
Borges' "The Library of Babel" and Moulthrop's Cybertext "Reagan Library" Revisited

PERLA SASSÓN-HENRY
UNITED STATES NAVAL ACADEMY

The works of Jorge Luis Borges are intimately related to technology and science. In his short stories "The Garden of Forking Paths" and "The Library of Babel," Borges anticipates hypertext and the Internet well before the advent of these technologies. Bifurcation and chaos theory have also been associated with both works. Thomas Weissert claims that "Borges discovered the essence of Bifurcation Theory thirty years before chaos scientists mathematically formalized it" (223). Weissert's research provides the foundation for a new direction in the study of Borges' works: the tripartite connection among "The Library of Babel," the cybertext "Reagan Library" by Stuart Moulthrop, and chaos theory. Each element of this triad contributes to the understanding of each literary work from the perspective of digital technology, and a new perspective in the literary analysis of Borges' works emerges.

Borges' innovative ideas about reading, writing, the role of the author, the role of the reader, and the text are reflected in the genre known as hyperfiction. This new type of literature, created on the computer to be read on the computer, allows the reader to traverse a series of lexias—electronic spaces—via links that generate an intricate narrative. In the last two decades, hyperfiction has evolved from a black-and-white electronic digital text into a rich environment where the text consists of images and sounds integral to the narrative. According to Susana Pajares Tosca, "hypertext fiction generally plays with disorientation as an aesthetic effect" and "each hyperfiction has its own reading rules embedded in its structure, and they apply often only to that text" (271). Even though "The Library of Babel" and "Reagan Library" were created at different times to be read in different mediums, many features of chaos theory and bifurcation theory lurk "intertwined" in the themes and narrative structures of both texts.¹

What is chaos theory? How do bifurcations operate? A brief introduction to the topic is relevant to the understanding of the theoretical approaches used below.

Since its inception more than a century ago, the science of chaos (or complexity as it is also called) has introduced new ways of examining the universe. The concept of chaos implies that what to the naked eye resembles noise, disruption, or

disorganization is in fact the result of some deeply organized structure. This premise is the result of many decades of theoretical work and experimentation which can be traced to Henri Poincaré. According to James Gleick, Poincaré was the first to understand the possibility of chaos and challenged the scientific determinism of his time (46).

To define the science of chaos we need to start from the oxymoronic quality of its terms. As a science it sets new parameters in the study of a specific phenomenon by acknowledging the fact that “chaos is ubiquitous, it is stable, it is structured” (Gleick 76). The new and emerging views on chaos were the result of James Yorke’s original paper titled “Period Three Implies Chaos” where he coined the use of the term “chaos” in a mathematical context for the study of nonlinear dynamic systems. Since then the study of chaos has become a new field. This new and complex perspective on science has influenced experts from diverse backgrounds who have relied on the paradigms of the science of chaos to analyze topics pertinent to their fields (Gleick 5).

One of the first scholars to relate chaos theory to literary studies was Katherine Hayles. According to Hayles, “At the center of chaos theory is the discovery that hidden within the unpredictability of chaotic systems are deep structures of order. ‘Chaos’ in this usage, denotes not true randomness, but the disorder characteristic of these systems” (Hayles, *Chaos and Order* 1). Hayles, who prefers to use the term “chaotics” to chaos theory, has paved the way for a study of literature where science and literature engage in a dynamic interactive loop. In this loop, each affects and energizes the other’s discourse as a result of being immersed within the same or similar historical moments that push them to generate responses to the world around them.

Another theory that evolved as a result of the science of chaos or complexity is bifurcation theory. As the term indicates, a bifurcation denotes a splitting into two branches where either a decision needs to be made or a reorganizational process takes place. In the foreword to Prigogine and Stengers’ *Order Out of Chaos: Man’s Dialogue with Nature*, Alvin Toffler states:

In Prigoginian terms, all systems contain subsystems which are continually “fluctuating.” At times, a single fluctuation or a combination of them may become so powerful, as a result of positive feedback, that it shatters the pre-existing organization. At this revolutionary moment—the authors call it a “singular moment” or a “bifurcation point”—it is inherently impossible to determine in advance which direction change will take: whether the system will disintegrate into “chaos” or leap to a new, more differentiated, higher level of “order.” (xv)

In so doing, the system branches off, creating a number of possibilities and solutions which emerge not only from the interaction within the system but also from its unique history and search for equilibrium. As it will be illustrated, the ideas of Prigogine and Stengers prove useful in establishing the tripartite connection among “The Library of Babel,” the cybertext “Reagan Library” by Stuart Moulthrop, and chaos theory.

Libraries are commonplace in Borges’ literary universe. Having spent a great deal of time at his family’s library in Buenos Aires, he developed a natural fascination with them as essential tools in the eternal quest for knowledge and inspiration. From 1937 to 1946, he worked as first assistant at the Miguel Cané branch of the Municipal Library in Buenos Aires, where he helped catalog the library’s holdings. During these years, he led essentially two parallel lives. On the one hand, he was thriving as a short fiction writer and producing some of his most celebrated pieces, including “Pierre Menard, Author of *Don Quixote*” (1939), “Tlön, Uqbar, Orbis Tertius” (1940), “The Circular Ruins” (1940), “The Babylon Lottery” (1941), “The Garden of Forking Paths” (1941), and “The Library of Babel” (1941). On the other hand, he was leading a life of “solid unhappiness” marked by the ignorance of his coworkers and the patronizing attitude of the municipal government which “underlined [his] menial and dismal existence” (Borges, *The Aleph and Other Stories* 241-242).² In 1946, Juan Domingo Perón was elected president, and owing to his political inclinations, “Borges was ‘promoted’ to inspector of chickens and rabbits in a public market” (Lennon 77).³ In 1955, the military government appointed Borges Director of the National Library, a position he held until 1973, when Perón returned to Argentina after his long exile in Spain. By this time, “Borges enjoyed a comfortable income from the sale of his books and was able to live exactly as he pleased. In his case, this meant the ability to travel the world in spite of his blindness” (Lennon 97).

There is no doubt that for many years libraries were Borges’ real universe, an idea he would metaphorically convey in “The Library of Babel,” which begins with a thorough description of the universe. Borges’ fictional library is an orderly and structured space where men search for the book or books containing all the answers to their concerns: “There was no personal or universal problem whose eloquent solution did not exist—in some hexagon” (Borges, *Ficciones* 83). Like readers of hyperfiction who struggle with disorientation as they read the text, the subjects in this library face a constant struggle with their environment, one that both constrains and liberates them. The men in the library of Babel think that the Library contains “the clarifications to all the mysteries of humanity” (Borges, *Ficciones* 84), but they are frustrated by the fact that some of the books cannot be found. These library

dwellers resemble the “Reagan Library” readers, who face excitement or disappointment while negotiating the narrative to arrive at the gist of the story.

“Reagan Library,” which hyperfiction award-winning author Stuart Moulthrop described in an interview as a “short-form cybertext fiction,” challenges readers to see literature from a different perspective. In his cybertext, Moulthrop takes up many of the issues elaborated by Borges in “The Library of Babel.” Borgesian themes and strategies such as the use of metaphors, the creation of labyrinthine narratives, and the ludic aspect of narratives resonate throughout “Reagan Library.” As Espen Aarseth observes, “hypertexts, adventure games and so forth are not texts the way the average literary work is a text” (2-3). For Aarseth, “A cybertext is a machine for the production of variety of expression” (3). Such a text engages the reader in its interpretation and “mechanical organization” (1). This type of cybertextual reading turns the text into an “ergodic text,” a phrase that Aarseth defines as “one in which at least one of the four user functions, in addition to the obligatory interpretative function, is present” (65).⁴ The reader of an ergodic text engages in a process of exploring, recreating, understanding, making sense, and/or coming to terms with a text. The reader recreates the text as she moves along the different paths available to her. This process of reading an ergodic text involves taking into consideration not only the text but also the medium in which it is created and the possibilities for interpretation that it offers. The reader should become aware of the different paths available to her in the labyrinthine almost chaotic display of an ergodic text such as “Reagan Library” which allows for a variety of interpretations. Therefore, like “The Library of Babel,” which to a certain extent can be understood as an ergodic cybertext because the reader must assemble all the threads of the text to understand Borges’ idea of the library as the universe, “Reagan Library” goes far beyond a plot, presenting a new mode of literature which resembles strategy games since the reader can reorganize the sequences according to what she has experienced before. This cybertext presents a plot and it also invites the reader/player to view the work as an artifact.⁵ As readers traverse the story, they must make sense out of what seems disruptive or chaotic. Behind the noise—a term usually associated with chaos theory—lie a story and meaning. As Adrian Miles puts it, “‘Reagan Library’ probes the relation of reading and game playing, and explores the boundary between image and text based diegetic worlds, demonstrating that writing’s electronic future is less about textual pyrotechnics than a refiguring of words into other narrative spaces” (par. 6).

In “Reagan Library,” readers are constantly challenged to make connections even beyond the plot in order to understand the complexity of the work. Those who engage in this ergodic type of reading are in a constant state of alert since the

story contains many clues which, as in a virtual game, must be deciphered to come to terms with the cybertext. Sense and order result not only from the presence of numerous clues, but also from their absence.

From the outset, “The Library of Babel” and “Reagan Library” present their metaphors. Borges begins “The Library of Babel” by stating that “The universe (which others call the Library) is composed of an indefinite, perhaps infinite, number of hexagonal galleries” (*Ficciones* 79). This remark, as Beatriz Sarlo argues, could be understood as a subliminal reference to Pascal’s conception of the world as an infinite sphere (71). Just as Borges lets the reader ponder the implications of this phrase, Moulthrop introduces his work with similar comments on the labyrinthine structure of his fiction: “The world is what you see and where that takes you. And where would that be? You’ll find out” (Introduction, “Reagan Library”). Throughout Moulthrop’s fiction, one encounters abundant references to geometric shapes whose function is not merely aesthetic. Whereas Borges appeals to the image of the hexagon to express the idea of infinity, Moulthrop uses the recurrent visual images of a sphere and a looping effect to create the virtual environments where the different plots develop. Moulthrop refers to the Borgesian view of the universe through one of his characters: “This world has a basic circularity” (Blue Zone, Pavilion).⁶

Many of the geometric images in “Reagan Library” have embedded links that allow the reader to explore a narrative from the point of view of the main character in one of the several environments. From this perspective, readers of “Reagan Library” resemble the library dwellers in Borges’ library: they gain a different perspective on the space according to their position. In effect, “Reagan Library” challenges readers to explore and gain a new understanding of the reading/writing process by utilizing this cybertext as a “space probe.”

Each screen is composed of text and a visual block in QuickTimeVR which loops as the reader directs. It is possible to traverse the narratives via the visual area or the text. Clicking on any of the recurrent geometric icons (sphere, cone, or obelisk) in the QuickTimeVR section or on the underlined words in the text takes the reader to a different level and/or zone of the work. Each screen has also four different states marked by a square in the lower right-hand corner. Every time the reader returns to the same screen, the text becomes more meaningful and cohesive, reaching its final form during the fourth visit.

In addition to these four states, this work has four zones designated by the colors dark grey, black, blue, and red, each of them presenting a unique narrative thread with a specific perspective on the world. The dark grey zone features a deceased stand-up comedian and his psychotherapy sessions. According to Katherine Hayles, “His therapist, Dr. Ramchandra, has hooked him up to a virtual reality apparatus,

presumably as therapy for his damaged sensorium. From his comments we can infer that Dr. Ramchandra is asking him to interpret the objects in the QuickTime movie, suggesting that his therapy is a weird science combination of visualization technology and a Rorschach test" ("Bodies of Texts" 271). Whereas the main character and the reader share the same visual images, each of them needs to resolve a different conflict: the comedian wants to come to terms with the traumatic experience that led to his death and the reader strives to use the images to add meaning to her reading experience. The black state is inhabited by a prisoner who has lost his memory and who, like the dwellers of Borges' library and the readers of "Reagan Library," tries to decode meaning and come to terms with the stimuli presented to him. A female film director named Emily St. Cloud is the main protagonist in the blue zone. Although she is dead, she constantly refers to memories from the time when she was alive. The phrase "This is the world I made, a garden of remembering" summarizes Emily's concern with memory (Blue Zone, Pavilion). Her voice echoes the ideas portrayed in Borges' "The Garden of Forking Paths," where the author points at the notion that past, present and future exist simultaneously. As Hayles explains, "we know that she [Emily] is obsessed with connecting the past to the future because she takes the trouble to bury a time capsule [in the form of her car] filled with a heterogeneous collection ranging from a pistol to a box of Kleenex to stolen plastic food" ("Bodies of Texts" 273). The red zone is perhaps the most coherent. Loaded with information referring to content as well as to the technicalities of "Reagan Library," it contributes to the decoding process that the reader/player must perform. Most phrases in this zone are clues to Moulthrop's cybertext puzzle. Whereas some of them hint at the stories in the different zones, others inform the reader about hypertext criticism and literary theory. For example, the quotation "More grass than a tree," which is taken from Deleuze and Guattari's *A Thousand Plateaus*, refers to the associative power of the brain, which functions more like a rhizomatic network than an arboreal structure.⁷ From a rhizomatic perspective the reader of "Reagan Library" may enter the text from a variety of points, establish multiple connections, and chart a textual territory in a narrative which does not abide the rules of a fixed printed text or any kind of hierarchical organization. Hence, "Reagan Library" challenges the reader to derive meaning from a narrative where texts embedded with words and virtual-reality panoramas mutate, challenging the fixity of print and calling for a new interpretation of reading.

The red zone, like the Crimson Hexagon in Borges' library, leads to an understanding of the story as well as to what lies beyond it. Within this context, content and structure inform the stories and the metaphor of "Reagan Library" and the reader is reminded to establish all sorts of connections among the threads as the

following quotation illustrates: “Links may cross state lines” (Red Zone, Pavilion). Both Borges and Moulthrop treat confusion and chaos as operative principles that generate new ideas. Nevertheless, the library dwellers, like the cybertext readers, feel a sense of entrapment as they struggle to come to terms with their chaotic environment. This perception is illustrated in one of the narrative threads by a character who searches for knowledge: “The universe would add up nicely if only we could find the other set of books” (Black Zone, Geode). Borges’ characters, by contrast, are trapped by their own ignorance or limitations as human beings in fighting to achieve what only God can accomplish: some are guided by the superstition that one of the library hexagons contains a cipher book which can unlock the mysteries of all the other books; others believe that “on some shelf of the universe there lies a total book” (Borges, *Ficciones* 85).

The two stories in question metaphorically convey aspects of chaos theory and bifurcation theory. According to Eric W. Weisstein, “In a dynamical system, a bifurcation is a period doubling, quadrupling, etc., that accompanies the onset of chaos” (par. 1). In the narratives I have analyzed, bifurcations mark the onset of new paths and allow us to trace trajectories rooted in organized structures. Similarly, Hayles remarks that “At the center of chaos theory is the discovery that hidden within the unpredictability of chaotic systems are deep structures of order. ‘Chaos,’ in this usage, denotes not true randomness, but the disorder characteristic of these systems” (*Chaos and Order* 1). This concept is intimately connected to Prigogine’s idea that “all systems contain subsystems, which are continually ‘fluctuating,’ and eventually leading to some form of equilibrium” (xv). If one is to restore order out of the apparent chaos in Borges’ and Moulthrop’s works, one should interpret them within the framework of complex systems in which all the elements enter into a mutual relationship with their environment. “Reagan Library” provides a new approach to understanding “The Library of Babel” by recasting many of the issues in Borges’ work in the context of cyberfiction and science.

Moulthrop’s and Borges’ libraries are carefully designed spaces where chaos and confusion abound. In the words of John Casti, “Chaotic systems correspond to those librarians of Babel who read every word and character in the books under their care. In contrast, nonchaotic systems are like readers who merely look at the titles and skim the contents” (289). Nevertheless, I contend that this complexity refers to the library dwellers and to the way in which Borges presents the metaphor of the universe as a library. The story seems straightforward in a Kafkian way, whereby the simplicity of the plot is responsible for the aesthetic impact it produces (Sarlo 70). “The Library of Babel” resembles a tapestry whose beauty derives not only from its linguistic component but also from the artifact it represents. It is a metaphorical

artifact that stands for a metaphysical concern: the reader is expected to disentangle those threads to recreate the metaphor behind it. Therefore, there are two complex systems at play in “The Library of Babel.” On the one hand, the library dwellers interact with an almost infinite number of texts, many of which are impossible for them to comprehend. Even though the library is perfectly ordered, it contains books whose chaotic arrangement of linguistic codes is indecipherable. At one point, for instance, the narrator states, “I can not combine certain letters as, dhcmrlchtdj, which the divine Library has not already foreseen in combination, and which in one of its secret languages does not encompass some terrible meaning” (Borges, *Ficciones* 86). On the other hand, “The Library of Babel” is an “artifact,” a body of text that challenges its readers to place the story within a Borgesian framework where one must differentiate between reliable information and noise to discover its metaphorical and metaphysical references.

As readers of “The Library of Babel,” we also try to unlock the mysteries involved in the unintelligible system confronted by the library dwellers. As Alexander Coleman puts it, “We must trust the author when he assures us that the apparent nonsense hides a crystal-clear idea” (31). But how can anyone trust Borges, whose narratives are well known for juxtaposing fiction and reality? What is at stake here is the reader’s ability to come to terms with Borges’ opening statement. Like the library dwellers, she experiences a reading process similar to the one undertaken by cybertext readers who engage in what Aarseth describes as a “non-trivial effort” to traverse the text. As Braxton A. Soderman explains:

Thus the nontrivial for Aarseth indicates that the user’s effort to traverse the medium of the text (coupled with various ways that the medium exhibits its structure to the user) is significant in the overall structure and interpretation of the literary object.... How the reader “completes a text” and how the text “manipulates” this effort becomes significant; they are nontrivial and cannot be discarded or overlooked in a discussion of the text’s structure or meaning. (par. 28)

This type of reading demands a thoughtful analysis not only of the content but also of the process the reader engages in. Whereas cybertext readers navigate the text by selecting different links and establishing connections that take into consideration the structure of the work, library dwellers and readers of “The Library of Babel” engage in a process of decoding that takes into account language and the spatial structure they perceive.

Obviously, “The Library of Babel” and “Reagan Library” convey their messages with different codes and media. Whereas Borges’ library portrays a fixed labyrinthine structure with hexagons that create an idea of infinity, “Reagan Library” has a meandering structure that makes tangible the underlying ideas of bifurcation theory

and chaos theory. "Reagan Library" allows the emergence of multiple plots as well as the unique experience of creating meaning out of what may look chaotic. Phrases such as "Some of the language is randomly generated," "Not that any of this makes sense," or "Do you have a problem with noise?" set the tone for the readers/players, who are virtually left to their own devices as they traverse this Borgesian world. Within this framework, each transition from one screen to the next leads to a new discovery and adds more meaning to the reader's interpretation of the narrative. Fragmentation and assemblage are constant processes throughout the text. In the words of Hayles, "In reassembling the (textual) bodies, the user can never be sure if the emerging coherence is an artifact of her imagination or a pattern intrinsic to the work" ("Bodies of Texts" 260). This is especially relevant in Borges' and Moulthrop's works where the perfectly devised chaotic worlds challenge the reader to shed some meaningful light on the texts.

The stories of Borges and Moulthrop have features of bifurcation theory, insofar as they portray multiple perspectives and multiple levels of time. According to Weissert, an "essential characteristic of bifurcations in nonlinear physical systems is that, at the splitting, chance determines which path the system will take" (234). In Borges' story, for example, the reader is confronted with different levels such as plot and metaphor. Therefore, the "splitting moment" is determined by the reader's choice to experience the story as plot or as metaphor. Similarly, in Moulthrop's work, the reader encounters several storylines as she attempts to deduce some meaning from the structure of the work. Whereas Borges uses language exclusively to stimulate the reader's imagination, Moulthrop adds another layer of complexity to his work by incorporating digital technology which forces the reader to assemble the different levels of the texts to arrive at the metaphorical implication of this cybertext. In both works, what is said and what is omitted play a relevant role. In order to comprehend the multiple levels of these stories, it is necessary to think of the language that is available to us and of the language that is latent and ready to emerge from one of the bifurcations.

"Reagan Library" is partly algorithmically generated and these algorithms produce bifurcating points, which adds either comprehension or noise to the cybertext. As Moulthrop asserts, "Much of what you read on your first visit may seem like nonsense: in fact it's generated by a set of simple random-assembly programs. The text should become more coherent (if not more sensible) on repeated visits" (Introduction, "Reagan Library"). At different points in the narrative, the reader is almost magically transported from one virtual environment/plot to another. On some occasions, she faces unexpected bifurcations, which can take the shape of a leap out of context or the movement from a coherent state to a less coherent one. These leaps force the

reader to reassess her understanding of the story/stories as well as the meaning behind the noise and chaos. The stories that stem from these disjunctions are interwoven in such a way that the transitions from one to another leave the reader in awe of the plot twists. This structure and its language seduce the reader into creating multiple worlds, points of view, and a new perspective of literature. This new approach, as previously observed, immerses the reader in a non-trivial act of comprehension that takes into account the role played by different media and technological applications in shaping new interpretations of a literary text.

What do “The Library of Babel” and “Reagan Library” ultimately stand for? To a certain extent, both texts address a common concern: how can our almost endlessly evolving and chaotic universe be represented and/or understood? Ironically, neither library provides a definite answer. Borges’ library dwellers look desperately for the book with all the answers, while the “Reagan Library” reader wanders back and forth through the text trying to decipher its clues. Neither work offers a solution beyond their opening statements, although both emphasize the demanding cognitive process involved in reading. “The Library of Babel” and “Reagan Library” demonstrate that language, science, and technology can allow us only to imagine—and never fully understand—the complexities of the universe. Whereas Borges achieves this goal by presenting a fictional narrative that illustrates the chaotic nature of the universe, Moulthrop, by contrast, takes advantage of language, including programming language and the technological developments of his time, to create a deep structured, noisy, and chaotic world that lets the reader grapple with complexities of interpretation.

“The Library of Babel” and “Reagan Library” constitute a type of rapprochement between literature and science, time and space. This convergence of print and digital literature allows readers to explore the intimate and almost unavoidable connection between Borges’ pioneering work and its 21st-century counterparts. With its almost materialization of Borges’ ideas, and with its mathematical and metaphysical concerns, Moulthrop’s cybertext helps create a new area of study whereby science and literature endlessly relate to each other as part of a complex environment. By bringing to the fore issues related to science, language, critical theory, hypertext theory, media, and Borges’ ideas, “Reagan Library” reinterprets “The Library of Babel” and underscores Borges’ pioneering conception of the universe as expressed through literature.

Whereas Borges succeeded in illustrating metaphysical, scientific, and technological ideas through his short fictional narrative, Moulthrop takes this concept a step further, enhancing the idea of a chaotic universe and a bifurcating system by means of his programmed cybertext. In the process, he challenges its interpretative possibilities

and opens up the possibility to see Borges' work from a new perspective. Hence, reading "The Library of Babel" while taking into consideration "Reagan Library" underscores the integral connection between the text itself, "Reagan Library," and science, giving modern readers a new tool for understanding Borges' works. ✱

Notes

¹ The term "intertwined" was coined by Theodor Holm Nelson to refer to the interconnectivity of texts (*Computer Lib: Dream Machines* 31).

² It was during this time that the municipal government of Buenos Aires would reward its workers for good work with two kilos of mate.

³ The fact that he was "promoted" to this new position made Borges feel as if he had in fact been demoted.

⁴ The other three functions Aarseth refers to are textonic, configurative, and explorative (65).

⁵ For a discussion on the literary text as an artifact, see Hayles (*My Mother Was a Computer Machine* 104).

⁶ I cite "Reagan Library" by the color of the zone and the name of the lexia.

⁷ Deleuze and Guattari distinguish "rhizomatic thought" from "arboreal thought." Whereas "rhizomatic thought" and networks extend horizontally and relate to non-linear linkages and non-hierarchical organization, "arboreal thought" alludes to a vertical and hierarchical organization. For further reference see *A Thousand Plateaus* (7).

Works Cited

Aarseth, Espen. *Cybertext: Perspectives on Ergodic Literature*. Baltimore: Johns Hopkins University Press, 1997.

Borges, Jorge Luis. *The Aleph and Other Stories 1933-1969*. Ed. and trans. Norman Thomas di Giovanni. New York: Dutton, 1970. 203-260.

_____. *Ficciones*. Trans. Anthony Kerrigan. New York: Grove, 1962.

Casti, John. *Complexification: Explaining a Paradoxical World Through the Science of Surprise*. New York: Harper, 1994.

Coleman, Alexander. "Chaos and Play in Borges." *Círculo* 6 (1977): 27-33.

Deleuze, Gilles and Felix Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia*. Trans. Brian Massumi. Minneapolis: University of Minnesota Press, 1987.

-
- Gleick, James. *Making a New Science*. New York: Viking, 1988.
- Hayles, Katherine. "Bodies of Texts, Bodies of Subjects." *Memory Bites: History, Technology and Digital Culture*. Ed. Lauren Rabinovitz and Abraham Geil. Durham: Duke University Press, 2004. 257-282.
- _____. ed. *Chaos and Order: Complex Dynamics in Literature and Science*. Chicago: University of Chicago Press, 1991.
- _____. *My Mother Was a Computer Machine: Digital Subjects and Literary Texts*. Chicago: University of Chicago Press, 2005.
- Lennon, Adrian. *Jorge Luis Borges*. New York: Chelsea, 1992.
- Miles, Adrian. "Review of Stuart Moulthrop's 'Reagan's Library.'" 15 June 2004. <<http://hypertext.rmit.edu.au/essays/rl/>>.
- Moulthrop, Stuart. Personal interview. 3 October 2002.
- _____. "Reagan Library." CD-ROM. *Gravitational Intrigue, the Little Magazine electronic anthology*. Vol. 22. Albany, 1999.
- _____. "Reagan Library." <<http://iat.ubalt.edu/moulthrop/hypertexts/rl/>>.
- Nelson, Theodor Holm. *Computer Lib: Dream Machines*. Redmond: Tempus Books Microsoft Press, 1987.
- Pajares Tosca, Susana. "Condiciones extremas: Digital Science Fiction from Colombia." *Latin American Literature and Mass Media*. Ed. Edmundo Paz Soldán and Debra Castillo. New York: Garland, 2001. 270-287.
- Prigogine, Ilya and Isabelle Stengers. *Order Out of Chaos: Man's Dialogue With Nature*. New York: Bantam, 1984.
- Sarlo, Beatriz. *Jorge Luis Borges: A Writer on the Edge*. Ed. John King. London: Verso, 1993.
- Soderman, Braxton A. "At the Crossroads of the Trivial." *The Electronic Journal of Communication* 14 (2004): 1-2.
- Toffler, Alvin. Foreword. *Order Out of Chaos*. By Ilya Prigogine and Isabelle Stengers. New York: Bantam, 1984. xi-xxxii.
- Weissert, Thomas. "Representation and Bifurcation: Borges's Garden of Chaos Dynamics." *Chaos and Order: Complex Dynamics in Literature and Science*. Ed. Katherine Hayles. Chicago: University of Chicago Press, 1991. 223-243.
- Weisstein, Eric W. "Bifurcation." *MathWorld*. Wolfram Web Resource. <<http://mathworld.wolfram.com/Bifurcation.htm>>. 3 Feb. 2005.