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# The Origins of Electronic Literature. An Overview.

## *As origens da Literatura Eletrônica. Um panorama.*

**Giovanna Di Rosario[a]; Kerri Grimaldi[b]; Nohelia Meza[c]**

a Politecnico di Milano, Milano, Italy - giovanna.dirosario@polimi.it
b Hamilton College, Clinton, New York United States of America - kgrimald@hamilton.edu
c University of Leeds, Leeds, United Kingdom - n.meza@leeds.ac.uk

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**Abstract:** The aim of this article is to sketch the origins of electronic literature and to highlight some important moments in order to trace its history. In doing so we consider the variety of languages, cultural backgrounds, cultural heritages, and contexts in which digital literature has been created. The article is divided into five sections: a brief history of electronic literature in general (however, we must admit that this section has a very ethnocentric point of view) and then four other sections divided into North American, Latin American, European (Russia included), and Arab Electronic Literature. Due to the lack of information, there is no section devoted to Electronic Literature in Asia, although a few texts will be mentioned. We are aware of the limits of this division and of the problems it can create, however, we thought it was the easiest way to shortly map out the origins of electronic literature and its development in different countries and continents. The article shows how some countries have developed their interest in and creation of electronic literature almost simultaneously, while others, just because of their own cultural background and/or contexts (also political and economic contexts and backgrounds), have only recently discovered electronic literature, or accepted it as a new form of the literary genre.

**Palavras-chave:**
Literatura
Eletrônica.
Origens.
Desenvolvimento.
Mundo.

**Resumo:** O objetivo deste artigo é esboçar as origens da literatura eletrônica e destacar alguns momentos importantes para traçar sua história. Ao fazê-lo, consideramos a variedade de idiomas, origens culturais, heranças culturais e contextos nos quais a literatura digital foi criada. O artigo está dividido em cinco seções: uma breve história da literatura eletrônica em geral (no entanto, devemos admitir que esta seção tem um ponto de vista muito etnocêntrico) e depois quatro outras seções divididas em norte-americana, latino-americana, européia (Rússia incluída), e Literatura Eletrônica Árabe. Devido à falta de informações, não há seção dedicada à Literatura Eletrônica na Ásia, embora alguns textos sejam mencionados. Estamos cientes dos limites dessa divisão e dos problemas que ela pode criar, no entanto, achamos que era a maneira mais fácil de mapear rapidamente as origens da literatura eletrônica e seu desenvolvimento em diferentes países e continentes. O artigo mostra como alguns países desenvolveram seu interesse e criação de literatura eletrônica quase simultaneamente, enquanto outros, apenas por causa de sua própria formação cultural e / ou contextos (também políticos e econômicos), só recentemente descobriram a literatura eletrônica, ou aceitaram-na como uma nova forma de gênero literário.

**Introduction**

The aim of this chapter is to sketch the origins of electronic literature and to highlight some important moments in order to trace its history. As electronic literature is a "recent" form of literature (Hayles) one could suppose that it is an easy duty to look for its origins. However, due to its ephemeral nature - many of the electronic literature works created in the last century and even in this one are lost or they do not work anymore on modern computers for several reasons - changes of the supports, changes in the programs, etc. - which makes the goal more complex than one may think.

Electronic literature is a form of literature that started to appear with the advent of computers and digital technology. It is a digital-oriented literature, but the reader should not confuse it with digitized print literature. Electronic literature is a new object of study that can be approached from diverse disciplines. There are different possible definitions of electronic literature or digital literature[1]. Yet again, without a clear and rigorous definition, electronic literature tends to be an object of study that is difficult to categorize and clearly describe.

While remaining aware of its problems and tautology, we decided to use the ELO's definition of electronic literature: "works with important literary aspects that take advantage of the capabilities and contexts provided by the stand-alone or networked computer" ("What is E-lit?")[2]. As stated by Markku Eskelinen and Giovanna Di Rosario in *Electronic Literature Publishing and Distribution in Europe*, "this definition is helpful mostly because of what it excludes: both digitized print literature and print-like digital literature" (6).

In order to trace the origins of electronic literature around the world we need to consider the variety of languages, cultural backgrounds, cultural heritages, and contexts in which digital literature has been created. Digital literature cannot be seen as a whole and it has not been produced at the same time, in the same ways, and for the same reasons, around the world.

An aspect we need to emphasize in this reconstruction of the history of electronic literature concerns languages. The variety of languages, while being a value, can also be considered a

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[1] We will use the terms "electronic literature" (or its abbreviation e-lit) and "digital literature" as synonymous and in the space of this chapter we will not make any reference to the possible different exceptions they may have.

[2] Electronic Literature Organization, https://eliterature.org

linguistic challenge. Being electronic literature a recent form of literature, the interest in translating works is quite recent as well. Although some electronic literary works have been translated and a number of significant researches on electronic literature translation have been made, much work remains to be done[3].

Given the vast scope of this chapter, we have also relied on the competences and knowledge of several colleagues that have helped us to retrace the origins of electronic literature in different countries and continents. So methodologically, we have conducted our research in part by interviewing different digital literature specialists around the world, and we would like to thank them for their contribution and involvement to this chapter: Natalia Fedorova (for her contribution to this chapter as far as digital literature in Russia is concerned), Carolina Gainza and Claudia Kozak (for their support and advice in tracing the history of digital literature in Latin America), Dani Spinosa (for her contribution to this chapter as far as digital literature in Canada is concerned), Eman Younis, (for her contribution to this chapter as far as Arab digital literature is concerned); and finally we would also like to thank Philippe Bootz, Serge Bouchardon, John Cayley, Dene Grigar, Michel Hockx, and Keijiro Suga for their suggestions and ideas.

This chapter aims to highlight some important works and moments in the creation of this new form of literature. In doing that, we have tried to combine several aspects, such as its social, political, and aesthetical implications. To do so, we divided this chapter into five sections: a brief history of electronic literature in general (however, we must admit that this section has a very ethnocentric point of view) and then four other sections divided into North American, Latin American, European (Russia included), and Arab Electronic Literature. Although we are aware of the limits of this division and of the problems it can create (for instance, does it make sense to geographically divide a literature that seems to be a true world literature?), we thought it was the easiest way to shortly map out the origins of electronic literature and its development in different countries and continents. Due to the lack of information, there is no section devoted to Electronic Literature in Asia, although a few texts will be mentioned.

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[3] One of the very first portals devoted to the translation of digital literature is the Finnish Nokturno (edited by Marko Niemi; www.nokturno.org), which has been in operation since 2005. *Déprise* (2010) by Serge Bouchardon and Vincent Volckaert is one of the few e-lit works that has been translated from French into English, Italian, Spanish, and Portuguese (https://bouchard.pers.utc.fr/deprise/home). Recently, María Mencía, Søren Bro Pold, and Manuel Portela have published "Electronic Literature Translation: Translation as Process, Experience and Mediation." in the *Electronic Book Review*
(http://www.electronicbookreview.com/thread/electropoetics/translative).

**Brief history**

For many years, the electronic literature community has considered "Stochastic texts" (1959) by Theo Lutz as the first digital literary text[4]. German scholar, philosopher, and poet Max Bense suggested that Lutz use a random generator to accidentally determine texts. Bense looked to establish a scientific and objective branch of aesthetics, by means of applying mathematical and information theoretical premises to the study of aesthetic texts. Lutz made a database of sixteen subjects and sixteen titles from Franz Kafka's novel *The Castle* (1926). Lutz's program randomly generated a sequence of numbers, pulled up each of the subjects/titles, and connected them using logical constants (gender, conjunction, etc.) in order to create syntax. The language of the work contained permutation—the same set of words were used over and over again, each time that the program was running. However, it was not the permutation of Kafka's complete work; it was a fragmented permutation of the words Lutz chose from *The Castle*.

The results of his project were published in 1959 as an essay in *Augenblick* 4 (3-9), a journal of aesthetics edited by Max Bense. The publication in a journal of aesthetics gave credit to consider "Stochastic texts" (*Stochastische Texte*) as the very first piece of electronic literature. After Lutz's work, many other authors have experimented with the possibilities of computers in creating poetry. However, a few years before, in 1952 Christopher S. Strachey created what could be considered the first piece of digital literature[5].

Strachey is rightly viewed as a pioneer of modern computing, but he is not usually viewed as the creator of the first work of digital literature. Strachey developed—using Turing's random number generator—a Mark I program that created combinatory "Love Letters" (1952). This was the first piece of digital literature and of digital art, predating the earliest examples of digital computer art by almost a decade.

Lutz was just the first of a group of scholars to view mathematics, science, and creativity as cooperative disciplines. Many other experiments in computer-randomized poetry have been conducted since 1960, primarily in Europe, the United Kingdom, and the United States.

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[4] See for instance Chris Funkhouser, *Prehistoric Digital Poetry: An Archaeology of Forms 1959-1995*, Alabama University Press, 2007.

[5] Christopher S. Strachey (1916–1975) was a British computer scientist. He was a pioneer in programming language design. He was a colleague of the famous Alan Turing and in 1952 Strachey was a programmer of the world's first commercially available general-purpose electronic computer, the Ferranti Mark 1.

Thanks to the evolution in technology, other *electronic/digital* poetry experiments began in the following years. Some examples are: Brion Gysin's permutation "I am that I am" (1960) programmed by Ian Somerville, "Tape Mark made" in 1961 with an IBM calculating machine by Nanni Balestrini, and "La machine à écrire" published in 1964 by Jean Baudot.

As hardware and graphical programs were developed in the 1960s, a few poets started to use digital tools to create visual poems. In the late 1960s concrete and visual poets began to focus on using computers to make graphical representations of and with language. When the technology became available, artists started to create digitally static and animated works and to manipulate language to increase visual properties.

By the 1980s poets increasingly presented moving language on screen as a result of the development of computers. These experiments prefigure many later works in poetry that proliferated in animated, hypermedia digital formats. The 1980s are an important moment for the history of electronic literature since in 1985 in occasion of an international exhibit held in Paris at the Centre Georges Pompidou, titled "Les Immatériaux", organized by Jean-François Le Lionnais, the ALAMO[6] group introduced its first poems "generated" by a computer, which somehow sanctioned the birth of a new form of visual poetry "animated" by this new medium. The ALAMO group wanted to develop tools and computational methods of use to writers. They have focused on the potentiality of writing "assisted" by the machine, by the computer.

By the mid-1980s, moreover, the influence of post-structural critical theories (such as deconstruction) spurred writers and poets to make up new appearances for literature in general (let's think of fictional hypertexts) and for poetry in particular. As for poetry, all the elements promoted by concretists -the visual presentation of texts, graphical effects, a new typography, coloration, repetition- can be easily found in many electronic texts. Computers clearly enable and extend ideas looked for by the concretist aesthetic. Examples of graphical poems made thanks to computer technology had already begun to emerge in the late 1960s. Marc Adrian's

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[6] Atelier de Littérature Assistée par la Mathématique et les Ordinateurs (Workshop of Literature Assisted by Mathematics and the Computers). Paul Braffort and Jacques Roubaud, both members of OULIPO, created in 1981 the ALAMO. In 2008 there were 17 members in the ALAMO group. Cf. Philippe Bootz, *From OULIPO to Transitoire Observable: Evolution of the French Digital Poetry,* accessible online at: http://www.dichtung-digital.org/2012/41/bootz.htm (Accessed, January 29, 2016).

*Computer Texts*[7] were featured in the Cybernetic Serendipity exhibition in 1974. The options derived by the possibility to animate the language were also particularly investigated; in fact, animated poems long predated a style of electronic poetic practice that erupted with the advent of the WWW, typified by works such as Brian Kim Stefan's *The Dreamlife of Letters* (2000).

To this technological revolution we should add another important step, which took place in the 1990s, when the CERN's researchers of Geneva (led by Tim Berners-Lee) developed the technology that has made the net popular. It was from that date that a proliferation of web sites of "cyber-poetry/cyber-literature" began and, consequently, a new generation of digital authors was born. Since then we have witnessed the continuous increase of poetic creations published on the web, so that in 1999 the magazine Doc(k)s[8] felt the need to catalogue what had already been produced so far[9]. Viewers confronting a program in an installation setting like text-generated poems automatically spawned the initial works. With the development of graphics software, successive works embodied visual methods that approximated concrete and visual poems rendered and fixed on the page[10].

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[7] In this work, the computer randomly assembles poems by using a database of eleven hundred alphabetic symbols to place twenty words at time on the screen. Adrian organized the interface using a grid of system. The symbols retrieved from the database (letters or groups of words) appeared in rows and columns on the screen. Adrian in part disguised the grid element by variegating the size of the font and not using every line or block.

[8] Doc(k)s is a review of contemporary poetry, which explores the audio-visual experiments in poetry that have marked the twentieth century. The review has a web site at: http://www.sitec.fr/users/akenatondocks/ (Accessed, March 31, 2016).

[9] It emerged immediately that the new generation of "digital" poets knew the computer culture very well, they came from different fields, visual and/or plastic arts, communication, design, or simply from the web but they did not have any specific aesthetic or literary knowledge.

[10] In contrast to the production of the earliest visual poets, these works are not interactive.

**Europe (Russia included)**[11]

Europe has been very prolific in the creation and development of electronic literature, although some countries more than others. In the space of this chapter it will be impossible to retrace the origins of digital literature through the whole of Europe, however, we try to give an overview on as many countries as possible focusing a bit more on the ones that seem to have a stronger tradition. Germany and the UK have undoubtedly played a central role in the origins and development of digital literature. As we have seen, the text that has been considered for years (and the discussion is still open) the first piece of digital literature was made in Germany in 1959, and the "Love Letters" generator was invented by the British Christopher Strachey in 1952.

As seen, in Britain, "I Am That I Am" (1959-1960) by Brion Gysin programmed by Ian Sommerville, was one of the permutation poems included in a series of sound poetry recordings. Gysin was invited to perform these for the BBC radio in 1960. "'I Am That I Am' is a cyclical, randomized representation of the three words contained in that phrase" (Funkhouser 39). In that period of experimentation with poetry, Italian artist Gianni Toti even coined the term, "poetronica," in order to highlight both components of a new fusion of the arts: the poetic element and the electronic mode, although Toti has never been seriously involved with digital literary or poetic creations.

France, as we have seen, also has a very long and strong tradition of experimenting with literature. Already in 1964, Jean Baudot published "La machine à écrire" ("The typewriter")—an example of "computer-assisted literature" ("littérature assistée par ordinateur"). Jean Baudot created a combinatorial program, and then gathered the generated texts into the book published by Les Editions du Jour.

In the "Brief History" section we have already mentioned that 1985 somehow sanctioned the birth of a new form of visual poetry "animated" by the new medium, and still in 1985 the first

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[11] A complete overview about Electronic Literature in Europe was impossible to report. Several countries such as Spain and Poland have not been mentioned although quite active in the digital literature panorama. For more information about Europe Cf. Markku Eskelinen and Giovanna Di Rosario, "Electronic Literature Publishing and Distribution in Europe", University of Jyväskylä Press, 2012; specifically about Poland Cf. Piotr Marecki, "The formation of the field of electronic literature in Poland", https://elmcip.net/critical-writing/formation-field-electronic-literature-poland (Accessed March 31, 2016); about Spain Cf. Maya Zalbidea Paniagua (ed.) "Spanish Language Electronic Literature", https://elmcip.net/research-collection/spanish-language-electronic-literature (Accessed March 31, 2016).

art review on Minitel[12] was published in France. According to Serge Bouchardon, around 80 artists participated in this issue, spanning 1500 Minitel pages. Text animation was already very present thanks to authors like Philippe Bootz, Frédéric Develay, Claude Faure, Guillaume Loizillon, Tibor Papp. At the time, "all of them were in the sphere of visual and sound poetry and were to play a key role in the evolution of French digital poetry" (105).

Portugal also has an interesting tradition of experimenting with literature, especially as far as automatic, generative, combinatory texts are concerned. The Portuguese writer and poet Ernesto Manuel de Melo e Castro is considered the father of the so-called "videopoetry" in which animation and temporality are brought to poetry and that then largely influence digital poetry. According to him "videopoetry" was "inevitable as a concept" answering the challenge of the new technological means for producing texts and images (De Melo e Castro). He also underlined that reading a "videopoem" would be a complex experience since different temporal modalities of perception would coincide with the moving and changing images and texts. He signaled the arrival of a new poetics of reading.

The Portuguese Pedro Barbosa is considered the father of generative texts in Portugal and a pioneer in Europe. His well-known "Sintext" (automatic generator created in collaboration with Abílio Cavalheiro) and "Oficio sentimental" (textual generator) were published in A.L.I.R.E. in 1994 (Édition Mots-Voir). Barbosa published a new version of "Sintext" in 1997 in A.L.I.R.E/DOC(K)S n.10 (CD-ROM): "Sintext: neuf textes automatiques générés par ordinateur".

Several pioneering works of digital literature in Europe were hypertexts (although this tradition derives from US examples and texts). For instance, Lorenzo Miglioli wrote the first Italian hypertext in 1993. "Ra-Dio" was presented at a conference in Reggio Emilia organized by Gruppo 63 (an Italian avant-garde movement that had several famous authors as members such as Nanni Balestrini, Edoardo Sanguinetti, and Umberto Eco). "Ra-Dio" was published along with the translation into Italian of Michael Joyce's "Afternoon. A story". Karl-Erik Tallmo published Sweden's first hypertext fiction "Iaktagarens' förmåga att ingripa" ("Participant's capability to interfere") in 1992. During the 1990s, European authors also experimented with this new form of writing. As stated by Markku Eskelinen "[g]enerally

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[12] The Minitel was a videotext online service accessible through telephone lines and is considered one of the world's most successful pre- World Wide Web online services.

speaking, it is typical of the Nordic scene that many if not most authors of the most prominent works of electronic literature are also (locally) well-known authors of print literature" (8).[13]

Natalia Fedorova notes that the origins of Russian electronic literature are untold stories of the experimentations of mathematicians in their labs that are hardly published as they were seen to be mere jokes. One of these experiments taken seriously is a program for composing verse that was described by Boris Katz in his article from 1978 in the journal of USSR Academy of Sciences. The aim of the program is to find minimal means to produce verse. The thesaurus consists of words (nouns, adjectives, pronouns, conjunctions, and verbs) from Osip Mandelstam's *Kamen* (*Stone*)[14] with marked number, gender, and tense. Each word is accompanied with the information about metrics, rhyme, and grammar. Its function in the sentence is also marked either as subject, predicate or adverbial modifier. Adding the information about the stress forms the rhyme: ultimate - for masculine rhyme, or penultimate - for feminine. A machine composes every line from right to left: first, it writes the last two words in each line, then it adds all the rest according to grammatical and syntactical functions, disregarding semantics. The program has been reimplemented and presented by an electronic poet and media artist Anna Tolkacheva at the Taburetka poetry festival in Monchegorsk, Murmansk region on August 28th, 2016.

The official birth of Russian electronic literature—visible, but not accepted, by rather traditional literary circles—can be dated back to the Teneta (1994) literary contest. Apart from poetry, prose and translation, it included nominations in "Hyperliterature", "the Creative Arts", and "Games". Teneta positioned itself as a "pure Internet contest". The best texts, originally published on the Internet, were to be nominated. It is important to note that the Internet culture itself started publicly as a literary phenomenon in the early 1990s (Gorny) with Dmitry Manin's Bout Rimes (Буриме) (1995) and Roman Leibov's ROMAN (1995). The 90's, as a nostalgic epoch of freedom for Russian millennials, can be seen as formative years of Russian e-lit. Net.art legacy established by the Da-Da-Net Festival (1993-1999), as well as the influence of Alexander Shulgin's lectures at Pro Arte Media Art Program (2000-2001), can be traced in Ivan Khimin's asciiticist (ASCII+asceticism) installation and postdigital painting Strokes and Incisions (Черты и резы) (2012). Michail Kurtov creates a Twine based IF Kourekhin: Second Life loosely based on the biography of legendary artist

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[13] This means first of all that their works of electronic literature are situated within an oeuvre that is already recognized and positively evaluated as literature, which is not always the case in the rest of Europe.

[14] Cf. *Stone*, Petrograd: Hyperborey, 1916. http://digitalmandelstam.ru/engl2.html

and performer of the 80-90s, Sergey Kourekhi.

**North America**

In North America, as in Europe, there has been a prolific history of electronic literature. John Cayley has suggested that digital literature is a "mode of practice," as all print writers today use digital affordances in their writing as it is (Szilak). To look at electronic literature as a "mode of practice," each work of e-lit would then be differentiated from another based upon which tools are utilized in making it.

In this way, we believe it is best to begin this account of the origins of North American electronic literature with the first programs and platforms that were utilized to create e-lit and the genres that they inspired. We will also briefly consider the organizations that saw the importance of these works and methods, and made it possible to preserve, archive, criticize, and promote the ever-growing history of electronic literature.

Interactive fiction emerged in the 1970s and describes works of e-lit that blur the lines between games and literature. These works are more interactive than other forms of e-lit in that most works give more control over the story to the reader/user. These are often called, "text adventures," where games are played with text-based input and output (Hayles et al.). The first work of interactive fiction was *Colossal Cave Adventure* created by Will Crowther with the help of Don Woods in 1976. In this text-based game, the player uses text commands to move the character through a cave searching for wealth, with the goal of making it out of the cave alive and finding the most treasure. It was built for the PDP-10 platform (Adams). The game could be accessed from ARPAnet, the precursor to the Internet.

Dave Leblin and Mark Blank were so enamored with *Colossal Cave Adventure* that they created their own game with the help of Tim Anderson and Bruce Daniels, *Zork* (1977-1979)*, which became known as the most influential work of interactive fiction. *Zork* was more complex than its muse, allowing for longer text commands and providing multiple levels to the game that the player could master. Joel Berez and Mark Blank wanted to find a way to take *Zork* and make it accessible to home computers, so they designed a program language that could run on any computer through an emulator. With this, they began a company called Infocom, selling commercial interactive fiction for home computers (Thorek).

As mentioned in the previous section of this chapter, the tradition of hypertext fiction was

born in the United States. Doug Englebart created the first hypertext system called, "Augment," in 1968. It was fully realized into a system called Xanadua, which was eventually adopted by the software company, Autodesk, in 1988 (Funkhouser 152). According to Thomas Swiss, Eastgate Systems, a publishing company, "managed to create a kind of 'local' scene for hypertext writers" (qtd. in Funkhouser 153). Eastgate published many works of hypertext in the 1990s, and notably developed the most popular software used to create hypertext fictions, Storyspace.

While hypertext fiction was largely popular in the 1980s and 90s, its popularity is now receding for its limitations with graphics and sound files. N. Katherine Hayles' refers to the hypertext, link-led style of digital literature as "First Generation" with the year 1995 introducing a "Second Generation" which de-emphasized the link-led nature (Hayles). Though hypertext fiction generated on proprietary software has receded for its limitations with graphics and sound files, the "First Generation" style of hypertext fiction lives on today through use of an open-source tool called Twine created in 2009.

Stemming off of hypertext fiction, electronic literature expanded to include more graphics, sound files, and structures that departed from the block text tradition thanks to the introduction of browser access to the web beginning in 1995. Network fiction employed these features by mimicking network forms like the Frequently Asked Questions list, blogs, news feeds, and e-mail. David Ciccoricco created the term, "network fiction," defining the new wave of e-lit as digital fiction that "makes use of hypertext technology in order to create emergent and recombinatory narratives" (4). One such example is Talan Memmott's *Lexia to Perplexia*[15], which utilizes DHTML and Java much like a computer network.

On the extreme end of immersive e-lit environments is the invention of CAVE, or Cave Automatic Virtual Environment, created at the University of Illinois. CAVE is a shared reality virtual environment generated through goggles and several projectors pointing to walls of a small room (Hayles et al.). The experience of CAVE is at once game-like, digital art, and fiction. *Screen* (2003)*,* created by Noah Wardrip-Fruin, Josh Carroll, Robert Coover, Shawn Greenlee, Andrew McClain, and Benjamin "Sascha" Shine, projects block text onto the walls, but words peel off and the user can interact with them and even hit them like a tennis ball back at the wall. Works created in CAVE immerse the user in a full-body experience, though

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[15] *Lexia to Perplexia* was first published on the *Iowa Review Web* in September 2000.

one that is not as accessible as those works that can be hosted on the web.

Despite our limited space in this chapter to address each organization and institution that has been created to support, promote, and preserve electronic literature, we would be remiss not to mention the strides that the Electronic Literature Organization have accomplished. The Electronic Literature Organization (ELO) began in 1999 and has since inspired several other organizations. Author Scott Rettberg, novelist Robert Coover, and Internet business leader Jeff Ballowe initiated the organization. The ELO pledged to "foster and promote the reading, writing, teaching, and understanding of literature as it develops and persists in a changing digital environment" (Hayles et al.). In 2001, the ELO held the first Electronic Literature Awards program—the first and only of its kind—to recognize exemplary poetry and fiction (John Cayley among them). The ELO was also responsible for the creation of the Preservation, Archiving, and Dissemination (PAD) project[16], the Electronic Literature Directory[17], and three volumes of the Electronic Literature Collection[18].

In Canada, not only are works usually mixed media, but they also tend to be collaborative, sometimes including authors of multiple countries. In "Toward a Theory of Canadian Digital Poetics", Dani Spinosa argues "Canadian digital poetics has tended toward post-structural skepticism of authorship by producing electronic literature that is generally concerned with generative work, source or seed texts, remixes, cut-ups, or plagiaristic borrowings" (239). Spinosa goes on to point out that, while many Canadian authors take pride in the collaborative nature of digital poetics, sometimes authors or source texts are not adequately credited for their contributions.

Because of the prevalence of transnational authorship and a lack of accurate credit, identifying national qualities and trends in Canadian works is complicated. However, there are still some trends that can be traced.

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[16] The Preservation, Archiving, and Dissemination (PAD) project from 2002-2005. This conference resulted in the publication of *Acid-Free Bits* by Nick Montfort and Noah Wardrip-Fruin and *Born-Again Bits* by Alan Liu, David Durand, Nick Montfort, Merrilee Proffitt, Liam R. E. Quin, Jean-Hughes Rety, and Noah Wardrip-Fruin. These publications provide advice to artists on how to best preserve their works and which software to use for their works. The conference turned into an initiative that offers works through a Creative Commons license on the Electronic Literature Collection Vol. 1 (Hayles et al.).

[17] The Electronic Literature Directory, maintained by scholars and readers, houses information about readings, events, and critical works. https://directory.eliterature.org

[18] The Electronic Literature Collection has produced three volumes in 2006, 2010, and 2016 respectively (ELC1, ELC2, ELC3). The first two collections have about 60 works and the third collection increased to 114, all of which are edited by editorial collectives ("The Electronic Literature Collection: Volume Three"). Though the ELC is based out of the United States, it includes works from many other countries as well.

Throughout Canadian electronic literature the visual concerns of transmedial and born-digital projects are heavily indebted to concrete poetry, as interpreted by earlier Canadian practitioners like bpNichol and Steve McCaffery. Nichol already saw the poetic potentials of the digital in his own work, extending the formal and visual concerns of his typewriter-based concrete poetry into digital technologies in 1982 with the production of *First Screening: Computer Poems*, a collection of kinetic poetry produced on an Apple IIe using Apple BASIC programming language. This work is widely considered to be some of the earliest programmed kinetic poetry and some of the first evidence of codework[19]. Nichol's influence can be seen most clearly in the digital component of Darren Wershler's *NICHOLODEONLINE* (1998), but is also evident in Andrews' own work, like "Seattle Drift" (1997) or "Enigma n" (1998) or in the digital component of Damian Lopes' *Sensory Deprivation/Dream Poetics* (1998, 2000).

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[19] The historical importance of *First Screening* combined with the high literary quality of Nichol's writing inspired the efforts of students and staff at the University of Calgary and the University of Victoria to preserve this work long after the Apple IIe was obsolete. The process continued into the early 2000s, and resulted in four different versions of *First Screening* (bpNichol's 'First Screening') hosted on Jim Andrews's *Vispo* site, including an emulator.

**Latin America**[20]

In "Latin American Electronic Literature: When, Where and Why", Claudia Kozak notes that the very first Latin American electronic literature works are most probably "IBM" (1966) by Argentinean Omar Gancedo, which means a bit more than a decade after "Love Letters" (1952) but exactly when other experimentations were taking place in North America and Europe. Omar Gancedo's "IBM" consists of a series of three short poems codified in IBM cards, which, processed by a Card Interpreter, produced the printing of the de-codified texts on the horizontal middle line of each card.

"Le tombeau de Mallarme" (1972) by Brazilian Erthos Albino de Souza —published 6 years later after "IBM" (1966) is a graphic poem consisting of a series of ten visual poems printed by a computer after the manipulation of software prepared for temperature measurement. Erthos Albino de Souza, who was an engineer, created a program for distributing temperatures and applied them to a heated fluid that runs through the interior of a tube. This program allowed a unique design to be obtained based on the different temperatures of the fluids in the various sections of the tube. But since the engineer-poet coded his graphic system in such a way that each temperature scale corresponds to one of the letters of Mallarmé's name, the result is that the letters are spatially arranged to form configurations that are vaguely reminiscent of Mallarmé's "tomb." By heating the fluid at different temperatures, he achieved varying graphic schemes and thus many distinctive configurations of Mallarmé's name, where the graphic sequence composes the poem[21].

During the 1980s in Latin America there were also diverse experiences linking literature and computers. Some examples are "Soneto só prá vê" (1982) by Brazilian Daniel Santiago with programming by Luciano Moreira, in TAL/II language, "Universo" (1985) by João Coelho programmed in Advanced Basic language. In 1986, in Argentina, Ladislao Pablo Györi shaped one of Grete Stern's photomontages using 3D graphics software and combining it with a poem written by artist Gyula Kosice recorded with the aid of a synthesizer (Kozak).

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[20] A complete overview about Electronic Literature in Latin America and the Caribbean was impossible to report for this chapter. However, significant research on the Origins of Electronic Literature is beginning to take place in different countries such as Argentina, Brazil, Chile, Colombia, México, Puerto Rico, etc. Recently, the Latin American Electronic Literature Network (litElat) opened its call for submissions for works of electronic literature from Latin America and the Caribbean to create the first Anthology of Latin American Electronic Literature to be published in 2020 (http://litelat.net).

[21] See ELMCIP, "The Knowledge Database", https://elmcip.net/creative-work/le-tombeau-de-mallarme (accessed April 30 2016).

As far as prose is concerned, Juan B. Gutiérrez, a Colombian writer and expert in mathematical modeling systems, created the first electronic hypertext produced by a Latin American: "El primer vuelo de los hermanos Wright". In the opinion of Carolina Gainza, this production has two stages. The first began in 1995, with a hypertextual novel composed of blocks of texts communicated to each other by links (first version 1996-1998). The structure imitates a book where the links serve to move from one block of text to another. In this case, a still linear sequence of events was created without utilizing the potentiality of the digital writing. Then in 2006, the "hypernovela" was rewritten to be included in the author's project called Literatrónica.

In Mexico (and in Latin America in general), Mexican/American author Blas Valdez (Guadalajara, 1972) was the first author of hypertext fiction (Pitman). He utilized the hypertext style in his print works before producing them on the Internet, as seen in *Restos de corazón* (Remains of the Heart) (1998). According to Pitman, Valdez claims that "all his work is essentially hypertextual, relating the experience of reading and writing hypertext fiction to his personal experience of a variety of neurological disorders: 'hypertext to me feels like home, it feels natural'" (2). His first Internet work was a series of twelve short stories called *Dolor y viceversa.* All twelve stories can be accessed through an index, except for a hidden thirteenth story that can be found within the twelve originals. This work was first published on paper in the 1990s but was later produced with multimedia artwork using Macromedia Director software.

**Arab Digital Literature**

Eman Younis notes that the interest in digital literature in the Arab culture started at the beginning of the third millennium, and specifically after the Jordanian writer Muhammad Sanajilah published the first Arabic novel in the genre of Interactive Fiction titled *Zilal al-Wahed* (*One's Own Shadows*) in (2001). After that, he published his second novel *Dardasha / Chat* (2005), followed by his third work—a short interactive story, called *Saqi' / Frost* in (2006). Sanajilah's works received a lot of interest by critics, and consequently, a large wave of studies and books appeared in the field of Arabic digital criticism.  Among the pioneers of this critical movement were the following critics: Sa'id Yaqtin and Muhammad Aslim from Morocco, Eman Younis from Palestine, Fatima al-Breki from the Emirates, Ibrahim Milhem from Jordan, and Sai'd al-Wakil and Sayyid Najim from Egypt.

The emergence of the pioneering works in the field of Visual Digital Poetry is attributed to the Moroccan poet Mun'im al-Azraq, who published a large number of digital poems on *al-Mirsa'* website, in which he combined media with colors, pictures, photos, paintings, and music. The first interactive poem was written by the Iraqi poet Mushtaq Abbas Ma'in with the title, *Tabarih Raqmiyya li Siratin Ba'dhuha Azraq / Digital Agonies of a Blue Biography*, in which the poet relies on the technique of hypertext.

It is worth mentioning here that the Arabic criticism maintains that visual digital poetry is an extension of visual poetry that was known to the Arabs during the Mameluke and Ottoman eras, during which the poets tried to introduce their poems as artistic paintings, and gave different names to each type of poetry such as: *the painting poem, the concrete poem, the plastic poem, and the calligraphic poem*. This can probably explain the speed of the development of the digital Arabic poem and how it reached the level of the Western poem from the technical point of view (Younis and Nasrallah).

Despite the enthusiasm of many critics in the Arab world towards this new literary experience, the digital literary movement is still progressing very slowly in comparison with the Western world concerning the number of digital texts and academic studies, and the number of websites that are interested in introducing this kind of literature. In fact, we can hardly find more than one website that is interested in consistently introducing digital works and critical studies in this field. This website is called: the Arab Union for the Internet

Writers. Recently, the first Arabic Electronic Literature Conference: "New Horizons and Global Perspectives" was held in Dubai, UAE, in February 2018.[22]

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[22] See Arabicelit website: https://arabicelit.wordpress.com/conference/

**Some Conclusions**

Before concluding, we would like to end this overview drafting a bit of digital literature in Asia and inviting scholars to deeply and scientifically investigate the origins and the development of digital literature in Asia since, to our knowledge, there is no complete and systematic study on the subject while it seems to us to be a very urgent topic to be studied.

Young-Hae Chang Heavy Industries is notably the most well-known art-duo creating digital art based in Asia, and more specifically in Seoul, South Korea. The members are Young-Hae Chang, a Korean artist, and translator, Marc Voge, an American poet who currently lives in Seoul. The group was formed in 1999 and since then has been creating works presented in 20 languages, characterized by text-based animations composed in Adobe Flash that are highly synchronized to a musical score that is often original and usually jazz[23].

In the Electronic Literature Collection Volume Three (2016), Japanese and Chinese texts of digital literature were published into an Anthology (collection) for the first time. "The First Intimate Touch" 第一次的亲密接触 by the Taiwanese author Pizi Cai (pen-name of Cai Zhiheng (蔡智)), is considered as the foundational work of Chinese online literature. As stated by Lena Henningsen "[as] one of the first Chinese language online novels it had a tremendous impact on the field and prompted a first wave of online fiction in the People's Republic of China (PRC). It was published from March to May 1998 in small sections on a Taiwanese Bulletin Board System (BBS) and turned into a bestseller on the Chinese mainland after its publication as a book in 1999" (Henningsen).

"The First Intimate Touch" is one of the first works in the area to be written in a new literary form, the online form of a novel. As said, the text was published as a book in 1999, however, even the printed version of the novel preserves certain characteristics of the online text, such as the use of icons and the English language note "to be continued" that divides the chapters and subchapters[24]. Henningsen also notices that "The First Intimate Touch" can be seen as a precursor of Chinese internet literature (wangluo wenxue 网络文学)" (Henningsen).

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[23] See Young-Hae Chang Heavy Industries: http://www.yhchang.com

[24] The novel was then turned into a TV series (produced by the mainland Chinese Shanghai Film Studio 上海电影制片厂), and its transformation into a stage play in Beijing in 2011 attests to its continuing popularity in the PRC. It has also generated a number of trends; it seems to us that it can be considered as an example of transmedia text in its whole.

Keijiro Suga (a renowned Japanese poet, writer, and translator) remarks that much of the so-called digital literature in Japan (notably twitter-based) does not seem to be very interesting. According to him, writers are still all very analog-minded, although they do occasionally publish digitally. But this does not mean that important experimental texts have not been produced. This just means that no rigorous studies on digital literature (its history and development) have yet been undertaken - or if they have, the Japanese literary community does not know them - and that digital literature is a niche literature. However, we do not have to forget as well that, although growing fast, electronic literature remains a niche literature also in those countries that have a long tradition in experimenting with literature and poetry.

As we have seen, some countries have developed their interest in and creation of electronic literature almost simultaneously, while others, just because of their own cultural background and/or contexts (also political and economic contexts and backgrounds), have only recently discovered electronic literature, or accepted it as a new form of the literary genre. Not only does electronic literature require literary competences, but also IT skills. Authors of electronic literature often work together with graphic designers and especially, programmers, to unite their competences. This collaboration, however, implies a different relation with the role of the author. With electronic literature, we see in some countries that this sharing of authorship may become problematic, particularly when collaborators are not accurately credited for their contributions. Finally, some developing countries have focused their interests and priorities on other aspects of their cultural and economical life. However, it seems to us that digital literature is globally and constantly growing, and it has been transforming itself thanks to or because of the advent of other new interfaces, supports, and media.

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