The Book under the Magnifying Glass
New Forms of Electronic Textuality
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Abstract: The present study consists in an experimental approach dealing with the unexplored possibilities of the electronic support as a medium for literary creation. Inspired by Neal Stephenson's Diamond Age and conceived as a set of reflections on the act of writing, the book under the magnifying glass would allow the writer and the reader to increase or decrease the degree of detail of the text, by a procedure evoking the magnifying glass effect and the fractals geometry. The main feature of this new kind of textuality would be a layout on levels of "depth", accessible by operations of "zoom-in" and "zoom-out", the text of the most abridged level being reproduced and appropriately augmented on each of the subsequent, deeper levels.

Keywords: Electronic Textuality, Magnifying Glass Effect, Zoom In, Zoom Out, Fractals Geometry

Introduction

If we consider the history of writing, from the clay tablets to the electronic screen, we can note that the transmission of texts has always depended on an interface. That is, a support (clay tablets, skin, fiber, electronic) and a set of techniques of inscription, organization and access to the information.

After the invention of the mouse device by Douglas Engelbart in the 60’s, the computer has become an environment, an information space to be explored, and the electronic interface a complex medium, an “art form” determining gradual changes in our everyday life, sense of physical space and taste of storytelling (Johnson, 1997). Unlike the previous ones (tablets, roll, codex), the electronic interface supposes the existence of two types of texts. On the one hand, the text intended to be read and on the other, the code written in a programming or markup language, determining the performances of the interface. This interaction between the visible and the hidden text, between the huge potential of expression of the natural language and the constraints of the programming language, represents one of the central elements in the production of new forms of electronic textuality. This kind of dependence implies a double sense relationship: the code supports the creation of new textual forms, and these forms can inspire or anticipate the development of new types of encoding, increasingly flexible.

As Philippe Boottz (2005) suggests, “programming is a new kind of material that artists can sculpt and model” and which adds new perspectives to our ways of thinking, understanding and analysing texts. The recent experiments on digital support (Joyce, 1989; Moulthrop, 1991; Jackson, 1995; Amerika, 1997) have therefore drawn attention to the new kinds of storytelling and relationships author – text – medium – reader implied by the digital technology. A new form of aesthetics has also emerged and its theorists have already addressed a series of problems like the possible replacement of the printed book by its electronic counterpart (Bolter, 1991; Birkerts, 1994; Landow, 1997; McGann, 2001) or the reconsideration of textuality, literary theory and cognitive processes, from the perspective of an electronic culture (Douglas, 2000; Ryan, 2001).

Taking into account these considerations, the present study proposes an experimental approach dealing with the unexplored possibilities of the electronic support as a medium for textual investigation. The aim of the project is the construction of a new type of interface (an editor written in Java programming language and using XML annotated texts) allowing the writer and the reader to increase or decrease the degree of detail of the text, by a procedure evoking the magnifying glass effect and the fractals geometry. Inspired by the fictional construction of Neal Stephenson (2000) and by the fractal theory of Benoit Mandelbrot (1983), this new kind of textuality would be a layout on levels of “depth”, accessible by operations of zoom-in and zoom-out, the text of the most abridged level being reproduced and appropriately augmented on each of the subsequent, deeper levels. The main question addressed by our study would be thus related to the theoretical and practical perspectives opened by a form of electronic text intended to be written and explored “under the magnifying glass”.

An “Anfractuous” Story

Stephenson’s construction is an illustrated primer where the real world of Nell, a six years old girl, is reflected as in a magic mirror: Nell becomes Princess Nell her home changes in a castle, and her friends and favourite toys, Duck, Dinosaur, Peter Rabbit and Purple become animated characters in the fantastic world of the book. When Nell opens the primer for the first time, she finds an outline of her story for the ten years to come and she gradually discovers the immersive-interactive capacity of the book allowing her to expand the episodes, by zooming-in and blowing them into other stories.

“Once upon a time there was a little Princess named Nell who was imprisoned in a tall dark castle on an island in the middle of a great sea, […]. Princess Nell and Harv could not leave the Dark Castle, but from time to time a raven would come to visit them … “What’s a raven?” Nell said.

The illustration was a colorful painting of the island […] The island rotated downward and out of the picture, becoming a view toward the ocean horizon. In the middle was a black dot. The picture zoomed in on the black dot, and it turned out to be a bird. Big letters appeared beneath. “R A V E N”, the book said. “Raven”. Now, say it with me. […] (Nell’s first experiences with the Primer; p.85)

“Once upon a time there was a little Princess named Nell who was imprisoned in a tall dark castle on an island …”

“Why?”

“Nell and Harv had been locked up in the Dark Castle by their evil stepmother.”

“Why didn’t their father let them out of the Dark Castle?”

“Their father, who had protected them from the whims of the wicked stepmother, had gone sailing over the sea and never came back.”

“Why did he never come back?” […] (Nell’s further experiences with the Primer; the origin of Princess Nell, p.109)

Nell’s primer is an “anfractuous” book, a source of practical ideas for reconciling immersion and interactivity according to Ryan (2001), able to answer reader’s questions by self-expansion and ramification, and functioning on the principle “tell me more about this subject”.

“This sort of thing no longer surprised or upset Nell because it had happened hundreds of times during her relationship with the Primer. Besides, she had known, from the very first day Harv had given her the book, how the story would come out in the end. It was just that the story was anfractuous; it developed more ramifications the more closely she read it.” (p. 312)

As Ryan suggests, this kind of “scalable” textuality implies several levels of detail, each level corresponding to a certain scale of representation. The term “anfractuous” evokes the irregularities of the coast of Britain, a well-known example from the fractal geometry, which gradually add details and increase the length of the coastline when they are made visible on a map of a variable scale.

A Fractal Approximation of the Coast of Britain

In his book The Fractal Geometry of Nature (1983), Benoit Mandelbrot proposes the term “fractal” in order to describe a series of irregular and fragmented patterns of Nature such as coastlines, clouds, mountains, trees, etc. He coined “fractal” from the Latin adjective “fractus” corresponding to the verb “frangere” which means “to break”, i.e. to create irregular fragments. The term defines a class of natural or mathematical objects of a highly irregular or discontinuous nature that do not fit the common patterns of the Euclidean geometry.

A typical category of fractals is considered to be the coastlines. In his famous chapter How Long is the Coast of Britain, Mandelbrot notes that if we try to measure the coast with smaller and smaller yardsticks, its length increases without limit, being so indeterminate that “it is best considered infinite”. This property characterizes the highly irregular shapes and would be a consequence of the existence of details. In cartographic terms, when a portion of a coastline observed on a map is reconsidered at larger and larger scales, every subbay or subpeninsula visible on the map adds to the measured length.

The phenomenon is described by a mathematical construction, the Von Koch curve (a fractal converging to a curve of dimension 1.2618) and which, at a suggestive level, “behaves” like a real coastline (see Fig. 1).
Fig. 1: The construction of Von Koch Curve, a - First Step, initiator; b - Second Step, Generator; c, d - Third, Forth Steps, Iterations.

Each iteration replaces all the straight line intervals by a reduced generator.

Let’s consider a portion of a coastline represented to a scale of 1/1.000.000 by a straight line called initiator. We assume, then, that at a scale of 3/1.000.000, a promontory represented by an equilateral triangle becomes visible on the map. This second approximation is called generator. Further details can appear at a scale of 9/1.000.000, and so on. Each iteration replaces straight lines by a reduced generator, while the curve becomes more and more anfractuous and its length gradually increases. The process can continue ad infinitum, but paradoxically, even of an “infinite length”, the Koch curve remains confined in a limited space (Mandelbrot, 1983).

The Text as a “Scalable” Structure

Our textual model, based on the two paradigms presented before, is a hierarchical paragraph structure involving parent/children and siblings relationships (see Fig. 2). The term paragraph will be used in a generic sense. Some applications (see Close Reading and New Historicism ) could imply larger or smaller textual units (fragments) than a paragraph.

Each paragraph can have one, many or no children on the next level but it has necessarily a parent on the previous level, excepting the case when it is a first level paragraph (one root of the tree). For example, P1 has two children on the second level (P1.1 and P1.2), P1.1 has one child on the third level (P1.1.1), and the process can theoretically continue without limit. Two paragraphs having the same parent are called siblings.
There are many strategies of children construction. We will discuss two of them. One possibility is to add text to an unmodified parent paragraph, as in the simplified example: “It’s raining”, “It’s raining cats and dogs”, “It’s raining cats and dogs and I’ve forgotten my umbrella”, which describes the transmission and development on three levels of an idea, “It’s raining”. Another possibility consists in adding text to a modified or even reformulated parent paragraph as for instance: “It’s raining”, “I can hear the drops on the roof. It’s the flood!”.

Therefore, the main idea of such a textual approach would be the construction of a tool allowing the reader and the writer to explore and develop this kind of structure on several levels of detail. Going deeper and deeper into the hierarchy will consequently imply an increasing complexity of the textual content, as in the case of a shape becoming more and more “anfractuous” when observed to larger values of the representation scale.

The Magnifying Glass Editor

The tool based on this concept is an interface we have called magnifying glass editor, on the model of the electronic maps explored by means of the zooming-in and out procedures. The editor contains a reading and a writing module.

The Reading Module

The reading module allows three directions of movement through the text: horizontal and vertical (scroll up/down, left/right) and in “depth” (zoom in/out). A zooming-in on a paragraph will produce the replacement of the paragraph by all its following level children, if any. A zoom-out action will replace the clicked paragraph and all its siblings by their previous level parent, if any. Consequently, the reader will have continuously on the screen a single “page” where the paragraphs are dynamically displayed or replaced, depending on the degree of involvement with the text. The procedure evokes the Von Koch iterative replacement of straight lines by broken segments (zoom-in) or the opposite process (zoom-out), as in a bidirectional passage from simple to complex and from detailed to abridged.

The Writing Module

The writing module includes three types of operations: expansion, modification and deletion, which should preserve the magnifying glass structure of the text. So, a paragraph expansion will suppose the construction of children, according to one of the methods presented in the section The Text as a “Scalable” Structure. In the case of paragraph modification, a desirable solution would be the transmission of changes to all the descendants of the modified paragraph. However, if the writer decides to make important changes, the operation might involve the removal of the paragraph descendants and the addition of new children. The deletion will imply the removal of all the paragraph descendants. Some techniques of archiving and recovering may be useful, in order to permit the retrieval of a deleted structure.

Possible Applications

Besides the construction of the editor, our study includes the development of some applications based on the magnifying glass concept. Our inquiry has
addressed the fields of literary creation and criticism and of cognitive and information sciences.

**Close Reading and New Historicism**

Gallagher and Greenblatt (2000) define the concept of close reading as a method of analysis using short excerpts from a text and carefully examining the style, the diction, the tone, the rhetorical strategies, and the philosophical and sociological assumptions. On the other hand, in his study of Shakespeare, Greenblatt (2004) brings to light some aspects of the Shakespearian work by trying to reconstruct its historical and cultural context. As Peter Holbrook (2002) suggests, this tendency, often called new historicism, consists in a reorientation of the aesthetic and literary criticism, from universal standards, to discrete cultural and historical details.

What the two approaches have in common is the fact that they both try to bring closer to the text, in one case, the literary and stylistic analysis, in the other, the historical and cultural concern. The use of the magnifying glass editor would therefore allow a sort of fusion of the text with the literary or historical analysis, developed on several levels of detail, as in the following example:

“HIPPOLYTA. - This is the silliest stuff that ever I heard.
THESEUS. - The best in this kind are but shadows, and the worst are no worse if imagination amends them.
HIPPOLYTA. - It must be your imagination, then, and not theirs.”
(William Shakespeare – *A Midsummer Night’s Dream*, first level text)

“Even as he called attention to the distance between himself and the rustic performers, then, Shakespeare doubled back and signaled a current of sympathy and solidarity. […] “This is the silliest stuff that ever I heard”, Hypollita comments, to which Theseus replies, “The best in this kind are but shadows, and the worst are no worse if imagination amends them.” “It must be your imagination, then, and not theirs”, is her rejoinder - the spectator’s imagination and not the player’s - but that is precisely the point: the difference between the professional actor and the amateur actor is not, finally, crucial consideration. They both rely upon the imagination of the spectators.”
(Stephen Greenblatt – *Will in the World*, third level text)

We can also imagine the editor as an annotation tool joining, on several levels, the text and the critic commentaries or the marginal notes, in a complex process of reading, re-reading and writing.

**Genetic Criticism**

The second application would be related to the field of genetic criticism interested in the study of the “unfinished” and “uncertain” and in revealing the secrets of the laboratory and the dynamics of the process of writing (Grésillon, 1994). On the other hand, the reconstruction of writers’ personal libraries and the analysis of the quotation and marginal notes draw attention to the cultural context, to the intertextual dimension and the reading/writing dialectics of the “work in progress” (D’Iorio and Ferrer, 2001).
From these points of view, an analysis under the magnifying glass would imply, for example, a layout on levels relating the definitive form, through the different variants, to the first plan sketching the idea of the text.

« La citadelle de Machaerous se dressait à l’orient de la mer Morte, sur un pic de basalte ayant la forme d’un cône. Quatre vallées profondes l’entouraient, deux vers les flancs, une en face, la quatrième au-delà. Des maisons se tassaient contre sa base, dans le cercle d’un mur qui ondulait suivant les inégalités du terrain; et, par un chemin en zigzag tailladant le rocher, la ville se reliait à la forteresse, […] » (Gustave Flaubert – Hérodias, first level text)

This layout could therefore facilitate the understanding of the gradual dynamics of the act of writing or the recognition of the eventual traces of previous readings. Other types of features can also be imagined, for example, highlighting the “DNA” of the text evolution, i.e. the set of words or expressions preserved by all the variants, from the first idea to the definitive form (Machaerous, cône, mer Morte, ville, etc.).

**Different Forms of Literary Expression**

Another type of application may concern the narrative strategies. We can imagine, for instance, a sort of auto-reflexive text, conceived as a set of reflections on the act of writing and trying to retrace by paragraph expansion and details accumulation the path backwards from writing to reading, from verbal expression to life experience. It would be a textual form describing the “history” of its own creation and involving different degrees of immersion as part of the storytelling.

Other approaches could be related to the development of the characters in a literary text. Greenblatt (2004) suggests that in Venus and Adonis, Shakespeare uses a “simultaneous, deeply paradoxical achievement of proximity and distance, intimacy and detachment”. It represents a way of approaching or distancing the reader from a character or situation by increasing or decreasing his “physical and emotional proximity”. If in some passages we seem to be at a great distance from the two protagonists (“Over one arme, the lustie coursers raine; / Under her other was the tender boy”), there are other passages where we can “observe” the tiniest details (“These blew-veind violets whereon we leane”) (Shakespeare, 1906). This kind of description and character development seem appropriate to a layout on levels of depth providing more and more details and allowing the reader to alternate proximity and distance by a zooming-in and out procedure. On the other hand, in his analysis of Evelyne Waugh’s Vile Bodies, Alan Palmer (2003) uses the term of “behaviorist narrative” defined as an objective description, focalized on the characters’ behaviour, i.e. on their actions rather than on their feelings and thoughts. Palmer asserts that in the case of Vile Bodies, the reader has little access to the characters’ consciousness. Could we therefore imagine a narrative starting with a behaviorist approach and gradually investigating, on several scales of detail, the psychological depths of the characters?

**Other Applications**

Other applications of the model could include: the cognitive and pedagogic domain (knowledge organization on levels of complexity, going from intuitive descriptions, through gradual inclusion of images, graphic representations, etc., to mathematical expressions or abstract concepts); the construction of dictionaries and encyclopedias (as collections of expanding articles, from precise definitions to larger and larger contexts); the domain of information science.
fractal paradigm could function as visual metaphors for a new form of electronic textuality, drawing attention to some aspects of the dialectics: text/textual or historical analysis, verbal expression/reading or life experience, global/local, essential/detail, intuitive/abstract, precision/vagueness, word/image, etc. in textual production and interpretation. However, there is not a definitive conclusion, but rather some directions of study. If we assume Leibniz’s (1996) hypothesis that in nature “everything happens by degrees, and nothing by jumps”, our approach would be an attempt to reconsider the textual paradigm as a gradual approximation, going closer to a more complex profile, circumstance, life or reading experience, on the model of a fractal gradually approaching the real shape of the coastline. A paradigm where the simple and the complex, the confined and the boundless, the hidden and the visible are not opposite and disjoint entities but parts of the same continuum.

**Conclusion**

Taking into account these possible fields of application, we can assert that the magnifying glass and the

**References**


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Florentina Vasilescu Armaselu is a Ph.D. student in Comparative Literature at the University of Montreal, Canada. In 2003, she obtained a M.Sc. in Computer Science at the same university. She also worked as an analyst programmer and as an assistant professor at the Faculty of Letters of the University of Craiova, Romania. Her research and publications concern the domains of electronic literature, computational linguistics, terminology and computer assisted language learning.
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