HOLOPOETRY

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1. Defining a holopoem

A holographic poem, or holopoem, is a poem conceived, made and displayed holographically. This means, first of all, that such a poem is organized non-linearly in an immaterial three-dimensional space and that even as the reader or viewer observes it, it changes and gives rise to new meanings. Thus as the viewer reads the poem in space — that is, moves relative to the hologram—he or she constantly modifies the structure of the text. A holopoem is a spatiotemporal event: it evokes thought processes, and not their result.

A holopoem is not a poem composed in lines of verse and made into a hologram, nor is it a concrete or visual poem adapted to holography. The sequential structure of a line of verse corresponds to linear thinking, whereas the simultaneous structure of a concrete or visual poem corresponds to ideographic thinking. The poem written in lines, printed on paper, reinforces the linearity of poetic discourse, whereas the visual poem sets words free on the page. Like poetry in lines, visual poetry has a long ancestry, which runs from Simias of Rhodes, through the Baroque poets, to Modernists such as Marinetti, Kamensky, Tzara, Cummings and Apollinaire, and most recently to the experimental poets of the 1960s and 1970s .

Following in this tradition, while at the same time opening up a new path, holopoetry began in 1983 by freeing words from the page. It was important back then, as it still is today, that the holopoem can be duplicated in large quantities and that it calls for silent reading. As distinguished from visual poetry, it seeks to express the discontinuity of thought; in other words, the perception of a holopoem takes place neither linearly nor simultaneously but rather through fragments seen by the observer according to decisions he or she makes, depending on the observer's position relative to the poem. Perception in space of colors, volumes, degrees of transparency, changes in form, relative positions of letters and words, and the appearance and disappearance of forms is inseparable from the syntactic and semantic perception of the text. The instability of color has poetic function and the visual mutability of letters extends them beyond the verbal domain.

If we compare the elements of language with the basic concepts of Euclidean geometry, as Bense has done in the analysis of visual texts , we may think of letters as points, words and sentences as lines, and visual texts as planes. Thus, letters would have dimension 0; sentences, dimension 1; and visual texts, dimension 2. By extension, one might conclude too quickly, holopoems, which free the text from the page and project it into space, would have dimension 3.

But holopoems are actually quadri-dimensional because they integrate dinamically the three dimensions of space with the added dimension of time. This is not the subjective time of the reader found in traditional texts, but a perceived time expressed in the holopoem itself. One does not need to look very far to realize that in fact any hologram (not only holopoems) can have dimensions other than 3, for fractal geometry tells us that there are dimensions in between those numbered with whole numbers, and we have software tools for creating images with fractional dimensions. Fractals teach us to accept the fraction, the passage from one dimension to the next, as a new value in its own right. In this context, Euclidean geometry becomes a part of fractal geometry, since dimension 2 is in between dimensions 1.9 and 2.1, for instance. Holofractals, therefore, can have dimensions other than 3.

In mathematics, being a fractal means roughly being between a given dimension and the next higher or lower one. In art, being a fractal may mean, by analogy, being between the verbal and the visual dimension of the sign. Taking Bense's analogy a step further, we can conceive of a language — moving and changing in space-time — that would consist of this passage from the verbal code (the word) to the visual code (the image) and vice-versa. The poetic experience is enriched when the viewer or reader sees a work that continually oscillates between text and image.

It is very important to emphasize that not all texts recorded on holographic film are holopoems. It is technically possible, for example, to record a symbolist sonnet on a hologram. Such a sonnet does not become a holopoem simply because it is displayed on holographic film. What defines a holopoem is not the fact that a given text is recorded on holographic film. What matters is the creation of new syntaxes, mobility, non-linearity, interactivity, fluidity, discontinuity, and dynamic behavior only possible in holographic space-time. It must be said that, in the future, even genuine holopoems might not be recorded on holographic film, since digital recording of holograms will become available. Holograms will also one day be scriptable. When that happens, new possibilities will emerge, and holopoetry will lead to other, newer areas of poetic experimentation.

2. Fundamentals of Holopoetics

Poetry is an art that uses words as its raw material. Visual poetry enriched the word, giving it physicality on the surface of the paper and extending this physicality to other materials, as in the case of poems made with wood, Plexiglas, glass and metal.

Holopoetry belongs to the tradition of experimental poetry, but it treats the word as an immaterial form, that is, as a sign that can change or dissolve into thin air, breaking its formal stiffness. Freed from the page and freed from other palpable materials, the word invades the reader's space and forces him or her to read it in a dynamic way; the reader must move around the text and find meanings and connections the words establish with each other in empty space. Thus, a holopoem must be read in a broken fashion, in an irregular and discontinuous movement, and it will change as it is viewed from different perspectives.

When one reads a conventional text or looks at the world around one, slightly different images are perceived by each eye. But in the reading of a book, newspaper or printed poem, this perceptual process is not evident, nor does it affect what is being read in any fundamental way: what the left eye sees is virtually the same as what the right eye sees. In the case of a holopoem, however, the reading is a synthesis of the two different inputs received by the eyes and is therefore something more complex and intense. This is where the concept of 'binocular reading' comes in: we are constantly changing the way we mentally 'edit' the text, based on the different inputs taken in during the different fixations of each eye on the letters in space.

The linguistic relation that produces meaning — syntax — is constantly changing because of the reader's perceptual activity. The holopoem's 'perceptual syntax' is conceived so as to create a mobile signifying system and thus extend its expressive power to encompass time, since the words are not fixed upon a surface but rather float in space.

Holotexts can only signify upon the active perceptual and cognitive engagement on the part of the reader or viewer. This ultimately means that each reader "writes" his or her own texts as he or she looks at the piece. Holopoems don't rest quietly on the surface. When the viewer starts to look for words and their links, the texts will transform themselves, move in three-dimensional space, change in color and meaning, coalesce and disappear. This viewer-activated choreography is as much a part of the signifying process as the transforming verbal and visual elements themselves.

Language plays a fundamental role in the constitution of our experiential world. To question the structure of language is to investigate how realities are constructed. Holopoems define a linguistic experience that takes place outside syntax and conceptualize instability as a key signifying agent. They blur the frontier between words and images and create an animated syntax that stretches words beyond their meaning in ordinary discourse. Holopoems undermine fixed states (i.e., words charged visually or images enriched verbally) and create a constant oscillation between them.

The temporal and rhythmic organization of holotexts play an important role in creating this tension between visual language and verbal images. Most of the holopoems I created between 1983 and 1993 deal with time as non-linear (i.e., discontinuous) and reversible (i.e., flowing in both directions), in such a way that the

viewer/reader can move up or down, back and forth, from left to right, at any speed, and still be able to establish associations between words present in the ephemeral perceptual field.

Holopoetry promotes new relationships between the appearance-disappearance of signifiers, which constitutes the experience of reading a holographic text, and our perception of the organizing factors of the text. In this sense, visual perception of parametric behavior of the verbal elements heightens awareness of meanings. As readers move they continually shift the focus or center or organizing principle of their experience by looking through dispersed viewing zones. The text they experience stands against the fixity of print, and for the branching of holographic space. Because of their irreducibility as holographic texts, holopoems resist vocalization and paper-print reproduction. Since the perception of the texts changes with viewpoint, they do not posses a single "structure" that can be transposed or transported to and from another medium. The combined use of computers and holography reflects my desire to create experimental texts that move language, and more specifically, written language, beyond the linearity and rigidity that characterize its printed form. I never adapt existing texts to holography. I create works that develop a genuine holographic syntax.

3. Theoretical Issues in holopoetry and the readerly experience

Twentieth century visual poetry evolved having the printed page as its basic structuring agent, as a support upon which ink is laid to form the verbal composition. As a physical surface where the poem is inscribed, the white on the page gained meaning and in most cases contrasted as silence with the verbal inscriptions that often resonated as representations of sounds. Once printed, the verbal sign is fixed on the surface and its signification is bound by the rigidity of the page, very much like a line drawn on a canvas. The comparison with painting is not accidental, because both modern poetry and modern art searched for the specificity of their materials simultaneously, leading to non-narrative poetry and non-figurative art. As modern painting moved away from representation becoming abstract, modern poetry moved away from the linear becoming fragmented. Some poets tried to give a new direction to the ancient "figurative poem" (i.e., a poem in the shape of an object), but this tendency is a minor part of modern and contemporary literary experiments. Even in Apollinaire's oeuvre, shaped words not always signify straightforwardly the subjects of the shapes they were molded into, creating an ideogrammatic tension between the symbolic [verbal] and the iconic [visual].

Among the linguistic conventions of the West is the left-to-right orientation of the reading process, which is an arbitrary representation of the linear chain of spoken

language. This is valid also for the two-dimensional page, which inherited the norm and is read from left to right and from top to bottom. In a sense, the reading from top to bottom follows an ordinary perception of reality, which is regulated by the action of gravity upon elements. A sequence of pages in a book is conventionally read from left to right as well, resembling the chain formed by sequences of words in a sentence. It is impossible not to take into account the limits imposed upon poetic creation by the physical properties of the visual space the poet works with. The poets' challenge is exactly to disregard conventions and to create new codes, moving language beyond the redundant, the verbose and the ordinary. Modern visual poets distributed words freely on the page, or created self-referential structures, sometimes with permutational reading possibilities between the words in the fixed structure. They printed fragments of words, enhancing their visual nature, or made the word an image in itself, always within the perimeter of the immutable page, or the tangible boundaries of firm and stable three-dimensional materials. The immutability and stability of two-dimensional and three-dimensional surfaces conditioned the signifying spectrum of visual poetry thus far.

In a reaction against fixed structures, holographic poetry creates a space where the linguistic ordering factor of surfaces is disregarded in favor of an irregular fluctuation of signs that can never be grasped at once by the reader. This turbulent space, with bifurcations which can take on an indefinite number of rhythms, allows for the creation of what I call textual instability. By textual instability I mean precisely the condition according to which a text does not preserve a single visual structure in time as it is read by the viewer, producing different and transitory verbal configurations in response to the beholder's perceptual exploration. The differences between the holopoem and other kinds of experimental poetry are marked by a set of characteristics that work together to destabilize the text, to plunge it into its specificity as written [text] as opposed to graphic representation [of speech], to create a syntax based on fleeting transformations and discrete leaps.

As Derrida has suggested , no text can be fully controlled by its author, to whom its inherent contradictions and collateral meanings inevitably escape. The precise positioning of [apparently stable] words on the [inanimate] surface of the page gives author and reader the illusion of control, of mastery and command of the text (and often of the exterior reality it refers to). Holographic poetry tries to exhibit the impossibility of an absolute textual structure; it attempts to create verbal patterns with disturbances that magnify small changes in meaning according to the perceptual inquiry of the reader. For example: a syntactical structure can be created in which one could see twenty or more words occupying the same space without overlapping; a word could also transform itself into another word/shape or vanish momentarily. Letters can collapse and reconstruct themselves or move to form other words in a time-reversal transition. These and all other latent expressive possibilities of holopoetry are unique to its grammar and they are only possible in part because its

space, as I create it, is an oscillatory field of diffracting light as opposed to the tangible surfaces of pages and objects. The white on the page which once represented silence is removed and what remains is empty space, an absence of (printing) support which has no primary symbolic value. The vacuous gaps between words and letters do not represent positively absence of sound, because the photonic inscriptions don't stand essentially for its presence. We are in the domain of spatiotemporal writing, four- dimensional writing, where spatial gaps don't point to anything except for the potential presence of graphemes. The voids are not to be "seen", unlike the white on the page. They are, to take Derrida's words literally, an interplay of absence and presence.

Needless to say, for the written word AIRPLANE, for example, to refer to [to mean] the vehicle that transports people and objects by air, it must belong to the proper textual and cultural contexts and its letters must be perceived by our senses in the proper sequence. The word that results from the sequence of letters must remain visually constant. In visual poetry, the verbal sign has been subjected to a number of graphic treatments that contributed to extend the meaning of words beyond their conventional associations. But once a printed word is sliced, fragmented and/or incorporated into a collage, it cannot escape the immutability of the final composition. The dissolution of the solidity of the poetic space, which makes the discontinuous syntax of holopoetry possible, also affects the signifying units of the poem, i.e., the word and the letter. One of the elements of holopoetry, which nevertheless does not necessarily appear in all holographic texts, is what I call fluid sign. It is essentially a verbal sign that changes its overall visual configuration in time, therefore escaping the constancy of meaning a printed sign would have as described above. Fluid signs are time-reversible, which means that the transformations can flow from pole to pole as the beholder wishes, and they can also become smaller compositional units in much larger texts, in which each fluid sign will be connected to other fluid signs through discontinuous syntaxes.

Fluid signs create a new kind of verbal unit, in which a sign is not either one thing or another thing. A fluid sign is perceptually relative. For two or more viewers reading together from distinct perspectives it can be different things at one time; for a non-stationary reader it can reverse itself and change uninterruptedly between as many poles as featured in the text.

Fluid signs can also operate metamorphoses between a word and an abstract shape, or between a word and a scene or object. When this happens, both poles reciprocally alter each others' meanings. A transfiguration takes place and it produces in-between meanings that are dynamic and as important in holopoetry as the meanings produced momentarily at the poles. The meanings of in-between configurations can not be substituted by a verbal description, like the word AIRPLANE can be substituted in the proper context by its definition [i.e., "the vehicle that transports people and objects by air"]. Neither can they be replaced by a synonym or a specific word, as gray suggests

a specific intermediary position or meaning between black and white.

In holopoetry transient clusters of letters or ephemeral shapes that lay between a word and an image aim to dynamically stretch the poetic imagination and suggest meanings, ideas and feelings that are not possible to convey by traditional means. Holopoetry establishes a syntax of disruptive events; an animated language that evades and deflects interpretation. Holopoetry is not possible without propagating light as the medium for interactive reading/writing. In holopoetry, texts are signifying networks animated by motion scripting and discontinuous word apparitions.

4. Writing holopoems

From 1983 to 1987 I pushed the limits of optical holography, writing poems that for the first time introduced in the field of poetics compositional elements such as pseudoscopy, discontinuity, luminous dissolution, three-dimensional juxtaposition, spatial compression, integral animation, color instability, and digital synthesis of impossible spaces. The body of work I developed during this phase was shown in solo and group exhibitions. As a consequence of my search for a turbulent space that is prone to mutability, I began experimenting in 1987 with a new kind of text I call digital holopoetry. Because I write digital holopoems in a process of stereoscopic synthesis, as opposed to the method of optical recording I used for most of my other holopoems, they allow me to manipulate each element of the text with more precision. The writings techniques I have developed allow me write texts in which the viewer, just by looking at words and letters, dislocates them from their position in a space zone. The unsettling choreography of my previous texts gains a new motion factor in addition to the "quantum leaps" and the optical fusions that occurred before between two or more zones in space. I can now write pieces in which the reader perceives animated fragmentations and actual metamorphosis within a single zone, or I can incorporate these and other new possibilities into hybrid poems that integrate the optical and the digital. With digital holopoems I extend the solubility of the sign to the verbal particles of written language, the letters themselves, widening the gamut of rhythms and significations of the text.

My writing process can be outlined as follows: 1) generation and manipulation with digital tools of the elements of the text on the simulated space of the computer "world" by means of a raster or vector-based software (this step could also be referred to as the modeling stage); 2) study and previous decomposition of the multiple visual configurations the text will eventually have; 3) rendering of the letters and words, i.e., assignment of shades and textures to the surface of the models (texture maps can be invented at will and shadows can be avoided in situations where they would necessarily exist if we were dealing with tangible models); 4) interpolation, i.e., creation of the animated sequences, which are now stored as a single file on the

memory of the computer (this stage could also be referred to as "motion scripting");
5) exportation of the file to an animation software and editing of the sequences (including post-manipulation of the elements of the text); 6) frame-accurate sequential recording on film of the individual scenes, which correspond to discrete moments of the text (this can also be done with an LCD screen);
7) sequential recording of the individual scenes on a laser hologram and
8) final holographic synthesis achieved by transferring the information stored on the laser hologram to a second hologram, now visible in white light.
In this process, film is used only as a temporary storage medium (due to its high resolution). It is intrinsic to the method of film the projection in theaters of one and only one frame at a time. All frames are projected in the same space, one at a time, in a rapid succession. The audience perceives exactly the same frame with both eyes. In three-dimensional film, two frames are projected in the same space at one time. Both frames correspond exactly to the same moment, but from discrete points of view. The audience perceives one frame with one eye, and the other frame with the other eye, thus forming a stereoscopic image. In holopoetry, all frames occupy the same space, all at the same time, and are not projected but suspended in the same space. They are only perceived if the viewer moves relative to the hologram. Frames can correspond to: 1- the same frozen moment or three-dimensional space as seen from different points of view; 2- different moments of an action; 3- completely different images corresponding to disparate spatiotemporal references. These possibilities create new reading and writing strategies.
The writer that works with holography 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. 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.

5. Holopoems

Holo/Olho (Holo/Eye), the first holopoem (1983), is a combination of anagrams in which the word "holo" mirrors "olho" and vice-versa. The mirroring effect, however, was conceived so that fragments of the poem would contain enough letters to form both holo and eye. The arrangement of letters in space was holographed five times; each hologram was fragmented and the five holograms were reassembled in a new visual unit. This holopoem recreated, in its own syntax, a structure that corresponds to the holographic model, according to which the information of the whole is contained in the part and vice-versa.

Then came Abracadabra, a holopoem created between 1984 and 1985. This work illustrates well the concept of discontinuous space, because precise control enabled me to predetermine the region in space where each letter was to be placed, as well as the specific angles at which they would become perceptible. Thus, at no time can the reader simultaneously perceive the complete set of letters that make up the word: one is forced to read discontinuously, in broken fashion. In this holopoem, the letter A, which symmetrically structures the word AbrAcAdAbrA, was image-planed (with part of the image in front of and part behind the plate) in the center of the visual field, while the consonants were placed around it (B and C as real images; D and R as virtual images) as if the vowel were an atomic nucleus and the consonants were the particles orbiting around it.

I created the holopoems Oco and Zyx in 1985. Oco employs two holograms, one with the letter I and the other with the word OCO. The first is displayed in front of the second, multiplying reading possibilities. In Zyx I used the three letters that name the axes of three-dimensional space to form new, nonexistent, bizarre-sounding words. The actual work is a set of fragments against a reflecting background that duplicates the reader's face inside the hologram and presents the letters X, Y and Z in discontinuous fashion. In this holopoem, the volume of each letter dissolves into colors.

In 1986 I made three new pieces. In the holopoem Chaos the letters C, H and A are distributed in pseudoscopic space (space where the image is inverted, inside out — the opposite of orthoscopic space), so that they move in space in a direction opposite to that of the reader's movement. This work opens the possibility of a letter changing into an abstract color image and vice-versa, for pseudoscopic space does not respect optical conventions regarding the proportion and conservation of forms. The letters S and O complete the reading in absentia, eliciting SOS from the word CHAOS. Other intertextual possibilities may emerge, such as the words "só" and "ossos" ("alone" and "bones" in Portuguese, respectively).

Also in 1986, I made the holopoems Wordsl No. 1 and Wordsl No. 2. The first is an experiment in optical anamorphosis: the letters of the words "world" and "words" were holographically combined into a new word, WORDSL, and placed in a 180° arc around my head. This information was transferred to a 90° hologram, through a process of contraction in virtual space (space within the hologram) that changed the forms of the letters; some of the letters, however, seem to go around and behind the hologram, reappearing in their proper proportions in real space (space in front of the hologram) . The curvature itself of the integral hologram (so called because it integrates motion pictures and holography and because it recreates the integral movement of a scene) is the cause of this phenomenon. This relates to the topic of visual deformation in variously curved spaces, which was investigated by Georg Riemann in 1854 in his non-Euclidean geometry and which greatly interested avant-garde artists early in this century .

Wordsl Nº 2 displays the same verbal material, only this time in a space that is both real and pseudoscopic. This piece proposes a reading in a succession of vertically oriented strips (from the bottom up and vice-versa), a sort of scanning instead of a global sighting of the scene or object.

In 1987, I created the holopoem Quando? (When?), in which a monolithic abstract shape rotates around its own axis, alternately disclosing and concealing the words of the text as it spins .

I created a 360° hologram, but not a 360° image that is seen as one sees a sculpture or an ordinary object. The monolithic fractal object rotates to accomplish almost two full turns inside the hologram. It thus widens the 360° space to nearly 720°. This gives rise to a perceptual paradox only made possible by holography: although one sees a 360° Plexiglas cylinder inside which there is a 360° holographic film, the fractal turns and multiplies the holographic space.

The text was conceived so that it could be read at any angle, but there is a basic structure that allows it to be read either clockwise or counterclockwise. Counterclockwise the viewer reads A LUZ / ILUDE / A LENTE / LENTA / MENTE (the light/deceives/the lens/slow/ly); clockwise the text is A LENTE / ILUDE / A LUZ / MENTE / LENTA (the lens/deceives/ the light/slow/mind). Other readings, just as valid as these, may arise, for instance, A LUZ/ MENTE / LENTA / A LENTE / ILUDE (the light/lies [i.e. tells lies]/slow/the lens/deceives). In Portuguese, the adverb lentamente (slowly) is made up of the adjective lenta (slow) and the adverbial suffix -mente (-ly), which as an autonomous word may mean either 'mind' (noun) or 'lies' ('tells lies').

These words never appear all at the same time; they become visible as the fractal turns inside the hologram and restructures its space. The words float before the fractal, and every time it turns, a new one appears. It is the fractal that causes the passage from one word to the next. As the fractal turns and passes from one word to the next, the words, which are legible when viewed frontally, are seen sideways, thus becoming illegible. They are seen as abstract forms. In this case, the text loses its verbal meanings and the entire set changes into a nonverbal form; thus the revolving fractal makes the viewer see a text in a reversible process. As the fractal turns, the boundary between word and image is assigned to time. For instance, the viewer will read, depending on his or her perspective at the moment, the adverb lentamente (slowly) or see it change into the noun mente (mind) and the adjective lenta (slow). From a third point of view, one can read mente as a verb preceded by a luz: a luz mente ('light lies', in the sense of 'tells lies').

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While still living in Rio de Janeiro, Brazil, I produced seven holographic poems, from Holo/Olho (1983) to Quando?(1987/88). These early pieces were made either in Brazil or in the US. In 1989 I moved to Chicago, where I was able to work and experiment on an ongoing basis. Below I describe briefly the poems I made in Chicago.

My first piece in Chicago was Phoenix (1989), a poem composed of only one letter that draws attention to its visual properties instead of representing a particular sound. Designed with ambiguity, the letter W might be perceived as a stylized bird with open wings. It floats in front of the holographic film plane (20 inches away from it) and is transfixed by a vertical open flame that can be read as the letter I and which moves randomly according to air currents. The laser transmission letter-image produces a curious harmony with the actual flame, suggesting perhaps that we are as fascinated by laser images today as the primeval man was by fire. Where the laser red meets the blue flame, a hybrid magenta is perceived.

Conceived in collaboration with Richard Kostelanetz, the holopoem Lilith (1987/89) employs words in French and English to comment upon the legend that gives it its title . In Jewish popular etymology, Lilith means "devil of the night". Its understanding as the "female devil" has Babilonic roots, but Lilith also stands for any myth of "female devils". In Jewish mystic literature, she is the Queen of the Demons. According to another legend, still, she was the first wife of Adam. As opposed to Eve, Lilith was not created from Adam's body and therefore was totally independent of him. According to this legend, it was only after Lilith left Adam that Eve was created. In traditional cabalistic literature — until recently a male-dominated field — she is the symbol of sensuality and sexual temptation. The transformations that take place in the poem between the words HE, EL (short for "Elohim", or "God"), ELLE ("she" in French and mirror image of EL) and HELL are meant to unveil and criticize the bias that surrounds the myth of Lilith, product of a male dominated culture creating God in its own (male) image.

Three pieces that followed, Albeit (1989), Shema (1989) and Eccentric (1990), approach the issue of structuring a text in discontinuous space in three different ways. Albeit is composed of five words that are duplicated and fragmented in space by means of fourteen masters (the counterpart of "negatives", in photography), so as to produce a dense configuration built upon layers of small color fields and the empty spaces between them. The words are read almost in stroboscopic manner from different viewpoints, multiplying meanings and paralleling, in the process of fragmentation, the contradictory reference to time that the text signifies. The word "take", for example, can be perceived as a verb ("take your time") or as a noun ("your take is over") - a syntactical fluctuation that is instrumental in the textual instability of holopoetry. The word "time", in another instance, can be a subject, as in "time take(s) over", when the letter "s" is read in absentia. But it also can be a direct object, as in "take your time".

Shema is structured with verbal signifiers floating in three expanded color fields that interpenetrate each other, creating a transitional discontinuity between them. The text is in Hebrew and is composed basically of four words and one big letter. The letter modifies the four words to suggest four new words — depending on the viewer's decisions as s/he moves in front of the piece. In this sense, the word "maim" (water) may be modified by the letter "shien" (S), to produce "shamaim" (sky, heaven). The word "mavet" (death) may be modified by "shien" to suggest "Shmvot" (Exodus). The word "mah" (why?, what?), may be modified to form "shamah" (desolation, destruction). At last, the word "mash" (to trough off, to remove) may become "shemesh" (sun). The possible eight words produce an atmosphere of associations, suggesting feelings about death and emotional loss. The piece is dedicated to Perla Przytyk, in memoriam.

As with the words in the two previous texts, the basic nine words in Eccentric ("shadows", "sounds", "smells", "nos", "nevers", "nothings", "that", "memories", "erase") can never be seen simultaneously in space. But this time, the viewer can not even perceive the words when he or she looks at the piece from a central position. In order to perceive each word, the reader must invent his or her own topological code. One must look for the words diagonally and decide if he or she will read looking up or to the left alternately or successively, or down and to the right concurrently. The crisscrossing invisible narrow viewing zones that form the poem allow for a highly turbulent syntax. Adverbs ("nevers", "nos") are found in unusual plural form to stretch their meanings and nouns in the plural ("sounds", "smells", "shadows") can be read as verbs in the present tense of the third person singular. The very configuration of the letters within each word suggests different interpretations, like the noun "nothings" implying the phrase "not this sign". In parallel configurations, the pronoun "that", for example, can become a conjunction ("nos that shadows erase"), a deitic pronoun ("smell that nevers"), an adjective ("that shadow(s) that nothings erase"), or a subject ("that sounds memories").

Amalgam (1990) is composed of two sets of two words each ("flower-void" and "vortex-flow"), and each set blends into the other as the viewer tries to read the text. The reader sees the visual transition between the sets as an attempt to produce a semantic transition as well, so that the in-between shapes indicate in-between meanings. In other words, when the left eye sees one set and the right eye sees the other set simultaneously (as opposed to both eyes perceiving slightly different viewpoints of the same set), the viewer is actually seeing a transitional verbal sign that possesses transitional meanings. This is what I call binocular reading. Normally, left and right eyes see, say, the letter A, from their respective viewpoints. Here, for example, the left eye could see the letter A, but the right eye sees at the same time the letter B instead. Both eyes try to force a synthesis that is deterred by the retinal rivalry. Within this process, a complementary reading strategy can be implemented: nouns

can be interpreted as verbs as in "flow (and) vortex void flower", or "flower (,) void (and) vortex flow".

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The first digital holopoem I created in Chicago was Multiple (1989), in which the sequence of numbers 3309 is seen floating in space. As the viewer moves past the numbers, they rotate around a pivot point, changing to an abstract pattern and then to the word POEM (and vice-versa); at first the three-dimensional form remains the same as it would if it were a regular object — but then it changes. Parallax is responsible for the production of meaning, which is based on the triple function of the sign (word-image-number). This piece translates a characteristic of the Hebrew alphabet (in which letters also stand for numbers) into the Latin one.

Souvenir D'Andromeda (1990) is composed of a single word, which is also perceived as a set of abstract shapes depending on the beholder's viewpoint. If the viewer reads the word LIMBO at first, as he or she moves, the word rotates (crossing from virtual space to real space and vice-versa) and comes apart (as if it were exploding). As this happens, the fragments of the word, which are not legible anymore, are now perceived as pure visual forms. This process is reversible in space and time.

If the fragmentation of a sound still produces phonetic resonances, the fragmentation of a letter produces visual shapes — a process that exhibits the graphic nature of written language as opposed to the phonetic nature of spoken language. The word LIMBO connotes "oblivion", "suspension" and "nothingness" in several languages — meanings which are enhanced by the visual process of fragmentation.

In Omen (1990) the word EYES floats and spins, emerging and dissolving in a space defined by luminous smoke. This spinning of the word happens so as to make the letter E, as seen from a specific viewpoint, vanish into the smoke before the whole word does, making the reader perceive the word YES at the edge of legibility and suggesting the word SEE. The smoke is charged with ambiguity, because it is perceived both as an element that blocks vision and as a transparent medium. Through this orchestrated motion, it is my intention to create a metaphor that expresses the hazy vision of a future occurrence .

In the three pieces mentioned above I explored movement, but did not work with syntactical discontinuity as I have done in other texts, such as Abracadabra, Albeit and Eccentric. My interest in writing motion texts with irregular syntactical links in a heterogeneous perceptual field lead to three new pieces produced in 1991.

Adrift is composed basically of seven words that dissolve in space and into each other as the viewer reads them. In one case, the reader may be invited to start reading from the letter which is further away from him or her. In another case, the letter closer to the reader could be the starting point. The reading process occurs back and forth along the Z axes. This piece is also an attempt to work both with the optical and digital,

trying to make one lend its properties to the other. The letters that make the words are floating irregularly along several Z axis, except for the word "breathe", which is integrated into the overall light field. This word is blown by an imaginary wind as its letters actually move away from their original position to dissolve again in the light field. The movement of the letters in this word disrupts the apparent stability of the other words.

The next holopoem I made in this new series is Zero, in which words grow or shrink, or turn and break, to express the drama of an identity crisis in a future world. Rotations, fusions and other actions make the words emphasize their relations and meanings in space. The multiplicity of "selfs" that would be inexorable with the proliferation of cloning is the ultimate theme of the poem, but for a more attentive reader the answer for the enigma could be found in words residing in other words.

In Adhuc, the third in the series, as the viewer moves relative to the poem trying to read it, he or she perceives the manifold choreography of the basic words of the piece ("whenever", "four years", "or never", "far eve", "forever", "evening"). All the words refer to time in varying ways, contributing to an overall vagueness that could resist assessment at first sight. The muddled interference patterns that blend with the words help to create an atmosphere of uncertainty, not only concerning the visibility of the words but also about the meanings they produce.

Astray in Deimos (1992) explores metamorphosis as its main syntactical agent. Deimos ("terror") is the outer, smaller satellite of Mars. The piece is comprised of two words rendered in wireframe (EERIE and MIST), which are seen through a circle of predominantly yellow light. Surrounding this scene is a web-like landscape made of shattered glass, which partially invades the yellow light circle. The circle may represent Deimos as seen on the sky from the ground, or a crater on the surface, or even a spacecraft window through which one may look down at the spacescape.

As the viewer moves relative to the piece, he or she perceives that each line that renders the graphic configuration of each letter starts to actually move in three-dimensional space. The viewer then perceives that as the lines and points go under an actual topological transformation, they slowly start to reconfigure a different wireframe letter. What was read as an adjective is becoming a noun. I call this semantic interpolation. If the viewer happens to move in the opposite direction, the noun is transformed into the adjective. The shifting of grammatical forms occurs not through syntactical dislocations in a stanza, but through a typographic metamorphosis that takes place outside syntax.

In the process of transformation the intermediary configurations of the letters, which do not form any known words, evoke in nonsemantic fashion meanings that are conceivably intermediary between the two words (EERIE and MIST). The point here is that this metamorphosis allows the text to suggest other meanings beyond the two words located at the extreme poles of the process. The viewer has to read the transformations without trying to extract semantic meaning from the nonsemantic

forms. These in-between verbal signs attempt to communicate at the level of abstract visual signs which have no extra-pictorial reality, at the same time that they operate under a specific framework provided by the words at the poles (EERIE and MIST). This can be very difficult at first because it escapes our common expectations about how language operates. For example: if I refer to the colors "black" and "white", I can think of a third term that will clearly define an intermediary color, that is, "gray". This precision becomes impossible, for example, if I refer to the words "knife" and "light". There is no common word that can define an intermediary state or concept between the two nouns. Only in poetry this is conceivable. In Astray in Deimos the metamorphosis between EERIE and MIST has the same emphasis that the two individual words have, without forcing the intermediary shapes to refer to extra-linguistic qualities or things in the way the two words do.

Astray in Deimos can be interpreted as a spatial haiku of sorts. Its natural subject is the landscape of Deimos, one of the two moons of the red planet. This holopoem is imaginarily written by someone who has visited Deimos, which so far is only known to us through photographs shot by the Mariner and Viking orbiters. The attentive reader will notice that if the word MIST is perceived first, followed by EERIE, a phonetic link between the two words suggests a third one: mystery.

Havoc (1992) is composed of 39 words distributed in three panels. The viewer can start reading from left to right or vice-versa, or even start in the center and move in the desired direction. The left panel has fourteen words (NOW, IS, IFS, AND, AIRS, ARE, MIST, BUT, PENS, ARE, THOUGHTS, IF, JAZZ, IS, TOUCH, SO, SPLASH, JUMPS, DRY), the center panel has one word (WHEN), and the right panel has fourteen more words (SHE, IS, HE, IF, FACES, ERASE, SMILES, BUT, THENS, SAY, MEMORIES, ARE, AIRPORTS, LIKE, DROPS, UNDER, MOONS, OF, MAZE).

The verbal material in the left and right panels is organized vertically in three-dimensional space. I used two different type faces in this piece. When a row has two words, one word is written with serif and the other without, creating an alternating visual rhythm. The color of the word(s) in one row is different from the color of the word(s) in the other row, but identical to the color of the following row, and so on. As in most white-light transmission holograms these colors are never stationary, but the relative chromaticity is preserved regardless of the viewpoint of the observer. This color modulation extends the rhythm created by the font selection and helps interweave the words visually.

As the viewer moves relative to these two panels, which are usually seen one at a time, all the words in them twirl simultaneously, as if drowned by a violent vortex. The words lose their graphic stiffness. They stretch, deform and contort themselves. As the words collapse they blend into one another becoming absolutely illegible. They form swirling patterns at the edge of the viewing zone and, if the viewer moves in the opposite direction, they return to their temporary state of rest. The opposite rotation of

the words in these panels resembles the equally opposite water vortices seen at the northern and southern hemispheres. This fluid visual metaphor is an important element of the piece.

The center panel has a different behavior. An abstract shape morphs into the word (WHEN) which morphs again into an abstract shape, placing the word at the transitory position preserved in other pieces for the nonsemantic in-between shapes. But instead of the smooth metamorphic transition created in Astray in Deimos, for example, the word WHEN goes through a compressed and violent process that generates time-smear. Time-smear occurs when the viewer perceives simultaneously two discrete points in the trajectory of a letter or word separated in time. One point can be the "present" or the "future" in relation to the other and the converse, which is to say that both are suspended in time nonsequentially. This unconventional concept translates itself visually into ever unfolding amalgams of images which are perceived as oscillations by a non-stationary viewer. The abstract shapes and the word are decomposed at the boundary of legibility. Surrounding this shifting scene are semi-curved light forms that change and fluctuate. The convex sides of these wave-like diffused semi-circles face outwards, as if placing now and then the word WHEN in a perpetually moving fluid parenthesis.

The title of my next holopoem is Zephyr (1993), which means "a gentle breeze". In this piece a relationship of semantic equivalence is created between word fragments and images seen in transition. It employs particle animation and synthetic water ripples. Particles and ripples are disturbed by an invisible air flow which is imaginarily caused by the reader as he or she moves in front of the piece. As the reader explores the work, verbal and visual elements move and change, making a statement about the fragility of the human condition. The letters in this piece form a word inside another word, one being affirmative (LIFE) and the other seeming to question its assertive character from within (IF). As the viewer moves relative to the piece, it oscillates between preserving these oppositions and solving them by blending the opposite terms. Due to the mutability of forms and the unstable behavior of words in space, viewers have read other words (LONE, LOVE) in this piece also.

As the viewer moves relative to the piece, he or she perceives that the letters are made of minute particles, and that these particles fly towards the viewer – as if they had been blown in the air. A three-dimensional cloud of particles is formed in space. If the viewer moves in the opposite direction, this cloud flies away from the viewer and reconstructs the letters, as if the viewer had blown them away from him or her with his or her own gaze.

The word IF is projected on synthetic water. I disturbed the synthetic liquid surface where the word is projected in order to record visual oscillations of the word. The meaning of doubt raised by the word IF is reinforced by its wavy motion, since the word is perceived as word or abstract pattern depending on the momentary position of the viewer in relation to the holopoem.

All letters are integrated into one entity, but they also dissolve into one another. Looking at Zephyr, the reader finds buoyant words, as if the particles and the ripples were relying for their movement on the vagaries of air currents and the displacement of small air masses caused by the movement of the viewer himself or herself.

My most recent piece, Maybe Then, If Only As (1993), is a subjective statement about what I see as the relationship between the elusiveness of language and the unpredictable and turbulent behavior of nature. The piece involved the recording of three separate space-time layers of information

The first contained three words: WHERE, ARE, WE?. The letters in the word WHERE spin and visually dissolve into falling "snow flakes". The words ARE and WE? are underneath WHERE and are skewed as the process described above takes place. These two words are partially covered by the "snow flakes" of WHERE.

The second layer contains the following words: HERE, WE, ARE, THERE, INK, INSTANTS, AND, WHY?. These words can only be seen from discrete points of view and were subjected to other animated processes. The A in ARE spins away from the viewer into holographic space and the other letters move up to suggest WERE. The first four letters in the word INSTANTS slowly disappear leaving ANTS to be perceived at the edge of legibility. The word WHY? is seen flashing at different moments, in different positions, across the space and in jerky fashion, as a graphic echo. These relationships are suggested when the viewer perceives the words breaking down and reconstructing other words in the immaterial holographic space. The words are perceived only for a brief moment and are interrupted by the presence of other animated words.

The third layer was used to record dry branches coming out of the film plane and reaching out to the viewer. The branches were recorded against a background of light generated patterns that subtly evoke the forms of clouds.

6. Holopoetry and the future of experimental poetics

Holopoetry defines a new domain of poetic exploration where the text is written with the malleable medium of light, where the word is free from surface constraints, where textuality is signifiers in motion. In a holopoem, the verbal phenomenon cannot be dissociated from the spatiotemporal environment of the optical and synthetic hologram.

If one is concerned with the development of a new poetry for the digital age, it is important to write visual poetry in a medium different than print, a medium that is fresh and the conventions of which are yet to be invented. To me, holography is such a medium, but I must point out that the use of new media does not constitute, by itself, a standard of quality or of authentic contribution to the repertoire of experimental writing. For example, if someone uses holography simply to reproduce a poem that was fully realized in another form (verse, graphic, etc.), he or she is not creating what

I call a holopoem.

In Western societies we are all used to electronic texts on television performing the most elaborate pirouettes on the screen. A golfer hits a ball and letters announcing a tournament are scattered on the screen. An electric shaver follows a path made of text about the product, "shaving" the text in the process. Logos fly onscreen to sell the visual identity of large corporations, and so on. The dynamic use of language that we are used to on television promotes most often redundancy, commodification, and banalization.

The new generation of poets belongs to the media culture. They breathe television, video, videophones, computers, virtual reality, CDs, CD-ROMs, telepresence, holography, and the Internet. In a literary culture still dominated by print, the author of experimental poetry that can only be read in electronic or photonic media will encounter many problems in trying to reach the audience (however small this audience might be). Regardless of these problems, or perhaps because of them, it is this generation's challenge to create dynamic electronic and photonic texts that recover the conceptual power and the mysterious beauty of languag