is integrated as a mental feature of the characters into a logically consistent narrative.

Is it possible for a work to combine the strengths of print with the effects made possible by the distinctive properties of digital media? One way to solve this problem is through what Simanowski calls double coding: building the work on the complementarity of traditional and electronic textuality. The most common form of bi-mediality is to subject a digitized print text to a processing of category 6, making the original text available to the user. This is the case with *Text Rain* and *The Dreamlife of Letters*, discussed above. Both of these works create an implicit hierarchy between the two media by using a print text written by another author as input to their own digital performance.¹⁴ Another type of bi-mediality is found in code poetry when the text can be both read as a print poem that addresses a human reader and executed as a program. This double interpellation is illustrated by Eric Andreychek's "Perl Port of Jabberwocky", a text which provides an amusing parody of Lewis Carroll's nonsense poem "Jabberwocky", and launches three dysfunctional processes – processes that do not do anything useful but do not harm the system – when executed as code (Ryan 2006, 220).



Screen shot from Richard Powers' *They Come in a Steady Stream Now*

¹⁴ By contrast, John Cayley's *Translation* is intertextual more than bi-medial, even though it uses sentences by Proust and Walter Benjamin, because it decontextualizes these sentences and does not provide access to the originals: the reader only sees the input texts as transformed by Cayley's code.

The implications of bi-mediality for the reading experience are powerfully demonstrated by Richard Powers e-mail story "They Come in a Steady Stream Now".

The work satirizes the proliferation of spam through a web-based story that simulates the interface of a standard e-mail program. Of the 17 messages that arrive one by one in the fake mailbox during the run of the program, ten are spam and seven "legitimate". The junk mail runs the familiar gamut of pornography, drug offers, and investment opportunities. In addition to the junk mail, the mail program is plagued by pop-up ads, which readers must close one by one before opening a new message. In contrast to the humor of the junk mail, the seven legitimate letters, addressed to the reader by a narrator named Richard Powers, contain a melancholic meditation on aging triggered by the junk mail's incessant hawking of drugs that promise to reverse the damage of time. In the last of the seven letters we read: "PLEASE REGISTER. The content you requested is available only to registered members. Registration is FREE and offers great benefits". The readers who dare to follow these instructions, mindless of the risk of viruses, by giving their e-mail address are rewarded with a message from Richard Powers in their own mailbox.¹⁵ In it they find a link to a PDF file which can be downloaded and printed. This file contains the text of the previous six simulated mails, together with a very Proustian conclusion in which the present absorbs the past and the past becomes present, allowing the narrator to relive an episode of his childhood. By including all the previously read installments, the final delivery contrasts the reading experiences of the digital and print versions. In the e-mail simulation, the text comes to the reader as a collection of fragments that create distraction through their many windows, through frequent interruptions, and through the obsessive need to click. The printable text gives rise to an entirely new reading experience: now we can hold the entire text in our hands, enjoying a haptic relation with it which is absent from reading on a screen, we can read it without interruption, and we do not have to worry about competing windows. All these features, by freeing our attention from the interface and from the material conditions of reading, enable us to pay greater attention to the semantics of the text and to the poetic quality of language. (It also helps, of course, that we are re-reading rather than reading for the first time). The originality of Powers'

¹⁵ At least this was the case in 2005; since then the work has been reformatted, and I have been unable recently [2009] to coax it into sending me the e-mail.

achievement lies in the complementarity of the comic experience of the screen version and of the lyrical experience of the print version. In its play with two media, the text manages to combine the power of print literature to induce emotions with the cleverness of conception and innovative presentation that we have come to expect of digital art.

NETWORKING

My discussion so far has mentioned all but one of the distinctive properties listed at the beginning of this article. This missing property, networking, is the one that has had the deepest influence on the use of language. To borrow Henry Jenkins' term (Jenkins 2006, 2-3), computer networks have made culture participatory. They have inspired countless people to share their thoughts, their artistic creations, the story of their lives through blogs, personal web sites, or public online meeting spaces. They have given birth to an industry of fan fiction, by allowing people to upload their own versions of the cult narratives of popular media, or to create original stories out of video games by adding their own text or sound track to images captured through game-cameras, also known as machinima. They have made possible a wholly new genre of entertainment, the online world (and its ancestors the MOOs and MUDs), a genre that takes advantage, to the highest degree, of all the properties of the medium: procedural nature by relying on a coded world model, multi-media by allowing players to communicate through text and now voice in a visual environment, interactivity through avatar-creating, role-playing, building objects, or performing quests within the fictional world, and volatility of inscription, through a constant updating of the world by players and designers – an updating that turns these worlds into living environments. It is true that by facilitating the exchange of any type of self-expression and artistic project, networking has promoted images, video and music as much as, or perhaps more than language. But language remains the most important means of personal communication on the Web, as it is in non-digital life. Thanks to networked media, writing is no longer "a spectator sport played by professionals", as Michel Chaouli observes, "it involves player participants content to be amateurs", because they are motivated by the pure pleasure of writing, playing, creating personas, engaging in dialogue with each other, and publicly performing, rather than by the ambition to become authors. As Chaouli concludes, "chances are [that this activity] will not produce great literature, but it will probably be a lot more fun" (2005, 617). More fun, presumably, than those types of

digital texts that maintain the distinction between author and reader – a distinction that cannot be entirely erased by interactivity.

CONCLUSION

Let me now turn to the question of what the computer means for the future of literature. I do not mean to discuss the fact that in the future books may be replaced by electronic reading machines: it is still for a large part books, still traditional literature that people read on these machines. The point of my question is whether the literature of the future will be the truly digital kind, the kind that takes advantages of the properties of digital media. The texts of the ELO collection certainly represent an avant-garde and experimental movement within textual art.¹⁶ But this does not mean that they represent the future of literature, because avant-gardes and experiments can be dead-end branches on the tree of literary evolution as much as they can be productive innovations. Literary evolution is not a coach pulled by the horses of experimental forms, no more than it is a load pushed from behind by the forms of popular culture; it is much more a swarm of ideas that move back and forth between the front and the back, the avant-garde inspired by popular forms, and popular forms adopting ideas that were once avant-garde. The complexity of these exchanges makes it very difficult, if not impossible, to predict where the swarm is heading.

The great strength of digital media is to have created hybrid forms of expression that challenge the distinctions between traditional art forms. Most digital texts become much more attractive if we think of them as a new form of art than if we regard them as literature, because literature relies on the semantic dimension of language, while most digital texts use language primarily as a material substance. In digital texts words become visible, audible or even tangible entities, and they convey meanings through their

¹⁶ As the anonymous referee of this chapter observes, the techniques used by electronic texts bear an obvious resemblance to those used by the avant-garde of print literature. The cognitive challenge issued by these techniques brings support to Culler's claim that reading literature is an "unnatural" activity requiring a specialized competence. This competence becomes technological in the case of digital texts: with the works of the ELO collection, users must not only learn how to read the texts (reading is taken here in a broad sense of appreciating), they must also learn how to operate them. This is no small challenge, given the variety of the interfaces represented in the collection. Yet it is essential to the survival of literature as a whole that it not limits itself to works that require a specialized competence.

sensory properties much more than through their lexical and contextual significance. In the most extreme cases of dysfunctionality, they even speak to us through the loss of their sense. But every gain comes at a loss, and the gains of digital texts in the sensory domain are not substantial enough compared to the losses of the semantic domain to reduce traditional literature to a marginal role.

I am not a neuroscientist, and I am not claiming expertise in the mapping of the brain, but it seems to me that traditional literature, especially of the narrative kind, stimulates many different areas of the brain, belonging to both the right and the left hemisphere. This means that it recruits our logical as well as our emotional faculties. Digital texts by contrast are more narrowly focused on operations that popular science associates with the right hemisphere, such as symbol manipulations, formal transformations and spatial thinking. This may be why digital culture has been associated with the emergence of a new type of subjectivity called the posthuman or the cyborg, a subjectivity supposedly produced by the co-evolution of machine intelligence and human cognition.¹⁷

The strength of digital texts lies in the originality of text-producing algorithms. They will speak to you if you regard words as objects with which to invent new games, and if you expect language to perform a new dance choreographed by code to a music that the computer alone can play – the music of its special affordances. But if you value literature's power to express the drama of human experience, to propose a vision of life, to tell spellbinding stories, to articulate complex ideas and to exercise emotional power, then print-based texts will never be made obsolete by their digital rivals.¹⁸

REFERENCES

- Aarseth, Espen. 1997. *Cybertext. Perspectives on Ergodic Literature*. Baltimore: Johns Hopkins University Press.
- Andreychek, Eric. PERL port of jabberwocky. <http://c2.com/cgi/wiki?PerlPoetry>.
- Beiguelman, Giselle. 2004. *Code Movie*. http://collection.elliterature.org/works/beiguelman_code_movie_1.html.
- 17 The notion of cyborg was proposed by Donna Haraway (1991) and the concept of posthuman popularized by N. Katherine Hayles (1999), though there have been earlier uses of the term.
- 18 A preliminary, shorter version of this article appeared in *Genre* xLI, vol. 3-4, 2008, 33-58, under the title "What Has the Computer Done for the Word?" Text reproduced by permission.
- Bell, Alice. 2010. *The Possible Worlds of Hypertext Fiction*. London: Routledge.
- Boyd, Brian. 2009. *On the Origin of Stories: Evolution, Cognition and Fiction*. Cambridge, Mass: Belknap Press.
- Carr, Nicholas. 2010. *The Shallows: What the Internet is Doing to Our Brains*. New York: Norton.
- Cayley, John. 2004. *Translation*. http://collection.elliterature.org/works/cayley_translation.html.
- Chaouli, Michel. 2005. How Interactive Can Fiction Be. *Critical Inquiry* 31: 599-617.
- Cicconico, David. 2007. *Reading Network Fiction*. Tuscaloosa: University of Alabama Press.
- Coover, Robert. 1999. *Literary Hypertext: The Passing of the Golden Age*. www.nickm.com/vox/golden_age.html.
- Crawford, Chris. 1987. Process Intensity. *Journal of Computer Game Design* 15. http://www.erasmatazz.com/library/JCGD_Volume_1/Process_Intensity.html.
- Culler, Jonathan. 1975. *Structuralist Poetics*. Ithaca: Cornell University Press.
- Dutton, Denis. 2009. *The Art Instinct*. New York: Bloomsbury Press.
- Falco, Edward. 2006. *Chemical Landscapes*. http://collection.elliterature.org/works/falco_chemical_landscapes_digital_tales.html.
- Flarf Poetry*. Wikipedia entry. http://en.wikipedia.org/wiki/Flarf_poetry.
- Haraway, Donna. 1991. *Simians, Cyborgs, and Women: The Reinvention of Nature*. London: Routledge.
- Hayles, N. Katherine. 1999. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics*. Chicago: University of Chicago Press.
- 2002. *Writing Machines*. Cambridge, Mass: MIT Press.
- 2005. *My Mother Was a Computer: Digital Subjects and Literary Texts*. Chicago: University of Chicago Press.
- 2008. *Electronic Literature: New Horizons for the Literary*. Notre Dame, Ind.: University of Notre Dame Press.
- Nick Montfort, Scott Rettberg, and Stephanie Strickland, eds. *Electronic Literature Collection*, vol. 1. <http://collection.elliterature.org/1/>.
- Isidore Isou home page. <http://www.thing.net/~grist/Ind/lettist/isou.htm>.
- Jenkins, Henry. 2006. *Convergence Culture: Where Old and New Media Collide*. New York: NYU Press.
- Kirschbaum, Matthew G. 2005. The Words as Image in an Age of Digital Reproduction. In *Eloquent Images*, eds. Mary E. Hocks and Michelle R. Kendrick, 137-56. Cambridge, Mass: MIT Press.
- Kurzwel, Ray. 1999. *The Age of Spiritual Machines*. New York: Viking.
- Lettrist Home Page. <http://www.thing.net/~grist/Ind/lettist/lettist.htm>.
- Leslie, Jacques. 1995. Ambiguity Machines. *EJournal* 5.2. <http://www.hanover.edu/philos/ejournal/archive/ej-5-2.txt>.
- Lu, Alan. 2004. *The Laws of Cool: Knowledge Work and the Culture of Information*. Chicago: University of Chicago Press.
- Mangen, Anne. 2006. *New Narrative Pleasures? A Cognitive-Phenomenological Study of the Experience of Reading Digital Narrative Fictions*. PhD dissertation, Norwegian University of Science and Technology, Trondheim, Norway.

- Manovich, Lev. 2001. *The Language of New Media*. Cambridge, Mass.: MIT Press.
- Mateas, Michael and Andrew Stern. 2005. *Façade*. Downloadable from: <http://interactivestory.net/download>.
- Mez (Mary Anne Breeze). (n.d.). Except from <http://networker.livejournal.com/>.
- Montfort, Nick. 2004. Interactive Fiction as 'Story,' 'Game,' 'Storygame,' 'Novel,' 'World,' 'Literature,' 'Puzzle,' 'Problem,' 'Riddle,' and 'Machine.' In *First Person: New Media as Story, Performance, and Game*, eds. Noah Waldrip-Fruin and Pat Harrigan, 310-17. Cambridge, Mass.: MIT Press.
- Morrissey, Judd. 2000. *The Jew's Daughter*. http://collection.eliterature.org/1/works/morrissey_the_jews_daughter.html.
- Moulthrop, Stuart. 1999. *Reagan Library*. http://collection.eliterature.org/1/works/moulthrop_reagan_library.html.
- Nelson, Theodore. 1981. *Literary Machines*. Swarthmore, Pa: Mindful Press.
- Powers, Richard, with Jennifer Gunji, Joseph Squier, Jessica Mullen, Lauren Hoopes, Chad Kellenberger and Val Lohmann. 2004. They come in a steady stream now. http://www.ninbletter.com/featured_artist/artist/5.
- Pratt, Mary Louise. 1977. *Toward a Speech Act Theory of Literary Discourse*. Bloomington: Indiana University Press.
- Racter [Bill Chamberlain]. 1984. *The Policeman's Beard is Half Constructed: A Bizarre and Fantastic Journey into the Mind of a Machine*. New York: Warner Books.
- Ryan, Marie-Laure. 2006. *Avatars of Story*. Minneapolis: University of Minnesota Press.
- Seaman, Bill. Interactive Text and Recomppinant Poetics – Media-Element Field Explorations. In *First Person: New Media as Story, Performance, and Game*, eds. Noah Waldrip-Fruin and Pat Harrigan, 227-34. Cambridge, Mass.: MIT Press.
- Simanowski, Roberto. 2007. Holopoetry, Biopoetry and Digital Literature. In *The Aesthetics of Net Literature: Writing, Reading and Playing in Programmable Media*, eds. Peter Gendolla and Jürgen Schäfer, 43-66. Piscataway, N.J.: Transcript Publishers.
- 2007. *Double Coding*. Paper presented at the conference "Remediating Literature", Utrecht, Netherlands.
- Stefans, Brian Kim. 2000. *The Dream Life of Letters*. http://collection.eliterature.org/1/works/stefans_the_dreamlife_of_letters.html.
- Turner, Scott R. 1994. *The Creative Process: A Computer Model of Storytelling and Creativity*. Hillsdale, N.J.: Lawrence Erlbaum.
- Utherback, Camille. 2004. Unusual Positions – Embodied Interaction with Symbolic Spaces. In *First Person: New Media as Story, Performance, and Game*, eds. Noah Waldrip-Fruin and Pat Harrigan, 218-26. Cambridge, Mass.: MIT Press.
- Utherback, Camille and Romy Arthiruv. 1999. *Text Ruin*. Installation. Description at: <http://www.camilleutterback.com/texttrain.html>.
- Wardrip-Fruin, Noah and Pat Harrigan, eds. 2004. *First Person: New Media as Story, Performance, and Game*. Cambridge, Mass.: MIT Press.
- Wardrip-Fruin, Noah and Brion Moss, with a.c. chapman and Duane Whitehurst. 2002. *The Impermanence Agent*. Project and Context. *CyberText Yearbook*, eds. Markku Eskelinen and Raine Koskimaa, 13-58. University of Jyväskylä: Publications of the Research Centre for Contemporary Culture.