

Digital Textuality and its Behaviors

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Abstract

What characteristics can we attribute to language written in and for publication in digital media? Matthew Kirschenbaum's (1997-8) choice of the word 'environment' evokes a sense of ecology, of words and their roles within a media ecosystem, and the forces that can be brought to bear upon them. I would add that it also serves to craft reading environments as well. Consider how a writer that writes in the ready-made environment of ink on paper is putting together words in a space with established conventions that shape the linguistic text in predictable ways. Any variations upon the design of such a writing space challenge cultural expectations of how to operate the page and can be used to draw a reader's attention to a specific element of the text. A writer that uses a computer to design a writing and reading environment creates a space for text where the potential interactions between its elements—linguistic codes, textual appearance and behaviors, and interface—are open to the writer's expressive needs. Writers enjoy an expanded palette of options when composing texts for digital media, which has allowed for the development of what is commonly known as electronic or digital literature.

This essay presents and discusses a typology of textual behaviors with the goal of providing readers of electronic textuality a working vocabulary to take into account an important component afforded by digital media. It will offer examples of electronic poetry (or e-poetry), perhaps the most concentrated use of language in digital media, as a model of the potential of digital textuality. This typological instrument was developed as part of my research into the particulars of digital textuality.

Keywords: digital textuality, electronic literature, e-poetry

Electronic literature is a set of experimental practices that explore the capabilities of the stand-alone or networked computer as a medium for creation, production, and reception of literary works. If translated to different media, say by printing them out, they might lose the extra-textual elements that I describe as 'behavior'. These textual behaviors are programmed instructions that cause the text to be still, move, respond to user input, change, act on a schedule, or include a sound component. The elaborate

terminology we can use to describe the materiality of print texts, with all their graphical, bibliographical, and linguistic codes is available and useful to apply to electronic texts displayed on a screen, but it would be incomplete without a discussion of its programmed characteristics. For example, a poet writing for print media must think about word selection (with semantic and phonetic considerations), sequence (morphological and syntactical considerations), and appearance (including graphical and bibliographical codes). A poet writing for electronic media must add interface (a mechanism for traversing the text) and behavior (what the words do and under what conditions) to all the previous considerations.

Reading is a skill; something we learn as children and become increasingly proficient at through learning and practice. Since most of the literacy training we receive is through print media—books, newspapers, magazines, journals, and so on—its conventions and technologies have become deeply ingrained in our reading practices, and we are rarely aware of them. For instance, we don't have to think consciously of turning pages, determining which word to read next, or that we are beginning a new sentence. Some print works challenge these conventions, forcing us to reexamine our reading practices, but they constitute a small portion of the works we read in print.

We are also used to reading on screens, be they movie theater, television, computer, smartphone, or tablet screens. When watching subtitled films, for instance, we are basically reading text that operates in a strict schedule: it needs to follow the pace of dialogue. In television news programs, we have screens loaded with text that is constantly changing, whether appearing or disappearing on or scrolling in the bottom of the screen. Video games tend to work more with images than language, but these images are charged with information which must be identified and interpreted (or read) by the player. Successful players are necessarily good readers of not just visual and aural information, but also of the program's responses to their actions.

Most documents that we read on a computer screen follow print conventions while adding a few of their own, such as the incorporation of links, and using hypertext for organization. These are rarely problematic, but when we encounter e-poetry or other first generation electronic objects—"a class of artifacts that have no material existence outside of computational file systems" (Kirschenbaum "Materiality" 2001)—our traditional reading skills are insufficient. Our training in reading print does not account for words that move and form new textual combinations, nor does it teach us to explore the textual surface with the mouse to reveal hidden elements, for instance. Readers are often disconcerted by a text that imposes a reading schedule, or texts that are impossible to reread because they change every time they are accessed. So how do we read the dancing signifier?

I have already suggested that when language is inscribed in programmable media such as a computer it can be described in terms of linguistics, appearance, and behavior. Since our reading skills have prepared us to see through the appearance of texts to reach a linguistic meaning, but not to deal with texts that exhibit behavior, I propose a typology that describes six behavioral characteristics: static, kinetic, responsive, mutable,

scheduled, and/or aural. The ability to identify and account for the signifying strategies of these behaviors allows for more sophisticated readings of e-poetry and by consequence e-texts in general.

But before discussing the typology itself, I must pause to explain my decision to describe this textual characteristic as ‘behavior’, unpacking some of the connotations and denotations that load the term beyond the scope I am using. Let’s take as a point of departure a dictionary definition of the term:

1 a: the manner of conducting oneself b: anything that an organism does involving action and response to stimulation c: the response of an individual, group, or species to its environment.

2: the way in which someone behaves; also: an instance of such behavior.

3: the way in which something functions or operates. (Behavior)

It becomes apparent that the term is closely associated with the actions of living organisms, and only in its third definition describes inanimate objects. This is not accidental: the term ‘behaviour’ has not been used to describe such objects for long, not since 1943, when Arturo Rosenblueth, Norbert Wiener and Julian Bigelow published an essay titled “Behavior, Purpose, and Teleology” where they defined it as: “any change of an entity with respect to its surroundings. This change may be largely an output from the object, the input being then minimal, remote or irrelevant; or else the change may be immediately traceable to a certain input. Accordingly, any modification of an object, detectable externally, may be denoted as behaviour.” (1943: 18)

Of interest in their definition is how broad its scope is, including living organisms or inanimate objects, and how it focuses on externally detectable changes. N. Katherine Hayles points out that this approach is “relatively unconcerned with internal structure” and that it leads to “‘black box’ engineering, in which one assumes that the organism is a ‘black box’ whose contents are unknown. Producing equivalent behavior, then, counts as producing an equivalent system.” (*How we became posthuman* 1999: 94) She argues that it is not a neutral term and that the attempts to apply it to machines have been ideologically motivated to “elide the very real differences existing between the internal structure of organisms and that of machines” (*How we became posthuman* 1999: 94). As part of her discussion, Hayles asserts that Richard Taylor, a philosopher who challenged Norbert Wiener’s definition of behavior and purpose, “sensed that behavior had been defined so as to allow intention and desire to be imputed to machines” (*How we became posthuman* 1999: 97). These are all considerable problems with the term behavior, and should be addressed in order to justify its usefulness as a methodology.

First of all, do machines have intentions and desires? In a conversation with French semiotician Philippe Bootz during the E-Poetry 2001 conference, he said that animation is the symbolic presence of the author in the text, and the cursor is the symbolic presence of the reader. I see these presences as the intentions and desires that fuel the behavior of e-texts, which are encoded into the source document that is executed by a computer. The computer orchestrates all these instructions in its processes, prioritizing some and overriding others so what emerges is its behavior,

which in turn responds to a whole complex matrix of intentions and desires—the writer’s, reader’s and everyone else’s who contributed to the workings of a computer. So computers have intentions and desires encoded within them, and their external behaviors may be interpreted as expressions of those intentions.

The typology of behavior I will now discuss provides a critical vocabulary to describe this feature of electronic texts. It is a brief list of characteristics which I have observed in e-poetry, along with some basic subcategories, that should describe a wide range of behaviors programmable into electronic texts. One could think of this as a taxonomy, which can be used to tag different textual behaviors within an electronic text.

- Static texts are the default we’re used to in print—they are texts that do not move or change on the screen.
- Scheduled texts may reveal themselves over time, which may be linear or looped; they may force a rate of reading by disappearing or scrolling; they may also trigger events over a programmed or random schedule.
- Kinetic texts move on the screen: this motion may be looped or linear, random, programmed, or responding to cues from the reader.
- Responsive texts take advantage of the computers’ interface devices (most commonly the mouse and keyboard) to create a feedback loop between the reader and the text.
- Mutable texts involve programmed or random changes or may be generated on the fly.
- Aural texts have a sound component: verbal, musical, or simply noise.

These categories are not by themselves unique to electronic media, nor are they mutually exclusive. They are often found in combination and in some cases they are inseparable—aural and kinetic texts are always scheduled, for instance. The next few sections will provide a brief genealogy of each behavior and discuss some of their subcategories, and implications as outlined above, providing examples from a variety of e-poems.

Static Texts

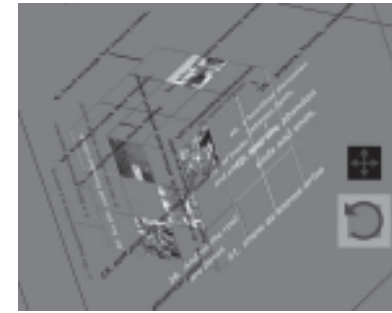
When we think about words in a document, we assume that they remain still so we can read them. We also assume that they will remain the same, so we can reread them if necessary. Motion and mutability are not characteristics we ordinarily attribute to words because the materials on which they have been inscribed don’t usually allow for such changes. Static texts are so ubiquitous that traditional definitions of text are based upon this behavior, or lack thereof. In *Scholarly Editing in the Computer Age*, Peter Shillingsburg defines text as “the actual order of words and punctuation as contained in any one physical form, such as manuscript, proof, or book” (1996: 46). This notion of text arises from a centuries old relationship between alphabetic technologies and the media in which they have been recorded. In simpler terms, documents have been produced in stone, clay, papyrus, vellum, wood, paper, and other materials that lend physical stability to the inscriptions they carry. The words etched, inked, penciled, or glued onto those surfaces are not likely to move from where they are placed, and any motion of

these depend on the manipulation of the materials they are placed upon. They are also not likely to change, even though they may be interpreted differently by readers. Therefore, in any given document, the text is defined by the design and stability of the materials in which it is inscribed.

The moment words start to appear on screens, the static default becomes simply another option available for their display because we are dealing with time-based media that can display moving images. So even if the text displayed is perceived as static it is being constantly redrawn many times per second. As Hayles explains, “when a text presents itself as a constantly refreshed image rather than as a durable inscription, transformations can occur that would be unthinkable if matter or energy, rather than informational patterns, formed the primary basis for the systemic exchanges.” (*How we became posthuman* 1999: 30)

Some of the transformations occur at the level of textual behavior, but they can also be changes in the appearance of the text, or even linguistic information of the text. More importantly, these transformations are possible because texts in digital media are informational patterns which are subject to manipulation and reconfiguration in computers. This is obvious to anyone who can use a word processing program to modify a word’s font, size, color, emphasis, spacing, indentation, and many other of its visual characteristics. What isn’t obvious to many users is that we are changing the word’s informational pattern in ways that the computer can recognize and reconstruct and that this pattern is particular, not universal. A different piece of software or computer may not recognize the pattern in the same way or may not have the font available, and it will interpret the information as it is able, reshaping the information pattern to conform to its capabilities. Therefore, static texts in digital media are not stationary objects in repose: they are informational patterns processed and constantly inscribed on a computer screen.

Purely static texts in electronic media can be similar to texts in print, especially when there is “remediation” at work—a term coined by Jay David Bolter and Richard Grusin to describe “the representation of one medium in another” (*Remediation* 2000: 45)—such as the representation of print in digital media. However, since the computer is such a powerful simulation tool and can be used to create writing environments for texts to inhabit such as hypertext, three-dimensional spaces, and other designed characteristics of a digital writing environment, the texts may require elaborate navigation or manipulation to read them. For example, Jason Nelson’s “Birds Still Warm From Flying” requires readers to manipulate a virtual cube to read the texts arranged on all its sides, and create new combinations of its lines.



“Birds Still Warm from Flying” by Jason Nelson

Stasis is the most common text behavior in electronic media, but that doesn’t make it any less of a behavior than the others. The specter of possibility haunts texts in digital media, because we cannot trust that what we see is what we get, what conditions might change over time or through interaction.

Scheduled Texts

Because computers are time-based in their operation, the texts they process have the capacity to be scheduled. Texts with this behavior are either finite or open-ended. If finite, they can be described in terms of duration—whether they are linear or looped. The events triggered in the scheduled text can be described as singular or recurrent. If recurrent, we can describe them in terms of frequency of their recurrence. A key concept here is the event—an action that changes the state of the electronic object, triggered by a preprogrammed schedule or user input. An example of a schedule-driven event is when a computer goes into sleep mode after a predetermined period of inactivity.

These subcategories become more complex in combination with other behaviors, such as mutability and responsiveness, because the scheduling can be random, variable, or affected by the user. Scheduling texts can have several implications as illustrated by three examples:

A basic feature of print texts is that the reader controls the reading rate. Scheduled texts take control of that reading rate over part or all of the work. A good example of this behavior is evident in the works produced by Young-Hae Chang’s Heavy Industries which displays one phrase, word, letter, or line at a time synchronized to the musical soundtrack—resulting in a text that plays like a film and demands the reader’s unflinching attention for the duration of the work. The text unfolds in a linear fashion, and cannot be stopped or reversed once activated.

WE SWUNG
INTO THE
PARKING LOT

“Dakota” by Young Hae-Chang Heavy Industries

When scheduled e-texts are looped they provide the opportunity of re-reading the sequence that has occurred. Brief loops do not give the impression of scheduled operation, because they present multiple opportunities for re-reading, as is the case of the minimalist animation in Ana María Uribe’s “Gimnasia 3” which alternates a cluster of letters P and R in a looped to create the illusion of an orderly group of letters exercising by lifting and lowering a leg.



Two frames in Ana María Uribe’s “Gimnasia 3”

A schedule can also offer recurring events on specific time intervals, such as the 10-second intervals between textual re-configurations in “White-Faced Bromeliads on 20 Hectares” by Loss Pequeño Glazier, or the multiple marquee delays which cause lines to appear and disappear at different rates in “Larvatus Prodeo” by Braxton Soderman and Roxanne Carter.

There is very little scholarship done on scheduling of texts, an area that merits further exploration. Some related fields that may provide fruitful information are studies on reception of oral language and recorded texts, such as audiobooks, and studies of subtitles, captioning, and other uses of language in time-based visual media, such as film and video.

Kinetic Texts

The moving image moves. But where does that movement come from? For a certain approach in art history, an image is a discrete, whole entity. To move from one image to another is already an immense wrench: even the analysis of a diptych is wildly complex. What then is it to speak of “a” moving image, constructed from thousands of constituent images? In what sense is it an image? Cinematic movement is a fundamental challenge to the concept of wholeness and integrity, its becoming a test of the primacy of existence. In particular, it raises the question of temporality: when is the object of cinema? When, indeed, is the moving image? (*The Cinema Effect* 2004: 5)

This excerpt from the introduction to Sean Cubitt’s book *The Cinema Effect* asks a relevant and provocative question about the ontology of the moving image which I will adapt to the discussion of kinetic texts. To what extent can a word in motion be considered a single signifier? More importantly, how does the shifting position of a word in motion reconfigure its relation to other linguistic, graphical and behavioral elements in ways that affect its meaning?

The singularity of the rendered electronic image is a perceptual event, whether it is still or in motion, because it is drawn and redrawn many times per second in order

for humans to achieve persistence of vision. As computer graphics, however, these electronic objects can be multiple or singular, depending upon whether they are vector or raster graphics. Any change in a raster graphic modifies its composition as a numerical object, whereas the formulas that create the vector graphic can have movement programmed into them, as is the case with Flash animation. For the sake of convenience, I will take the computer science approach of “object-oriented programming” to treat all kinetic texts as singular objects because it is more flexible towards incorporating other behaviors, even if they are composed of multiple frames.

The primary theoretical approaches towards computer animation comes from cinema—and appropriately so. In *The Language of New Media*, Lev Manovich uses “the theory and history of cinema as the key conceptual lens through which I look at new media.” (2002: 9) His exploration goes in both directions, however, seeing also how digital media and their capabilities transform cinema, a deep study on how the history of cinema informs and helps us understand new media work. However, its focus falls more on characteristics of new media, imagery and visual narrative rather than on written language and its signifying potential when placed in motion. John Cayley sets out to rectify this need in “Bass Resonance,” an essay that explores the cinematic history of words in motion, focusing on the work of Saul Bass—a man famous in film history for his animated title sequences at the beginning of films like *Anatomy of a Murder* (1959), *North by Northwest* (1959) and *Goodfellas* (1990). This brief essay describes some of the effects of Bass’ dancing words, aligning his practice and much of the practices of e-poetries with Concrete poetics. Both studies place kinetic texts and images in digital media in historical, cultural, and cinematic contexts, yet their interest isn’t with the complexities of textuality in motion and their implications for poetic practice.

An essay that takes an important step in that direction is “The Software Word: Digital Poetry as New Media-Based Language Art” by Janez Strehovec. This essay focuses on the aesthetics and cultural space that digital poetry is establishing for itself—one that moves away from the “lyrical and ‘projective saying’” (2004: 143) and even beyond remediation of print poetic traditions (2004: 145). More importantly, he asserts that “words inside textscapes are words-images-virtual bodies; they are self contained signifiers which must be perceived not only considering their semantic function but also their visual appearance as well as their position and their motion in space.” (2004: 149) Strehovec is accurate when discussing digital poetry and its aesthetic function, yet his discussion of kinetic texts is insufficient. Like Manovich, he argues that kinetic texts basically operate on the concept of the loop. This is a weakness in their argument because they are privileging one of several control flow statement types, roughly categorized as follows:

- continuation at a different statement (jump),
- executing a set of statements only if some condition is met (choice),
- executing a set of statements repeatedly (loop),
- executing a set of distant statements, after which the flow of control returns (subroutine),

- stopping the program, preventing any further execution (halt) (Wikipedia Contributors, “Control Flow”).

These control flow statement types are what make all the textual behaviors possible and make animation in digital media so unique, since it is able to incorporate other elements discussed in this typology, such as responsiveness, mutability, and scheduled operation. Let us explore further some of the potential and implication for kinetic texts.

Time in an animation may be finite, looped, or open-ended. Finite kinetic texts have a clear beginning and ending. For the reader to re-experience the animation, they may have to reload the text and experience it again from the beginning. Brian Kim Stefans’ “The Dreamlife of Letters,” for example, is a long kinetic e-poem that unfolds without allowing readers to pause, “rewind,” or skip through the text. Looped animation allows the reader to re-read the kinetic text when it cycles through. Sometimes the loop can blur the sense of a beginning and end for it. For example “Ah” by K. Michel and Dirk Vis creates a stream-of-consciousness effect by the moving of words at different speeds flowing from right to left on the screen.



K. Michel and Dirk Vis “Ah”

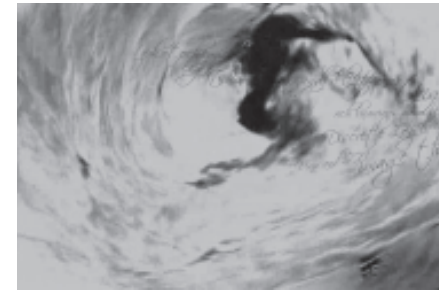
In Jim Andrews’ “Seattle Drift” words a left adrift and readers have to chase after them until the screen is left blank. There is an option to stop the text from drifting, and to even ‘discipline’ it back into its original configuration, but the drift cannot be reversed nor repeated once it starts because it is semi-randomly determined.

Word motion can affect reading in several ways. It blurs the line between reading and looking, especially when motion serves as an obstacle to reading. The reader may see texts in motion and not have the time to recognize them, in which case, the words are perceived more as objects than as signifiers. This foregrounds the graphical aspect of the text, reducing the impact of the semantic codes in the document. In Jim Andrews’ videogame poem “Arteroids,” words and lines of verse move on the screen and chase the player’s word (‘desire’ below) at increasing speeds, until the reader’s interaction focuses increasingly on shooting and avoiding collision with the texts rather than reading them.



Jim Andrews’ “Arteroids” (play mode level 161)

It may reconfigure the word order, producing different phrases and meanings. This is evident in a work like “Slipping Glimpse” by Stephanie Strickland, Cynthia Lawson Jaramillo, and Paul Ryan in which lines and words drift to form new textual combinations, and the potential for multiple readings, for example water movement below:



Stephanie Strickland, Cynthia Lawson Jaramillo, and Paul Ryan “Slipping Glimpse”

Works like “The Dreamlife of Letters” by Brian Kim Stefans create a grammar of motion by grouping words with the same or similar movement. For instance, in the section from “dread to drip” the words “read” and “ream” are alternated in an 11-word semicircle which moves by the stationary letter “d” to form the words “dread” and “dream,” after which the solitary letter “d” drops from the center of the screen to fall by the suddenly appearing word “rip,” forming the word “drip” for a brief moment. All the words in this section of the poem share the same letter “d.” The visual organization of the alternated words ream and read cascading in their curve from top to bottom of the screen to form dream and dread highlight the relationship between both pairs of words: what is the relation between dreading to dream and reading a ream of paper, or perhaps reading is like reaming juice out of a fruit? What is the relation between the liquid action of dripping and the very solid action of ripping? The juxtaposition of these words is brought about through patterned motion.



Brian Kim Stefans’s “The Dreamlife of Letters”

There is much more to explore on the implications and effects of motion in texts, an endeavor undertaken by Alexandra Saemmer, who explores the “animated metaphor” in her 2007 book *Matières textuelles sur support numérique* and in other publications and presentations.

Responsive Texts

I have chosen to describe these texts as ‘responsive’ rather than ‘interactive’ because the latter term has generated some controversy in its previous uses. This arises from the fact that all texts are interactive, because to read is to interact with the graphical and semantic codes contained within a document to generate meaning. There is also interaction with the physical document in which the text resides, such as page turning and other physical manipulations, in the case of printed texts. The responsive texts I refer to, however, take advantage of the computers’ interface devices to allow for input from the reader (such as mouse, keyboard, and touchscreen).

The distinctive feature for responsive electronic texts is the presence of a feedback loop that takes into account the reader’s input and responds according to its programmed instructions. By ‘input’ here, I do not refer to the mental interaction that is always supplied by readers, as described by Wolfgang Iser’s reader’s response theories, but to options programmed into the text by the author for the reader to trigger. These input cues (such as links, hotspots, cursor movement, keyboard entries, or others) may be manifest or hidden, allow for voluntary or involuntary interaction, and have immediate or delayed reactions.

Manifest input cues find their clearest example in the traditional underlined link that is such a staple of hypertext. In general, manifest cues are invitations for input, be it as simple as a clicking on a link or entering text into a box. Hidden input cues are also an invitation to interaction, but of the exploratory kind. They challenge the reader to discover aspects of the text not apparent to the naked eye, by using the tools at their disposal, most commonly the mouse. The mouseover function, for instance, reveals hotspots and may trigger responses from the text, as in Andy Campbell’s “Dim O’Gauble” where arrows guide navigation and hidden hotspots.



Andy Campbell’s “Dim O’Gauble”

Voluntary triggering of responsiveness is the most common, and perhaps the friendliest towards the reader. The reader chooses to activate hotspots or links. Involuntary triggers, however, present interesting possibilities. For instance, to have links or hotspots activated by a mouseover, not a click of the mouse, and to have these cues hidden can create a sense of being trapped in an environment, in which any movement of the cursor can set off effects beyond his/her control.

Most of the reactions of responsive texts are immediate, creating a fairly direct correlation between action and reaction. There is a sense of discovery whenever a reader activates an input cue, particularly the first time a responsive e-text is read. Delayed responses from activated input cues blur the correlation between action and reaction. This is one of the most important devices for Philippe Bootz’s e-poem “Passage” because it reinforces the ‘unique-reading’ experience of the poem. This poem in three movements allows for interactivity during the second one, but its input cues are hidden and its reactions postponed as the input gathered by the program during this movement is then used to generate the third, which is necessarily different every time it is read, partly due to the programming, partly because of the variations in interaction.

All texts are responsive and interactive, irrespective of the media they inhabit, because they are machines for signification. The act of reading is by definition a dynamic interaction with the document that holds the text: and different writers will place different demands upon the reader and offer different cues for such interactivity. Electronic texts externalize aspects of this interactivity by scripting the reader’s function in a work, creating interfaces for the interaction to occur, and incorporating data collected through the computer’s hardware devices.

It is worth noting that I use the term ‘computer’ in the broadest sense possible, including gaming consoles, touchscreen devices, mobile phones, and installations that include processors, programming, and any input or output devices. The crucial point is that the reader’s symbolic presence and actions are read by the e-texts themselves, which as electronic objects have built in variables and responses informed by those events. And that presence can be established through GPS, accelerometers, microphones, cameras, gyroscopes, compasses, pressure sensors in shoes, touchscreens, keyboards, mice, touchpads, or any other kind of peripheral device and represented in the text. The extent to which a text can be changed by interaction can be best described in the next element of the typology: mutability.

Mutable Texts

Mutable texts incorporate deliberate variation into their design, making rereading the same text difficult, if not impossible. Mutable texts involve programmed, random, or user-defined changes in the document. Mutability is not a distinctive feature of electronic texts. Works like *Cent Mille Millions de Poemes* by Raymond Queneau use the book as a machine (and the reader as engine) to create 100,000,000,000 possible sonnets. This is a sonnet in which each page is cut under each of its 14 lines, so the reader can open each line on any of 10 pages, thus creating 1014 possible combinations. And yet, the work as a book is present to the reader, who can make choices based on page

numbers and lines. Nothing is hidden, and while the potential line combinations are enormous, the fact remains that the individual lines will not change from what they are.

Loss Pequeño Glazier's e-poem "White-Faced Bromeliads on 20 Hectares" exhibits some significant differences from Queneau's, particularly regarding issues of user access and control, as described in "Reading Notes:"

Instructions: Allow this page to cycle for a while so you can take in some of the images and variant titles. When you are ready, press "begin". Once there, read each page slowly, even aloud, watching as each line periodically re-constitutes itself re-generating randomly selected lines with that line's variant. Eight-line poems have 256 possible versions; nine-line poems have 512 possible versions. (n/p)

While it too has a finite number of variants, their access is not user-defined, and the variables are hidden from the reader. It also operates on a schedule, changing the displayed text every 10 seconds. Thus, the reader doesn't have: 1) control over the changes, 2) the ability to reread the same text, unless it is through printing out a given version, or capturing the image of one of the displayed documents, 3) access to the variants. The mutability is very much a part of this text: it shifts during the reading, encouraging the reader to reread read backwards, start over and over, attempting to make sense of this textual moving target. My article "A Shifting Electronic Text: Close Reading 'White-Faced Bromeliads on 20 Hectares'" elaborates on the challenge of reading this text and provides strategies for approaching it.

The difference between these two works goes deeper than their relation to the user/reader: they represent the paradigm shift from floating signifiers to flickering signifiers. According to N. Katherine Hayles in "Virtual Bodies and Flickering Signifiers" (2002), the floating signifier embodies the dialectic between presence and absence, while the flickering signifier shifts to a dialectic based on pattern and randomness. Each page/line of Queneau's book/poem represents a choice for the reader: what lines become present and which lines are absent. Glazier's e-poem has built in randomness, yet it is structured enough that a pattern emerges from the flickering lines of his poem.

Espen Aarseth coined two neologisms in *Cybertext* which become useful for the discussion of mutable texts: scriptons and textons. Scriptons are "strings [of signs] as they appear to readers," and textons are "strings as they exist in the text" (1997: 62). Aarseth describes Queneau's Cent mille milliards de poemes as containing 140 textons that can combine to produce 100,000,000,000,000 possible scriptons (1997: 62). Aarseth goes on to develop a typology of "modes of traversal" of cybertexts: a useful one to show the similarities between print and electronic works that require the reader to spend "non-trivial effort" in their traversal.

A similar calculation could be applied to Glazier's "White-Faced Bromeliads," with a significant difference: that the possibilities are part of the text, but the reader is presented with only a fraction of these. In works such as "Passage," by Philippe Bootz, the program guarantees that you will never see exactly the same scripton, no matter how many times you reread the poem.

The two main sources of mutability are defined by the programmer or the user. Programmed mutable e-texts have changes that result from authorial planning, whether

it is to include random elements into the generation of scriptons, or whether these occur in a schedule, or through randomized animation. User-defined mutability results from the intersection of responsiveness and the programmed nature of the e-text. The difference between merely responsive e-texts and mutable responsive e-texts is that the changes in the text are at least partly dependent upon the reader/user's input. In a mutable e-poem such as "Passage" by Philippe Bootz, the reader's input during the second movement is essential to the changes that manifest themselves in the third movement of the poem. Different users, and repeated reading performances of the entire work by the same user, will necessarily produce different interactions, which will result in a newly configured third movement of the poem.

Mutability is necessarily a general category, but a significant one because it literalizes the textual instability present in all texts, whether in print or in electronic media. The changes take place as part of the production history of the material text that may or may not include interventions by the reader. Some change—however minuscule—is possible in any electronic text, as was discussed in the introductory chapter, but in mutable e-texts this happens to an even greater degree, and as part of the design of the poem.

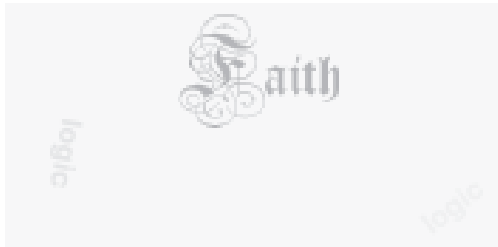
Aural Texts

Poets have used writing as a recording medium for centuries by translating the sounds of poetry into alphabetic scores for oral reconstruction—just as composers have written musical scores on sheets of paper for subsequent musical reinterpretation. In poetry, sounds and units of breath become space: lines, stanzas, punctuation, spaces between words, formatting, and other visual markers become part of what readers learn to interpret in order to come up with to provide an oral rendition. The use of writing, however, led many poets to explore the expressive potential of writing in and of itself, leading to the visual Concrete Poetry movement.

The rise of sound recording technologies allowed for poets to explore the aural element of language beyond the limitations of the writing and oral reconstruction model. These technologies are fairly new and have therefore accrued a smaller body of work—and market—than print. For the most part, sound recording technologies have been used to record poets reading their work: serving as an archive of authorial interpretations of the written poems. However, the Concrete Poetry movement also explored sound as a means in and of itself using the sounds of language beyond the traditional constraints, such as using words. Poets like Paul de Vree and Henri Chopin experimented with recording technologies to mix sounds, voices, and sound effects, creating sound poems that could only exist as recordings. This is yet another example of how production, storage and dissemination technologies have an impact on poetry, at times transforming it into something not witnessed before.

Computers have become increasingly apt for multimedia compositions, particularly since most come equipped with sound cards and speakers enabling writers to explore the potential of adding a sound component to their texts. Writers like Jim Andrews and Jörg Piringer take the exploration a step further by creating works of interactive music, such as "Nio" and "ABCDEFGHJKLMNOPQRSTUVWXYZ," respectively.

So what are some possibilities for the use of sound in e-poetry? There are several different types of sound recordings possible for use with e-poems. Some kinetic works attach noises to the movements of the words on the screen. For instance, “Faith” by Robert Kendall has the word “logic” fall on and bounce off of the word “Faith,” making a clinking sound when they make contact. This reinforces the illusion of solidity of the words—yet playing on their meanings at the same time.



“Faith” by Robert Kendall

Ambient sounds can also communicate volumes, such as establishing a situation or setting. Katharine Norman’s award winning poem “Window” powerfully evokes a sense of place by providing year-round sound clips of natural and domestic sounds recorded from the liminal space of a window in an upstairs room of a house (see figure 10).



“Window” by Katharine Norman

Young Hae Chang Heavy Industries, an artistic duo based in South Korea, have become well-known for synchronizing poetic texts to jazz and other kinds of music. Examples abound of the use of music in works of electronic literature, though one might be hard-pressed to find more varied incorporations of music and audio than in Alan Bigelow’s *Webyarns*, his collection of poetic stories for the Web. Sound is one of many media integrated in his work.

Readers need to become careful listeners when part of the text are presented aurally—at least if they want to get the whole text. David Knoebel makes clever use of overlaying verbal and visual text in “Thoughts Go,” leading readers to decide what text they will devote their attention to since given the difficulty of simultaneously apprehending two different texts.

At times the audible text is the same as the readable component, adding information such as tone, volume, and paucity clearer. This can be seen quite dramatically in María Mencía’s “Birds Singing Other Birds’ Songs” in which voice recordings reading transcribed birdsongs accompany kinetic visual poems in the shape of flying birds.



“Birds Singing Other Birds’ Songs” by Maria Mencía

I believe that the computer, and by extension poetry native to it, is a mostly visual medium that is slowly incorporating sound into its workings. Most navigation and interactivity, for instance, occurs through visual and not aural cues. I also believe that the use of aural elements figures prominently in the future of e-poetry, because the silence associated with reading is linked to print technologies. While it is true that texts speak when they are read (whether aloud or silently) on the page, it is thanks to screens and speakers that they have literally begun to dance and sing.

To conclude, it is important to pay attention to these diverse textual behaviors when reading electronic literature. I recommend considering the impact of a given behavior or group of behaviors in the text as part of a work’s signifying strategies. For examples of textual behaviors integrated into analyses of works of e-poetry, read my research and visit my scholarly blogging project, *I e& E-Poetry*.

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