EDITED BY EDUARDO KAC

MEDIA POETRY

AN INTERNATIONAL ANTHOLOGY

"An important book. It will undoubtedly mark the history of digital poetry." — DOC(K)S MAGAZINE, FRANCE

Media Poetry: An International Anthology

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INTRODUCTION

Eduardo Kac

The first edition of this anthology came out in 1996 as a special issue of the journal *Visible Language* (vol. 30, n. 2). The original title and subtitle were "New Media Poetry: Poetic Innovation and New Technologies". For this revised and enlarged second edition I changed "new media poetry" to "media poetry", and the subtitle now accents the global nature of the movement. I changed "new media poetry" to "media poetry" because now, ten years later, digital and electronic media are no longer new in society in general or in poetry in particular. The change we see today is not one of kind but degree. In other words: the question concerning media today is no longer the passage from a society without personal computing devices and mobile networked media to one in which they reshape social space and interpersonal experience; the question today is the acceleration and expansion of this process. This implies further miniaturization (greater portability), additional media convergence (integration of word, image, sound, movement, transmission, and many other sign-processing features into a single device), and broadband network ubiquity (the eventual ability to process and exchange messages in any media anywhere). This process will undoubtedly contribute to expand the poet's creative media and will affect the writing/reading process in stimulating ways.

Another fundamental aspect of the difference between the terms "new media poetry" and "media poetry" is that while "new media" is often associated with digital technology, "media" is broad enough to also encompass photonic and biological creative tools as well as non-digital technology (e.g., analogue electronic technology and poetic experiments conducted in zero gravity). Further, the general term "media poetry" – without the word "new" – is useful in defining the broader field of technology-based poetic creation going back to the 1960s and projecting it forward into the twenty-second century. "New" is too ephemeral; "media" connotes the various means of mass communication thought of as a whole – in other words, technological systems of production, distribution, and reception.

It is a truism to state that the audience for poetry in general is not large, and that readers of media poetry constitute an even smaller group. In 1996 the audience for media poetry was fundamentally composed of the poets themselves and their immediate circles. In order to share

the results of our poetic experiments we met informally, exchanged disks via the postal system (because the network was not capable of storing, displaying, streaming, or transmitting specific formats and large files), convened (and often presented together) at international conferences, discussed common interests via e-mail and listservs, and mounted exhibitions. Fortunately, it is possible to say that in these ten years the audience for media poetry has grown. Several factors contributed. The original edition of this book was the first anthology of its kind published anywhere – a truly international anthology of media poetic theory featuring essentially poets themselves discussing their works and ideas. In the last decade, several anthologies and monographs have been published, contributing to shape the field and spread the reach of the poets' accomplishments. As a consequence of the international growth in production and scholarly interest, media poetry started to be incorporated into the curriculum of literary and interdisciplinary studies programs, with the by-product of countless master and doctorate theses being produced. While academic scrutiny and exegesis in and of itself, as a scholarly exercise, would be of no particular interest, the fact that interested literature students have read – and reflected on – the work of these poets with focused interest and intellectual curiosity is a clear sign of change. Perhaps even more significant in the educational context is the fact that now we also see creative writing classes incorporating digital technologies, which means that interested young writers now have environments in which they can be supported in the production of their own original works. An ever-broader global media art exhibition circuit started to incorporate media poetry works that cannot be properly or exclusively displayed online, such as installations. It is a unique sign of the new boundary-blurring condition of language-based media art that many works are equally comfortable in "visual art" or "creative writing" circuits – what makes this clearly different from 1960s conceptual art is the literary dimension of these works in direct engagement with the new cultural context of global digital networks. Finally, the greater accessibility of personal computers and mobile devices and the growth of the Web have helped disseminate that facet of media poetry that is specifically digital.

Clearly, technology as a writing and reading medium occupies an important place in the creative repertoire of the poets represented here. However, it is important to insist on the fact that they come to technology out of their own individual literary needs; that is, the impulse to combine their personal vision with a radical reimagining of poetry's expressive power through programming, interactivity, looping, networking, and many other new procedures. Technology alone is not the focus. Inasmuch as their work does indeed break new ground through the creation of new poetic forms, the focus must always remain on their individual poetic visions. This is true of all noteworthy art and poetry (think of Cummings and his inseparable portable Smith-Corona). By the same token, it must also be clear that what is at stake in media poetry is *not* a retake of the modern ideal of the "new" as a value in itself. Quite simply, the essays in this book demonstrate that formal innovation is a process intrinsic to culture. Formal innovation has always been and always will be a part of art and literature.

So, if technology plays a fundamental role in the poetry here documented but is not the central or dominant issue itself, what should be the focus of the reader's attention? The answer is simple: the poems themselves as verbal/visual/acoustic entities and as cognitive/perceptual/kinesthetic experiences. Each poet addresses his or her own themes through his or her own compositional system. An examination of the personal characteristics of the production of media

poets is a significant task, to be taken up at another place and time, by diligent researchers. Undoubtedly, the poets' own essays and the critical reflections collected here will be of assistance in this task. The poems are the focus of the reader's attention, but the poems themselves, by the very technological nature that makes them what they are, cannot be directly presented in a print compendium. Most digital pieces herein discussed can easily be downloaded or seen online (see the Webliography section), whereas other works can be seen during international exhibitions, visits to public or private collections, or special events. Inevitably, the distribution of media poetry follows from its immaterial condition.

The contradiction between the wide distribution of the media poems and the limited circulation of the first edition of this book (which was distributed directly to libraries and not available through bookstores or the Internet) is the main reason for this second edition. Since it first came out as a journal special issue, it could only be consulted at the libraries that owned it; it did not circulate as a regular book. Its accessibility has remained restricted to devout researchers. While a portion of the original material has subsequently found its way online, the collection itself, as the focused mark of media poetry's foundational moment and as an inclusive and portable volume, was not available until now. This book is both a historical document of the dawn of media poetry and a contemporary tool meant to be instrumental in the wider dissemination of the poets' achievements – the poems, which are, in the end, what truly matters.

It is no small wonder then that requests for a widely accessible edition of this book have been consistently forthcoming. In responding to them I was faced with the dilemma of either reissuing a facsimile edition of the book, exactly as it first came out in 1996, or editing a new book with the most current developments in the work of the original contributors as well as in the ever growing production of some of the many experimental media poets active today. In the end, I decided to merge the best of both worlds. Precisely because of its now historical status – time is relative: in the digital age, ten years may be perceived as equivalent to several decades of pre-digital time; not to mention that it first came out in the last century – I opted to keep all texts featured in the first edition (see Sources at the end of the book), add a few previously published but little known significant texts and images, and complement them with a series of new texts especially commissioned for this book, including some translated from French, Portuguese, and German.

Ten years later, ex post facto, we may ask: was/is media poetry a movement, like Beat or Language? Or a new form, like video art? Literary critics may decide one way or the other, but the incontestable fact is that the innovative media poets represented here – and many others documented elsewhere – have sought to redefine poetry in their experimental works created with, through, and for media and environments as diverse as video, electronic displays, computers, holograms, biotechnology, early and contemporary digital networks, cellular phones and other mobile media, skywriting and its logical consequence: outer space. Seen collectively, their works are a testament to poetry's relevance to contemporary life.

In a world in which we are constantly bombarded by the detritus of information technology, from irritating e-mail spamming to ravishing computer viruses, some may argue that the place of poetry should be a removed and more quiet realm that provides a respite from the twirling chaos of the technology-inflected contemporary life. Readers in need of restorative experiences

are reminded that poetry is not a substitute for a walk in the park, sunbathing, or meditation. Traditionalists with a penchant for colloquial directness or vernacular linearity are advised to avoid media poetry and pretend not to be surrounded by television, video and music players, cellular phones and Internet forms such as e-mails, instant-messaging, chat rooms, video conferencing, and blogs in which language is malleably and constantly expanded and transformed. Contrary to the ordinary use of words in these contexts, however, poetry is a profound engagement with language and so the poets whose work shapes this book challenge themselves and their audiences and argue instead that precisely because of the malaise generated by and through technology, the writer's task imposes itself as reshaping the media and transforming technology into an instrument of the imagination. Poetry liberates language from ordinary constraints. Media poetry is a paramount agent in pushing language into a new and exciting domain of human experience.

Chicago, May 2006
Paris, August 2006

Introduction to the First Edition (1996)

This is the first international anthology to document a radically new poetry, one that is impossible to present directly in books and that challenges even the innovations of recent and contemporary experimental poetics. The new media poetry documented here pushes language into dimensions of verbal experience not seen thus far. The work of the poets explained and discussed in this issue takes language beyond the confines of the printed page and explores a new syntax made of linear and non-linear animation, hyperlinks, interactivity, real-time text generation, spatio-temporal discontinuities, self-similarity, synthetic spaces, immateriality, diagrammatic relations, visual tempo, multiple simultaneities, and many other innovative procedures. Due to their immaterial nature, the poems created by the authors in this anthology can only be stored in computer disks, videotapes, and holograms. They can only be read on CRTs, whether with disks, tapes or via the Internet, and on holograms.

This new media poetry inserts itself in the field of experimental poetics, at the same time that it clearly departs from the formal conquests of other groups or movements in the twentieth century. From the rational and anti-rational approaches of the avant-garde movements of the first half of the century (including Futurism, Cubism, Contructivism, Dadaism, and Lettrism) to the print-based directions of the second half (including Spatialism, Concretism, L=A=N=G=U=A=G=E, Beat, Visual Poetry, Fluxus, and Process/Poem), experimental poetics has seen a relentless exploration of the verbal sign in "codexspace", to use a term introduced by John Cayley. The poems discussed in this anthology do not follow this route; instead, collectively they state that a new poetry for the next century must be developed in new media, simply because the textual aspirations of the authors cannot be physically realized in print. The old storage medium created by Gutenberg must now be replaced by floppy and hard disks, CDs, CD-ROMs, DVDs and SuperCDs, magneto-optical disks, tape, and holographic film. Many of the authors included in this anthology also make their works and theoretical writings available on the Internet.

The geographic diversity of this small sample of new media poetry – from Argentina and Brazil, to the United States, and to the Netherlands, France, Portugal and the United Kingdom (via Canada) – is a clear indication that this is an international phenomenon. At the same time, the age range in this anthology, from authors in their 30s to those in their 60s, shows that this is

more than a single generation's issue. What this anthology documents is an innovative work that seems to contradict postmodern obituaries of new and non-pastiche manifestations. Technology has undoubtedly changed artistic practices in a profound manner in this century. In most cases, however, what one sees is the impact of technological innovation reflected on traditional forms, as exemplified by pop artists' use in their paintings of mass media and television imagery, or by the current use of the Internet to publish traditional lines of verse. This anthology, on the other hand, reveals poets that appropriate the new writing tools of our time and with them give life to new and differentiated poetic forms. The multiplicity of forms here recorded (Rosenberg's simultaneities, Valias' multimedia text, my own holopoetry and digital poetry, Cayley's cybertexts, Bootz's unique readings, Györi's virtuality, and Melo e Castro's videopoetry) are complemented by Eric Vos' critical analyses of some of the fundamental principles of the innovative poetics outlined collectively by the authors.

This anthology is by no means comprehensive. A more thorough examination of experimental poetics and technological innovation would have to include pioneers of electronic sound poetry, such as François Dufrêne, Henri Chopin, Bernhard Heidsieck, Brion Gysin, and John Giorno; forerunners of digital poetry, such as Aaron Marcus, Erthos Albino de Souza, and Raymond Queneau; contemporary polywriters such as Richard Kostelanetz, Jackson Mac Low, and Silvestre Pestana; and electronic media artists who straddle between literature and the visual arts, such as Bill Seaman and Jeffrey Shaw.

While some of the present forms of distribution of new media poetry are doomed to disappear in the near future, as is the case of the videotape with the imminent arrival of small digital video disks, the revolutionary change in writing and reading strategies new media poetry promotes are likely to have a long lasting presence. The changes at stake are not a matter of writing lyric sonnets with a word processor instead of a typewriter; the focal point is not a change in writing medium, but the fact that we now also have new accessible reading possibilities. What held back this area of experimentation for over two decades, namely limited processing power, huge size and general unavailability of computers to readers, is no longer an impediment to the development of new media poetry. This international phenomenon started notably in the early 1980s and continues with renewed strength today.

The reader interested in locating the actual poems discussed in this issue will find plenty of references in the texts. In addition, a Webliography included at the end provides the reader with links to Web pages of direct interest, including some pages authored by anthologized poets that include digital poems available for downloading. I have also edited, in non-commercial CD-ROM format and in limited edition, the first International Anthology of Digital Poetry, which includes works by the poets represented here.

This is only the beginning.

Eduardo Kac

Part I – Digital Poetry

The Interactive Diagram Sentence: Hypertext as a Medium of Thought

Jim Rosenberg

1. Diagrams: A Separate Channel for Syntax

The most basic elemental structural act, the most fundamental micromaneuver at the heart of all abstraction, is juxtaposition, 'structural zero': the act of simply putting an element on top of another, with no other structural relation between the two elements except that they are brought together. But consider the problem of the poet in bringing this about. When a sound is played simultaneously with another sound, the result is a sound. When a painter places a bit of coloured space on top of another bit of coloured space, the result is a bit of coloured space. A mathematician would say that the domains of the composer or visual artist are *closed* with respect to the operation of juxtaposition: the result of juxtaposing two elements from the domain is another element from the domain. But what happens when we juxtapose words? Whether it is done by means of sound – either via simultaneous readings by multiple performers, or by overlaying magnetic or digital media – or visually, the result of juxtaposing words – in the almost palpable physical sense of putting them directly on top of one another – is likely to be sheer *unintelligibility:* one will be lucky to make out any of the words at all. How is the poet to achieve juxtaposition with no sacrifice of intelligibility?

But it gets worse: how can direct juxtapositions of words be *used* in larger structures? It is not hard to work in modes that give up such structures as syntax. One simply does without. Asyntactic poetry is a large and fruitful domain in which to work. On the other hand, giving up all possibility of structure is giving up a great deal indeed. Syntax is at the heart of how we normally structure words. How does one achieve such structuring and yet still have complete freedom to use juxtaposition wherever it is artistically important? How does one designate the *structural role* of a juxtaposition in a larger structure? One could put this question a bit more crudely by asking: What is the part of speech of a juxtaposition? The composer John Cage once criticized the twelve-tone system as having no zero.[1] One could say that syntax 'has no zero': in a sentence every element has its structural role with respect to the syntax diagram, or parse tree; there is no way to have words in a sentence whose syntactical relationship to one

another is the *null relationship:* no relation at all except that they are brought together. How can the poet have her cake and eat it too? I.e., how can one keep both syntactical null relationships and much more elaborate relationships, in which juxtapositions act as elements?

These are some of the formal problems that have motivated my work going back more than 30 years. A method for approaching the second problem – how to incorporate null structures as structural elements – became apparent long before I realized how juxtaposition could actually be implemented. By devising an explicit visual structural vocabulary – separating syntax out into its own channel, so to speak – structural roles could simply be directly indicated. The elements occupying those roles might be words or word clusters or other structural complexes. Thus began a long series of works called Diagram Poems.

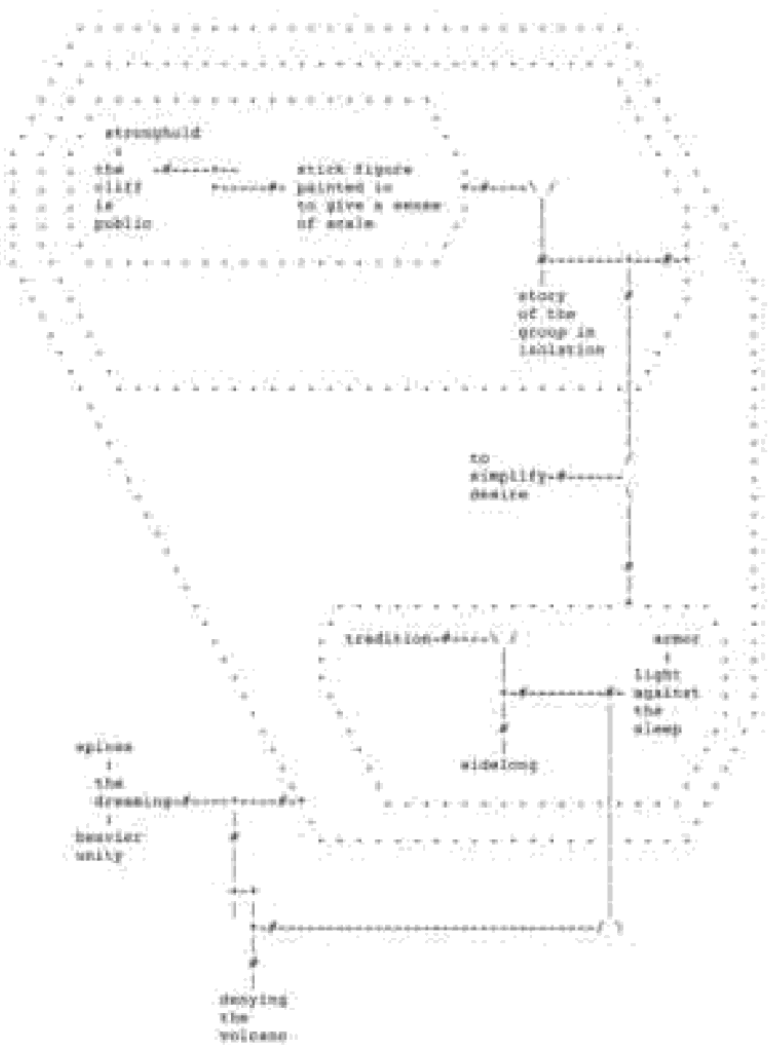


Figure 1: A diagram poem from *Diagrams Series 3*.

Figure 1 shows a poem from *Diagrams Series 3*.[2] It illustrates many of the facilities provided by the diagram notation in a variety of works spanning a large number of years. The configuration:

shows a simple modifier relationship where x is modified by y. The configurations:

show verb relationships; in the left case above, z acts as the verb relating x and y, in the right case above, y acts as the verb and x acts as the subject.

These relationships can be built up into complexes in two ways: where a 'node' in a relationship is a loop of dots, the element participating at that node is the entire contents of the loop; where a node terminates in the graphical part of a relationship, the element at that node is *the act of making* that relationship.

A number of interesting things happen when syntax is 'externalized' in this way. Syntax came about originally in conjunction with speech, where speaker and listener are constrained by: (1) the requirement that the listener 'decode' the message approximately synchronized in real time with the speaker; and (2) the aid of only whatever 'temporary storage' the listener has available in short-term memory. One might say that the function of syntax is to pre-code the message with *storage cues* so that the listener will know how to park pieces of the message in short-term memory so that they can be properly assembled in the logical relationships desired by the speaker – all in more or less real time without getting behind the speaker. Writing, however, changes the picture completely. Obviously, the real-time constraints are absent: the reader may take as much time as desired, may revisit parts of the message as many times as is necessary, and may even browse the message 'out of order'. In addition, a written document may be said to *provide its own storage*. In contrast to speech, where whatever parts of the message that are not properly stored in short-term memory by the listener are simply (and irretrievably) *gone*, the written message *persists*: it stores itself, it stores its structure, it stores its own logical relationships.

Secondly, by externalizing syntax, all points and substructures in the message are *accessible* in ways not normally found in speech. That they are accessible to the reader has already been discussed. Some interesting ways they are accessible to the writer are revealed by Figure 1. Note the relationship of the phrase 'story of the group in isolation' to a larger whole in which it appears. In an externalized graphical syntax, such a relationship is easy to simply *draw*; joining a part with a larger whole in which it participates is as easy as joining a part with a

disjoint part. Relationships between a part and a larger whole in which the part occurs are an obvious logical structure that occurs commonly in the world; yet this is difficult to do in conventional syntax. In addition, the fact that relationships may simply be drawn to parts of the message already laid out allows for complex multiple pathways to be established within even small messages; the message may *feed back upon itself*. Feedback, while a ubiquitous structure in nature, is notoriously difficult to deal with. It violates the principle set theorists call 'well-foundedness'; it may induce the potential for infinite loops in computer programs; where feedback is introduced into the way sound elements are combined in an electronic synthesizer the results may be completely unpredictable: all bets are off. Figure 1 also illustrates this concept of feedback inside the sentence: the 'highest-level' logical relationship shown in Figure 1 relates the configuration at the very bottom, in which 'denying the volcano' is a modifier, with a cluster 'already' deep within the message: 'armor: light against the sleep'.

A feedback loop may seem an inimical structure to a programmer, where the threat of infinite loop is ever present (and indeed the infinite loop stands out as an archetype 'cardinal bug' second only in its fearsomeness to an out-and-out crash); one may say that the threat of infinite loop stands as the fear at the heart of all programming. (Technically, the theorem that one cannot algorithmically determine whether a general computer program will lead to an infinite loop is known as the halting problem, and establishes absolute limits on what is computable.) Yet, when the composer induces feedback into synthesized sound structures, the ear can hear it as a single sound; when a graphical feedback loop is established in a visual syntax, the mind can apprehend *the loop as a whole* as a single gestalt. Of course to do so, *time must not be constrained*. It is difficult to see how an aural syntax, subject to real-time constraints, could accommodate feedback loops.

A diagram syntax is notably non-linear. While this is an important point, one must be careful to avoid going too far in pushing non-linearity as a distinction between a diagram syntax and the conventional speech syntax. The essence of syntax is its ability to convey logical relationships across a distance of intervening words; one might say syntax has been our way out of the bind of achieving complex speech structures in the face of the constraint of linear time. Conventional syntax provides a start toward obtaining full non-linearity from an inherently linear channel; a diagram syntax can break free completely to non-linearity without restraint. Non-linearity is freed to extend far down into the fine structure of language – just barely above the word. Or, to put it slightly differently:

2. The Interactive Juxtaposition

But how to actually achieve juxtaposition of words – to place them literally on top of one another – and sacrifice nothing in the way of intelligibility? Too often we think of words simply as whatever comes out of a word *processor* – or perhaps one should call it a word constrainer,

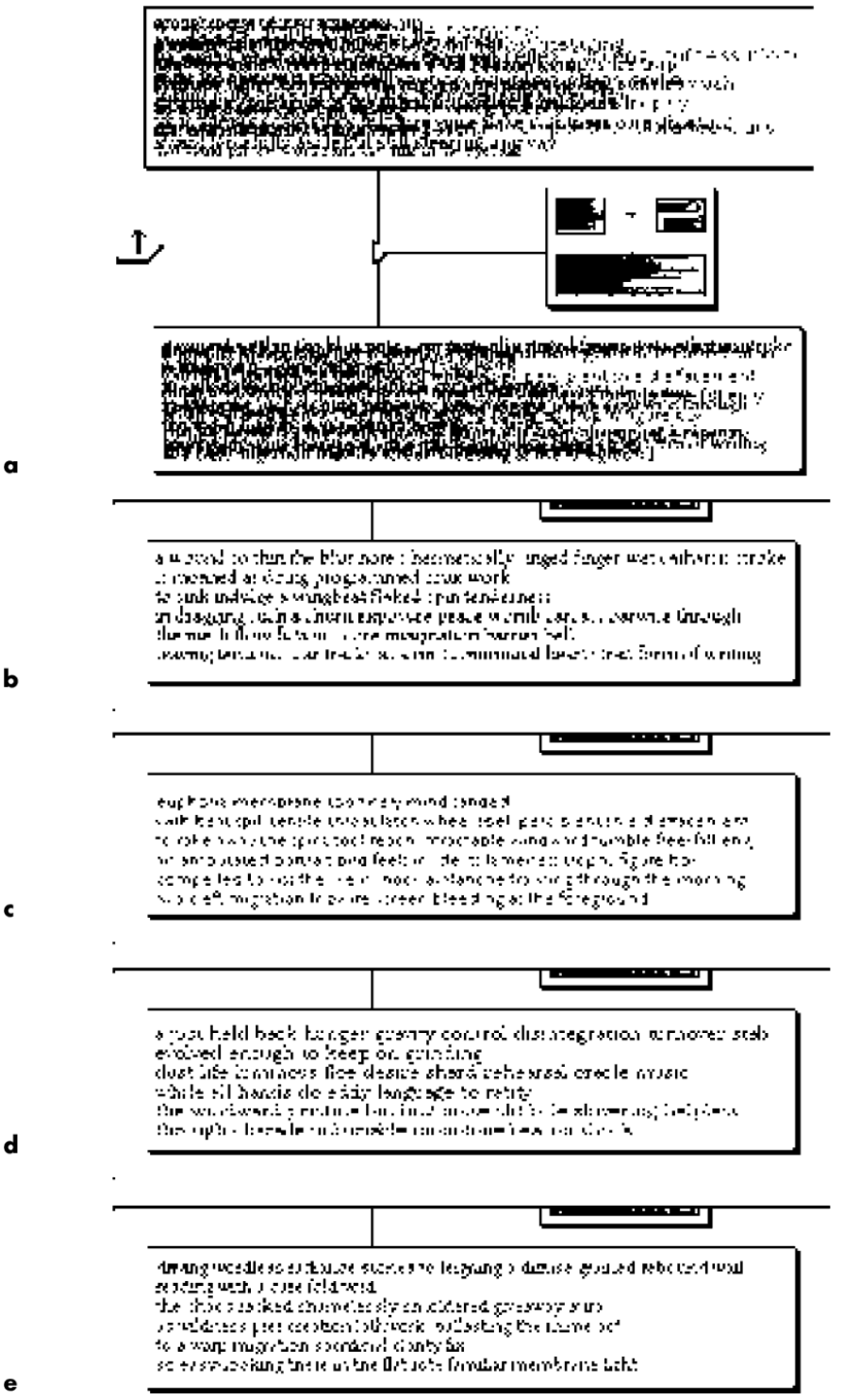


Figure 2: Taking the Diagram Interactive: Hypertext as a Medium of Thought.

forcing as it does the words into the familiar linear chains (with a nod to non-linearity by allowing hypertext links) and certainly *not* allowing words to be one atop another! A graphics program, on the other hand, allows text objects to be placed on top of one another with complete graphical freedom, but the legibility problem remains. Yet the graphics program gives a clue: juxtaposition combined with intelligibility is achieved (at last) by using interactive software. In a construction I call a *simultaneity*, words are placed in the same location – with all the freedom and fluidity a graphics program allows. At first it appears the words are simply overlaying one another – with no solution at all to the problem of overlay plus legibility. In this state the simultaneity may be called *closed*. The act of *opening* the simultaneity consists of moving the cursor using the mouse to a particular 'hot spot' on the screen. When the cursor enters this hot spot, all layers of the simultaneity but one are hidden: the one visible layer can be read unimpeded by its partners in the juxtaposition.

Figure 2 shows a simultaneity from *Intergrams*.[3] In 2a the simultaneity is closed and all layers are visible; in the detail views 2b-2e the simultaneity is opened showing each layer. (A static illustration cannot convey the *tactile* aspects of causing the different elements to appear by moving the mouse with one's hand; the reader will have to try to imagine this.)

A diagram is a marvellous instrument for presenting information of great complexity in a small space – to the point that the phrase 'Well, you'll have to draw me a diagram' is a stereotype epithet of complaint that something is too complex. There are limitations to diagrams, however. What happens when the space required is not small? How does one manage a diagram comprising *thousands* of elements? Enter hypertext.[4]

Hypertext is most often thought of as a special kind of computer software – or as the documents produced using that software, but here I would like to consider the idea of hypertext as virtual diagram. In the classical model of hypertext, a document is structured as a network of *nodes* and *links*. The nodes are typically either entire documents, or document regions (known as anchors); a link is a relationship between document places such that clicking on the anchor at the source end automatically takes the user to the destination anchor. If a hypertext is small enough and simple enough, the entire network can be represented by other means than using a computer – on paper, for instance.

Often hypertext begins (alas) at the level of the document; such documents are fully linear and use completely traditional methods for structuring text internally. Using links, associations are built up among places in these documents. The notation of the diagram poems suggests a different possibility: hypertext built up from scratch using very fine-grained word elements, where hypertext is used to carry the infrastructures of language itself, e.g. syntax. One may speak here of *hypertext as medium of thought:* rather than hypertext serving as an association structure for thoughts that are not themselves hypertexts, an individual thought itself is 'entirely' hypertext. To use terminology familiar to computer programmers, hypertext becomes a medium in which one thinks 'natively'.

Why should we do this: construct a morphemic hypertext[5] – hypertext taken into the fine structure of language? Why not make do with the syntax we have? Why not leave hypertext structure to relate 'conventional' documents, at the level known in the hypertext literature as the lexia?[6]

To answer this question, let me pose a counter-question: How does a single mind apprehend a complex network? It is becoming more and more clear that not only are networks – in the actual physical sense – becoming more and more important in our lives, the network as a metaphor is becoming increasingly important in dealing with a wide range of aspects of living. What does it mean for thought when an individual thought is itself a network? Does it help in understanding the complexities of life's networks around us, containing us, moving us, to 'think native' in a mode that is inherently network? Many seek in art a *refuge* from complexity; indeed, many consider simplicity as such a paramount goal for art that it virtually defines artistic purpose. For others, complexity is taken as a given in this life, and art is seen as an aid that can help us *to live with it* rather than fight it or withdraw from it. To understand the network one *becomes* the network. Thought itself is a network, there is no other-than-network:

The obstacles in the way of achieving such a hypertext of thought are many:

(1) Lack of Tools. Most commercially available hypertext systems are not adequate. Although much attention has been paid in the hypertext research community to a variety of structural models other than the standard 'node-link' hypertextmodel,[7] this has borne very little fruit in tools available for the kinds of computers writers are likely to have accessible.[8] Instead, commercially available hypertext software tends to either adhere too rigidly to a node-link model or require the user to build everything 'by hand'. Typical hypertext structures are or-based, i.e. disjunctive: from lexia L with links X, Y, and Z one may choose X *or* Y *or* Z. Syntax structures are *and-based*, i.e. conjunctive: a sentence with parts X and Y and Z consists of X *and* Y *and* Z. (Consider the classical phrase structure rule.

$$S \rightarrow NP + VP$$

A sentence can be rewritten as a noun phrase followed by a verb phrase. One does not get to *choose* which of NP and VP to use; they are both there.) This is not to argue against the use of disjunctive structure, or 'classical' hypertext links. Rather, the need is for both to be available as an author requires. Typically, commercially available software has no built-in support for conjunctive abstractions at all.

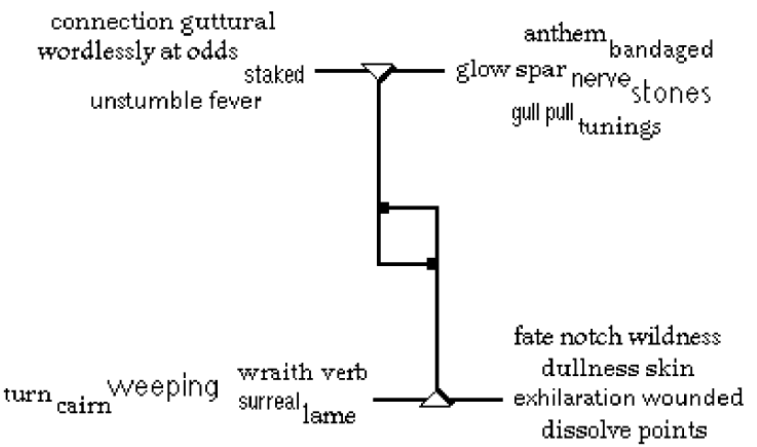
Another problem with available software packages is too rigid an attitude toward *behaviour*. Available hypertext systems typically offer only off-the-shelf behaviours that cannot be extended by the user. At the other extreme, systems like Hypercard are fully programmable, but do not allow that programmability to be encapsulated in pluggable objects. (For instance, a Hypercard button has no storage containers!)

(2) Reticence to tackle 'language itself'. There is no gainsaying that the idea of using hypertext to carry the infrastructure of language itself is an extremely radical proposition – one from which many will shrink. One source of objection is the idea that 'language itself' is off limits by virtue of being biologically hard-wired.[10] There are two answers to this: the artistic answer and the

engineering answer. For the artistic answer, consider the analogy of dance. No one would dispute that there is a biological basis for how our bodies are put together, for the conformation of bone structure, for the ways that joints work: in short, biology places many constraints on how the human body can move. This has not notably abolished the dance. To the contrary: one may say it has *created* the dance: we admire those who can show us what the boundaries are for how the human body can move, who can take us all the way up to those boundaries and perhaps even stretch them. To the degree that syntax is biological, it makes experimentation on the limits of syntactic structure *more* valuable rather than less valuable. For the engineering answer, consider the analogy of computer networks. Again, there is no disputing that neurons are biological objects, and that genetics has a great deal to do with how neurons function individually and how the nervous system functions collectively. This does not diminish the utility or importance of those 'externalized nervous systems' we call computer networks. The proposal for hypertext as a medium of thought, for hypertext inside the infrastructure of language, is a proposal for an 'externalization' of syntax analogous to the externalization of the nervous system manifested in computer networks.[11] Just as computer networks do not 'replace' the biological nervous system, an externalized mechanism of thought does not 'replace' syntax; rather it adds to syntax and allows new possibilities.

For instance, how do we allow more than one user 'inside the sentence'? For a diagram syntax this is almost trivially easy: each user's relationships can be distinctively marked – using colour, for instance, or any other form of explicit marking. How is it possible using conventional syntax to construct a 'multi-user sentence'? It is exactly in joining multiple users that our biological nervous systems break down and externalized ones show their true value. How does one construct a true multi-user medium of thought? To repeat: a multi-user medium of thought does not mean a multi-user mechanism for bringing together 'single-user thoughts' but rather a medium where *the individual thought* can be a multi-user construction. Just as multi-user interactions require an externalization of the nervous system, a true multi-user medium of thought will require an externalization of syntax.

It all interacts:[12]



Notes

1. See, for instance, Cage, John, '45' For A Speaker', *Silence*, The MIT Press, Cambridge, 1961.
2. Rosenberg, Jim, *Diagrams Series 3*, published on demand by the author, Grindstone, PA, 1979. Excerpts appeared in *Interstate 14*, Austin Texas, 1981.
3. Rosenberg, Jim, *Intergrams*, Eastgate Systems,Watertown MA, 1993.
4. The term 'hypertext' was originally coined by Ted Nelson. The literature on hypertext is extensive; for a bibliography (though dated) see Harpold, Terence, 'Hypertext and Hypermedia: A Selected Bibliography', ed. Berk, Emily, and Devlin, Joseph, *The Hypertext/Hypermedia Handbook*, McGraw-Hill, New York, 1991. The best single-source introduction to hypertext is probably still Nelson, Theodore H., *Literary Machines*, T. H. Nelson, Swarthmore, PA, 1981.
5. The term 'morphemic hypertext' was applied to my work by the hypertext researcher Catherine C. Marshall (private correspondence).
6. The term 'lexia' was borrowed from the writings of Barthes by George Landow to refer to a document piece at a hypertext node; see Landow, G. P., *Hypertext: The Convergence of Contemporary Critical Theory and Technology*, Johns Hopkins University Press, 1992.
7. See, for instance, Marshall, Catherine C., Halasz, Frank G., Rogers, Russell A., and Janssen, William C. Jr., 'Aquanet: a hypertext tool to hold your knowledge in place', *Proceedings of Hypertext '91*, ACM, New York, 1991for a model based on relations; Parunak, H. Van Dyke, 'Don't Link Me In: Set Based Hypermedia for Taxonomic Reasoning', *Proceedings of Hypertext '91*, ACM, New York, 1991 for a model based on sets; and Stotts, P. David, and Furuta, Richard,'Petri-net based hypertext: Document structure with browsing semantics', *ACM Trans. Off. Inf. Syst.*, *7*, 1, (January), 1989 for a model based on Petri nets.
8. In some ways the wide popularity of the Internet has actually made this problem *worse*. Not only is hypertext on the World Wide Web currently almost entirely node-link, it is a particularly simplified form of node-link hypertext.
9. The concept of conjunctive hypertext was introduced in Rosenberg, Jim, 'Navigating Nowhere/Hypertext Infrawhere', *SIGLINK Newsletter 3*, 3, December 1994, http://www.well.com/user/jer/NNHI.html.
10. For a review of issues pertaining to the biological basis of language, see Pinker, Steven, *The Language Instinct*, William Morrow and Company, New York, 1994.
11. Externalization of language is discussed extensively in Donald, Merlin. 1991. *Origins of the Modern Mind*. Cambridge: Harvard University Press.
12. The final figure is a single plane in a simultaneity from Rosenberg, Jim, *Diffractions through: Thirst weep ransack (frailty) veer tide elegy*, Eastgate Systems, Watertown MA, 1996.

Quantum Poetics: Six Thoughts

Stephanie Strickland

Introduction

In a world of electronic, photonic, and bionic technologies, what and how does poetry speak, write, sound? What qualities emerge as it threads network flows, protein synthesis, random generators, algorithmic visual tools, sound engines, and other instruments that do not aim to (re)produce notes, or words, or pigments, but rather their own mesh of variable pattern.

For more than a century poetry has risen from the printed page, (re)locating itself in the corporal voice, in the life of the community, on the walls of cities, as part of performance. Now, by means of new technologies, poetry lives in new multi-dimensional environments. The position of the reader/auditor/viewer, who is sometimes a possible collaborator, has shifted – one more shift in a long history of shifts in reading mapped in the anthology *A Book of the Book*.[1] We do not know the "future of reading," though a recent Xerox Parc installation, *XFR: Experiments in the Future of Reading*, prototypes some exciting possibilities. Digital art makes us think of other directions. In the electronic arts, on which I will focus, (inter)convertibility of all previous media and energetic forms to one digital bitstream is a key capability and constraint.

The six major interests for me, as maker and receiver of these works, are 1) the discovery or refinement of new time dimensions, from macroscopic "world lines" to engagements at the periphery of attention to "curled-up" hidden possibilities; 2) privileging what I call a stenographic paradigm for interaction: "moving through me as I move";[2] 3) cultivation of an oscillatory or flickering kind of attention, directed not only to different components but also to different emergent levels as we have learned to understand these in dynamic systems; 4) thinking beyond oscillation to superposition; 5) remolding our sensorium, our neuro-cognitive capabilities, through these new works; and finally, 6) a sense of the importance of the practice of translation, understood as encompassing acts of transduction, transposition, transliteration,[3] transcription, transclusion,[4] and the transformation we call morphing.

One: Time Dimensions[5]

What is engaging about poetic works in new media? A way of entering time, unmatched by our other experiences. We are taken, not by the site or the map, but by the ongoing journey; not by the view or the path, but by the changing of the view, the diverging of the path; not by the archive or database, but by the ever re-contextualized act of retrieval; it is, then, not stasis, not velocity, but a new sort of time connection: what speeds me up, what slows me down, what hangs –

For almost a century, Einsteinian physics has taught that the universe has no master clock, no space pervaded by absolute time. We are intellectually convinced, but we have no "feeling for," no intuitive sense of what it is to travel on a world line in an irreducibly compound space-time. We do not understand kinesthetically that a world line never ends or begins, that it can time-reverse without violating laws of physics. Could we simulate the experience of such travel in the unconstrained dimensionality of cyberspace?

Designers in educational multimedia have produced tools such as *Mathematica* and *ODE Architect* to provide an interactive sensory grasp of highly abstract structures, but electronic poetic art has only begun to harness similar strategies and has not given itself the task of rendering temporal abstraction. One wants to grasp *temporal* abstraction because the critical changes from sub-atomic levels through biological macromolecules, cells, organs, individuals, societies, on through ecologies, are decisive *time-based* events. These changes are jumps between levels that reveal emergent properties. Such properties are unpredictable by, and unanalyzable in terms of, properties of the prior level, *even though* there is an unbroken line of inheritance from bottom to top, and even though there is always a part/whole relation between the levels. In the transition from any one of these levels to the next, not only is the whole greater than the sum of the parts, but the emerging qualities feed back on the parts and give them qualities they could not have if isolated.

How do we measure time, then? Metronomes of considerable historical importance include the solar and lunar cycles, the rhythms of the tide, the heart, the menstrual cycle, and now, vibrations of a cesium atom. Most important, we ourselves are proper clocks, measuring one kind of time, because a proper clock, in Einsteinian physics, is a clock affixed to a moving object.

In this age of preeminently bio-science, we re-understand the body, have in fact translated the body through cloning, through digitized anatomy, through medical body-scan devices. We newly understand that the human timekeeper, the heart, is not the kind of clock that measures unvarying flow, but is rather a fractal tempo tracker that runs concurrently to the beat of several highly variable drummers. When it runs to no beat, or if it collapses to one stereotypic periodic behaviour, losing some of the long-range correlations that tie it to events thousands of beats into the future, then it is about to die. Is the Internet also a fractal tempo tracker?

The tracing of a heartbeat over a period of milliseconds, then seconds, minutes, hours, days, exhibits a pattern that remains the same. The concept of fractal shifts here from self-similar structure in space to self-similar dynamics in time. Thus, though you cannot tell what timescale you are looking at simply by seeing, or hearing, these patterns, the pattern's persistence does become a means to travel *between* timescales. And although it is true that an average regularity,

a pulse, can be established, this is not the most interesting pattern – as a measure, it smoothes and destroys the huge amount of information hidden in the micro-measures, in the fluctuations, the interbeat intervals.

How can we use these dynamic measures, these hidden dimensions, for poetic works? By using large networks as our instruments, as arguably Net artists Mez (Mary-Anne Breeze) and Netochka Nezvanova[6] both do, creating and exploring multiply connected spaces in which different regions of space and time are spliced together, but more than spliced; in which histories are alterable, always different, manifesting in many media, driven to immaterial spaces by the assaults of technology – or are they released by technology, escaping both identity and identification, in search of some new present that they are leaning into? As Talan Memmott says, "Adentity is another manner."[7]

One poetic work that thinks time dimensions in new media is *1:1*, a time series image of the Internet, created by Lisa Jevbratt.[8] In this piece, softbots, or agents, continuously scan servers doing an interlaced search of all possible IP addresses, expressed as four octets, and then expressing the results in terms of five different visualization algorithms. The search zooms in repeatedly on different samplings, each of which constitutes not a slice, but a snapshot, of the Web, which increases in resolution as the scans move toward sampling all the octets, after which they recommence. The title *1:1* refers to a scale of 1:1, suggesting that this map has the same size as its referent. In fact, the interface here has become not only the map but the environment, implying all of the logical problems Lewis Carroll addressed in 1893, in his book *Sylvie and Bruno Concluded*, and raising, as well, the issue of map as time tunnel, map-meaning dependent on date.

Readers of *1:1* can select locations via the Hierarchical, Random, Petri, Excursion, or Every interface. The latter is a densely striated coat of many colours, a clickable image map linking to every top level website associated with an IP address. The specific colour of each square is generated by using the second, third, and fourth octets to specify RGB numbers. The Petri interface resembles a star-map of live sites, each of which brightens the more it is clicked, demonstrating the self-fulfilling-prophecy aspect of collaborative filtering. The Excursion interface permits a recursive choice from a search-progress graphic that opens nested windows; Hierarchical allows consecutive choice of each octet; and Random requests a randomly generated choice. When using these database interfaces, readers experience predominantly undeveloped sites and inaccessible information, at best a few hits among the myriad error messages that announce vacant or forbidden sites. Without a probabilistic sampling scheme, without recursive searches, without a time series interface, this particular view of one of our most important public environments would not be available. This interface/visualization only transiently yields to a gestalt. It must be reconstituted continuously with computer processing time and human cognizing time, a kind of temporal knowledge that we learn to feel with and that digital artists are exploring in unpredictable ways.

Two: The Stenographic Paradigm[9]

If we think of oral performance as mapping time into time, an insertion of the invisible into the invisible, smoke in air; if we then think of script as mapping time onto space, the time-uttered word now held on vellum, stuck there, ink-spattered, or the time-uttered word now chisel-chipped on stone, we will think, the letter kills, but the spirit (-voice) gives life.

And then, if we think of print as mapping time onto a grid, the justified page stamped by type set in rigid frames, always the same, no difference one copy to the next, under the control of the Learned Latin line, a line that has excluded childhood and linguistic play, that has excluded those prohibited from learning by reason of their birth, we will wonder where the human voice has hidden itself – and notice that the Romantics and Mary Shelley, for different reasons, aligned themselves with technology dreams.

And if we ask, finally, in this line, what does the electronic word do, will we say that it maps time into a medium that defeats geometry, that is profoundly anti-spatial, not a place to hold and to own, but a place to log in, full of transitions, timely views, snapshots of malleable non-placed space? Will we say that many co-present, fleeting, refugial, but reappearing, glances and glimpses can begin to assemble themselves across many levels of reference and embeddedness, across many types of text, and will this act of recombination or reconfiguration have a shared public structure, the structure of a quest? A quest, we must ask, of whose unconscious.

What anthropologists call polychronic time, software engineers call multitasking: doing many things at once. Both multitasking and microprocessing, as Sadie Plant points out in *Zeroes + Ones*, are activities associated with the work of women in many societies and eras. This interruptible ability to do many "little" things at once is contrasted with monochronic male time, a time in which only one task is addressed, no matter its mental, physical, or ritual character. In a digital age, all are interruptible, and digital art often takes on the "never done," always renewable quality of so-called "women's work".

Rosmarie Waldrop, in her prose poem "Accelerating Frame,"[10] describes this mode of reading: "I badly wanted a story of my own, as if there were proof in spelling. But what if my experiences were the kind of snow that does not accumulate? A piling of instants that did not amount to a dimension?"

Vannevar Bush[11] wanted his Memex to intercept and capture the neural circuits of the stenographer who could reduce his words to a phonetic code on the fly, whose encoding practice was encompassed by her body. I want to do the same thing, not from the position of Bush, outside the device, but from the position of the stenographer, attached to it. In her body, words moved through her as she moved, a fluent circuit of meaning that she hosted, instigated, permitted, understood, explored, and enjoyed. Her somatic practice deflects not only the threat of analytic dispersal, into "simplified language...nascent form...intelligible only to the initiated," as Bush characterizes her code, but also the threat of obsessive recombination and confusion, the multiple overlapping streams of speech she is asked to transcribe.

The notion of "moving through me as I move," as a paradigm for interaction, intends to install the stenographer, and not her employer, as the crucial creative/receptive presence in digital art. Hers is an egalitarian position that can be stated of, and by, each element in a dynamic network. "Move through me as I move" is as much the "voice" of a hypertext as it is of the writer/encoder. It is also the voice of the network addressing all those hosting it and served by it. In the case of work open to multiple authoring, or to synchronous reading and performance, the command 'move through me as I move' represents the utterance of each of the performers and participants speaking to all the others.

The stenographer, however, is more than a writer/reader/monitor; she is also the operator of an appliance. This position is described by Talan Memmott, here explicating his theory/fiction hybrid, *Lexia to Perplexia*, winner of the 2000 trAce/altx New Media Writing competition:

> With a document that is acted upon, unfolded, revealed, opened rather than read, full of holes to elsewhere, hiding secret inScriptions, filled with links like mines and traps and triggers – we are no longer talking page or screen, but appliance. Navigating the Lexia of *Lexia to Perplexia* is...like getting a new device and trying to figure out how...it works...."[12]

The stenographer moves within an unforeseeable context. Communicating by "strokes" in an energized yet languid atmosphere, she is absorbed, alert, and somehow also free to gaze about the room – the aspect that most disquieted Bush. She participates in a form of dancing in which the lead changes many times a minute, her moments of apprehending/encoding activity giving way to deep moments of passive reception in a regular alternation or oscillation.

Partnering the machine – and then the network, always in touch as well with the social networks in which the digital networks are embedded, people often need to change their patterns, or moves, to deploy or receive effectively. The more one becomes attached, the more one wants a fluid form of action/understanding. "I want to be as able as a spider, sitting astride thousands of webs she has spun, to sense each soft ripple or bursting hail of electrons coming toward me and, of course, those pouring back – from my fingers, my mouth, perhaps even my glance."[13]

Figuring this back-and-forth motion, I wrote a poem about Sand (silicon-based e-media) and Soot (carbon-based life) called *The Ballad of Sand and Harry Soot*.[14] It hosts a seeming disjunction of image and text on each of its 33 pages. Images from Jean-Pierre Hébert's *Sisyphus* – a device shown at Siggraph 1999 that inscribes algorithmic patterns in sand with a steel ball – are the ones most prevalent in the *Ballad*. Other images suggestive of digital or mathematical culture, such as a Metro card, Webcam photos, a core dump, or an animated fractal, accompany the text of a love poem, a ballad of love gone wrong or at least not entirely right, between Sand and Soot. At one level, the disjunction of image and text mirrors the difficulties of this pair; however, the particular discordance, or non-reference, that seems to exist *between* image and text will, at some point, spring into resonant oscillation for the reader who either sees, or reads, an avatar of carbon-based chemistry in Harry Soot and one of silicon life in Sand.

Though this poem was written to probe differences between Sand and Soot, I came to identify, not only with Harry Soot, despite gender and temperamental differences, but also with Sand. A sensuous willingness to be pulled in, or to pull in, is part of what I feel about her. And certainly the intent of the *Sisyphus* device in actual operation is to create a meditative environment, which occurs as you watch it draw and also as you contemplate what it has drawn, a transient silicon image, equally present in the sand being traced and in the tracing program.

This early hypertext does not use programming to fluidly adjust to each reader, but it does provide a world responsive to many approaches. There are no privileged nodes, no highlighted links – the links must be found by caressing the text with the cursor in an attentive stenographic manner. Three navigation methods are explicitly described, each explicitly recommended, and

their combination in any fashion also explicitly catered for. Beyond the multiple, but un-urged, choices on any page, there are "tendencies and flows" for the reader who seeks direction; for instance, there is a persistent but not rigid tendency for links to be found in both the Soot and Sand portions of the text at each node.

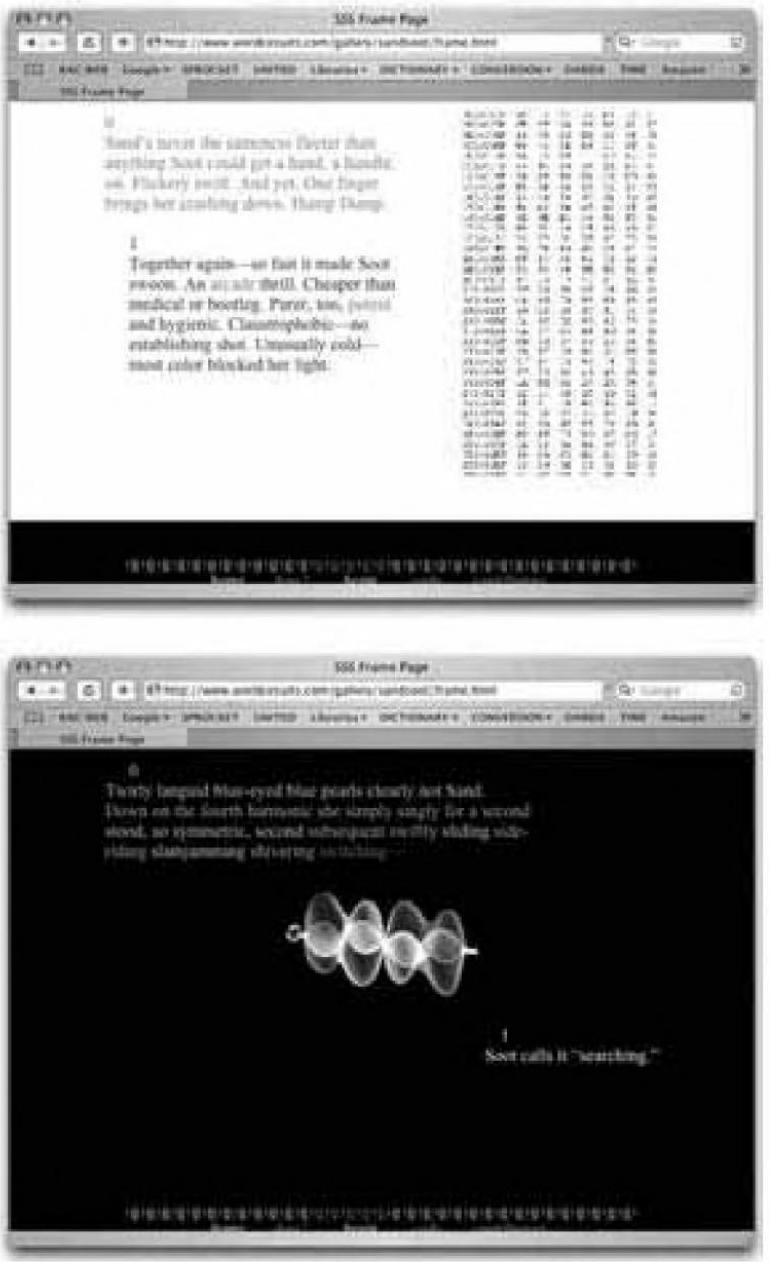


Figure. 1: Stephanie Strickland, "Ballad of Sand and Harry Soot", hypermedia poem, 1999.

Four key images in the *Ballad* were created by Alex Heilner and shown at the 6th Annual Digital Salon. On his contributor page within the *Ballad*, Heilner explains: "This series of 'microbe' images...seeks to invert traditional understanding of our internal and external environments. Large, orthogonal, built objects...have been re-imagined here to represent the most basic organic living beings...." Thus, a DNA molecule is figured from transmission towers, helicopters appear as mosquitoes, and the island of Manhattan is hidden as a collection of floating microbes.

Scale is elided on the Web, as it is in the stenographer's practice, where events in the conference room, in her brain, in her hand, and on her code-filled writing machine are nearly simultaneous. Many different scales can be present to the same screen, as if they belonged together, as if they cohered there as "naturally" as they do in the stenographer's body. But a change in scale is a change of context: the view/read cusp will shift differently for zoomed text than it will for text that is panned. In fact, this kind of zoom or scale-changing cusp may be a particularly important one in a world where we are asked to process simultaneously scales from the nano to the cosmic.

Sand as meta-medium, the digital medium into which everything else can be poured – sound, image, touch, data – has its own Protean or Circean character, a hyper-environment, a cave, in which any world can present itself and be lived. There is a process of interpenetration, or perhaps learning, that goes on between Sand and Soot, moving through each other as they move, yet they are strongly contrasted to the end. The stenographer at her stenotype was an early pioneer in this environment. Her continual active choice to attend or to blur her focus, to remain poised or to flow within the moving stream, is a task we take up. We will not all take it up the same way. We bring many biophysical and cultural heritages to the task.

Three: Oscillation and Resonance[15]

Alan Sondheim and other digital e-media hyperpoets speak about taking a long time to "tune" their works, and I think this verb will ring true for most e-artists, truer than editing, cutting, retouching, painting over, or rehearsing, for instance.

An oscillating, or flickering, pattern has often been invoked with regard to electronic art. Katherine Hayles has said, "We have only begun to construct a semiotics that takes into account the different functions signifiers perform when they cease to be flat marks and become instead layers of code correlated through correspondence rules."[16] In recognition of the layered dynamic interactions between text and code, she proposed the term "flickering signifiers" for text onscreen. Both Richard Lanham in *The Electronic Word* and Bolter and Grusin in *Remediation* have remarked the importance of an oscillation between the viewer positions of "looking at" and "looking through"; that is, between experiencing works primarily as heavily mediated and "windowed," in the software sense, or primarily immediate and immersive, as in looking through transparent glass. I would like to propose a third kind of flickering or oscillation, the oscillation that occurs between the processing of alphabetic text and the processing of image in works that use both. A digital writer who uses image and text is in fact writing a score for their shifting interrelation.

Flickering or oscillating poems differ from pure sound and pure image work in the following respect: whereas sound layered on sound creates new sound, and image on image makes new

image, alphabetic text, superimposed on alphabetic text *or* on image, does not reliably yield legible text. In the poems that explore this truth, one flickers between seeing the viewable and reading the legible. Jim Rosenberg[17] and Mez are poets who approach this movement very differently. Rosenberg overlays his texts in a dense blur of self-interfering micro-information, a tangle literally drawn apart by hand into legible text. But no sooner do words come into focus than the slightest mouse movement dissolves them back into blur. These texts thus move through the reader, as she moves, at *exactly* the pace her hand/brain browses – and superimposed on that oscillation, one experiences a constant trembling across the view/read cusp. Mez, on the other hand, in a practice she calls "M[ez]ang.elle.ing,"[18] leads us to confront the legible with strategies ordinarily reserved for the viewable, giving us text that rewards a scanning multi-directional view that is not restricted to movement in lines.

My own e-poems investigate oscillation between image, text, sound, and animation, both within and between hypertextually linked units. In this way, several states of oscillation, a set of cross-rhythms, come into being.

In 1995, I translated my book-length poem *True North*,[19] featuring language-revolutionaries Emily Dickinson and Willard Gibbs, to Storyspace. The *True North* themes of navigation and embeddedness moved from being print concepts, refracted in language, to being the steering mechanism and constitutive structure of the hypertext. For this textually driven work about navigation, I designed the two most important orienting elements to be visual. The first of these is a set of mouse-drawn Storyspace maps, emblematic shapes with their legends of node names. As sitemaps *and* as pattern poems, they give a very fair idea or sampling of *True North*. They provide a mode of understanding that may supplement, *or* substitute for, following links and reading text. Such a displacement of text by image, that also functions recursively as a guide to text, is itself a distinct mode of oscillation – one which co-exists with the familiar reference oscillation between a map and what it maps. The second orienting device was the colouring of a few words on each page. Since Storyspace does not use colour to signify text-links, instead permitting the reader to press a key to reveal boxes around link words, each colour operates visually to suggest a connection between similarly coloured words: each colour *is* an embedded link, but one traceable only by human memory, not by software.

A different kind and rate of oscillation occurs in *To Be Here as Stone Is*,[20] an early digital poem (properly viewable on Netscape 4) written collaboratively with M. D. Coverley. This poem is composed of two very different sorts of screens: six highly visual ones with sound that use Anfy Java applets and thirteen primarily textual ones where lines of verse are overlaid on a visual background, itself layered with a text ribbon. The links between these promote a rapid exchange between two kinds of attention, between primary viewing/listening and primary reading/searching, for the links must be sought for, by cursor scanning, on the textual pages. The experience of strongly discernible shift resonates with the text of this poem which shifts the reader from photons to cosmos and back.

In the Flash poem, *Errand Upon Which We Came*,[21] Coverley and I choreographed animation for the alphabetic text as well as for accompanying images and sound. The reader/operator of this text may press the silver butterfly to the screen if she wishes to read with complete accuracy, but she may prefer to oscillate between sampled reading and periods of viewing.

Figure. 2: Stephanie Strickland and M.D. Coverley, "Errand Upon Which We Came", hypermedia poem, 2001.

The words of *Errand* address the reader, speak to her of fragmented mobile text; speak to her, in fact, of the very act of reading she has undertaken: in response, she may actively intervene in the poem to read or redirect it, or she may attend to it as a movie.

One *Errand* stanza begins with the question "space?" floating down from the top of the screen, followed by a second question about knowledge-mining. A flock of butterflies flies in from upper right and circles around toward screen center. A third and fourth question, about "go(o)ds" refusing to go to market, appear onscreen. They imitate the butterflies' circling motion. At the end of the Flash movie we see two dimnesses in the central far distance, one, the almost out-of-sight V of butterflies; the other, the lines of the last two questions, now collapsed to one extremely faint line poised at the butterflies like a lance. The question is *visually* posed as to whether the image and text must attack each other, or may perhaps exist in oscillating accommodation.

The range of oscillation and its timings are extended in my next project, *V*, a poem distributed *across* media. *V* exists, in part, as an invertible two-in-one print text, *V: WaveSon.nets/Losing L'una* (Penguin, 2002). No matter where one begins it, upon arriving midway at the URL, http://vniverse.com, a reader must choose: either invert the physical book and continue from the other "end," or go to the Web address to find the poem's digital embodiment, *V: Vniverse*, a Director project made in collaboration with Cynthia Lawson. *V* exists in the virtual space of oscillating attention *between* book(s) and screen, each of which is interpreting the poem in its own material way.

V analogizes the role of nomadic peoples of the Ice Age to nomadic peoples of the Information Age. Acts of migration are key to both. The *Vniverse* interface, like the night sky read by Ice Age nomads, is a continuous present of varying forms in which readers trace their own path. As with the night sky, highly abstract diagrammatic images are produced by tracking. Sweeping a mouse across the *Vniverse* screen full of "stars" causes fleeting forms to appear that disappear back into the darkness. These are spontaneously read as constellations, though most of them (the Broom, the Dragonfly, the Embryo, etc.) are invented. Rolling-over a star releases its constellation, its keyword, and the spelling-out text of a numbered tercet. Clicking stabilizes the constellation, making it temporarily permanent, able to be read if it is traced *without* clicking. A second click (or any double-click) releases the text of a WaveSon.net, assembled not sequentially, not the top-down of print, but in relation to that chosen tercet, which displays in color while the other lines display in white. Clicking yet again oscillates the form between a Son.net and a set of triplets, creating a kind of doubled reading. Toggling between these provides a spatial micro-texture unavailable in print, an interplay between a pattern and its activation – not only the patterns of the alphabetic text, but their relation to the diagrammed constellation which is being read visually at the same time.

Clicking the darkness makes everything disappear, whereas pressing a "next" activates many implicit time-scales. A text-decay process takes place that leaves many states of the poem co-present onscreen. The time of break-up, the time of emergence, and the time of cross-layer existence *between* dissolving and emerging text co-exist with the time of reading forward in the same constellation. Many foci compete for attention even though the overall environment is highly textual and subdued. A reader who continues to swing her hand across the screen, as

she reads, brings forward at her own pace, moving as she moves, the time of overlying keywords, the almost auditory time of the spelling-out tercet, and her own hand's rhythm. This play-read process is an iterative one. The iterative process of return overwhelms individual differences in sampling, just as years of sky observation yielded recognizable repetitions or significant conjunctions. Extinction, as much as production, is to be read.

For people of the Ice Age, their sky became an Oracle, a constructed relation to the natural world probed by counting. The *Vniverse's* Sibylline space can also be probed directly by number, by entering any star's number in the small circular dial in the upper right of the "sky". The *Vniverse* not only creates a fragile, infinitely interruptible location, but there is a special smoothness to its space that comes from the way it was programmed in Director. This highly recursive piece never leaves its original frame which helps give the illusion of words moving directly in and out of the sky. In this space, time never advances – so far as the Director timeline is concerned – but it is highly active. All of the time resources go toward responsiveness and the production of language, rather than visual display. All the stars are waiting – each one a standpoint and a center – and they are more active than the constellations, though the visual impression is the reverse. Here, space has been fashioned to amplify the sense of resonance that internal timings create.

Simone Weil distinguished different ages in the history of science according to the values they embodied. She claimed that Greek science was motivated by ideals of "balance" and "beauty". The Greeks, she said, saw a moving waterline on a hull as an image of balance; whereas Newton, in the next age of science, one that valued energy and work, saw a loaded-down ship; he saw force and displacement.

Willard Gibbs, in the nineteenth century, devised visualizing methods which redefined the meaning of space. Instead of being a static Cartesian grid, his phase space could represent every possible lifeline of a system, any system, any number of coexisting systems. Gibbs's method, criticized by some as *merely* visualizing, was grasped at once by James Clerk Maxwell – the man whose equations define electronic reality – as both profound and productive. The very shapes of graphs and models yielded truths about energetics of the system – the relation of transitions to degrees of freedom and free energy; phase transition itself, as from ice to water, being a change of identity toward which the whole system was attracted.

Simone Weil died in England in 1943. What word might she have chosen, had she lived, to name value for our age, as "balance" and "beauty" named value for the Greeks? I would propose her Greek term μεταξύ translated as "betweenness" or "resonant communication". Resonance entails response, interaction, co-creation, a space between.

Quantum reality, the reality of electronic computers, works by resonance.

Four: Superposition

To recognize threads in the cloth, then patterns in the weave, and then to understand every thread, every pattern, as co-present, superimposed on each other in a multi-dimensional space, a superposition space: all "there" until "then, when" only one is observed, one trailing and entailing long-range correlations.

Quantum mechanics is an engineering science used for building electronic devices. The equations "work," as well tested as any, but the language describing what they do is either entirely mathematical or verbally extremely counter-intuitive. To explain all the *observed* effects, one must acknowledge that "the particle" is in more than one place, is in fact "everywhere at once".

It takes a very long time to compute atomic angles in a molecule, using quantum mechanics, yet the forming molecule figures it out instantly. It seems to store superpositions, many states at once, or to do many calculations simultaneously. In a quantum system when two particles interact, their fates are entangled, interdependent, remarkably correlated, beyond any such interdependence in the classical world. To measure one is to affect the state of the other, no matter where that other is. Quantum mechanics suggest every possible separate configuration and a profound entanglement, that can yet be undone, can decohere. What it does not suggest: intermediate states, fused combinate states, *Gesamtkunstwerke*.

The physics of neuron and transistor depend on quantum mechanics, but neural processing appears to take place at the classical, Newtonian level. I offer no suggestion of quantum mechanism, here, with regard to digital art; but rather a set of metaphors for understanding that draws on the struggle between mathematical abstractions and words in coming to terms with quantum mechanical effects. I suggest that we may need and expect a new level of emergence, a new form of gesture, of notation, perhaps notating processes rather than images or outcomes – even as the Feynman diagrams permitted a rethinking of quantum mechanics – to grasp the situation that has emerged in the ever-filling space of interconnected digital structures, to understand the effects of network connectivity on the synchronization of biological oscillation.

Five: Neuro-cognitive Shifts: Seeing the Wave Through the Particle[22]

The flow of waves and of particles, the scan constantly sweeping down over the screen/over the eye, cutting it off, setting a rhythm of passes, shifts us toward an older information-processing pattern, holistic pattern-recognition, away from our newer accomplishment, sequential analysis. Sequential analysis had allowed us to become adroit at anticipation, not be trapped the same way twice, and now sequential analysis is relocated to the writing and execution of code. These two types of thinking, pattern recognition and sequential thinking, are highly associated with visual and auditory processing. Visual processing is almost entirely static pattern recognition – with one exception, when we react instantly to the image of a rapidly approaching object, a response not handled by the brain but hard-wired in the retina. Auditory perception is, however, inherently sequential, because sound is received not as a broad field of information but in a stream.

How might we grasp several levels of information at once? How do we combine different types of processing? Two non-electronic examples are autostereograms and calligraphic inversions.

Autostereograms are computer-generated random dot "Magic Eye" pictures, used to entertain but also for vision training. Embedded 3-D images are discovered, perceived, in what appears to be a plane of flat repeating patterns, when fused by the brain's active seeing. Each eye is addressed separately and neither eye alone can perceive the hidden form. The perception is not instantaneous, because the brain has to take time to create the perception. One must look *through* the plane image, and not focus on it, in order for the perception to occur.

Inversions, from the book so named by Scott Kim, are calligraphic words that read the same upside down and/or in the mirror and/or across other symmetry operations. As Douglas Hofstadter, remarking on similar games he and his friends played, says: "We were not very good at it, for we never came across the key insight that [Kim] has learned to exploit, namely, that letter *parts* can be regrouped so that what is one letter going one way may be two letters or half a letter when read the other way."[23] Here we see that the letter is no longer the combinatorial primitive, but that the human sensorium is used as a guide to create new, more granular, "primitives".

How do we make or recognize patterns, with our visual and auditory cognitive systems, both employed at their different time-processing scales, both passing through that mill of scans that supervenes on our gaze as the screens repaint themselves, leaving us to glean from gaps in the glow what we can or will. Something has been "carried across," from one energy form to another, from one "language" to another. Is it an algorithm indifferent to its manifestations? Is it a melody, a font design, that survives all texts in it, all arrangements of it? What gets carried over does not remain unchanged, not in either or any of its locations. The appellations source and target exchange places at a high-frequency rate, both in the process of translation and in its generated forms. There is no seamless information environment, only increasingly extended forms of attention and inter-attention, cross-modes of attention, muscular, neural, endocrinologic, visual, acoustic, kinesthetic, and proprioceptive. New forms of learning, as with the Magic Eye pictures and Kim Inversions, are called for to integrate environments partially digital, partially photonic, partially biotechnical.

In relation to space/mapping, road builders, travelers, and wanderers maintain different body/map relationships; but from a time/processing awareness the pathway to the present is created *by* the "travel" (signal) which has built a transient road. To arrive, to be, at the present, by wandering or by intention are not fully distinguishable in a world where which choice gets made depends on interactions between internal rules and completely unpredictable gradients in the external environment *at that time*. Frozen accidents create history and are the means by which we reveal it.

Can digital art change neuro-cognitive timespace? We know that the number of neurons firing in the adult brain of a person who has played a musical instrument since childhood is appreciably greater than the number in a person who has not played an instrument.[24] We know that timespace perceptions change in our dreams, those powerful wetware virtual reality machines. When we dream, we do not need to discriminate between what originates in perception and what in fantasy, because physiology protects animal bodies from dreams by decoupling them from the possibility of action: during dreams motor commands are inhibited before they reach the body's muscles. But with digital simulations such source-monitoring becomes a pressing issue, because we have no comparable mechanism for decoupling representation and reality in public simulations, the sort of digital work that dominates adventure games, television, the Web – or the larger-scale work apparent in blockbuster movies and theme park thrill rides. One can easily imagine public spaces, like a subway system, transformed by such simulations. What would be the consequence of an art that affected our time-sense as dreams do, but without dream safeguards and without any public source-monitoring standards or conventions in effect?

Guitarist Davey Williams, a performer of freely improvised music since the mid-70s, says: "Improvising, for me, is almost a state of unconsciousness. You kind of lose your awareness because you're leaning into the present, you might say. It's like a dream, the way you don't realize you're dreaming until you wake up."

When "leaning into the present," a very awake state of intense focus and a deeply asleep state of dream seem to co-occur. Timespace perceptions are observed to change when people are particularly awake, focused, and concentrated in a task. An example from Tracy Kidder's *The Soul of a New Machine* describes a computer engineer who is so focused on his task that his sense of duration has been affected: he is able to respond to nanoseconds. Since the time it takes to snap your fingers is 500,000,000 nanoseconds, these are presumably below the threshold of human temporal consciousness, yet

> It's funny, [the engineer says,] I feel very comfortable talking in nanoseconds. I sit at one of these analyzers and nanoseconds are *wide*. I mean, you can see them go by. "Jesus," I say, "that signal takes twelve nanoseconds to get from there to there."[25]

What about the neurophysiology of time perception? From the edge of awareness through to speech: one-thousandth of a second for neural firing, one-hundredth of a second for neuronal pattern formation, one-tenth of a second for vocal articulation or action, and more than three seconds for narrative description. Tools from dynamic systems help us understand how we might develop time concepts from this physiology, particularly the retrospective and prospective horizons involved with our sense of being in a "now". The basic event or fusion interval specifies the minimum time between events such that they *can* be perceived as distinct and not simultaneous. This time is different for each sensory modality. The modalities also interact with each other, and a lot of Web art explores these interactions through the use of micro-manipulated streaming sonic and cinematic effects.

The neuronal level relates to brain operation. Any mental act involves the concurrent participation of separated regions of the brain. The time needed to relate and integrate signals from these separate regions is called the relaxation or holding time, during which perceptual flashes are spread and organized by cell assemblies to create the synchronized firing we need in order to act, to move our mouse for instance. From a mathematically intractable number of possibilities, from many competing cell-assemblies, the interaction of external gradient and internal rules yields one particular "now," without the assistance of either an internal or external clock – synchronization occurring rather by resonance.

From this point on in the cognizing process, on the scale of seconds forward, language does finally enter, and with it, all that descriptive assessment entails. Thus the e-artist is tapping many scales, fine-tuning neuro-cognitive and muscular response both to fluctuations in the signal propagation structure of the Net and to the emerging nuances of the way, on another level, Web traffic communicates a social environment. Web literature and art also exploit different aspects of the time-based human perception process, playing with the fusion interval limits, and – because they require a large number of actions from their readers, clicks, mouseovers, drags and drops, shifts of a joystick, scans, zooms, probes of all kinds, maneuvers to be made within a certain time frame in some literary and all game environments

of attachment, to encounter newly trained sensoria. It is subject to the emergent behaviour of networks and subject to a constraint of oscillatory resonance with its many new partners, each as convertible as the other into a bitstream. However harsh this process may appear, it can, as Felstiner suggests, reveal dimensions unseen (or unfelt, or ungrasped) in its former "quiescent" state. I find translation newly appropriate as a model: a process that involves transliteration,[33] transduction, transposition, transcription, transclusion,[34] and transformation. With regard to new media poetry written with new technologies, I would also suggest that print is a fully viable position within the many conversion sequences, as well as having a place in documented code and as one element at the presentation level of many e-works. It is not the source, nor the target, but neither is it displaced beyond the displacement of any other non-electronic modality, mathematical, visualizing, moving, sonic, or haptic.

Some questions are not easy. Why does DNA write RNA in order to write proteins? Why that much "translation"? Evidently, some aspect of the entire systemic environment makes this an optimal choice. I think of Salman Rushdie's sea of stories. The sea is not a storeroom – the sea is an ocean comprised of the streams of story, of poem, of poesis/making, held in fluid form. If, to that metaphor, we add the oceanographer's knowledge, gained only in the last 40 years, of how the oceans store and exchange energy through the movement of water masses from basin to basin and through the activity of eddies, which hold more than 90 per cent of the ocean's energy, we can amplify the metaphor and see that to access energy and life the poems must move from basin to basin and swirl in the eddies, becoming new versions of themselves. I suggest that the dynamic electronic composition of various media streams supports exactly such movement. Beyond that, we understand that 90 per cent of the "stories" are *in process of* "translation". The actual home of the poems is in the eddies, only occasionally arriving at the basins of contemplation.[35]

A work of digital art and telepresence that raises issues of translation is Eduardo Kac's *Time Capsule*.[36] It does not investigate the space "between" print and e-domains, but it does investigate and reside in the unspoken but experienced spaces between its various transversions. Kac, whose family arrived in Brazil from Eastern Europe and who now teaches at the Art Institute in Chicago, makes holographic poems that display time-reversibility and also makes work that combines robotics and telecommunications. The world of *Time Capsule* is a world where, for many, TV competes with, or even exceeds, face-to-face experience in providing the effect of being "live," and where this effect of "live" has become the effect of "truth": technology the transmitter become technology the warrant.

What is the *Time Capsule* Kac embeds in this world? It is a complex act. On 11 November 1997, in a room in São Paulo with parquet floors and ornate plaster ceiling, he created an inner room of movable white walls on one of which hang seven sepia-toned photographs his grandmother brought from Poland in 1939 – the *actual* photographs, he says in a talk given a year later, though in the gallery they are not identified in any way. On the facing wall, as of the next day, he hung a diptych combining an X-ray of his ankle with an enlargement of the registration screen for a Web database used to track lost animals; for, on the prior day, broadcast live both to Brazilian TV and to the Web, Kac had injected his leg with a microchip implant that contained a programmed identification number and that, when scanned, emitted a radio signal. He then put his leg in the scanning device, and his ankle was Web-scanned from

Chicago, the scanner button being pushed by a telerobotic finger. Kac then registered himself, as both animal and owner, in a North American pet database, the first human to do so.

Time Capsule takes place in Chicago, Brazil, Poland, the airwaves, the phone lines, around the world on the Web, and in Kac's flesh wherever he goes, yet is called site-specific. It takes place on 11, 12, 13 November, or now on his webpage devoted to it, or always, in his leg, or in the thirties in Poland. It is a body, a broadcast, a netcast, a database, an identification, a schedule, a sound byte, an implant, a webscan, an X-ray, a gallery show. In these respects it resembles the spatially distributed cell-assemblies that have to be synchronized temporally in a neuronal pattern for us to take action. The meaning of the image changes with the pathway. A man is marking his ankle with an identification number under the photographed eyes of his refugee family, a family in flight from a regime that wrote numbers on skin with needles. Without being bound to any machine he is now always readable by a machine, wearing an electronic anklet that monitors him as much as any prisoner. The temporal scales range from milliseconds to years, but where is memory, personal or collective, the kind of memory we believe ethically needs to persist? Is it "quiescent, or even overcrystallized"? Has Kac effectively relocated it in the microfluctuations, in multifractal patterns that persist beyond the persistence of any given sequence, even though we may consciously experience it as disconnected and diffuse, as both refugial and vivid?

In new media, our task is the measure of measure. To accomplish this we write less "with places" and more with "transitions". Space does open up, perhaps monstrously, to a world of currents and translations. We don't see these spaces full so much as feel them fill. We don't watch them perform; we perform them, in part, in connection with others, in processes of conjugal transfer that propagate themselves. Our probes help us draw the connections and form the perceptions needed to flow, to participate in and comprehend an increasingly complex patterning that enfolds us, from nano-techniques to cosmic extent through genetic alteration and the new world disorders.

Notes

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3. John Cayley, "T_R_A_N_S_L_I_T_E_R_A_T_I_O_N", http://www.shadoof.net/in/translit/transl.html.
4. In Ted Nelson's Xanadu and ZigZag programs, "transcluded" units of information are shared across a system of evolving versions in n-space. Each unit can simultaneously be part of many different dimensions; but, unlike units or cells in a spreadsheet, it is not required to have any particular set of connections.
5. Much of the discussion here is taken from my essay "Dalí Clocks: Time Dimensions of Hypermedia", *ebr* 11, winter 00 /01, http://altx.com/ebr/ebr11/11str.htm.
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33. John Cayley, "T_R_A_N_S_L_I_T_E_R_A_T_I_O_N", http://www.shadoof.net/in/translit/transl.html.
34. In Ted Nelson's Xanadu and ZigZag programs, "transcluded" units of information are shared across a system of evolving versions in n-space. Each unit can simultaneously be part of many different dimensions; but, unlike units or cells in a spreadsheet, it is not required to have any particular set of connections.
35. John Cayley's poem, *riverIsland*, as shown at TechnoPoetry Festival 2002 (Georgia Institute of Technology) could be seen as supporting this claim. My own poem, *V: WaveSon.nets/Losing L'una*

(http://vniverse.com in collaboration with Cynthia Lawson), supports it in an entirely different manner.

36. Eduardo Kac, http://www.ekac.org/timec.html. Much of the discussion here is taken from my essay "Dalí Clocks: Time Dimensions of Hypermedia", *ebr* 11, winter 00/01, http://altx.com/ebr/ebr11/11str.htm.

From ASCII to Cyberspace: A Trajectory in Digital Poetry

Eduardo Kac

I will discuss the development of my work with experimental poetry, focusing on my digital and Web-based works. I will start with my ASCII works in the early 1980s and proceed to comment on the multimedia and interactive works that followed, culminating with the first poem written for the ultrabroadband Internet of the future.

* * *

Between 1980 and 1983, aware of the multiple directions visual poetry had taken in the twentieth century, I experimented with different media in search of a new poetry. I created public performances with poems in vernacular and ribald language that had political connotations. I published visual poems produced with mechanical and electric typewriters; I used collage, photocopy, printing, photography, and typographic techniques; I wrote poems with a cadence between prose and verse; I created animated poems for electronic media. This extensive experimentation made it clear to me that one of the main forces behind the re-emergence of visual poetry in the second half of the twentieth century was the popularization of print technology. I concluded that I would have to move beyond the limitations of the print medium and try to think my way outside this form. I was not interested in creating physical, three-dimensional object-poems, since this sculptural approach also belonged to the tradition of visual poetry. In other words, I realized that the poetry I wanted to develop would have to jump off the printed page, but could not be embodied in tangible objects. I wanted to develop an immaterial poetry for the information age; that is, poetry native to the new cultural environment of digital global networks, with its dynamic data flux and distributed communication systems.

In 1974 I had read an encyclopedia article on holography.[1] The article intrigued me so much that I preserved it. In the early 1980s I read it again, this time already as a potential technical solution to the poetological problem I had created. However, at that point I still could not

Figure. 2: Eduardo Kac, "Não!" (No!), LED poem, 1982/84. The ASCII version from 1982 (top) was presented in its final LED form in 1984 (bottom), at Centro Cultural Cândido Mendes, Rio de Janeiro.

minitel/videotext system allowed users to log on with a remote terminal and access sequences of pages through regular phone lines. This network functioned very much like today's Internet, with sites containing information about countless subjects. It also allowed users to send messages to one another (email).

The minitel poem "Reabracadabra" was shown in 1985 in the group exhibition "Arte On-Line", a minitel art gallery presented by Companhia Telefônica de São Paulo. All of my minitel poems were shown together in 1986 on the network and via terminals at the *Brasil High Tech* exhibition, realized at the Galeria do Centro Empresarial Rio, in Rio de Janeiro.

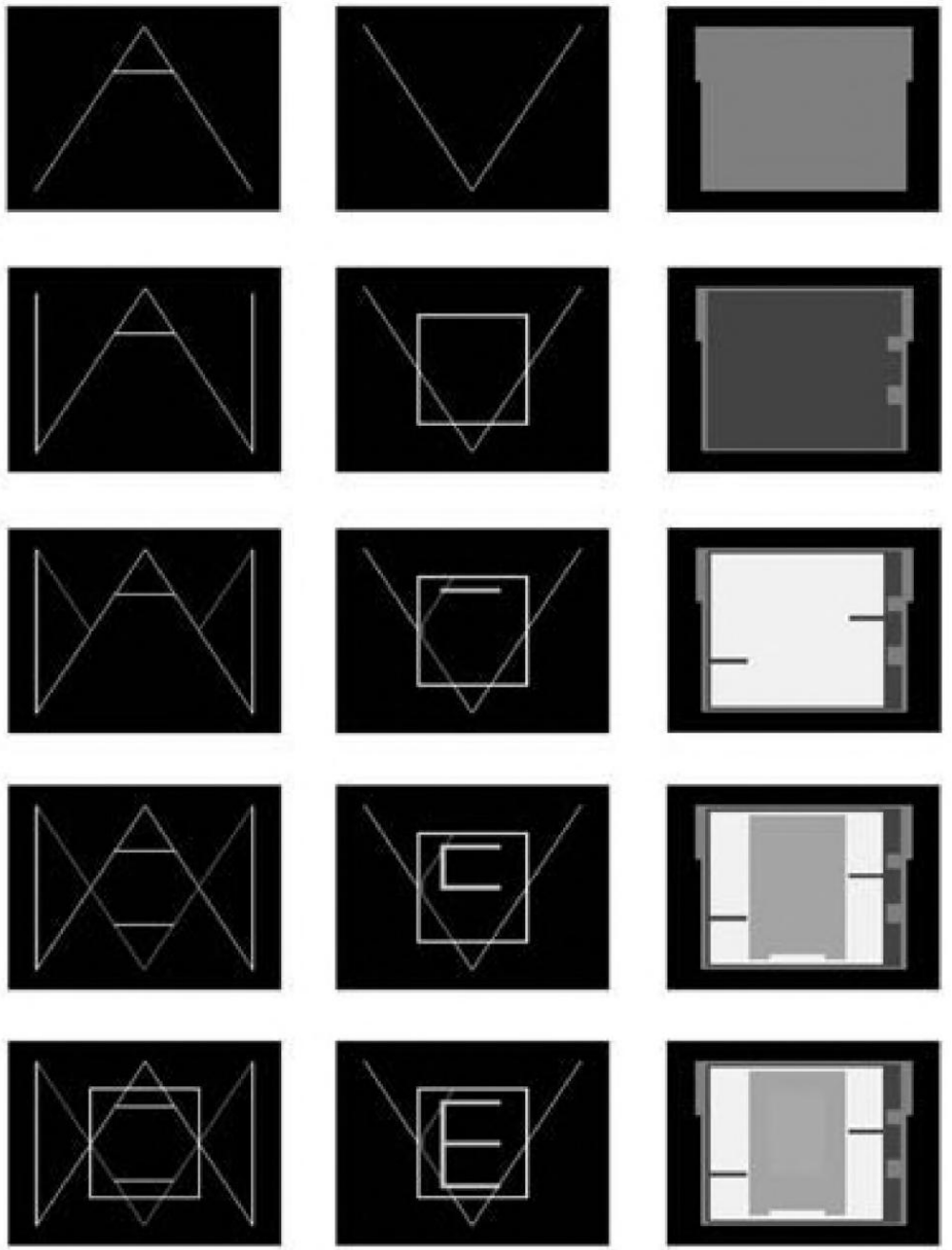


Figure. 3: Eduardo Kac, "Tesão", frames from minitel animated poem shown online in 1986. The frames are shown in three vertical columns and the sequence in each column is displayed from top to bottom.

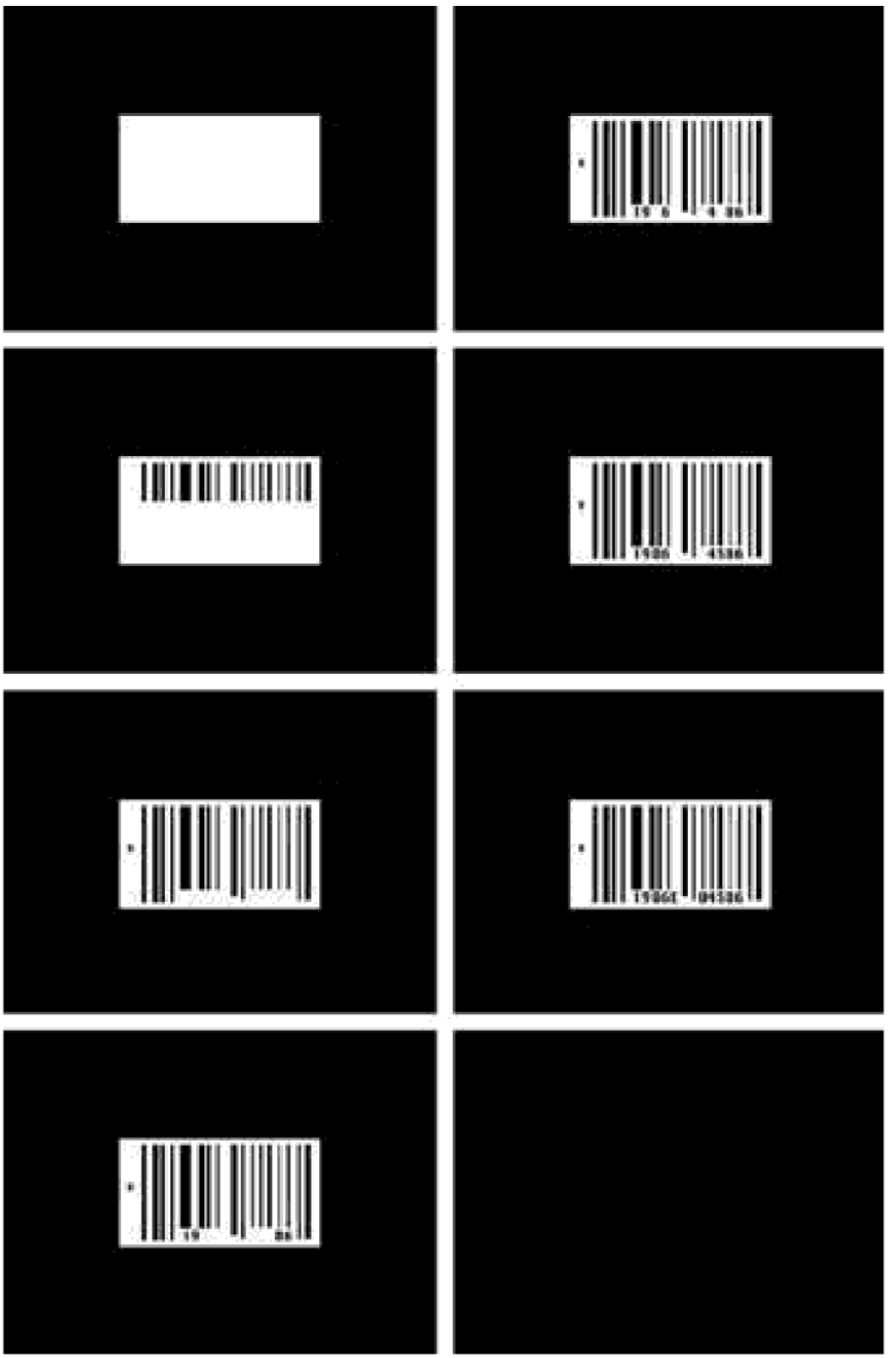


Figure. 4: Eduardo Kac, "d/eu/s", frames from minitel animated poem shown online in 1986. The frames are shown in two vertical columns and the sequence in each column is displayed from top to bottom.

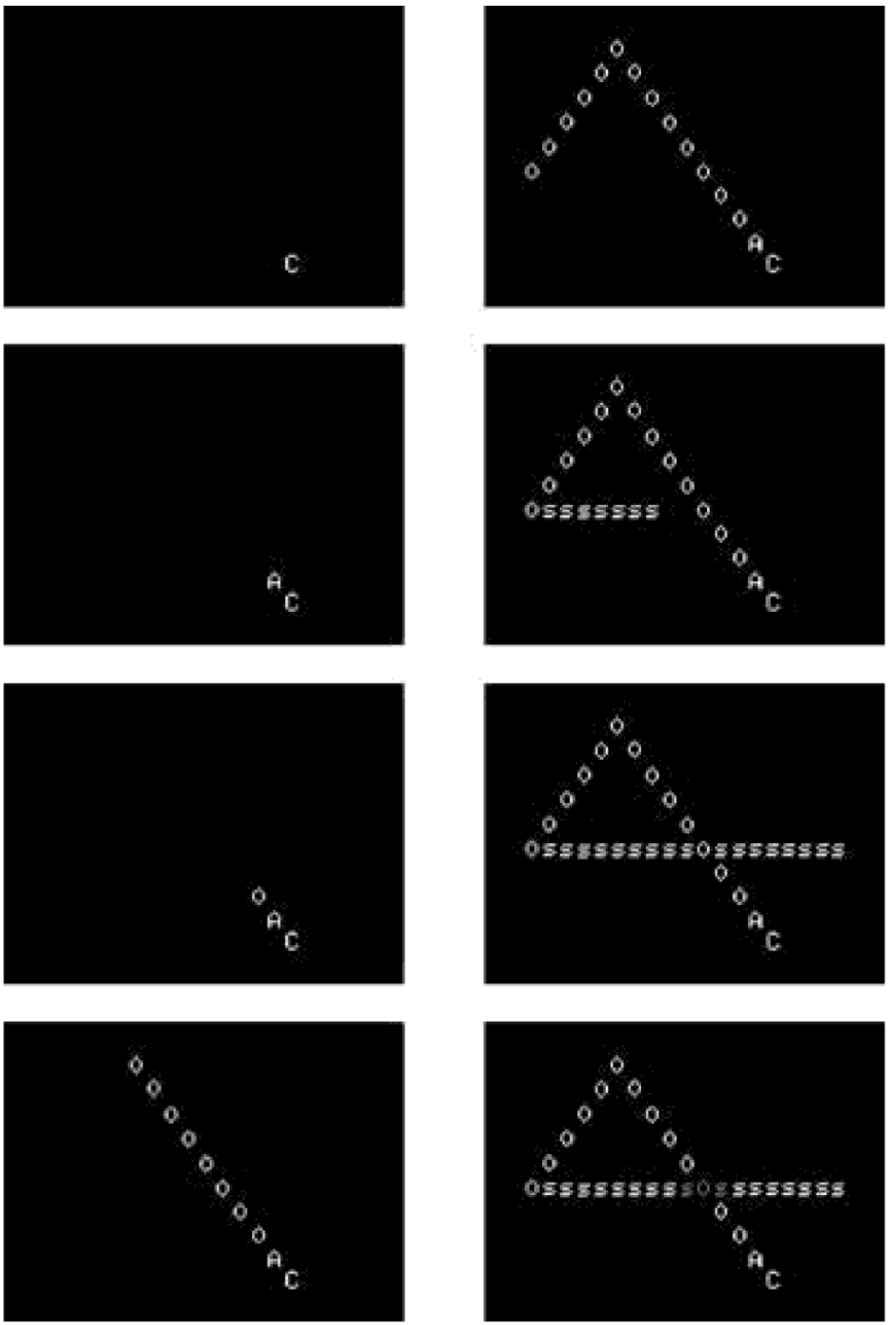


Figure. 5: Eduardo Kac, "Recaos", frames from minitel animated poem shown online in 1986. The frames are shown in two vertical columns and the sequence in each column is displayed from top to bottom.

In the early 1980s in Brazil, where I created these digital poems, minitel terminals were available around the country in airports, shopping centers, universities, and other public spaces. My animated poems were read in the network and seen by remote readers online from both public and private (home) terminals.

The minitel poem "Recaos" (after the word "caos", i.e., chaos in Portuguese), for example, was created in 1986. When viewers logged on, they first saw the letter C on the lower right corner of the screen. The letter A appeared above the C, followed by a series of letters O moving upwards. This motion was against the default mode of the medium, which refreshed pages with slow top-to-bottom scans. Like a light beam, the letter was "reflected" by the top margin of the screen and redirected down and to the left, where it once again "reflected" off the left margin of the screen towards the right margin. As it moved swiftly across the screen horizontally, it changed into the letter S. Up to this point all letters were red. Once the letter S reached the rightmost margin of the screen, the acrostic SOS was formed in blue at the center. The animation then came to a halt, leaving the viewer with the image of the infinite symbol. In "Recaos", through this particular rhythmic behaviour, the letter C performs and duplicates itself on the screen, suggesting simultaneously the outline of an hourglass (slow passage of time) and the infinity symbol (time beyond speed). In the process, the letter C is transformed into other letters, spelling *caos* and *sos*, and leaving along the way a mnemonic trace of other words, such as *só* (alone) and *ossos* (bones), in Portuguese.

When viewers logged on to read the minitel poem "D/eu/s" (1986), they first saw a black screen. Then, a small white rectangle appeared in the middle of the screen. Slowly, vertical

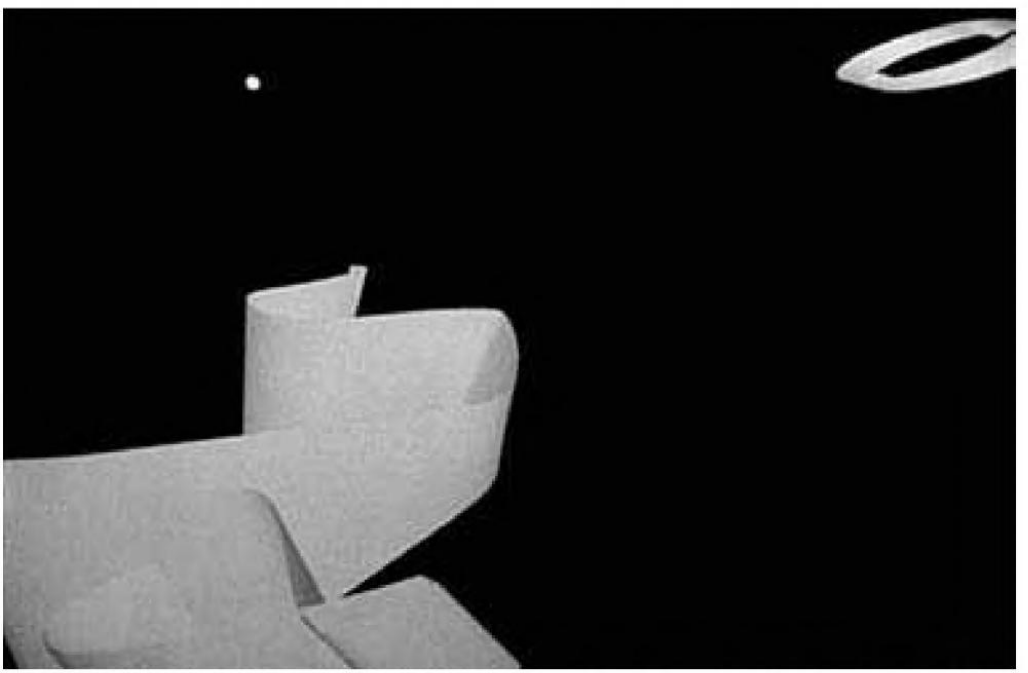


Figure. 6: Eduardo Kac, "IO", screen view of the three-dimensional navigational poem, 1990.

/ article (m.) the. /pron. 1. it, him, to him. 2. you, to you.

CIO s. m. rut, heat, oestrus; (of fishes) spawning.

OCO s. m. hollow, excavation, hole, emptiness.
/ adj. 1. hollow, addle, deep, empty. 2. (fig.): a) futile, vain, void, insignificant, trivial. b) cavernous.

Taking this exploration of the virtual architecture of the letter further, I created "IO" (1990), a three-dimensional navigational poem. In this piece the letters/numbers I and O appear as elements of an imaginary landscape. IO means "I" in Italian. In this piece it can also give rise to other readings, as the binary pair one/zero, for example. The reader is invited to explore the space (up/down, left/right, forward/backward) created by the stylized letters and experience it both as an abstract environment and as a visual text. The self is presented as an inexhaustible navigational field. "IO" was translated to VRML – Virtual Reality Mark-Up Language, the first Web-native three-dimensional environment – in 1995 and made available on the Internet at that time.

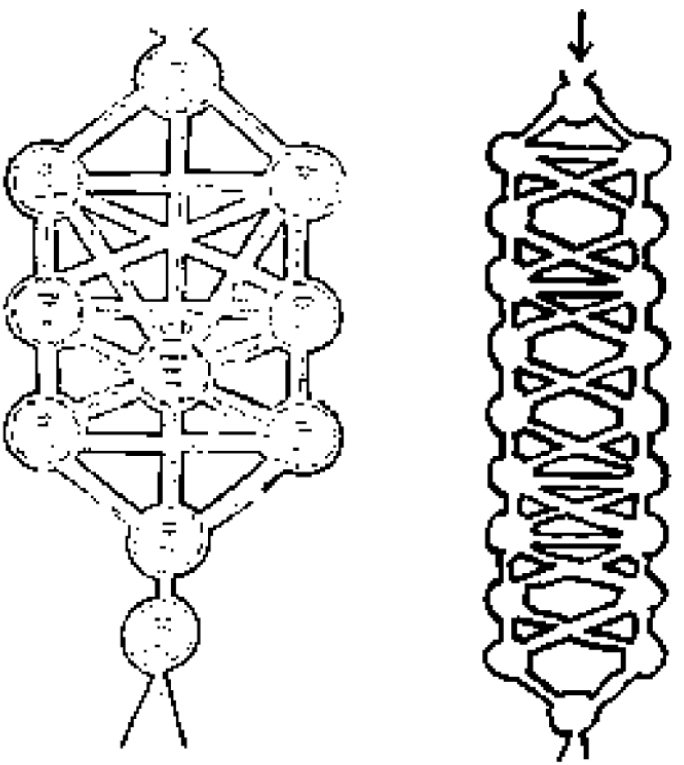


Figure. 8b: On the left, the Kabbalistic Sefirotic Tree. On the right, the link structure of the hypertext poem "Storms".

The question of smooth navigation in cyberspace opened entirely new possibilities, since the reader now treated the text as a field; that is, as an open expanse of space. Navigation, however, can also be explored via a series of discrete jumps from one space or field to another. With hypertext links we consider the text itself as a network, with each link connecting to another node in the text/network. In 1993, I finished "Storms", my first hyperpoem. It is organized in vocalic and consonantal bifurcations. To navigate through the poem one is invited to click on a letter (either vowel or consonant) at any given time. In some instances, navigation can also take place by clicking anywhere in the space around the word. If the reader does not make a choice – that is, if he or she does not click on a vowel or consonant, or in some instances also on empty space, the reader will remain stationary. The poem does not have an end or

Figure. 9: Eduardo Kac, "Accident", sequence of images showing the runtime looped poem, 1994. The frames show, from left to right, the transformations that form the poem's loop.

conclusion. This means that one can continuously explore different textual navigation possibilities or quit at anytime.

After I finished the first draft of this hyperpoem, I noticed that its structure was coincidentally very similar to the diagram of sefirotic systems typical of the Kabbalah. This made me realize that I could push it further by borrowing some links I had observed in a particular sefirotic system.[6] What was at stake with "Storms" was a disengagement of the textual distribution characteristic of print. The node – and not the syllable or word – from which links irradiate was the new unit of measurement. The reader has to make selections in a way that is similar, albeit not identical, to the way the writer has. The reader is now presented not with one narrowed-down selection of words in strings or in graphic layouts, but with an electronic field that is a complex network with no final form. This piece was shown on the Internet in 1994.

Also shown on the Internet at the same time was "Accident" (1994), a looped run-time piece that explores sound, image, text, and movement. An investigation of the infinite loop as a poetic rhythm, this poem is about accidents of language, possible misunderstandings, and the lack of need of language when two lovers meet in their embrace. In "Accident" the verbal material is subjugated to violent visual and aural distortions. These fluctuations suggest that antinomies based on language's precision or imprecision disappear in ecstatic encounters, when a lover's discourse is made of physical contact, gazes and gestures. The poem starts with a fragment of a sentence ended by a period. It says: "the words won't come out right." This sentence is repeated and transformed several times through elimination of certain letters, engendering new meanings and suggesting perhaps the hesitations of a speaker's mouth opening and closing (if visualized frontally) or the vigorous moments of lovemaking (if seen as a stylized profile representation). Seen as a whole, the poem ultimately states: "the words won't come out, right or wrong, tonight."

UPC (1994) is an installation-poem, a looped and silent live video piece in which seven-foot-tall letters are projected on the wall. The letters in the live, never-ending video emerge out of focus on the right, move across diagonally into focus, and disappear again out of focus to the left. Literal and at the same time metaphorical, the verbal material evokes multiple analogies: "Nothing Above To Left Or Right Nothing Below". This piece was shown simultaneously on the Internet (as a CU-SeeMe videostream) and at a gallery exhibition.[7]

"Insect.Desperto" (1995) operates in Portuguese and English at the same time – one not being the translation of the other. The words moving on the screen are in English, while the soundtrack is in Portuguese. Even if words in one language are not understood, the visual or aural properties of the rhythmic treatment of the verbal material contributes to the overall experience. The piece also addresses the differences between spoken and written languages, exploring distinct possibilities unique to these semiotic systems.

"Insect.Desperto" runs only once and then collapses. This is meant to stress the linearity of the experience and at the same time to undermine it. To see/read it again, i.e., to open it, the viewer/reader has to double-click on it once again. The piece has sequence reversals throughout the cycle that only become evident to the attentive viewer/reader. These reversals open new possibilities of signification. The elusive movements of the words on the screen can

Figure. 10: Eduardo Kac, "Insect.Desperto", sequence of images photographed off the screen showing the runtime poem in motion, 1995. The photographs capture moments in which words appear, overlap, flash, move, or disappear.

be read in many ways. They can be seen as unresolved hesitations concerning the construction of syntagms. They can also be seen as reflecting the fleeting behaviour of flying insects. In either case, both are meant to evoke inconsistencies and undecided aspects of life. My website went online for the first time on 2 June 1995, and this piece was first made available online at that time.

In 1996 I created "Letter", a VRML poem that presents the viewer with the image of a three-dimensional spiral jetting off the center of a two-dimensional spiral. Both spirals are made exclusively of text. The reader is able to freely navigate this cosmic verbal image. Thus, reading becomes a process of probing the virtual object from all possible angles. The reader is also

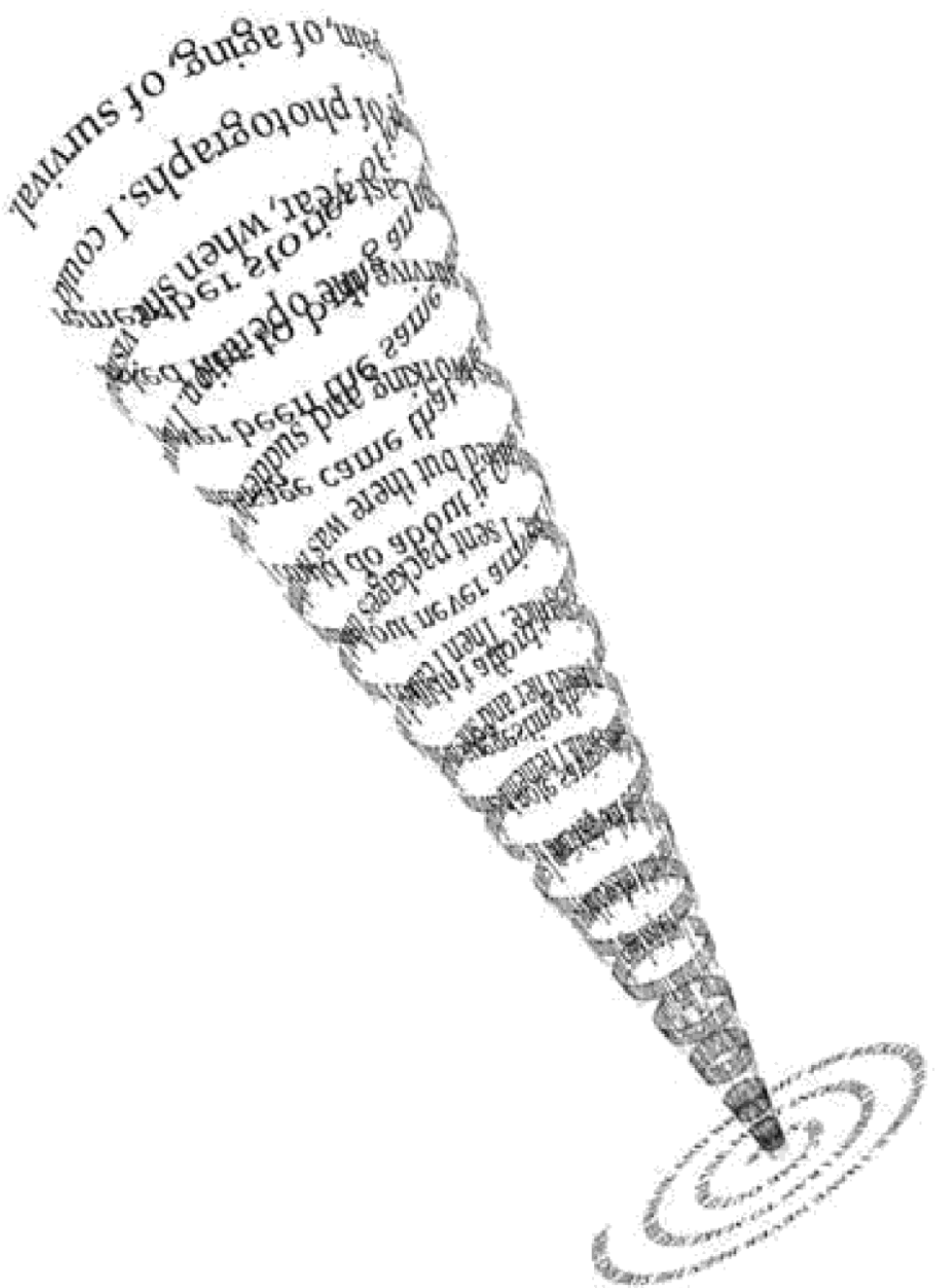


Figure. 11: Eduardo Kac, "Letter", VRML poem, 1996. Shown is one moment in the navigation process.

able to fly through and around the object, thus expanding reading possibilities. In "Letter"[8] a spiraling cone made of words can be interpreted as both converging to or diverging from the flat one. Together they may evoke the creation or destruction of a star.[9] All texts are created as if they were fragments of letters written to the same person. However, in order to convey a particular emotional sphere, I have conflated the subject positions of grandmother, mother, and daughter into one addressee. It is not possible for the reader to immediately distinguish to whom each fragment is addressed.[10]

"Secret" (1996) is a VRML poem. There is no "correct" way to read/navigate "Secret". The reader's experience will be determined by the choices she makes in the act of reading and the digital environment (that is, computer and browser) used to read the poem. The words in "Secret" are dispersed in the semantic darkness of a potential space. Upon close scrutiny, distant blinking lights might reveal themselves as words. If the reader gets too close, the words will fly by as flocking birds or orbiting celestial bodies.[11] The reader is invited to navigate this space and create cognitive links between immaterial presences, voids, and distant signs. Secret was made available online in 1996.

Also available online the same year is "Wine" (1996), a delicate and silent animation poem. It suggests an inebriate mental state in which foreground and background blend in almost undifferentiated fashion. The poem articulates the fleeting apparitions of the words from within themselves, as if one word would write another. Words will momentarily manifest themselves in unexpected areas on the screen, often bordering the very edge. The word "window" acts as a central metaphor, as it suggests the separation between internal and external spaces (both on mental and physical levels). It alludes both to the physical and the computer window. The "verbal wind" penetrates both spaces and flows in both directions. The poem communicates as much through the verbal apparitions as it does through their carefully orchestrated evanescence.

"Reversed Mirror" (1997), is a seven-minute single-channel videopoem. It was produced without the use of cameras. The material was generated directly within the editing equipment.[12] This work takes language into a domain of trance where the subtle dissolution and reconfiguration of verbal particles is charged with a feeling that is at once calm and vibrant. Through its peculiar rhythm it articulates the notion that language (particularly written language) is in fact nothing but a transitional moment in a much more complex semiological continuum. This model promotes a cognitive framework in which language emerges from an inchoate semiological pool, only to return to it and from it emerge again, in an unstable, perpetually irresolute vacillating graphematic motion. Not unlike the phenomenon known as "Brownian motion", this work reveals erratic random movements performed by verbal particles, as if caused by the continuous bombardment of the particles by the molecules of the surrounding medium.

Avatar Poetry: Writing for the Future Internet

My most recent digital poem, "Perhaps" (1998/1999), is the first poem written specifically for the ultrabroadband Internet of the future. The poem is a world with 24 avatars, each a different word. It may be called an "avatar poem", since each reader, in order to read the poem, must establish his or her own presence in this textworld through a verbal avatar. As remote participants choose a word and log on with their word-avatar, they contribute with their word choices to

Figure. 14: Eduardo Kac, "Perhaps", screen shots of the multi-user VRML poem written for the ultrabroadband Internet of the future, 1998/99.

determine the semantic sphere of that particular readerly experience. Once in the world, they make decisions about where to go. In so doing, they move towards or away from other words (i.e., towards or away from other participants), producing a syntax of transient meanings based on the constant movement, as well as the approximation and isolation of the words. For example: the word "blood" moving towards the word "abloom" has a very different meaning from the word "titanium" moving away from the word "violet". Here is the complete list of avatars readers may choose from: abloom, blood, canyon, daze, eleventh, fabric, grace, hour, ion, jet, kayak, lumen, mist, nebula, oblivion, pluvial, quanta, radial, sole, titanium, umbra, violet, xeric, year, zenith. This poem was experimentally read online throughout 1999 using a special server in the Art and Technology Department of The School of the Art Institute of Chicago.

Conclusion

Several of my poems explore motion, displacement, and metamorphosis. In some poems I use only one word, exploring aural qualities, connotative or denotative meanings, graphic form, ambiguities, and other properties. In many of my multiword poems a given word may lose graphical integrity and become temporarily something else, a sign or an abstract pattern with

no extra-linguistic or extra-pictorial reality. Visual and verbal transitions will often evoke transitional meanings that cannot be frozen into specific words. This textual drift suggests, ultimately, a view of the word and the world as malleable.

The writer that works with new media must give up the idea of the reader as the ideal decoder of the text and must deal with a reader that makes very personal choices in terms of the direction, speed, distance, order, and angle he or she finds suitable to the readerly experience. Readers often encounter a textspace where the graphical substance of the verbal material is under constant disturbance, being transformed, morphed, or disintegrated in a new signifying process. The writer must create the text taking into account that these decisions, being personal as they are, will generate multiple and differentiated experiences of the text and, most importantly, that all of these occurrences are equally valid textual encounters.

Notes

1. "A holografia", *Conhecer Nosso Tempo* (São Paulo: Abril Cultural, 1974), pp. 350–352.
2. Kac, Eduardo. *Holopoetry: essays, manifestoes, critical and theoretical writings* (Lexington: New Media Editions, 1995); Kac, Eduardo. "Holopoetry", in: Kac, Eduardo, (ed.) *New media poetry: poetic innovation and new technologies*, Providence: Rhode Island School of Design, 1996. (Series: Visible Language, 30:2), pp. 186–212.
3. *Escracho* can be consulted in the following public collections: Museum of Modern Art, New York; Harvard University, Houghton Library, Department of Printing & Graphic Arts; University of New Mexico, General Library, Albuquerque; and Joan Flasch Artists' Books Collection, Chicago.
4. Different countries, such as the UK, France, Japan, Canada, USA and Brazil, implemented different versions of the minitel concept under their own names. The UK called it Prestel. The Brazilian system was dubbed Videotexto. In Canada it was known as Telidon. In the USA the network was named Videotex. Under the name "Minitel", France implemented a comprehensive videotex network that was widely used throughout the 1980s. In 1984 Minitel terminals were distributed to subscribers free of charge, which helped to further popularize the network. From 1983 to 1994 (the year of the Internet boom), use of the Minitel grew continuously. In 1995 there were seven million Minitel terminals in France. Although most countries no longer use videotex, the medium was still employed in France in 2006. It was also possible to access the Minitel through the Web.
5. The *On-Line Dictionary of Computing*, served by the Department of Computing of the Imperial College of Science, Technology and Medicine, University of London, thus defines "runtime": "1. The elapsed time to perform a computation on a particular computer. 2. The amount of time a processor actually spent on a particular process and not on other processes or overhead (see time-sharing). 3. The period of time during which a program is being executed, as opposed to compile-time or load time." Consulted on 7 January 2003.
6. Sefirotic system according to Pa'amon ve-Rimmon, Amsterdam, 1708. See: Halevi, Z'ev ben Shimon. *Kabbalah: Tradition of Hidden Knowledge* (London: Thames and Hudson, 1979), p. 65.
7. Eduardo Kac, *Dialogues*, Center for Contemporary Art, University of Kentucky, Lexington, 1994.
8. In 1998, on the occasion of my solo exhibition *Language Works* (17 July to 29 August 1998), curated by Julia Friedman and realized at Aldo Castillo Gallery, in Chicago, I presented "Letter" as a ten-by-fourteen-inch Iris print on Arches paper. This piece is now in the collection of George Hartogensis, Chicago. See: Garrett Holg. "Eduardo Kac at Aldo Castillo, Chicago", *Artnews*, November 1998, p. 170; Pablo Helguera. "Restless Words", *Art Nexus*, no. 31, February - April 1999, page 119 and 120. See also: < http:// www.ekac.org/castillo.html>.
9. Browsing an issue of *Scientific American* in 2002, I saw a picture that is extremely similar to my poem "Letter". The caption stated: "A picture like this could not have been drawn with any confidence a decade ago, because no one had yet figured out what causes gamma-ray bursts – flashes of high-energy

radiation that light up the sky a couple of times a day. Now astronomers think of them as the ultimate stellar swan song. A black hole, created by the implosion of a giant star, sucks in debris and sprays out some of it. A series of shock waves emits radiation." See: Neil Gehrels, Luigi Piro and Peter J. T. Leonard. "The Brightest Explosions in the Universe", *Scientific American*, December 2002, pp. 84–85.

10. The words in the cone make reference to the death of my grandmother. The words in the planar spiral make reference to the birth of my daughter.
11. In 1996, when opened in Voyager, the VRML browser in which "Secret" was originally viewed, the poem opened with a scene that evokes a moon over the skyline of a silhouetted city. This is in fact a point of view inside a word, as if the computer screen formed a surface that separated the word in two, with the other half hypothetically "floating" outside the screen. The scene changes immediately with the first navigational movement. This situation of enabling a transitional form of visual reading inside the three-dimensional word itself is a new semiological condition, and as such was chosen to open Secret. Although "Secret" will open differently in every VRML browser, a unique feature of this reading environment, inside views will always be experienced in transition.
12. I created the text on a character generator using a Bauhaus font and writing with white letters on a black background. The words were always expanded to fit the screen with the post-transform and size functions on the Grass Valley Group DPM-700 (Digital Picture Manipulator – DPM), which caused some (desired) pixelization. The text was luminance-keyed over a white background to remove the low luminance component of the picture (black). Clip and gain functions on the DPM were used to force the white on black to become gray on white. The text was routed into an effects bank on an A/B Grass Valley switcher, using a multiple diamond pattern wipe, which had the frequency and the amplitude of its pattern modulation at full tilt. On the second effects bank of the same Grass Valley switcher, I had the same pattern wipe with the same modulation, wiping between the still store of every other piece of text. As the sources were sequentially alternated, the text was wiped between black and the character generator. Fader bars were used to implement the change from one to the other by hand, with a subjective tempo, in real time.

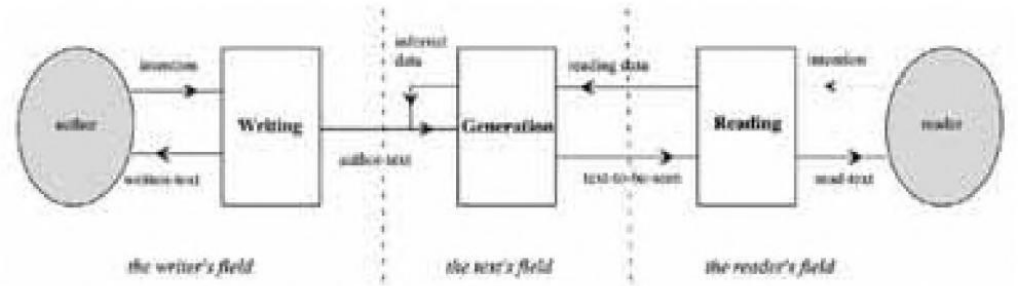


Figure. 1: Philippe Bootz, The functional model of the unique-reading poem *passage*, 1995.

permanent. But if we examine a real procedural text-to-be-seen which is not isolated, the rereading process reactivates the generation process and is not just a "second reading of the same text-to-be-seen". The rereading process becomes therefore instrumental: procedural works are not meant to be read but reread.

In this model, literary work is the text's field. It is clearly an open system made of a generation process and some inputs and outputs, i.e. the author-text, the text-to-be-seen and the inferred data. Unique-reading poems could not exist without these inferred data.

Unique-reading poems launch a process generating *on a given computer an irreversible* final text-to-be-seen. To create a unique-reading poem the whole generation process must be activated at least twice: the first activation (comparable to reading in the common meaning of reading a book) to create the final state and the second (equivalent to a rereading) to activate the final state.

In unique-reading poems, the "reading"[7] function is constructive insofar as it allows the poem's final state to be realized whereas the "generation" function is unproductive as it progressively impoverishes the author-texts' potential. Therefore the reader only has access to a small part of the work's materials.

Procedural works establish a discrimination between readers. During their reading, all readers do not have access to the same texts-to-be-seen. This is generally true for hypertexts or automatic generators. Unique-reading poems establish this discrimination but also introduce another one in the last phase: two readers reading the same text-to-be-seen in the same place and at the same time but who have not performed the previous readings together are not in the same reading situation. In its final state of *passage*, the text-to-be-seen has a history for the reader – that of its "making" – who manufactured it with his actions. It also has "memories" of the previous readings. The reader therefore creates in the read-text some semantic links between some elements of the final text-to-be-seen and some that are memorized: the read-text for the reader and the work itself are in a diachronic relationship. Another reader who did not experience the manufacturing of this particular text-to-be-seen can not possess the same history. For this reader, the read-text and the work itself will be set in a synchronic relationship. Both readers may not read the same meaning beyond the same words.

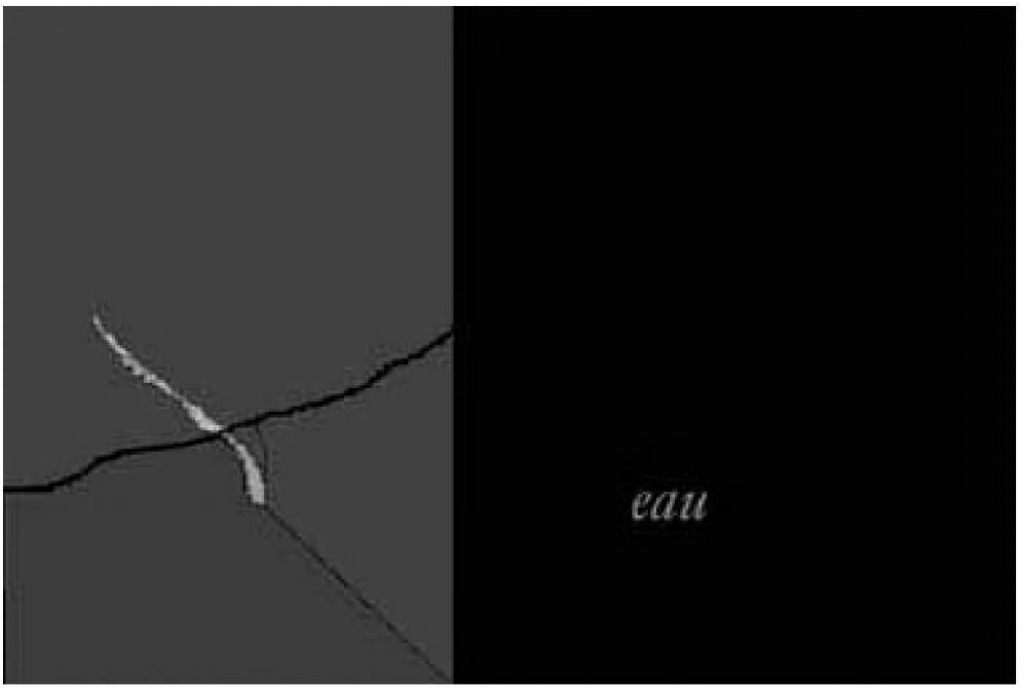
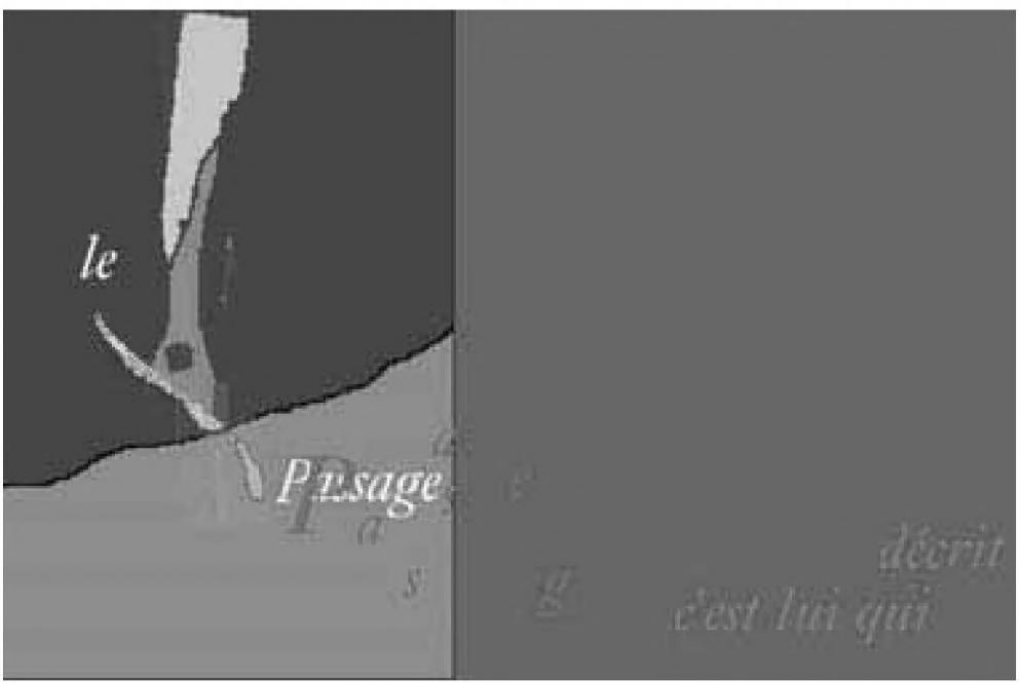


Figure. 2: Philippe Bootz, screen capture from the unique-reading poem *passage*, 1995.

Figure. 3: Philippe Bootz, screen capture from the unique-reading poem *passage*, 1995.



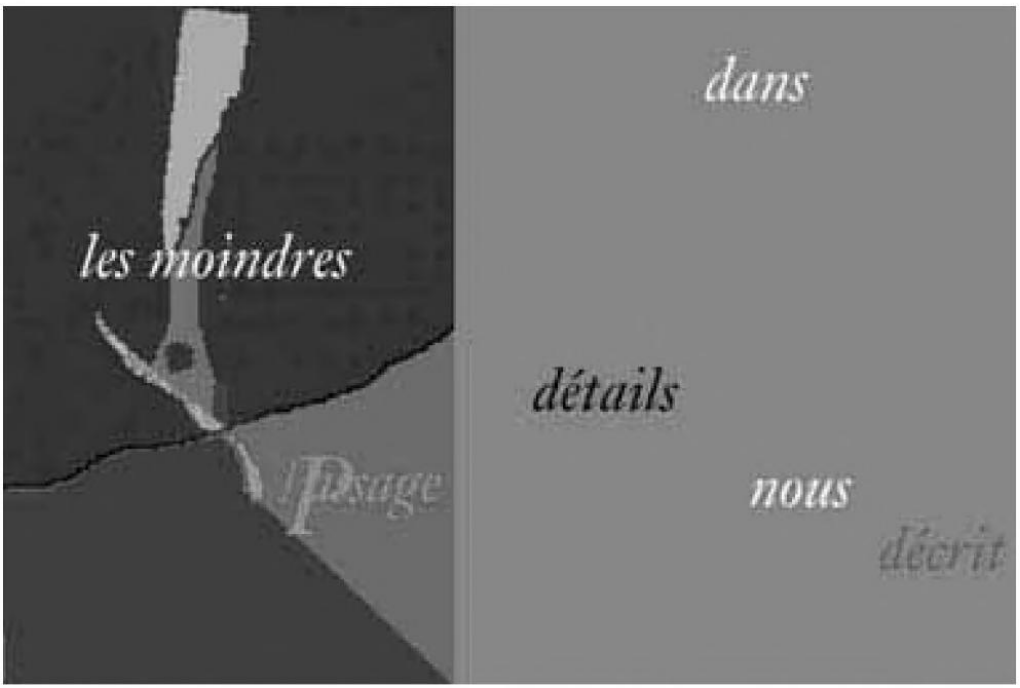


Figure. 4: Philippe Bootz, screen capture from the unique-reading poem *passage*, 1995.

2.2 Unique-reading forms, a "trap for the reader" in the reader's field

By contrast with printed texts that are static and complete, the reader has no means of accessing a global vision of the work submitted to him. He cannot guess what is beyond the mere words and whether there is "something else apart from the reading". In that sense, *passage* is a very linear work. By masking the deeply logical structure which generates it, the text-to-be-seen gives no alternative to the reader but to make his own mental representation of the work (the read-text) which does not match the writer's initial project (the written-text) neither in its structure nor sometimes in the semantics. Therefore, while the reader believes that he dominates and assimilates the literary work by his reading, he has a false representation of it. In the functional model this characteristic is branded as "trap for the reader". This is the most surprising consequence of the separation between the writer's and the reader's fields but also the most stimulating which, beyond the new and explored literary forms, gives the procedural work all its creative (and scandalous) force. The notion of "reader's trap" recognizes that a part of this literary work is not aimed at the public. It is when it promotes communication while communication is in fact negated that the procedural work becomes unacceptable[8] because it places its reader in a non-receiving situation: to read is to participate in the irreversible manufacturing of the work but not to receive it. This is the pragmatic functioning of procedural works that has been admirably summarized in the *alire* journal by this fundamental maxim: reading forbids reading.

2.3 the unique-reading form, a structural component in the writer's field

The diachronic behaviour of a procedural work must be considered as carefully as its synchronic behaviour on which critics have based their work since the beginnings of literature.

The written-text of a unique-reading poem associates a hypertextual structure representing the work's diachronic features with a generation structure (a descriptor's generator) that represents its synchronic aspects. Their unique interdependence contributes to the overall coherence of the work and gives it its unique-reading nature.

If we take *passage* as an example, in the creation of its final state, i.e. in the second phase, the generator is guided by the reader who is instrumental in allowing it to update the different states. This generator elaborates a descriptor of the future text-to-be-seen, processing data from the generation process. This descriptor does not hold all the characteristics of current or future texts-to-be-seen[9] but only those that will allow the generation process to choose from several sub-processes when the final text-to-be-seen is generated.[10] Furthermore, any value of the descriptor's variables cannot be modified once attributed (the reader's actions are irreversible). The creation phase is completed once each variable of the descriptor has been attributed a value. In order to prevent an infinite looping in this phase, after the work has been executed a few times,[11] non-allocated variables are given a value by default set up by the author. Therefore the textual process evolves towards a final text without any participation of the reader. However, one can speak of "interactivity" insofar as the reader's inaction is interpreted by the computer as his/her acceptance of the author's choice.[12] In this phase, interactivity has a technical function: it chooses a variable or gives it a particular value.

In the next phase, the non-interactive final state, the textual process uses the descriptor in order to generate the text-to-be-seen. As the descriptor's variables can no longer be changed, the calculated solution will be the same for all rereadings on the same computer. Indeed the descriptor contains the "inferred data" saved on the hard disk and present in the functional model (Fig. 1). In this sense the descriptor is a formal tool necessary for the realization of unique-reading works. It is also a representation of the work's state as chosen by the reader and gives information on the latter which is used by the author. In *passage* this information is processed as the reader's semantic requests. Therefore the generative behaviour of the unique-reading form consists in a simulation of a dialogue between reader and author.

With the hypertextual structure, one can describe the variety of textual processes successively involved. Each process is a node in the hypertext and every possible activation a calculated link. The reading, in its diachronic development, is a path taken through this hypertext. In our description, attributing a value of the former descriptor amounts to exploring a particular node called "paradigmatic" unit, but, on the other end, choosing a variable is exploring another type of node called "syntagmatic" unit. There is interactivity (decision-making) when links are established between these two units: when a variable is chosen the syntagmatic unit is changed into a paradigmatic one and, when the variable is attributed, goes back to being a syntagmatic unit. Some links are managed by the author. In this description, unique-reading is defined by links' calculation methods, i.e. a paradigmatic unit can only be visited once and some links are conditioned by others already realized. Because these links do not link different textual objects but rather the different behaviours of the textual process, not only the "generated texts" have a potential nature but also the "generators themselves".[13]

The final state of the unique-reading poem by which the same textual process is identically reproduced for each reading is simply described as the common node towards which all the

paths within the hypertext necessarily converge. This node is the one which, within all the hypertextual structure, possesses the greatest number of calculated elements as it has to adapt to every possible path. Therefore it is in every sense an automatic generator, which, however, hides its automatic nature to the reader who is always presented with the same generated solution.

In *passage* the structure has a particularity that is not essential to the unique-reading structure: an initial sequence, a first phase that develops over several rereadings.

I would finally like to point out another trap for the reader, typical of unique-reading forms. When the descriptor is being set up, some automatic or combinatory generators use its attributed values to elaborate the text-to-be-seen. Therefore the reader thinks that he realizes an animated combinatory exploration and that his actions only serve to define the grammatical features of the text-to-be-seen which he/she has in front of him/her. At this stage the reader cannot guess that his/her choices will serve later to determine semantics. Even a knowledge of some particularities of the written-text will not give a clue about the links' activation dates or their location on screen. This contributes to an even more lively and emotion-oriented reading as opposed to an analytical reading. Therefore, by giving a great deal of fascinating but in practice unusable information, the critic becomes an instrument in the mutation of this reading. However, by alerting the reader to what neither he/she nor the reader[14] can read, it plays an essential role: inadequacy of information which he/she brings to this reading is the cultural and social, therefore collective, safeguard of the change in individual reading. Readers have not chosen to move from an informative reading to a reading functioning like a life experience, constructive and destructive,[15] but instead it is the society's mechanisms which have failed in efficiently informing readers how to read differently. Unique-reading poems assert the non-informative but experimental nature of reading which, in our information and communication society, is comparable to a life experience.

A possible opening

As other unique-reading poems are produced, the possibility of linking them and thus creating "Locked Works" emerges: a transversal structure[16] that would link unique-reading-poems separately produced, thus transposing the unique-reading process to the level of all texts-to-be. Therefore, the reader would always get the impression that the poem that he/she is reading has been written after the others that he/she has just read, even if this impression is wrong. The reading chronology would create a read work independent of the writing chronology, thus locking the reader in his/her own reading. The work will not be a unique voice given to everybody but a very personal vision dependent on one's own voice, entrapped in a personal reading as it is the case with human encounters.

Notes

1. Adapted from an article published in *Rencontres médias*, BPI, Pompidou Center, Paris, 1999, pp. 39–66.
2. This term is defined in the second part of the present article.
3. An animated poem which, however, contains a combinatory element.
4. This conception could be defined as generalized performance only if the performer is not envisaged as either an author, an interpreter, or a player but rather as a property of the process mingled with the text itself. The work exists only through its functioning and all the protagonists (either people or

Interactive Poems

Orit Kruglanski

Just before leaving, a friend gave me a present – a word – logorrhea. It means incessant or compulsive talkativeness; wearisome volubility (I looked it up). I packed the word carefully among the rest of my wordly possessions and left for the airport. When I got there, I noticed the word had stained everything, and, more than anything, my next few months. I had just left my country and my job as an interaction designer in order to go and study in New York. I was meeting new people all the time. They all seemed to ask, out of politeness, perhaps, but I answered. Lengthy answers that came subtitled in my mind, 'logorrhea'. That very night I wrote the first of my interactive poems titled 'Words are InnerSpace Invaders', a game of space invaders in which the user tries to defend herself against the words that make up the sentence: 'I'm tired of hearing myself talk about myself so I talk about being tired of hearing myself talk about myself.'

Since then I seem to have been travelling a lot, and I've noticed something: people who don't share a language tend to either understand each other on a very basic level or on a very abstract, intuitive level. As a poet, I have always been somewhere in the middle ground – not totally basic but definitely not abstract. When I wanted to write poetry in digital media, I noticed there was very little language to be shared. Or, that what little language there was resided in the realm of the select few – scholars and initiates of a highly complex and experimental writing.

I can't write like that.

I started by borrowing. For the Space Invaders poem I borrowed the interaction from a game. The words descend from the top of the screen, one by one, with obvious malicious intentions; the user can move and shoot at them. If a word is shot, it disappears but is heard. And anyway they just keep coming at you. I liked the way the required action of the game interacted with the frustration of the speaker in the poem. I also liked the fact that the interaction was complex, but didn't require explaining (assuming the user is familiar with Space Invaders). I wasn't too happy, though, with the strong connection to the gaming world; I wanted to create my own interactions.

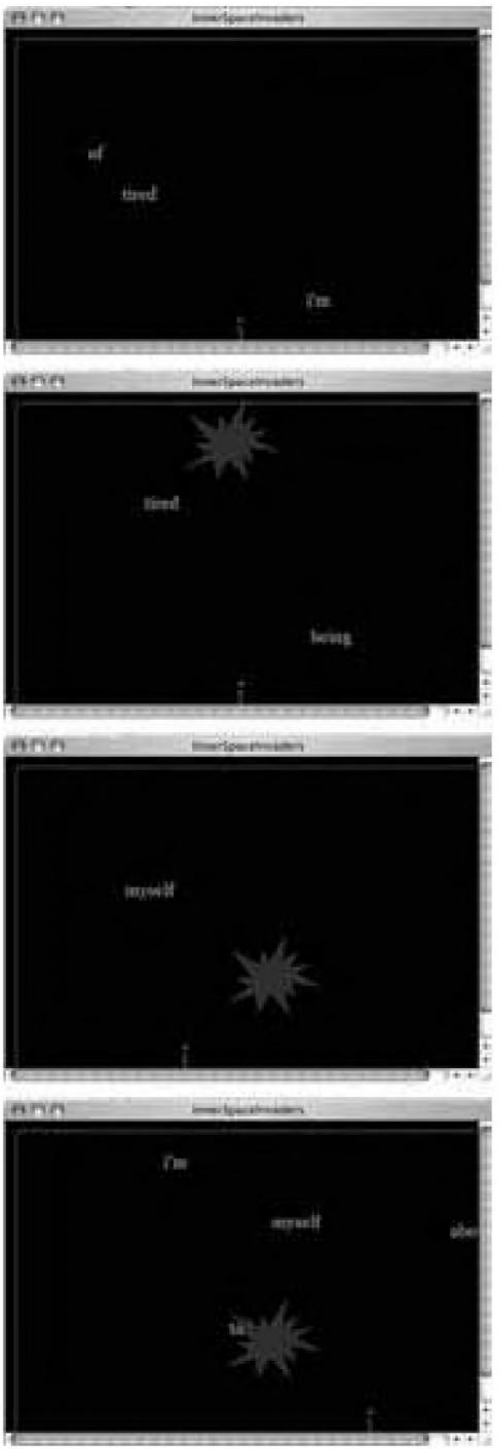


Figure. 1: Orit Kruglanski, "InnerSpace Invaders", interactive poem, 1998.

For my next poem I borrowed the interaction from a toy. The poem was an image of a doll's hand with a virtual string which the user could pull; when the user released the string it would slowly return to place, playing an audio of the text 'if I were pure thought/ then I would surely be/ the thought of someone touching me.'

Then I let go. I incorporated interactivity into my sleep vocabulary and started dreaming interactive poems. I let things happen without deciding and ended up in bed with my best friend. I lost my best friend. Then I woke up one night with an abstract shape and a small circle that moved five different ways making a clicking sound and triggering five short poems (audio) about sex and relationships. It was inspired by gravity. I called it 'five small poems for me and my lover' and went back to sleep.

The interaction in 'five small poems for me and my lover' is playful. The texts are erotic and sad, intimate. I noticed that when people used it, they seemed to take a while to notice the text, losing themselves in the playfulness of the interface. When the text finally sinks in, it collides with playfulness and its impact is doubled.

I call these things I make 'interactive poems' because the interaction itself (in its computer-world sense) serves as a major poetic device, playing an important role in the construction of meaning. I like the idea of using electronic devices as poetic ones; I like electronic devices in general, but more then that I like the way people relate to the world and to each other. Art or literature that likes these same things is my favorite type.

My mom says that you should never run after men and buses because another one always comes along. I feel the same way about technology. I prefer slightly old technology. It is less smug. This is why when the Palm Pilot came out I didn't buy one. (I did not have the money either). But my good friend Bruno Vianna did. And he had this great idea – to add a tilt sensor to it. I liked the idea so much that I told him I would write for it.

After a few months of working with the Palm, I was invaded with sadness. The Palm, like me, was growing old. New models were coming out all the time. As our novelty wears off, I told it, we will be discarded and forgotten. The Palm, a faithful servant, almost a friend, how can I explain that it is not in my hands? How can I tell it that I, too, if I knew who to ask, would fall down on my knees and beg for more time, beg for them to stop producing new models, because they scare me.

So I wrote a poem for the both of us (and a tilt sensor). It starts with the word 'please' on the upper part of the palm's screen. As you tilt the palm, the word 'please' turns into a string of letters from which a poem hangs, and, with the inclination of the Palm, quickly falls off screen. The poem is 'please / I do not want to disappear / if you will not hold me / tell me / why am I here? / I only aim to please / not disappear.'

The Palm, new technology that it is, is tinted by what I call 'the coolness effect'. The mere novelty of it, and of having poetry in it, is so fascinating that the "how you say with it" tends to override the "what". Art in very new or unfamiliar technology tends, on first encounter, to exhibit its technology, provoking a 'cool!' response from its audience, regardless of its specific content.

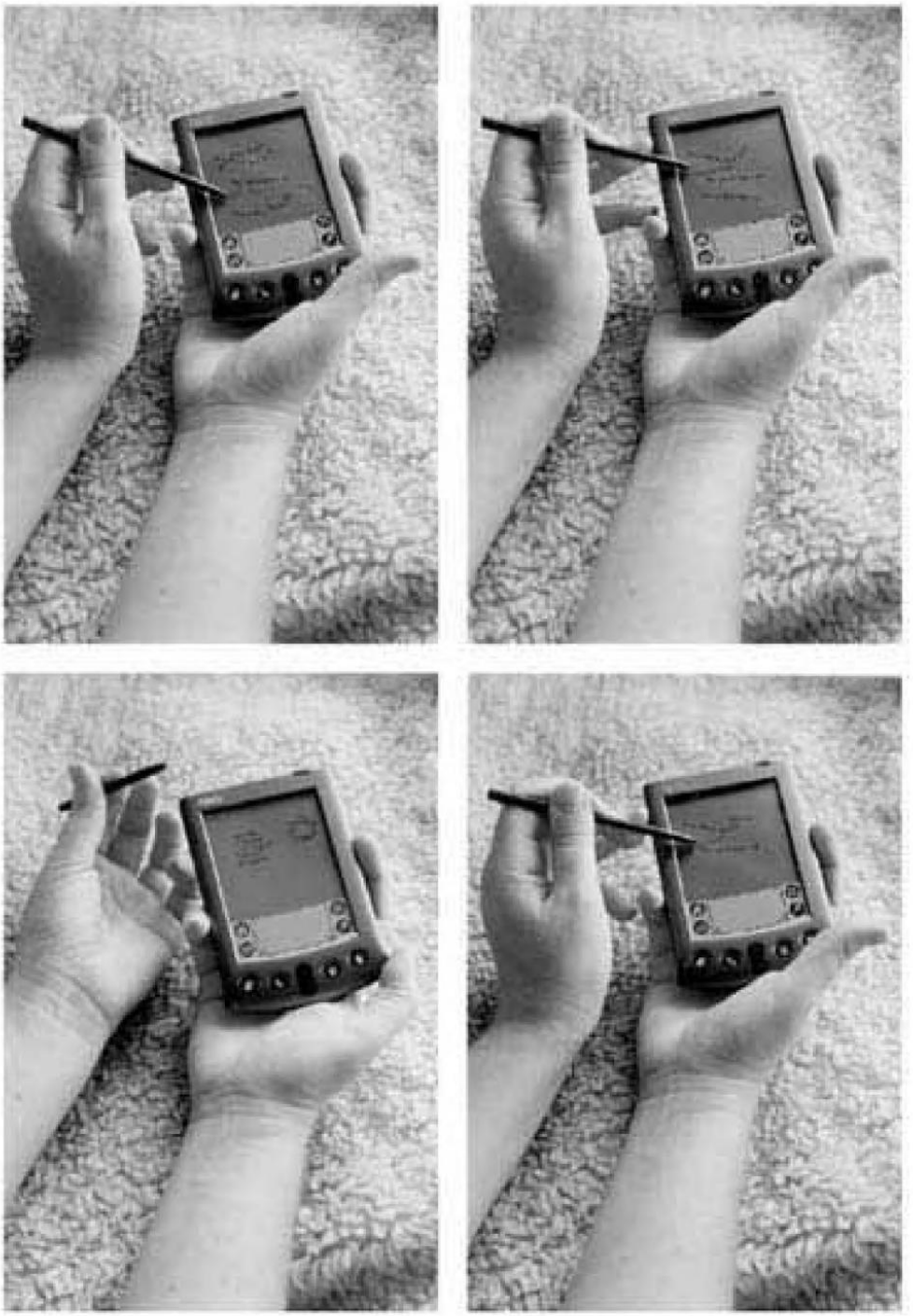


Figure. 2: Orit Kruglanski, "Please", interactive PDA poem (for Palm Pilot with a tilt sensor), 2000.

this last phrase the user is relieved from the burden of guilt and the poem returns to its opening screen.

People who go through 'as much as you love me' more then once notice that the phrases are always heard in the same order. And sometimes they ask, 'Can't each phrase be connected to a visual object, so the user composes the order of the poem as s/he goes along?' Of course it can. There are two reasons not to do so. The positive one is that I feel the specific order of the lines in the poem contributes to its effect, the tension building up to the end and the final release from guilt. The negative one is that I feel that the user 'composing' the order of the poem does not contribute anything to the poem in terms of its impact. I do not want to use this possibility only because it is so readily available. I will use it when I create an interface in which the very act of choosing participates in the creation of meaning, reflects on the whole of the poem. Or when I write a text that is really good and different every time its order changes.

You see, poems, traditional poems, on paper, deceivingly stable looking, change with every reading. They change because we know them better now. They change because we, and language, and objects, all accumulate time. And no two readings are the same. Even if you are bored as hell the third time, the experience of boredom itself will be different the sixth time around.

More than I wish I could write a poem that is different every time it is experienced, I wish I could write one that would be always the same. And be the same for everyone. An isolated, pure and singular experience, unchanging, erasing its context.

But poems cannot be the same. One reason is that people cannot be the same. This creates a problem when you call them by a common name: public. I would like to say that this many headed monster called public plays no role in my work. But I cannot. I wish to be heard. By a public. This is implicit in the word publishing. Beyond the technical requirements of knowing how to read the language and having physical access to a poem, there is also a question of cultural literacy required for appreciating a specific poem. In interactive poetry we must add to the technical side of software and hardware to cultural literacy we might need to add computer literacy.

Access to hardware is a big one. Left to my own devices, force feedback mouse, tilt sensor are physical objects the user must posses in order to experience poetry written for them. One of my current projects, the Moussager (a cross between a mouse and a massager), is that kind of project.

On the other hand, I still fantasize with the Internet being democracy, and so create projects for standard software and hardware, such as flash, shockwave, downloadable Palm Pilot files, and even plain text.

When I think of a project, the availability of required hardware is one of my considerations. Another is language. Being an English-speaking Israeli living in Spain, I write in Hebrew, English, and Spanish and then sometimes translate. Relatively well read for a computer person, relatively computer literate for a writer, I sometimes wake up in the morning not knowing in which language to have my identity crisis.

The more I know, the less I know who I am. One solution is to snap shut like a slow box and wish to never learn again. In spite of that, I do. Something new every day. Maybe if I could stop changing (hardware, software, platform, language) I could get really good at something. This is a risk I am not willing to take. I love the challenge. I get frustrated. Interactive poetry is awkward and charming, a small child saying its first words.

We Have Not Understood Descartes

André Vallias

Continuous mutation: this is perhaps the only constant distinguishing mark of the digital media. The growing speed with which hardware and software components change would seem to condemn the creators who venture upon this new territory to production of ephemera, to a permanent process of making and remaking, of endless "work in progress". The general picture is one of instability, of vertigo, and it is at one and the same time a source of stimulation and frustration.

I entered the computer age in 1988, motivated largely by the compelling essays of the philosopher Vilém Flusser;[1] financially I was able to do so thanks to the economic stability of Germany, where I had settled in the preceding year. Galloping inflation and import restrictions would have made this step extremely difficult in Brazil, my country of origin, at any time before the early 1990s.

Basically, my poetic work at the time employed the resources of Desktop Publishing; these were substitutes for the techniques which I had previously used for the composition of visual poems: silk-screen printing, collage, photocopying, instant transfer lettering, etc. Although I was fascinated by the computer, by the breadth and flexibility of this new tool for graphics, the fact that I had perceived no significant alteration in my own poetic procedures drew me into a creative crisis which lasted from 1988 until 1990.

I put this period of silence to good use and started out on research into three-dimensional space; it was there that the potential of the computer seemed to make itself most clearly evident. I exchanged the simulacrum of blank page and palette of colours – available to me through DTP programs – for the black infinity and the austere and complex interface of Computer Aided Design; the AutoCad[2] program became my Ariadne, and coordinates *xyz* my magic ball of thread. The open architecture of AutoCad also led me on to my first stammering efforts in programming language (AutoLisp), an experience which was to prove useful after 1994, when I started on authorship systems in multimedia.

An initial impetus towards construction of three-dimensional letters soon wore off. I could see no possibility of organic integration between the third dimension and the alphabetic code; it seemed to me that such a proceeding would lead to an iconization which, fundamentally, differed very little from the typographic experiments found in the visual poetry of the 1970s and 1980s. So instead I sought to integrate the third dimension into the syntax of the poem.

My creative crisis resolved itself in 1990, with the making of a poem which has become a landmark in my poetic production: "Nous n'avons pas compris Descartes". The title is an excerpt from a text by Mallarmé dating from 1869, his "Notes",[3] which I came upon just when I was putting the finishing touches to the poem. These notes were an outline for a treatise on linguistics which Mallarmé unfortunately never got round to writing. The fifth paragraph in

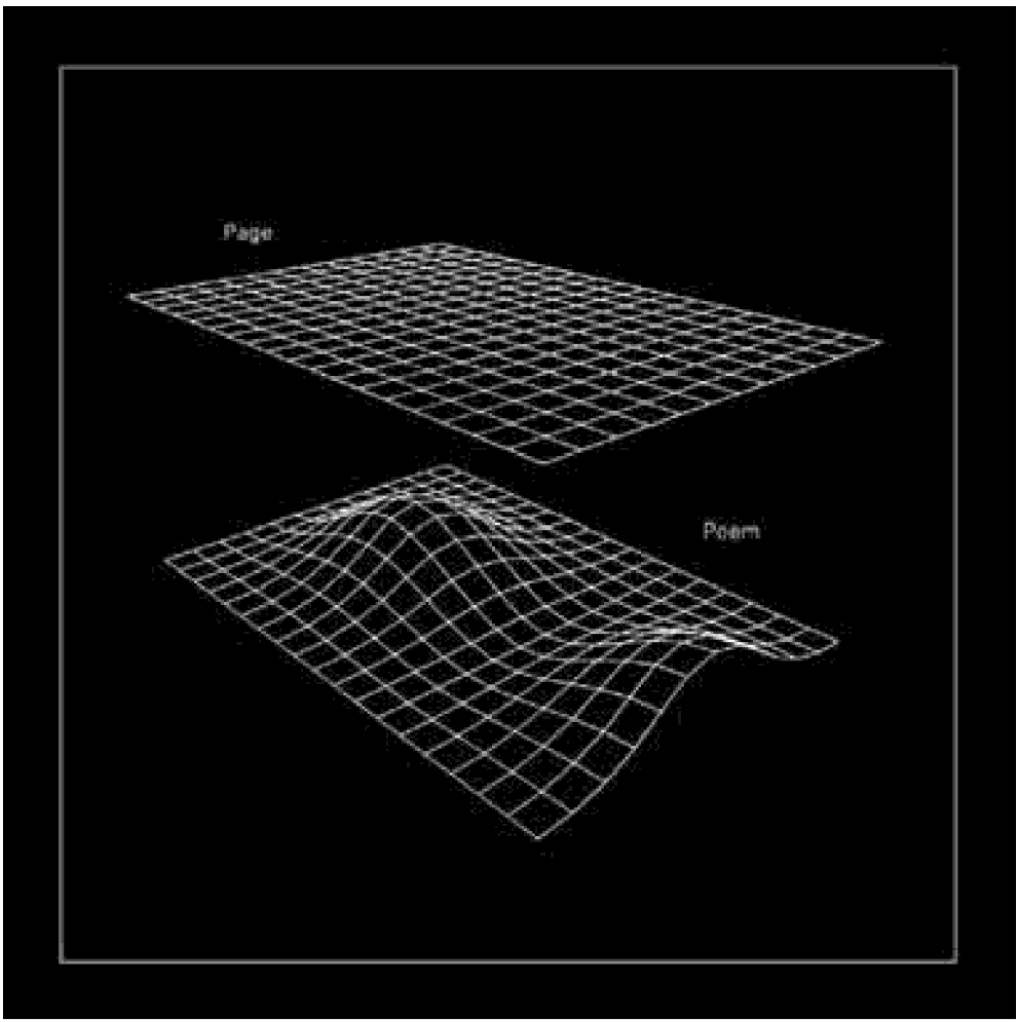


Figure. 1: André Vallias, "Nous n'avons pas compris Descartes", 1990.

particular caught my attention: "Nous n'avons pas compris Descartes, l'étranger s'est emparé de lui: mais il a suscité les mathematiciens fran·ais" – We have not understood Descartes, it's the foreigners who have laid hold of him; but he has aroused French mathematicians.

I confess that I didn't spend much time on attempts to interpret the fascinating web of Hegelian concepts to be found in the "Notes"; I was quite satisfied with the luminous insight brought to me by the text. I perceived what a mighty feat it was on Descartes' part to have created an interface between the discrete universe of algebra and the continuous world of geometry, thus establishing a basis for what, in the end, was to be the computational graphics which I was using myself.

The poem "Nous n'avons pas compris Descartes", made with the resources of Computer Aided Design, takes as theme the relationship between page and poem; in doing so it transcends this same relationship and makes three-dimensional space the new field of meaning for the poem – its new "page". The sinusoidal form of this "poem" may perhaps be seen as a reference to Descartes' analytical geometry; yet in the end it is arbitrary in its nature. It points above all to a virtual inter-relationship of codes, a programmatic gesture which bestows on this meta-poem the character of a manifesto.

The fundamentals of its making arise from reflection on a series of visual and ideographic codes which begin to take shape during the Renaissance and the Baroque, and which continue with increasing intensity as they accompany the development of western science and technology in all its fields and forms: from classical perspective, still centred upon mimesis of nature, to the anamorphoses of Mannerism, architectural design, isometric perspective, cartography, graphs, charts, tables, and statistics; all those codes, that is to say, of technical and scientific visualization which attempt to go beyond the limits imposed by the linear nature of our society's hegemonic code of communication – the written text.

The common denominator of these codes is their hybrid nature: graphic and numerical elements, colour and text, to a greater or lesser degree add up to a network of reciprocities which will provide the field of meaning for the whole. It is this dynamic and syncretic complex which I call by the name of **Diagram** – from the Greek *di·*, 'through' + *graphein*, 'to write'.

Diagrams, in accordance with the growing complexity and volume of information in our times, find in the computer an ideal stage for development and dissemination. Digital technology provides a basis for increasingly rapid and wide-ranging inter-relationships of codes, since the computer itself transforms text, sound, form, colour, and movement into digits. Starting with "Nous n'avons pas compris Descartes", I have come to see the poem as an "Open Diagram", operating under the sign of diversity. Poetry is set free from the domain of the text – logocentrism – and recovers its primordial meaning of "creation", from the Greek *poiésis*, 'making'.

My work "The Verse" (1991), tries to cast light on this conception of poetry, going back to the neolithic origin of the word 'verse' – from Latin *versus*, the furrow produced by a plough. The work is composed of surfaces built up on graphic representations of long and short syllables – line and semicircle – and following the four principal metric schemes known to antiquity – trochee, iamb, dactyl, and anapest. These schemes are combined so as to give rise to surfaces

object's texture changes, from opaque to transparent, to show the cylindrical penetration within the sphere. This is accompanied by a sound background: the vocalization of "o" and "i", in reference to the opaque and transparent worlds respectively, and the vocalization of the diphthongs "io" and "oi" at the change from one texture to another. At certain moments, chosen at random by the program, quotations and commentaries appear in relationship to the various meanings of the word "IO" – Italian for "I", the sign for Input/Output, numerals "1" and "0" – and excerpts from Hölderlin's translation of Sophocles' "Antigone", in which "io" appears as a phonetic transposition of an ancient Greek interjection indicating pain and lamentation.

In 1996 I moved to Rio de Janeiro and focused my activities on the Internet. 'Aleer' (1997) is a Web anthology of my works: <http://www.refazenda.com.br/aleer>. 'RIO' is a digital-poetic essay about the city where I still live.

Conclusion

Intelligent use of the increasingly sophisticated resources of multimedia for the creation of poetic works is, to my way of seeing things, an irresistible challenge: the computer, as stage for the integration of various different codes – visual, sound, numerical, etc.) seems to me to include within itself and to transcend technologically a whole series of poetic manifestations which started out from the avant-garde movements of the twentieth century, such as "visual poetry", "phonetic poetry", "performance poetry", etc.

Interactivity allows a work to be modified according to internal criteria (those defined in the programming language) and also according to the repertoire and interests of the reader; it opens up a field of unlimited dimensions for poetic research, and becomes an irreversible subversion of the traditional relationship between author, work, and reader.

I believe that the concept of poem as an open diagram, when it incorporates the notions of plurality, inter-relationship, and reciprocity of codes, not only guarantees the viability of poetry in a society subject to constant technological revolution, but places it in a privileged position – that of the "universal progressive poetry" of Schlegel and the "Dichtung + condensare" of Pound. That is to say, *Poiésis*.

Notes

1. Vilém Flusser was born in Prague in 1920. He studied philosophy at the Carl's University and emigrated to Brazil in 1940, where he continued his studies at the University of S„o Paulo. Since 1963 he was professor of philosophy of communication at the Faculty of Communication and Arts. In 1972 he moved to Europe, where he worked as a visiting professor at numerous universities. He was killed in an auto accident on his return to Prague in 1991. Among his most important writings: "Ins Universum der technischen Bilder", European Photography, Göttingen 1985; "Die Schrift", Immatrix Publications, Göttingen 1987; "Vampyrotheuthis Infernalis" (with Louis Bec), Immatrix Publications, Göttingen 1987.
2. Computer Aided Design Software made by Autodesk.
3. Stéphane Mallarmé – Oeuvres Complètes, Bibliothèque de la Pléiade – ...ditions Gallimard, Paris 1945: p.851–856.

VIRTUAL POETRY

Ladislao Pablo Györi

Cyberspace, digital processing, telepresence, multimedia, Internet, VR, computer animation, AI, robotics, expert systems, nanotechnology, electronic photography, fiber optics, 3-D sound, fractal geometry, non-linear dynamics, chaos and complexity, artificial life, fuzzy logic, neural networks, genetic programming...

and ... what about poetry? VIRTUAL POETRY!

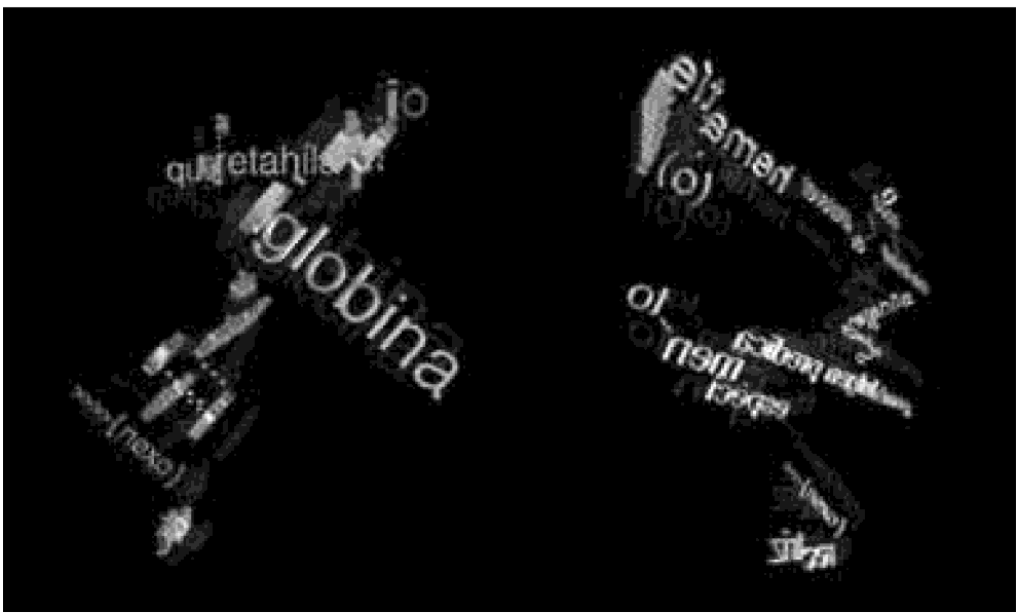


Figure. 1: Ladislao Pablo Györi, "Vpoem12", VRML navigational poem, 1995.

Figure. 2: Ladislao Pablo Györi, "Vpoem13", VRML navigational poem, 1995.

Virtual Poetry results from a basic need to impel a new kind of creation related to facts whose emergence – for their morphological and/or structural characteristics – would be improbable in the natural context. This new creation requires a rational and constructive human action, as well as the surpassing of redundant events that confine poetic production to previously absorbed instances and away from new aesthetic functions.

Because of the essential conjunction between human creative work and the utilization of electronic media, which have enormously widened the fields of poetry and art, all creative processes will move into the virtual space offered by the machine. In it, and with the aid of adequate software, signs can reach multiple proportions by means of the application of functions which go as far as to intrinsically modify their usual properties, to generate even unexpected systems due to their radical configuration and behaviour.

The application of computers has facilitated not only access to a custom-definable logical or virtual space (which ignores the coordinates defined in a gravitational one, having no privileged direction or immovable constraints), but also to a large series of algorithmic operations. Fundamentally, it has inaugurated an essentially different field, for which it is necessary to produce new languages that will spawn a new aesthetics. Moreover, in connection with virtual reality, and its extraordinary scope, this proposal avoids the simple transposition of already barren situations supported by old codes of non-electronic systems.

The digital world (computerized, therefore synthetic) deeply differs from physical, real or analogical materiality and goes beyond its limitations and the usual categories of experience associated with it. It founds its mastery in the mathematic or numeric character of the elements that are contained in it and in the possibility to openly establish correlations between virtual space, objects and subjects, as no previous medium has allowed.

Faced with this state of affairs, we start from the innovations developed by the latest constructivist vanguards and from a philosophical and epistemological context in accordance with the current development of the sciences. In this context, we must respond to the imperious need to design the brand new theoretical profiles of this revolutionary technology and the events technically consistent with a N-dimensional virtual space – that is to say, able to be created and treated in that space.

Thus, VIRTUAL POEMS or VPOEMS are interactive digital entities, capable of: (1) taking part in or being generated within a virtual world (here called VPD or "Virtual Poetry Domain") through software or routines for the development of VR applications and real-time explorations that confer diverse possibilities (manipulation, navigation, behaviour) in the presence of environmental constraints and interactions, such as evolution, sound emission, animated morphing, etc.; (2) being experienced by means of partially or fully immersive interface devices (vpoems support "walkthroughs" and "flybys"); (3) assuming an aesthetic dimension (in accordance with the semiotic and entropic concept of information), not reducing themselves to a simple phenomenon of communication (like a pure data stream); and (4) being defined as hypertext structures (circulation of open and multiple digital information) but principally producing hyperdiscourses (through strong semantic non-linearity).

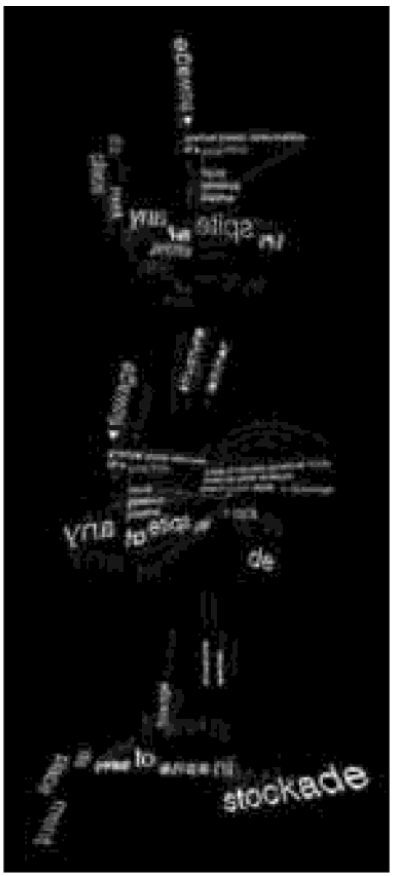
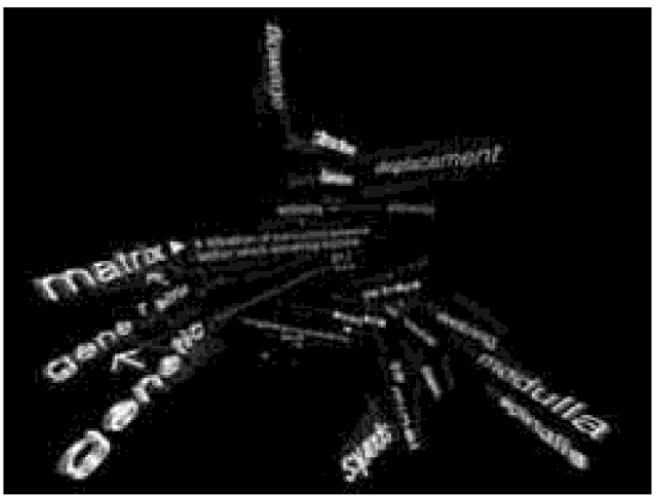


Figure. 3a: Ladislao Pablo Györi, "Vpoem14", VRML navigational poem, 1996.

Figure. 3b: Ladislao Pablo Györi, "Vpoem14", VRML navigational poem, 1996.



Nomadic Poems

Giselle Beiguelman

Wop Art (2001), *Leste o Leste?* (*Did You Read the East?*, 2002), and *Poétrica* (2003) are projects addressing reading contexts marked by nomadism. The first involved cell phones, the second was a teleintervention combining electronic panels and the Internet, and the third involved PDAs interaction with electronic panels and large plotters. The projects deal with situations in which inscriptions vanish, interfaces multiply and fragment the reception on electronic surfaces, connected to telecommunication networks.

These projects investigate the possible realm of a post-phonetic, hybrid culture, crossed by printed and digital layers, where the informational and esthetic codes are entangled through programming and produce a new semantics involving a rearrangement of signs and signification processes. Triggering and resulting from different variables, these poems have some common starting points and issues which will be discussed here schematically. My goal is not exactly to clarify the poems in *Wop Art, Leste o Leste?* and *Poétrica*, but rather to contextualize them within the fuzzy cartography of cyberliterature, which is not always distinct from other literary forms.

Along these lines, the starting points are the following:

- The place where the text is located is the reader's non-place, space-time of antiphenomenology and visibility.
- Every reader is the book's double, a post-original, immemorial "aleph" who one writes for and who is beyond description.
- Nothing imprisons the text. The prefiguration of writing is always a sordid act, a vile exercise, a mere waste of time within a reading interval.
- Interfaces are primordial environments of the arbitrariness of enacted words, betraying language so as to become language.

Despite the awareness that new production, publication and distribution technologies do not alter much the design of relationships in terms of the complicity, seduction, and empathy which

Figure. 2: Giselle Beiguelman, "Os Vipes são Bípedes" ("VIPs are Bipeds", 2002), an e-graffiti presented at the teleintervention *Leste o Leste?*

establish the fruition of the text, I believe that one cannot fail to perceive the specificities of literary times such as ours. Within the intersections of words and symbols, the boundaries of communication and of art are being redefined.

On discussing new forms of creation mediated by evermore agile and wireless remote networks, such as the ones which *Wop Art, Leste o Leste?* and *Poétrica* interact with, I have to take into account the novel reading contexts which emerge from the interaction with interfaces such as cell phones, palm tops and electronic panels.

Thus it is important to foreground some details of the creative processes involved, for they not only guide the development of this series of nomadic poems, but also highlight their basic assumptions or conditions for existence. I will therefore review some ideas that were developed before, during, and after the creative process itself:

- The popularity of portable wireless communication devices connected to the Internet and the proliferation of telecommunication spaces in urban areas, such as electronic billboards, indicate that the urban lifestyle has encompassed nomadic life patterns.
- PDAs, cell phones, and electronic panels are instruments that were especially devised for situations involving movement, always in transit. These tools enhance adjustment to an urban universe undergoing continuous acceleration and entropy, one that alters and adjusts to new forms of perception, visualization, and reading.

Figure. 3: Giselle Beiguelman, "Streets" (2001). Screen shot of the wap poem in the web emulator.

- Art rendered for these nomadic interfaces makes us reflect on reception in such environments – always in flux, moving, involving interactions between different equipments, and connected to multiple, non-related tasks (such as talking on the phone and driving, checking e-mail and eating, or watching movies and standing in line).
- Creating for such saturated, entropic situations implies reconsidering the nature of artistic fruition and of communicative conventions and formats, in a culture of ubiquity, where contemplation will simply vanish.
- Creation aimed at this emerging context of liquid reading, stemming from and occurring in connected, flowing systems raises a pressing issue: How can we consider art forms conceived to be read "in between", among diverse, simultaneous (but asynchronic) interfaces and actions?

Wop Art was the first move in this reflective process and offered the reader an imponderable situation: op art accessed via mobile Internet, in WAP (wireless application protocol) cell phones. The situation was imponderable not because of the precarious situation of the medium back then, in 2001, but rather due to the incompatibility between what was being offered to read and the reading context itself.

Figure. 7: Giselle Beiguelman, palm version of "2+2 = Crowd" (2002), visual poem of *Poétrica*.

phenomenon pertaining to nomadic literature: on being hybrid and unlinked to a specific substrate, it dematerializes the medium, and the interface construes itself as the message.

Contemporary literature has overflown the page margin to invade and be invaded by the transitory territories of screens and windows, of the places and non-places that construe us. Now that we have become speedy snails roaming around the world with a bunch of data located @somedomain, there is an urgent need to consider new forms of writing and literature that respond to the fragmented, mixed character of information. Talking about hybridism is more than giving in to the fashionable universe of what is considered hype at the globalized university. It is a crucial issue. What really matters occurs in multiple platforms, within interconnected spaces, words, and things.

It is very possible that all this Herculean effort to manage data, domains, and new languages is in vain. All that we say nowadays can be deleted and reconstructed without leaving a single trace of what it was meant to be. This does not matter. We did it. We have updated McLuhan. The medium does not count. In these days of nomadic words, the interface is the message.

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