

HOLOPOETRY

Essays, manifestoes, critical
and theoretical writings

Eduardo Kac

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1995

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Prefácio

Este livro reúne textos que apresentam este novo tipo de poesia visual que introduzì em 1983. Os textos selecionados aqui recolhidos foram reproduzidos, em sua maioria, na língua em que foram originalmente publicados. Estes textos tem por objetivo esclarecer as questões básicas da holopoesia e documentar obras que de outra forma seriam de difícil acesso.

Espero que este livro sirva como encorajamento ao leitor para que este se interesse por ler os holopoemas eles mesmos. A teoria não substitui os poemas. Tampouco ela os antecipa; antes, ela se desenvolve e muda com eles. A teoria é o resultado direto das experiências textuais, e também uma arena na qual o poeta exercita a reflexão sobre seu trabalho.

Então, se este livro cumprir seu objetivo, onde pode o leitor ver os holopoemas? A esta altura, apenas em exposições individuais ou de grupo em museus e galerias. Espero que no futuro – devo dizer, no futuro próximo – seja possível a publicação de um livro de holopoemas. Até lá, que o presente livro seja uma introdução e um convite ao leitor para que explore a escritura holográfica.

Preface

This book contains texts that document this new kind of visual poetry I introduced in 1983. Most of the selected texts collected here are reproduced in the language they were first published.

These texts aim at clarifying the basic issues addressed by holopoetry. The book also aims at documenting pieces that otherwise might be very difficult to access.

A book like this, it is my hope, will serve as an encouragement for the reader to see the actual holopoems. The theory by no means replaces the poems. The theory does not anticipate the texts either; rather, it evolves and changes with them. The theory is the direct result of the textual experiences, and also an arena where the poet exercises his thinking about his own work.

So, if this book fulfills its role, where can the the reader see the actual holopoems? At this point, the reader will see them only in group and solo shows in galleries and museums. I hope that in the future – shall I say, in the near future – the dream of a whole book of holopoems will come true. Untill then, may this book be an introduction and an invitation for the reader to explore holographic writing.

Eduardo Kac

Chicago, 1993/Lexington, 1995

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Poesia Holográfica: as três dimensões do signo verbal

Eduardo Kac

Lá pelos idos da primeira década do nosso século, no turbilhão dos movimentos de vanguarda, o desenvolvimento da linguagem cinematográfica levou Guillaume Apollinaire a afirmar que a era da tipografia havia chegado ao fim e que no futuro o poeta conheceria liberdades que naquele momento não eram sequer imagináveis.

Se o famoso poeta calígrafo-cubista pecou ao ser taxativo sobre a futura simbiose entre a poesia e as artes gráficas, não se equivocou ao sentenciar profeticamente que a poesia ainda seguiria rumos imprevisíveis. Da mesma forma que a galáxia de Gutenberg provocou profundas alterações na cultura humana e a eletrônica, em plena era da telemática, é responsável igualmente por mudanças radicais — a holografia traz um contundente questionamento das formas convencionais de percepção visual e, ao introduzir um método de registro tridimensional, abre possibilidades totalmente novas nos campos da expressão artística e do conhecimento científico.

Com as experiências levadas a cabo no século XX pela poesia visual, a consciência da página impressa e o conhecimento dos inúmeros recursos gráfico/visuais levaram este código bidimensional a um ponto de saturação. Isto não significa, contudo, que não se possa fazer excelentes poemas visuais. Antes, ao contrário: o máximo que se pode realizar neste terreno são excelentes poemas. E ao poeta cabe ousar, conquistar o desconhecido, habitar a terra-de-ninguém onde as novas linguagens nascem e se multiplicam.

Com as vanguardas, a palavra conheceu seu momento máximo de liberdade na página, distante das amarras da linearidade aristotélica do verso. Mas o poeta do pós-moderno quer libertar a palavra da página, longe dos grilhões da bidimensionalidade da página impressa do poema visual. Como? Através da holografia, ou melhor, através da imagem real. A imagem holográfica pode ser virtual (atrás do holograma) ou real (na frente do holograma); ou ainda parte real, parte virtual, como se o filme holográfico seccionasse a imagem. Isto permite que o leitor abra um livro de poemas holográficos e o poema propriamente dito esteja flutuando no ar a 50 cm de distância da página, por exemplo. Sim, porque a holografia pode ser impressa com grandes tiragens e baixo custo — o que fará dela indubitavelmente a forma de impressão do futuro.

Ao conceber o poema, o poeta deve estudar todas as possibilidades combinatórias entre as letras (objetos tridimensionais) e os ângulos de visão do espectador (paralaxe), que se norteiam vertical e horizontalmente. Ou seja, o layout de um holopoema se constitui da formulação das diversas formas de percepção que o espectador terá, levando-se em consideração o grau da paralaxe do holograma.

Neste sentido, surge uma nova sintaxe visual que, em oposição ao branco mallarmaico, articula o poema a partir de volumes invisíveis, buracos negros tridimensionais. É por esta razão que o poema adquire independência do suporte e, pensando ainda em termos de imagem real, permite que o espectador passe a mão entre a página e a sua projeção holográfica.

Digo “espectador” no lugar de “leitor” porque o poema desencadeia uma decodificação perceptual incomum. O poeta também não “escreve”; ele cria o design, esculpe a matriz e holografa o objeto. No lugar da caneta, da máquina de escrever, ou da Letraset, o laser (Light Amplification by Stimulated Emission of Radiation).

Meu primeiro poema holográfico foi realizado em dezembro de 83, com Fernando Eugênio Catta-Preta, em seu laboratório, em São Paulo. O anagrama paronomástico HOLO/OLHO foi holografado (caixa alta, corpos grandes e pequenos) quatro, cinco vezes. Depois criei uma espécie de holocollage, fragmentando e remontando as quatro imagens pseudoscópicas do poema. A imagem pseudoscópica é o avesso da imagem que reproduz o objeto assim como foi holografado (ou imagem ortoscópica).

Desta forma, o poema é a interpenetração tridimensional das palavras esculpidas em luz. Cada fragmento é concebido simetricamente a formar uma leitura em círculo: as duas palavras possuem quatro letras e as duas primeiras letras de “OLHO” (corpos pequenos) formam “olho” com as duas primeiras letras de “HOLO” e as duas últimas formam “holo” com as duas últimas de “HOLO” (corpos grandes). Isto sem falar na iconização dos dois pares de “O”, que sugerem ideograficamente os olhos humanos.

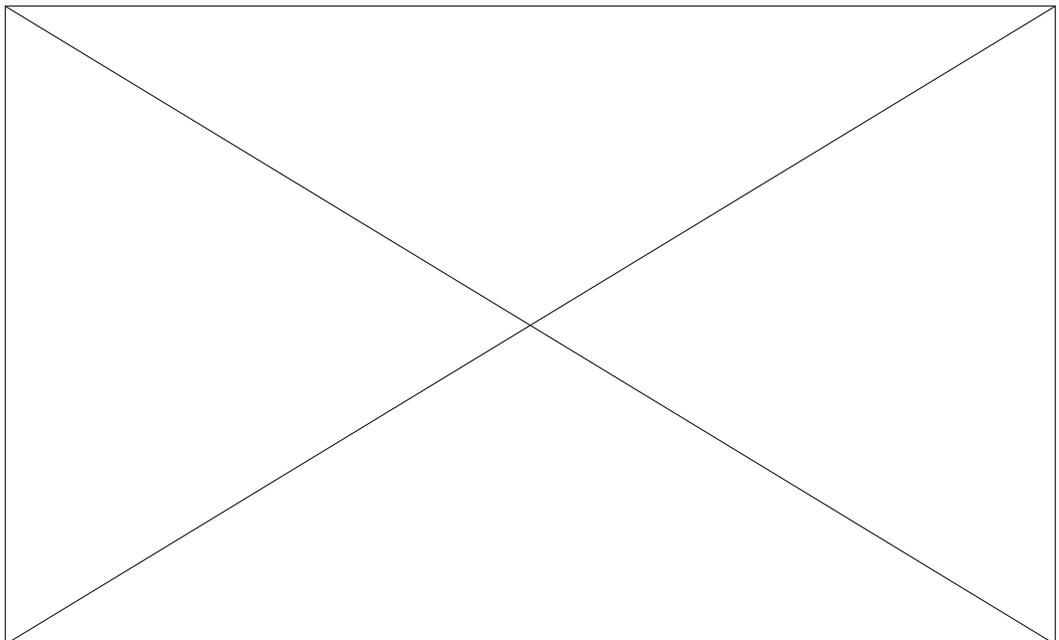
Através de uma instalação com luminárias é possível fazer com que as letras fiquem em movimento constante (holokineticismo), enquanto o espectador pode, se quiser, permanecer parado e observar o comportamento do poema. As possibilidades, enfim, são infinitas.

Mesmo diante das evidências, ainda há os que criticam ceticamente a *electronic art* e que pensam que a holografia é apenas um modismo. Mas ela é uma realidade e não veio para trazer messianicamente respostas. O poeta do século XXI trabalha a linguagem holográfica e busca perguntas. O que ele quer ninguém sabe.

A poesia é um enigma tridimensional.

Holo/Olho (1983),
by Kac and
Catta-Preta.

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published in the
catalogue of
*VII Salão Nacional
de Artes Plásticas*,
1984, Museu de
Arte Moderna,
Rio de Janeiro,
pp. 43-44.



Poesia Holográfica: a ruptura fotônica

Eduardo Kac

Se a prensa tipográfica foi inventada no século XV, e a poética dela originada no fim do século XIX e no XX, a holografia surgiu, conceitualmente, em 1948, através do Prêmio Nobel de física (1971) Dr. Dennis Gabor, e, visualmente, em 1963, quando Emmett Leith e Juris Upatnieks, três anos após a invenção do raio laser, tornaram públicas suas primeiras imagens de reconstrução laseriana. A holografia, portanto, tem pouco mais de vinte anos e a poesia holográfica, que lancei no Brasil, com Catta-Preta, se apresenta, até onde chega minha informação, como o primeiro projeto mundial de elaboração das tensões holográficas na formulação da linguagem. Friso a palavra *projeto* porque meu empenho é o desenvolvimento desta nova poética, tanto a nível conceitual quanto prático, já estando concluído o segundo poema holográfico criado no Brasil (Kac/Catta-Preta), iniciado em janeiro de 1984.

Trata-se de ABRACADABRA, que até o presente momento não foi levado a público. Este poema parte de e se realiza numa releitura desse signo criptográfico cabalístico que os sábios judeus da antiguidade caligrafavam com funções místicas em forma triangular, a partir da supressão sistemática da letra da extremidade da palavra, sendo esta em sua forma integral a base da figura e a letra restante o seu vértice. Resgatando esta minha atávica tradição milenar, o holodesign do poema surge em função da sua leitura estatística, estruturada num eixo horizontal-linear, formado pela letra **A** (correspondência latina das letras hebraicas “alef”, “ain” e “hei”), que incide, simetricamente, nos limites da palavra e no seu interior (no português, esta corporificação se dá a nível gráfico e fonético; no hebraico, apenas a nível fonético). Desta forma, operei uma supressão lexical e uma redução holossintática, mantendo, analogicamente, a imagética triangular por meio da interseção em image-plane de uma grande letra **A**, que atravessa obliquamente o filme, com seus hipotéticos base e vértice em imagem real e virtual, respectivamente. Eliminei a redundância da dupla presença das consoantes **B** (“beit”, em hebraico) e **R** (“reish”), utilizando-as em corpos pequenos apenas uma vez, numa nova harmonia com o **C** (“kav”) e o **D** (“dalet”), de sorte que, simetricamente, duas delas aparecem flutuando no ar, na frente do holograma, e duas em profundidade virtual.

Finalmente, após inúmeras conversas com Fernando, o poema espectral ganhou um controle cromático de alta voltagem rítmica, que faz as cores do arco-íris vibrarem em oscilações distintas e propiciarem aos olhos do espectador um verdadeiro balé de cores no espaço.

Definitivamente, um holograma não é o lugar onde os caudalosos e retóricos poetas versejadores podem deixar escorrer seu lírico prosaísmo oratório. A holografia tem um astronômico poder de acúmulo de informação — a tal ponto que cada vez mais vem sendo pesquisada a substituição das atuais memórias dos computadores por memórias holográficas, armazenadas em cristais fotossensíveis.

Assim, a poesia holográfica é uma das criações mais radicais em prol da condensação anti-retórica, contra a redundância do uso normativo da linguagem e

pela criação de uma sintaxe e uma semântica perceptuais descompromissadas com as regras da fala subordinada ao aparato comunicativo.

Poesia de antecipação; pedra fundamental das novas poéticas do século XXI; alheia aos becos sem saída da poesia pós-moderna. Estreiteza de visão histórica é referir-se a este projeto como “criação de poesia visual em mais um dos novos media”; seria o mesmo que dizer que a poesia modernista não passou de uma paródia à poesia com “p” maiúsculo, ou que a poesia concreta foi apenas a criação de artes gráficas com palavras.

Para a prospecção holopoética, não haveria diferença micro-estrutural ulterior entre as poéticas decorrentes da aventura mallarmeana, da pioneira tipografia parolibrista à construção esculto-táctil-volumétrica dos poemas objetos, incluindo-se aí também a experimentação em meios eletrônicos, como o videotexto, por exemplo. Bidimensional e programado por página, o poema criado em videotexto não supera o impasse da mera visualidade retiniana.

Somente a geração de poemas *holotrônicos* podera dar conta dessas limitações telecomunicacionais, possibilitando à escrita eletrônica uma interrelação direta com o espectador em seu espaço e questionando as convenções do sensível que o habituaram a ver, viver e escrever em apenas duas dimensões, seja em página impressa ou digitada. A poesia holográfica, ao gerar lumisignos tridimensionais, desencadeia uma revolução sintática e epistemológica, apontando pragmaticamente para o futuro, quando a escrita pictográfico-espacial não mais estará enclausurada no plano do suporte e quando os sistemas de impressão terão no holograma o seu mais banal recurso. Um exemplo evidente é a revista norte-americana National Geographic, que, no começo deste ano estampou 11 milhões de hologramas impressos em sua capa.

A palavra, que emergiu da reclusão no livro impresso (séculos XV a XVIII) para a difusão nas ruas através da grande imprensa e dos cartazes publicitários (séculos XIX e XX), segue agora seu fluxo para além do ano 2.000: desmaterializando-se, entrando em foco no espaço e percorrendo distâncias cada vez maiores (indo ao cosmos e voltando à Terra via satélite, por exemplo), em unidades temporais cada vez menores (a super-condutividade torna possíveis operações em um picossegundo, ou seja, um trilionésimo de segundo).

A palavra-imagem holográfica tenciona superar os nossos códigos verbivisuais, postulando uma escritura que ao mesmo tempo funda uma poética luminosa tridimensional e não se situa como análogon da realidade. O signo holoforme implode o mito da ilusão, característico dos códigos icônicos (fotografia, desenho, pintura, cinema), gerando uma dissolução conceitual e morfológica entre uma possível iconicidade levada ao seu mais complexo grau (poderia-se especular, equivocadamente, que o holograma é o icone perfeito, capaz de “reproduzir” com exatidão as características “palpáveis” de seu objeto referencial) e uma provável realidade paralela explicada pela física (através da interferência de feixes monocromáticos de alta coerência espaciotemporal, o filme holográfico capta as frentes de onda refletidas pelo objeto e as reconstrói tal e qual no espaço). A maior prova dessa ‘nova realidade’ é apresentada pelos CGHs, ou Computer Generated Holograms, que, podendo ser gerados por intermédio da utilização de comprimentos de onda para os quais o registro ótico se torna difícil ou impossível, instauram em nosso mundo imagens sem referencialidade alguma, sem nenhum

correspondente no mundo material. O registro de “nonphysical wavefronts” conduz a holografia a um terreno jamais aventado, no qual apenas a mente se converte em instrumento, produzindo hologramas a partir de ondas imaginárias.

Cabe ao poema holográfico despertar em nossa inteligência o poder do pensar-espacial em vez de corroborar o pensar-perspectivo, fazendo do seu processo de organização em relevos óticos o modelo para o afloramento de uma nova consciência *obsubjetiva*, amálgama da *não-localidade* da mente humana (lugar no qual as noções de escala, distância, e finitude se anamorfizam e se diluem no tempo) e da realidade imediata (a natureza apreendida por nossa limitada capacidade pentasensorial).

A holontologia do poético conduz a uma revisão daquela poesia criada do artesanato de letras construídas com madeira, plástico, papel, cimento e outros materiais. Noções como volume, massa, matéria, espaço e profundidade são agora lidas ao avesso, originando indagações sobre sua natureza última: que volume é este ao mesmo tempo cheio e vazio? Como pode a massa ser constituída de luz? Dois corpos, visivelmente materializados ocupam, finalmente, o mesmo lugar no espaço? E este, não possui mais limitações entre exterior e interior? A profundidade não é um continuum? Como disse Bachelard¹, em “A Poética do Espaço”, “tornar imprevisível a palavra não será um aprendizado de liberdade? Que encantos a imaginação poética acha em zombar das censuras! Outrora, as Artes Poéticas codificavam as licenças. Mas a poesia contemporânea pôs a liberdade no próprio corpo da linguagem. A poesia aparece então como um fenômeno da liberdade.”

Nota

1- Gaston Bachelard, “A Poética do Espaço”, in Bachelard, São Paulo, Abril Cultural, 1978.

Poesia Anos-Luz Além

Fernando Catta-Preta

Foi em maio de 1983 que o meu amigo Otavio Donasci me apresentou ao artista plástico Eduardo Kac, que vinha lendo e buscando informação sobre holografia. Convidei-o à minha casa onde pude propiciar ao meu futuro amigo o mesmo prazer indescritível que senti quando vi, incrédulo, uma imagem holográfica pela primeira vez, na histórica exposição organizada pelo Ivan Negro Isola, em 1980, em São Paulo.

Em 83, eu ainda trabalhava com uma mesa de areia e só usava um raio laser de 5 miliwatts num pequeno laboratório, a Holográfica. Kac que vinha realizando trabalhos entre o verbal e o visual comentava sua insatisfação com o impasse em que se encontrava a poesia contemporânea. Foi, então, que me propôs a realização de um holopoema, trabalho a ser feito em conjunto e que seria concebido, executado e exibido holograficamente.

Desse nosso encontro, nasceu, então, HOLO/OLHO, ainda em 1983, que contou com a colaboração de Don Hardiman. A partir desse primeiro trabalho, muita coisa começou a mudar. A Holográfica cresceu, meu trabalho se diversificou, Kac concebeu outros holopoemas e iniciou incursões teóricas sobre a arte eletrônica; enfim, demos juntos e individualmente um salto dimensional anos-luz além.

Hoje, os holopoemas somam um total de quatro peças, todas trabalhadas madrugadas a fio na superação de toda sorte de adversidades, desde as referentes aos filmes, inexistentes no Brasil, até à distância geográfica, pois eu moro em São Paulo e Kac, no Rio de Janeiro. Mas as dificuldades são inerentes ao trabalho e se revelam insignificantes diante do incomensurável prazer que é esculpir a luz, e, com a energia luminosa, criar uma nova escritura em três dimensões.

Como escreveu certa vez o Kac, “o poeta do século XXI trabalha a linguagem holográfica e busca perguntas. O que ele quer ninguém sabe. A poesia é um enigma tridimensional”.

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published in the
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the exhibition
Holopoesia, realized
at the Museum of
Image and Sound,
São Paulo, August 1
to September 1,
1985.

No Museu da Imagem e do Som, a poesia do futuro

Antônio Gonçalves Filho

Esta será a primeira vez que uma exposição é inteiramente dedicada a holopoemas, ou seja, poemas holográficos criados com o raio laser, onde letras tridimensionais flutuam no espaço em função da posição do observador. Antes desta exposição, que será inaugurada hoje, às 20 horas, no Museu da Imagem e do Som, com quatro poemas holográficos do poeta carioca Eduardo Kac, 23, e do técnico em holografia Fernando Catta-Preta, 29, apenas o artista plástico alemão Dieter Jung ousou introduzir nesse método de registro tridimensional uma das mais antigas formas de expressão do ser humano, a poesia, ainda limitado pela reprodução descritiva de um poema escrito pelo alemão Enzensberger.

Limitado porque o tal poema — concluído em 1983 e exposto no Masp, em 1984, numa individual de Dieter Jung — não rompia definitivamente com a tradição da linguagem guttemberguiana, ou, em outras palavras, apenas registrava holograficamente o original de Enzensberger — “Dieser Satz Liegt in der Luft” (esta frase flutua no ar) — e não pretendia ser algo além de um tributo ao revolucionário poeta francês Stéphane Mallarmé. O projeto dos hologramas de Kac e Catta-Preta, criados entre 1983 e 85, ao contrário, pretende abolir toda e qualquer relação com as formas clássicas de reprodução poética. A dupla conseguiu atingir tal objetivo? Eduardo Kac, estudioso de holografia e pesquisador, acha que sim. “Sem negar o mérito de Dieter Jung, o holograma exposto no Masp continuava a obedecer a linearidade do discurso do poeta Enzensberger. A limitação é evidente, por que o poema era datilografado e as palavras que fluuavam no ar eram apenas reproduções. O que nós desejamos — eu e o Catta-Preta — é desenvolver, efetivamente, uma nova poética, tanto a nível conceitual quanto prático”.

Esta nova poética, holográfica, ao gerar lumisignos tridimensionais, segundo Kac, “desencadeia uma revolução sintática e epistemológica, apontando pragmaticamente para o futuro, quando a escrita pictográfica espacial não mais estará enclausurada no plano do suporte”. Ele acredita que os sistemas de impressão, então, terão no holograma o seu mais banal recurso. “Quando duas letras ocupam o mesmo lugar no espaço desenvolve-se uma espécie de ‘sintaxe perceptual’, há todo um remapeamento da nossa percepção. Cada ponto de observação propicia uma experiência visual diferente, porque as letras de luz sólida flutuam no ar, se distorcem, se movimentam”.

Assim, o poema “Oco”, por exemplo, relativiza o espaço visual, recorrendo à metalinguagem e trabalhando com o conceito de imagem virtual. Em duas placas de vidro, as duas letras “O” sofrem a interpenetração da letra “I”, trocando o “oco” pela palavra “cio”, que aparece em cores diferentes (a palavra “oco” é verde escura). Os outros três poemas utilizam as palavras “Holo-Olho”, “Abracadabra”, e “ZYX”. “Esses holopoemas não possuem nenhuma semelhança com qualquer gênero poético existente até hoje. Faça essa observação porque, hoje, a mecânica quântica, Einstein, e a alta tecnologia parecem mais importantes para o desenvolvimento da poesia do que Mallarmé”. É, enfim, a poesia do século 21, chegando.

A arte da síntese nos holopoemas

Reynaldo Roels Jr.

No Parque Lage, a partir das 21h de hoje, a exposição Holopoesia, de Eduardo Kac e Fernando Catta- Preta, oferece ao público carioca uma experiência inédita na cidade. São quatro holopoemas — ou poemas holográficos — montados em uma sala negra na Escola de Artes Visuais e resultado de dois anos de trabalho em conjunto (e muita circulação pela Via Dutra: Eduardo mora no Rio, e Fernando, em São Paulo). Jornalista e publicitário de 23 anos, Eduardo Kac já vinha buscando novas formas de síntese entre palavra e imagem quando, através de Fernando, psicólogo de 29 anos, conheceu a holografia. A palavra significa “mensagem completa” e designa uma técnica de reprodução de imagens em terceira dimensão, descoberta em 1948 por Dennis Gabor, físico húngaro. Supera em sofisticação e perfeição a agora arcaica estereoscopia. Utilizada até mesmo no cinema e em processos de impressão em larga escala, a holografia parece ser um dos recursos que, a médio prazo, tenderão a tornar-se tão correntes e baratos quanto a fotografia. Apesar do alto preço do material envolvido, os trabalhos em exposição foram custeados pelos próprios autores.

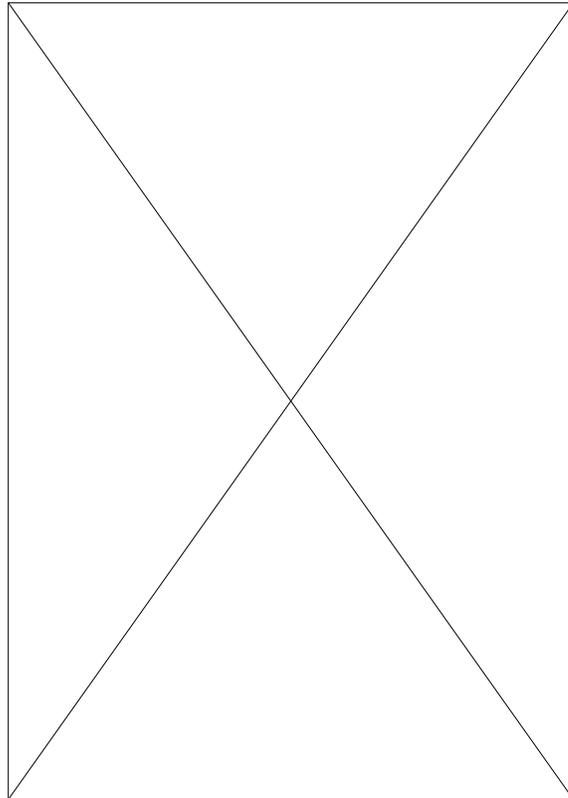
Hoje à noite, a exposição contará com um extra: um labirinto luminoso criado por um canhão de raios laser refletidos em jogos de espelhos, e que será retirado após a inauguração — é o instrumento de trabalho de Eduardo. As obras em exibição são uma incorporação da linguagem poética aos processos visuais fornecidos pela holografia, letras que flutuam (e nele intervêm) sobre um fundo negro, espaço simultaneamente real (para fora da superfície do suporte) e virtual (para dentro da superfície). Em **Abracadabra**, a letra A recorrente na palavra grafada penetra ambos os espaços e remete ao triângulo resultante das manipulações realizadas com fins encantatórios pelos cabalísticos medievais: escrevia-se “abracadabra” sucessivas vezes, uma por cima da outra, suprimindo-se a cada repetição a letra da extremidade da palavra. Ao triângulo assim formado, atribuíam-se poderes propiciatórios. Em **Holo/Olho**, os autores brincam com a noção espacial do espectador, projetando no espaço real as letras rebatidas, como em uma imagem ao espelho, e jogando para o espaço virtual as imagens “corretas”, indagando sobre a legitimidade dos critérios que nos levam a decidir o que está dentro e o que está fora.

Já na segunda metade do século passado, Mallarmé tomou posse dos processos tipográficos e transformou definitivamente a poesia, até então um fenômeno acústico (oral, para ser recitada), passando a ser puramente visual (para ser lida e olhada). Daí em diante, as questões sobre a síntese entre palavra e imagem têm sido retomadas em vários níveis de elaboração, como, por exemplo, na poesia concreta. Para Eduardo os holopoemas são uma forma revolucionária de abordar o problema artístico através da tecnologia. High tech, sim, mas não um elogio à máquina, como o Futurismo. Trata-se apenas do emprego de um meio para criar uma nova linguagem, o “início de uma longa viagem inexplicável”, capaz de colocar em causa não somente a percepção, mas a própria experiência humana em seus limites. O que se torna impossível aos artistas, mesmo os mais radicais, que tra-

balham os meios convencionais das artes plásticas e da poesia. A própria transvanguarda, que retornou aos meios pictóricos convencionais, desiste de ser uma vanguarda ou querer revolucionar o que quer que seja, adotando uma postura de conciliação com seu público e com o mercado. A intenção de Eduardo é exatamente oposta, buscando produzir uma obra que escape a qualquer modismo e que seja fruto de uma pesquisa meditada sobre as possibilidades e os limites do futuro da arte que faz.

Abracadabra
(1984/85),
by Kac and
Catta-Preta.

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published
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Jornal do Brasil,
Rio de Janeiro,
9/24/85.



Holopoetry and Perceptual Syntax

Eduardo Kac

The Holopoetry project creates a new poetic language through the improbable possibilities of immaterial, textual volumes, produced through the holographic process. The main problem in poetic expression today is not one of compositional unit (from letter to sentence), but one of syntax, which is no longer organized in a line (“undimensional flow of signs” — Max Bense), or structured on a flat surface (“a textual surface” — Bense). With holopoetry, syntax is organized in discontinuous space.

Instead of reducing the rhythm to the limitations of a flat surface, holopoetry makes it possible to create a poetic language in which it does not matter if one is using phrasal, vocabular, syllabic or literal structures — expression is similar to the enigmatic states of conscience and spatiotemporality is used on an extreme, pluridimensional level of complexity.

This new holistic perception, source of the fruition of real immaterial objects, volumes without mass, requires a response in the structure of language: the possibility to transform the instrument of intellectualization — the word — into a sign as fluid and elastic as thought. By taking over an optic or, better yet an optronic system of production, distributing the elements of the composition in the surrounding space and registering this information on a flat device, holopoetry launches a perceptual syntax, relativizing the cognitive process according to the different points of observation in space.

Quantum theory (Heisenberg’s “uncertainty”, Bohr’s “ambiguity”) teaches that two properties associated with atomic and nuclear objects cannot always be measured at the same time, and that the possible values of these “observable quantities”, or quantized physical magnitudes, can be discontinuous. Holopoetry is coded according to this principle, to take on quantified verbal configurations, whose reading is done in leaps, irregularly, discontinuously, according to each point of view. The way one looks at it modifies the holopoem. The act of looking in itself implies a specific spatial position of observation, in which one must consider the distance between the two eyes (approximately 6.5cm) which are situated in different points in space. Looking at a holopoem, therefore, is more than receiving the wavefront of a verbal light code; it is reading it according to a changing order. To read a holopoem is to impose upon it a grammar without defined outlines, discovering its meanings in space itself.

Perhaps holopoetry is contributing toward a new vital human experimentation. Restructuring the dimensional field of language can be an adventure as rich as are scientific revelations in physical and mathematical fields. Holopoetry demands an urgent reformulation in the methods of conceiving, producing and enjoying poetic states, for in the holomatic era, the artist intermediates his or her creation through techno-systems, increasing the quantity of information in shorter periods of time and consequently intensifying the sensorial experience of the spectator.

In these three years of work with Catta-Preta, we have created four works: *Holo/Olho* (Holo/Eye), which uses the orthoscopic/pseudoscopic bipolarization; *Abracadabra*, analogically constructed in relation to orbital systems, with rhythmic chromatic control; *Oco* (Hollow), in which an image of conflict between desire and idleness is created; and *Zyx*, which uses the old Cartesian coordinates of tridimensionality, reorganizing the syntactic space in dimensional leaps.

The development of holopoetry as a hybrid poetic language is an interdisciplinary project, for it deals with a hybridism of genres (visual and verbal mixing) and of structure (syntax and pictorial space) that wants to coordinate the infinite possibilities of the word-image, written with the revolutionary spatial focalization of holography. It would not be worthwhile to try to find, in the pages of literary publications or even in any couple of verses, the radical poetic rupture that will reflect the deep alterations in knowledge and perception that result from new developments in the techno-sciences. It will not be found there, simply because it was not invented to live in books, at least not in those we know today — printed in two dimensions.

Two monumental exhibitions that took place in 1985, the Tsukuba Fair in Japan and “The Immaterials” at the Beaubourg in France, are the most evident proof that in the next millenium, perception and sensibility are bound to undergo deep transformations, metamorphoses which we cannot even imagine. But at least one thing can be affirmed beyond a shadow of a doubt: in the future new art forms will emerge. In time, however, these new artforms will become as classic as the enigmatic smile of Leonardo da Vinci’s *Mona Lisa*, or the provocative goatee of Duchamp’s *Gioconda*.

Inteligência e High Tech

Reynaldo Roels Jr.

Bem no coração de Copacabana, a três quadras da praia banhada pelo sol de verão, encontra-se montado o primeiro laboratório de holografia do Rio de Janeiro. Parece anúncio imobiliário mas não é, apesar de o laboratório também ter finalidades comerciais. O seu proprietário, Eduardo Kac, o utiliza para criar hologramas de propaganda. Mas o principal objetivo é outro: a holografia como linguagem artística. Desde 1983, Kac vem pesquisando o que ele batizou de holopoesia, uma síntese entre a imagem e a palavra, trabalho pioneiro no Brasil de três anos atrás e que foi mostrado pela primeira vez no ano passado, em uma exposição em São Paulo depois trazida para o Parque Lage no Rio com o título **Holopoesia**. Hoje, às 18h30min Kac inaugura **Holopoesia 2**, na Galeria Espaço Alternativo da Funarte.

Para quem ainda não sabe, holografia é um processo de fixação da imagem em três dimensões muito mais sofisticado do que o tradicional 3D. A técnica é complexa e utiliza recursos de ponta, como o raio laser. Devido à extrema precisão dos instrumentos e à delicadeza de seu funcionamento, um laboratório de holografia recebe cuidados que quase lembram a ficção científica. O mais impressionante é a mesa de trabalho, em concreto (quanto mais pesada melhor), isolada do chão por um sistema de amortecimento que inclui até camaras de ar para impedir vibrações. Ainda assim, Kac só trabalha de madrugada, quando o movimento de veículos diminui e há menor risco de trepidação.

Na exposição do ano passado, Kac mostrou cinco holopoemas em parceria com Fernando Catta-Preta, hológrafo paulista. Eram **Abracadabra** (em duas versões, uma delas premiada no 8º Salão Nacional de Artes Plásticas), **Holo/Olho**, **ZYX** e **Oco**. Agora, na segunda exposição ele mostra apenas trabalhos seus, ainda inéditos: **Wordsl 1**, **Wordsl 2**, e **Chaos**. Os três foram realizados no Museu de Holografia de Nova York (que já tem um de seus holopoemas no acervo) e continuam a pesquisa com imagens e palavras. Ele também incorpora elementos com os quais as artes plásticas estão pouco familiarizadas, teorias científicas que Eduardo faz intervirem na própria concepção do trabalho, como a teoria do caos, de Mitchell Feigenbaum, um físico americano que estuda o “comportamento tendencial dos fenômenos ao passar da ordem para o caos”, como explica Kac.

—Toda arte de vanguarda institui um conhecimento — afirma ele. — É claro que não no mesmo nível da ciência. Mas a arte torna evidentes certas questões que os cientistas trabalham nos laboratórios. E é isto que pretendo com meu trabalho, tornar explícitas certas dúvidas que são também objeto da ciência.

Kac não está sozinho em sua opinião, e são conhecidas as relações entre o cubismo e a topologia, por exemplo. Para Kac, Cézanne trabalhou diversos elementos que estão presentes na imagem holográfica, e Picasso, se tivesse nascido hoje, também o faria. A teoria do caos de Feigenbaum foi empregada por Kac em **Chaos**, uma peça que se afasta bastante de todas as que ele fez até agora. Em vez dos sóbrios e discretos hologramas, ele tentou um diálogo entre a holografia e o neon, criando uma peça cinética que “é até bonita”.

—É um trabalho que gostei de fazer. mas não pretendo continuar — confessa ele. —Foi só uma experiência, e não um novo caminho.

As outras peças são holopoemas simples, sem maiores elaborações do que as que o público está acostumado a esperar de seu trabalho. Em **Wordsl 1** e **Wordsl 2**, ele mistura as palavras *Words* e *Worlds*, “fusão só possível em inglês, única língua em que eu poderia criar essa imagem do mundo como signo”, segundo ele.

Amantes da arte **high tech**, em particular, e amantes da arte em geral mas que não tenham preconceitos pelo incomum não percam! É um raro momento de inteligência em uma linha que costuma não ir muito além do deslumbramento pelos recursos tecnológicos.

porque holopoesia?

Eduardo Kac

a holopoesia é o adn da linguagem high tech porque quer dizer nada porque o dizer é a estruturação de mensagens no espaço porque o espaço não é a superfície porque as dimensões fractais não são as três dimensões da geometria euclidiana porque um holopoema é um novo complexo espaço-temporal porque holo/olho e abracadabra e oco e zyx e chaos e wordsl 1 e 2 são a cristalização de uma nova poesia porque o espaço pseudoscópico é um novo espaço sintático que gera tempos paralelos e pontos de vistas relativos porque o modelo holográfico possui um correlato na linguagem porque a holopoesia disciplina a luz e o espaço porque o paradigma holográfico gera outros paradoxos e formas e ritmos porque a sintaxe é perceptual porque tudo começou em 1983 porque o holopoema se estrutura no vazio descontínuo quanticamente porque no vazio não há em cima nem em baixo nem de um lado nem de outro nem muito pelo contrário porque duas letras holográficas podem acontecer ao mesmo tempo no mesmo lugar no espaço porque na holopoesia a menor distância entre duas letras não é uma linha reta porque na verdade tudo ocorre na mente do observador porque o holopoema é o quasicristal impalpável do pensamento porque o pensamento é a emoção do pensamento e vice-versa porque é preciso criar verbivocovisumemolumiperceptualmente porque é preciso reaprender e recomeçar tudo de novo porque a holopalavra é evanescente e intangível porque a holopalavra é uma imagem real e virtual e image-plane porque o processo de cognição são processos cambiáveis para um observador em repouso ou movimento segundo diferentes pontos de observação que por sua vez são sempre amtríguos porque quem diz que não há arte de vanguarda é porque não faz a arte de vanguarda e quem diz que não há nada de novo é porque está fora do campo paralaxial do futuro porque um holopoema é uma obra de artes plásticas porque em um holopoema a parte está no todo assim como o todo está na parte da linguagem porque a ciência e a alta tecnologia do presente são mais importantes para a arte do futuro que a arte do passado porque é preciso fazer hoje a poesia do século vinte e um porque eis porque

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Sintaxe, leitura e espaço na holopoesia

Eduardo Kac

Com o objetivo de desenvolver uma nova poética e, ao mesmo tempo, criar um novo campo para a arte holográfica, em 1983 concebi um projeto que se situa entre a poesia e a arte visual. Este projeto, que chamei de poesia holográfica, ou simplesmente holopoesia, vem há cinco anos buscando um diálogo com outras disciplinas, como a psicologia da percepção, a mecânica quântica, a filosofia holística e a geometria fractal, na tentativa de fazer do continuum palavra-imagem um valor holográfico novo, que se define precisamente no fluxo entre dois códigos: o verbal e o visual. A fruição do signo de característica dual é mais intensa do que a fruição simples da palavra transformada em ícone ou da imagem com função de símbolo, pois provoca a síntese dinâmica dos componentes perceptivos e lógicos em um nível de complexa interação. Na base deste fenômeno, ao qual a consciência humana não está acostumada, reside a luz.

Sintaxe perceptual

A sintaxe à qual estamos habituados nas comunicações interpessoais ou nos meios de comunicação de massa se ocupa da posição das palavras na frase e das frases no discurso, mas sobretudo da “correta” construção gramatical. Este condicionamento, que por extensão padroniza nossa forma de pensar, ler e compreender o mundo à nossa volta, tem como parâmetro a unidimensionalidade da linha ou a bidimensionalidade da página, um limite rígido como a perspectiva monocular na arte pictórica, que pressupõe o olho humano fixo no espaço e orientado em uma única direção.

Se a abolição total de toda e qualquer sintaxe conduziria à impossibilidade da expressão, a obediência aos cânones da linguagem ordinária é incapaz de corresponder ao grande paradigma tetradimensional e relativista do nosso século. É preciso, então, inventar uma nova sintaxe que encapsule o tempo na relação lógica das letras e das palavras entre si em função da atividade perceptual do observador-leitor.

No holopoema, a percepção modifica a leitura. O próprio ato de olhar implica uma posição de observação espacial específica mas transitória, na qual deve ser considerada a distância dos dois olhos (cerca de 6,5 cm), que se situam em pontos do espaço diferentes. Perceber o holopoema é mais do que receber a frente de onda do lumicódigo verbal: é lê-lo segundo uma ordem mutante, é impor a ele uma gramática sem contornos definidos, é codificar sua significação no espaço. E no tempo.

O holopoema é codificado para assumir configurações verbais quantificadas, cuja leitura se dá aos saltos, irregularmente, descontinuamente, segundo cada ponto de vista. O leitor é provocado a perceber o poema como se estivesse passeando em um “campo antigravitacional”, no qual os signos que levitam à sua frente têm comportamento inconstante, mudando de forma ou simplesmente desa-

parecendo. Nesta nova sintaxe que proponho, este comportamento irregular é que constitui a lógica relacional dos signos. Em síntese: a “sintaxe perceptual” é a relativização da relação lógica intersignica segundo as nuances do processo cognitivo entre diferentes pontos de observação no espaço-tempo holográfico.

Leitura binocular

É preciso que se some à noção de “sintaxe perceptual” a idéia de “leitura binocular”. Desde que a poesia se tornou uma arte escrita, ou impressa, ela vem se transformando cada vez mais em criação visual, na qual palavra e imagem se fundem numa forma qualitativamente diferenciada. Neste processo, porém, a binocularidade da visão humana não teve a menor importância — afinal, poemas impressos ou em displays continuam os mesmos se os observamos com o olho direito ou esquerdo: eles permanecem imutáveis se os olhamos de perto ou de longe, de cima ou de baixo, de um lado ou de outro. Coloca-se aí a questão de desencadear novas formas de leitura que revelem ao próprio leitor a extensão de suas faculdades, adormecidas pelo costume a estímulos já codificados e absorvidos. Contra esta letargia sensorial está o princípio da conversão do pensamento descontínuo em um fluxo de sinais que enviem vários inputs visuais a um só tempo para o cérebro e condicionem sua percepção-cognição à paralaxe binocular e à posição relativa do observador no campo visual.

O que proponho é romper com a tradição monoscópica em poesia fundamentando o novo método de leitura na visão binocular. Levando em conta a diferença entre o padrão ótico projetado na retina e a experiência mental do holopoema, estruário lumisgnos no espaço para serem “lidos” com os dois olhos, cada um enviando ao cérebro informações diferentes de acordo com as posições relativas do observador.

Com a “leitura binocular” atinjo uma nova maneira de ler o poema, na qual o cérebro está constantemente mudando o modo de “montar” mentalmente o texto, com base nos inputs recebidos durante as diferentes fixações dos olhos sobre as letras no espaço. Aqui, as palavras assumem configurações oscilatórias em tempos e espaços irregulares e pré-programáveis.

Espaço Descontínuo

O conceito de “espaço descontínuo” como campo de construção do holopoema pode ser melhor visualizado se confrontado com o plano — a base formal sobre a qual se ergueu a poética do século 20.

O plano é, para o artista, uma superfície material balizada por dois pares de retas, um vertical e outro horizontal. No interior desta superfície impera o princípio de coesão e constância material dos elementos distribuídos sobre ela (pontos-letras e letras-frases) encerrando tensões verticais, horizontais e diagonais. A superfície é regida por uma hierarquização que pode ser atribuída às noções que adquirimos em decorrência da ação da gravidade sobre nossas vidas. A divisão da página em alto e baixo, esquerdo e direito, é uma consequência desta hierarquização.

ção material e sensorial que faz com que as formas se cristalizem, se tornem concretas, e adquiram um comportamento fixo e constante sobre o plano. Há implícito no plano uma certa simultaneidade, pois os elementos dispersos sobre ele convergem na direção dos olhos formando um único padrão visual integrado.

Os eventos formais no holograma possuem um comportamento oposto ao descrito acima, não apenas pelo fator distintivo de a imagem holográfica não coincidir com o suporte plano onde é feito o registro (padrão interferométrico), mas principalmente pela complexidade estrutural que o holograma permite construir: o emprego de dois, três ou mais raios de referência durante a feitura da obra permite que se pré-determine probabilisticamente a região do espaço onde determinados elementos serão posicionados e de que ângulos específicos eles se tornarão perceptíveis.

Uma definição genérica do holograma o situaria como a reprodução luminosa tridimensional de um objeto, de modo que quando corretamente iluminado reconstrói a informação ótica tal e qual no espaço. Se de um lado hologramas comuns de objetos convencionais formam uma mimese em termos de amplitude, comprimento e fase das ondas eletromagnéticas, de outro a arte holográfica estabelece princípios totalmente novos para o artista: o domínio total da luz, a focalização no espaço, a imaterialidade da imagem, a neutralização da gravidade e a superação da perspectiva.

Enquanto os objetos referenciais da holografia possuem existência física e palpável, a linguagem é o “objeto” imaterial por excelência. É no holopoema, então, que a imaterialidade dos “materiais” da linguagem escrita (forma verbal e sintaxe) se potencializa plenamente. Desafiando a continuidade do espaço topológico, a estruturação sígnica descontínua inaugura um espaço de negação da tridimensionalidade euclidiana e de afirmação de um sistema de frequências como o espaço sintético que se opõe ao natural-material.

Como já disse, a descontinuidade do espaço no holopoema torna-se viável, na grande maioria dos casos, através do uso de múltiplos raios de referência — uma vez que a imagem mimética holográfica tende a se aproximar de um espaço tridimensional análogo ao da extensão material. A gravidade não exerce influência sobre os elementos holográficos, que flutuam no ar e superam as noções rígidas estabelecidas pela ação da força gravitacional. Diante dos volumes óticos sem massa — que também podem ser vistos como ondas eletromagnéticas em propagação, vibrações luminosas em foco suspenso — o “gravitropismo” (condicionamento da forma à gravidade) dá lugar ao “antigravitropismo” (estruturação de novas formas que não sofrem a ação da gravidade), libertando a mente dos clichês do mundo físico e propondo um novo desafio à imaginação.

No holopoema, as configurações verbais são exteriorizações codificadas da imagem mental da linguagem e não da sua imagem visual expressa em caracteres planos e/ou estáticos; logo é impossível definir uma posição fixa para cada letra ou traçar uma curva entre duas letras, porque elas só podem ser configuradas em situações posicionais variáveis. Assim, o holopoema é formado por letras e palavras estruturadas no espaço sem extensões materiais (papel, fios, etc). Estes elementos dispersos em profundidade se ligam por vazios e só podem ser percebidos um de cada vez ou em pequenas aglutinações, mas nunca de uma vez só. Neste complexo espacial não há simultaneidade entre as letras fotônicas; trata-se

de um sistema de eventos quantificados que só podem ser observados aos saltos.
Em duas palavras: “espaço descontínuo” .

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São Paulo, 1987, pp.
7-9.

Holopoesia

E. M. de Melo e Castro

Nesta série de comunicações sobre tecnologia de ponta (high tech) e a criação poética (porque pesquisadora e investigadora das possibilidades dessa tecnologia criada por nós — homens) já me referi à videopoesia e à infopoesia assim como aos seus estreitos pontos de contacto, quanto a uma noção de **tempo-visual** desenvolvido num plano de produção e percepção de imagens. Refiro-me hoje a imagens que no espaço tridimensional se criam e se percebem e na animação e intercepção das dimensões de que se constituem: as três dimensões espaciais, a sua intercepção temporal e a sua fragmentação fractal. Refiro-me à **holopoesia**, tal como hoje ela é proposta e definida pelo brasileiro Eduardo Kac e pelo norte-americano Richard Kostelanetz.

Citando Eduardo Kac: Com o objetivo de desenvolver uma nova poética e ao mesmo tempo criar um novo campo para a arte holográfica, em 1983 concebi um projecto que se situa entre a poesia e a arte visual. Este projecto, que chamei de poesia holográfica ou holopoesia, vem há 4 anos buscando um diálogo com outras disciplinas, com a psicologia da percepção, a mecânica quântica, a filosofia holística e a geometria fractal, na tentativa de fazer do continuum palavra-imagem um valor holográfico novo que se define precisamente no fluxo entre dois códigos: o verbal e o visual. A interface da arte com outros campos do saber, como a física e a matemática, trouxe uma importante colaboração para o vocabulário pictórico e poético nos últimos 100 anos. Já no século 21, acredito, esta interface será fundamental — e um dos holofotes que eliminará o diálogo interdisciplinar é a “dimensão fractal” concebida por Benoit Mandelbrot em sua geometria fractal.

Importa saber que a holografia nasceu em 1947 quando Denis Gabor investigava para melhorar as imagens do microscópio electrónico. Então, esse físico húngaro não estava preocupado nem com problemas estéticos nem com as possibilidades de uma nova linguagem pluridimensional. No entanto, só após a descoberta do laser em 1960 é que os cientistas Leith and Upatnieks, nos Estados Unidos, e Denisyuk, na União Soviética, conseguiram em 1962 realizar as teorias de Gabor e obter o registo de imagens tridimensionais ditas holográficas (do grego holos = total ou completo).

Um filme fotossensível recebe, simultaneamente, a luz directa do laser e a luz laser refletida por um objecto. Ambas interferem entre si, gerando na emulsão holográfica um padrão óptico geométrico que é o holograma, ou seja, a informação visual e espacial do objecto. As descobertas destes cientistas apontavam para uma arte totalmente nova, que se baseia no domínio total da luz, na imaterialidade e na focalização das imagens no espaço.

Uma definição simples do holograma diria que se trata da reprodução luminosa tridimensional de um objecto, de modo que, quando correctamente iluminado, constrói a informação óptica tal e qual no espaço. Hologramas comuns de objectos comuns formam uma mimese em termos de amplitude, comprimento e fase das ondas electromagnéticas. Mas se os objectos possuem existência física e

palpável — a linguagem, não.

*Enquanto o deslumbramento com objectos tridimensionais destituídos da sua fisicalidade não passa de um nível primário de descoberta de uma das características desta nova tecnologia, a estruturação de mensagens no espaço descontínuo — poesia holográfica, ou holopoesia — se configura num projecto experimental preciso, pois é a própria imagem mental da linguagem que se exterioriza. O pensamento descontínuo é cristalizado no holopoema em sintaxes complexas que só podem existir holomorficamente (sintaxes orbitais, curvas, etc). Ao enviar vários **inputs** visuais a um só tempo para o cérebro, o holopoema condiciona a sua percepção-cognição à paralaxe binocular, aos movimentos na posição da retina e à posição relativa do observador no campo visual.*

Leitura Binocular

Desde que a poesia se tornou uma arte escrita, ela vem-se transformando cada vez mais em criação visual, na qual palavra e imagem se fundem numa forma qualitativamente diferenciada. Neste processo porém, a binocularidade da visão humana não teve a menor importância — afinal, da prensa tipográfica aos sistemas electrónicos, houve mais uma expansão de possibilidades do que uma mudança substancial do processo de leitura-percepção do texto. Poemas impressos ou em displays electrónicos continuam os mesmos se os observamos com o olho direito ou esquerdo: eles permanecem imutáveis se os olhamos de perto ou de longe, de cima ou de baixo, de um lado ou de outro.

*O poema holográfico rompe com esta tradição monoscópica em poesia: ao se fundamentar na visão binocular (levando em conta a diferença entre o padrão ótico projetado na retina e a experiência mental do poema) ele procura ampliar os limites da percepção humana e o próprio método compositivo do poema. Criar textos estruturados luminosamente no espaço, para serem “lidos” com os dois olhos, cada um enviando ao cérebro informações diferentes de acordo com as posições relativas do observador, é o ponto de partida de uma pesquisa que tateia seu próprio campo de expansão. Diante de um holopoema, o cérebro está constantemente mudando o modo de “montar” mentalmente o texto, com base nos **inputs** recebidos durante as diferentes fixações dos olhos sobre as letras no espaço. Estamos diante de uma nova maneira de pensar o poema, em que as palavras assumem configurações oscilatórias em tempos e espaços variáveis e préprogramados.*

Assim proposta claramente a problemática da holopoesia por um dos seus criadores, Eduardo Kac, ela logo se coloca como a ponta mais avançada da invenção poética neste fim de século, como também aquela que mais fascínio exerce e mais problemas novos levanta, longe, longíssimo já das poéticas sentimentais do ainda vigente romantismo novecentista, das querelas pós-modernistas ou proto-humanistas. É, de fato, na interface com outros ramos do saber humano que o novo humanismo se vem definindo e as novas oportunidades se abrem para a criatividade e a sobrevivência do homem no próximo século.

Eduardo Kac. Rio de Janeiro. Tem laboratório próprio de holografia. Primeiro holopoema com a colaboração técnica de Fernando Catta-Preta: “Holo-Olho” em 1983. O princípio geral da holografia que um fragmento contém a infor-

mação do todo é utilizado como sintaxe do poema. Assim encontra-se uma combinação entre **holo** e **olho** que só é possível encontrar espacialmente, quer em profundidade quer em paralaxe. Ao mesmo tempo este princípio é traduzido numa estrutura verbal que permite a reclamação de um novo modo de olhar, procurando incessantemente essa combinação em vários níveis espaciais. Para dramatizar essa procura escolheu-se uma diferenciação do tamanho e de cor dos caracteres gráficos usados. Ao mesmo tempo fizeram-se vários cortes no filme holográfico, remontando os fragmentos e espelhando sempre a relação recíproca com as duas palavras no espaço. Deste modo cada fragmento do holopoema **Holo-olho** contém mais informação do que conteria esse mesmo fragmento num suporte meramente plano.

Eduardo Kac apresenta este holopoema no Salão Nacional de Artes Plásticas no Museu de Arte Moderna do Rio, em 1984, o que constitui a primeira apresentação de holopoesia no Brasil. No entanto, já trabalhos holográficos de demonstração técnica tinham sido apresentados em São Paulo, em 1980. Em 1985 e ainda com Catta-Preta, realiza a primeira exposição de holopoesia no Museu da Imagem e do Som em São Paulo, apresentando 4 peças. Em 1986 é artista residente do Museu de Holografia de Nova Iorque, onde realiza três novos holopoesmas. Também em 1986 realiza a exposição Holopoesia 2 na Galeria Espaço Alternativo da Fundação Nacional de Arte (Funarte), Rio de Janeiro. Em 1987 apresenta holopoesia no 1º Festival de Poesia Viva em Portugal e faz uma apresentação particular de três holopoesmas na Fundação Calouste Gulbenkian, em Lisboa. Com o artista brasileiro Ormeu Botelho planifica a criação de um holopoema digital no qual a informação é sintetizada por um computador usando um software fractal, dispensando assim o registro de imagens de objetos reais. É atualmente pesquisador do Conselho Nacional de Desenvolvimento Científico e Tecnológico, com o projeto “A holografia digital como novo meio para arte”.

Também no Brasil, mas em São Paulo, um grupo liderado por Décio Pignatari vem reunindo regularmente para o estudo da holografia e suas implicações poéticas, decorrentes no entanto de uma noção diferente — a de transcrição, cuja origem é a idéia de Roman Jakobson, de tradução intersemiótica ou transmutação da arte verbal para outra arte, como por exemplo a música, a pintura, a dança ou o cinema, entendidos agora como suportes. A holografia seria apenas mais um suporte para a realização de transcrições de textos existentes sobre a forma verbal linear ou mesmo nas formas espaciais planas da poesia concreta.

Em Portugal, a Fundação Gulbenkian concedeu há tempos, a artistas portugueses, a possibilidade de estudarem a técnica holográfica. Mas enquanto não houver entre nós um ou vários laboratórios holográficos, abertos à criatividade, a holografia não passará de uma mera curiosidade. O que me parece injusto para a potencialidade dos experimentadores portugueses, impedindo-os de se colocarem na frente global da pesquisa poética, já com projecções no século XXI.

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Eletrônica Antiquada

Ferreira Gullar

Uma vez o Eduardo Kac me procurou lá no jornal Estado de São Paulo para conversar. Ele é inteligente e bem-intencionado. Eu disse para ele que aquilo (poesia eletrônica) é outra coisa, não tem nada a ver com poesia, é outro negócio. Se trata de grafar de maneira diferente as palavras. Não importa se a poesia é escrita à mão, à máquina, na areia ou no papel. O que importa é o que está sendo dito. Projetar na tela é secundário. Então, eu disse para ele: ‘Quem sabe se lançando mão de holografia se possa enriquecer uma ou duas palavras no espaço?’

É curioso de se ver uma vez, dá idéia de terceira dimensão. Mas esse pessoal está muito atrasado, essa de fazer arte eletrônica é coisa do passado: há dez, 15 anos, as Bienais viviam cheias de obras de arte eletrônicas. Nego descobriu que a eletrônica era a nova linguagem de arte e fizeram painéis, máquinas de pintar, esculturas, coisas incríveis. Sabe o que aconteceu? Sumiram, foram para o anonimato porque não despertavam mais qualquer interesse. São entusiasmos, euforias, em geral de quem não é artista.

Pergunta se o Volpi alguma vez quis fazer pintura eletrônica? Ou se Picasso e Matisse se deixaram levar por esse entusiasmo? As descobertas da tecnologia são características do começo do século. O ‘claviluz’ era um piano de que, em vez de sair som, saíam cores. Maravilha, acabou a pintura! Agora se compõe pinturas ao piano. Sumiu, está no museu. Essas coisas velhas são uma espécie de sarampo: de vez em quando voltam.

Na França, Schöffer aparece com escultura eletrônica, que se movia com luzes. Sacal perto do Calder que simplesmente botou os móveis dele no ar para o vento soprar como se fossem roseiras, plantas. Sou a favor das coisas novas, mas nada mais sacal do que o que é velho e batido. A poesia eletrônica é velha, representa um espírito antiquado, de uma coisa superada, de uma ilusão que já passou. As pessoas deveriam aprender com o fracasso das tentativas tecnológicas e aprender a lição simples: a arte comove quando fala das pessoas, dos sentimentos, da fantasia.

A anticaretice da arte high tech: resposta a Ferreira Gullar

Eduardo Kac

Na primeira página da edição da última terça-feira do Segundo Caderno, o poeta Ferreira Gullar prestou um depoimento sobre o qual considero importante apresentar esclarecimentos.

Como homem culto, grande crítico de arte e excelente poeta (sobretudo por sua produção entre “A Luta Corporal” e os não-objetos), Gullar deve se sentir pouco à vontade para falar de um trabalho, que é perceptual, sem vê-lo. Desde 1983, venho desenvolvendo a holopoesia, que é uma nova linguagem poética formulada a partir das inúmeras possibilidades desta tecnologia emergente que é a holografia.

Não se trata, portanto, de uma nova maneira de “grafar palavras”, e sim da construção de uma nova sintaxe, na qual a fruição do texto seja totalmente relativizada de acordo com os pontos de vista cambiantes do leitor-observador. A holografia em si, como uma nova técnica, não pode ser comparada com a eletrônica, pois cada uma possui especificidades irreduzíveis.

A holografia não apenas “dá a idéia de terceira dimensão”. Ela reconstrói tal e qual as ondas luminosas refletidas por um objeto, que são as mesmas que nos dão a “sensação” de ver um objeto. Assim, a imagem holográfica é capaz de expor a tênue fronteira que há entre matéria e energia, entre ilusão e realidade. Sob o signo da fantasia, a arte holográfica — e neste caso não só a holopoesia — revela que algumas das noções caras ao homem não são tão rígidas quanto parecem. Antes, a matéria se traduz em uma densidade provável da energia e a realidade se revela uma das possíveis “ilusões”.

Não se pode exigir de um artista que pesquise novas linguagens o mesmo nível de popularidade que possui o artista que atua dentro de um código já amplamente dominado pelo público. Ninguém ousaria dizer, por exemplo, que Abraham Palatnik foi “para o anonimato porque não desperta mais qualquer interesse”. Ninguém ousaria dizer que Palatnik “não é artista”. Reconhecido internacionalmente como um dos inventores da *arte cinética*, ele fez recentemente no Rio de Janeiro uma exposição com novos trabalhos cinéticos. Trata-se, ao lado de nomes como Waldemar Cordeiro, Lygia Clark e Hélio Oiticica, de um dos maiores artistas brasileiros deste século.

Por fim, desejo afirmar que a holografia não é uma “coisa sacal” nem “velha e batida”. A holografia, o vídeo e a computação gráfica são tecnologias em pleno desenvolvimento e que ainda estão sendo pesquisadas por artistas nos principais centros do planeta. No caso da holografia, mais especificamente, as obras da inglesa Margaret Benyon e do holandês Rudie Berkhout são a prova de que uma nova arte está nascendo. Algumas delas podem ser vistas nos Museus de Holografia de Nova York ou Paris. Em que pese todo o respeito e a admiração que tenho pelo poeta Ferreira Gullar não acredito que a arte comova “quando fala da fantasia” porque não a vejo como um discurso sobre o imaginário. Para mim, a arte é — ela mesma — a maior das fantasias.

Wordsl

Eduardo Kac

A holopoesia é um projeto interdisciplinar que pretende colocar novos problemas para a arte que se situa entre os códigos verbais e visuais, valendo-se para isso das imensas potencialidades estéticas deste “high tech medium” que é a holografia. Quando a concebi, em 1983, não havia nenhum programa rígido de pesquisa, e sim o desejo de descobrir de que maneira a composição luminosa imaterial poderia suscitar a concepção de uma nova sintaxe, que se fundamentasse radicalmente no complexo perceptivo humano e no contínuo espaciotemporal do holograma. Assim, cada holopoema criado entre 1983 e 1986 significou para mim novas descobertas plásticas e poéticas. Os holopoemas “Wordsl nº 1” e “Wordsl nº 2” são fruto de uma sintaxe que se organiza em um espaço curvo e contraído opticamente, o que acarretou no comportamento irregular das letras que desordenadamente sugerem as palavras “mundos” e “palavras” em inglês.

A técnica empregada é a holografia integral, assim conhecida por integrar cinema e holografia em um composto que produz não apenas profundidade e paralaxe (capacidade de enxergar ao redor de um objeto) mas também o movimento. Originalmente, me pendurei de cabeça para baixo e orientei o enquadramento cinematográfico de modo a registrar apenas a cabeça, sem o resto do corpo. Em seguida, dispus as letras **W**, **O**, **R**, **D**, **S** e **L** ao redor de minha cabeça em 180°. Cada letra foi disposta no espaço de modo não convencional: a letra **W** foi posta com sua linha reta lateral paralela ao chão; a letra **O** foi disposta de maneira a permitir visibilidade parcial para a cabeça; a letra **R** foi inclinada obliquamente para a direita e para trás, indicando profundidade; a lateral da letra **D** ficou paralela ao chão, simbolizando uma janela através da qual via-se parte da cabeça; a letra **S** foi colocada perpendicular ao observador, que só identificava sua forma olhando de um lado ou de outro, e a letra **L** foi invertida de ponta-cabeça. Ao fundo, minha cabeça girava e eu emitia uma gargalhada, perceptível pelo movimento dos lábios.

Todos esses elementos, originalmente em um espaço de 180°, foram filmados e transferidos para um holograma de 90°, resultando em uma anamorfose (deformação da imagem) obtida opticamente. A contração do espaço foi obtida por meios óticos e todos os elementos presentes nesse espaço se contraíram e metamorfosearam também óticamente.

Como o espaço foi concebido de maneira curva, a curvatura irregular e a contração ótica se somaram para configurar um espaço experimental, onde as letras dramatizaram suas formas gráficas e a cabeça ganhou uma ambiguidade formal e simbólica. Em “Wordsl nº 1” o espectador identifica a organização descrita acima. Já em “Wordsl nº 2”, busquei um diálogo com a primeira peça explorando a noção holográfica de “espaço pseudoscópio” que é espaço invertido de dentro para fora; na segunda peça, o leitor percebe apenas faixas luminosas com partes da imagem se deslocando verticalmente, o que sugere uma espécie de varredura típica de meios eletrônicos. Como os dois holopoemas foram produzidos com a técnica de transmissão à luz branca (que faz com que a imagem seja reconstruída por uma fonte de luz situada atrás do holograma) — técnica que elimina a paralaxe

vertical—, “Wordsl nº 2” tenta amplificar o poder expressivo do meio forçando-o a produzir informação no eixo vertical.

A questão do espaço curvo em arte não é absolutamente nova. A origem do problema se encontra na apropriação que artistas de vanguarda do começo do século, como os pintores cubistas, fizeram das noções revolucionárias criadas pelo matemático alemão Georg Friedrich Bernhard Riemann em 1854 em seu sistema geométrico não-euclidiano. Riemann concebeu uma geometria baseada em superfícies de curvatura positiva constante (que pode ser representada pelo exterior de uma esfera) e sugeriu a possibilidade de superfícies ou espaços nos quais a curvatura poderia variar onde uma figura não poderia ser movida sem que ocorressem mudanças em sua forma e propriedades. A principal conquista de “Wordsl”, no que diz respeito à elaboração em arte do espaço curvo, é que os signos ganharam um componente dinâmico, operando a mudança da forma diante dos olhos do observador. Quem olhar atentamente “Wordsl nº 1” poderá encontrar na extrema direita a letra **W** deformada no interior do holograma (imagem virtual). Ao se locomover para a extrema esquerda, o observador perceberá que a letra “deu a volta” por trás do conjunto para surgir com sua forma original, proporcional e harmônica, na frente do holograma (imagem real), invadindo o espaço do próprio observador.

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in the newspaper
Folha de São Paulo,
São Paulo,
11/11/1987, on the
occasion of the Salão
Paulista de Arte
Contemporânea,
where the holopoems
Wordsl 1 and *2* were
exhibited.

Holofractal, a arte no futuro

Ligia Canongia

A exposição Holofractal, de Eduardo Kac e Ormeo Botelho, será inaugurada hoje na galeria de Fotografia da Funarte. Esta é a primeira obra de arte a unir a tecnologia holográfica, a computação gráfica, e a geometria fractal. A geometria fractal, que vem sendo desenvolvida pelo matemático polonês Mandelbrot há mais de dez anos, revoluciona os conceitos da geometria euclidiana e se dedica a estudar as formas irregulares da natureza. Assim, os fractais são unidades que ampliam infinitamente as possibilidades da percepção humana, acostumada até então a abordar a realidade apenas com as noções de reta, plano e espaço. Reconhecendo no universo as dimensões fracionárias, Mandelbrot trabalha com números aleatórios que pretendem dar conta das irregularidades existentes nos objetos e nos fenômenos naturais. E foi a partir de um *software* fractal — um programa capaz de gerar formas irregulares — que Kac e Ormeo se basearam para construir o holopoema “Quando?”, trabalho pioneiro na aplicação da matemática fractal às artes visuais. Dizem os artistas:

— A geometria fractal nos oferece os instrumentos para a criação de imagens com dimensões fracionárias. Os fractais nos ensinam a aceitar a fração, a passagem entre duas dimensões como um novo valor em si.

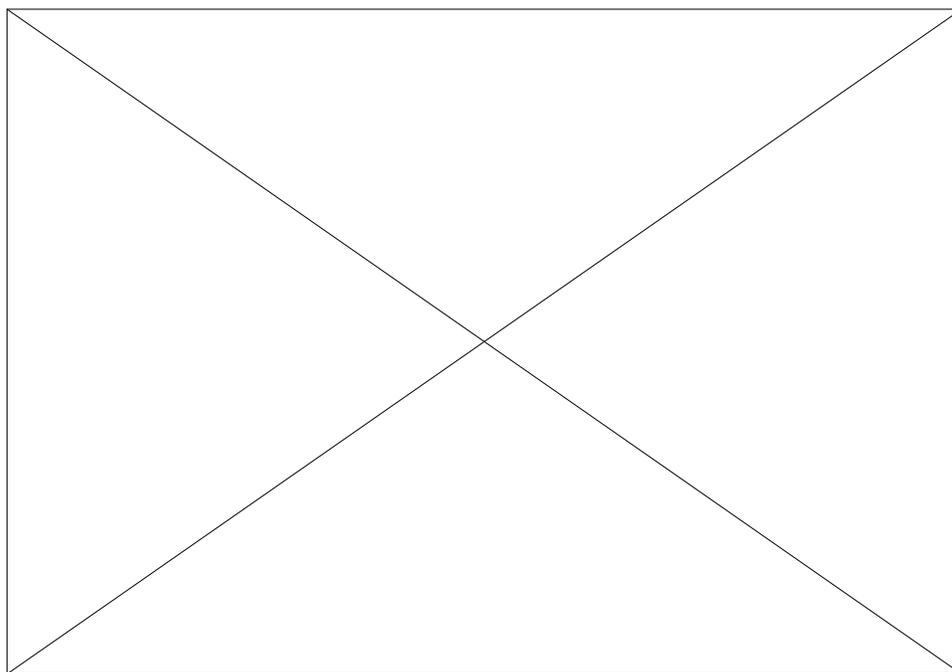
Mas, a complexidade da experiência não pára por aí e depois de estudos que se desenvolveram durante quase dois anos, Kac e Ormeo associaram ainda o domínio que cada um possuía na área da holografia e da computação gráfica, respectivamente, o que lhes permitiu retirar a imagem de dentro do monitor e inserí-la em um espaço imaterial, multiplicando-a infinita e descontinuamente, segundo cálculos fractais de grande sofisticação. O holopoema em si mesmo já corresponde ao pensamento descontínuo no tempo e no espaço, trabalhando a palavra aos saltos, liberta da página, tomando um corpo imaterial e transformando-se em imagem. O que a holografia fractal incrementou na holopoesia que Kac já desenvolvia antes, e com os recursos científicos e estéticos da computação gráfica, foi a dramatização dos objetos lançados ao ar, sem espessura física; objetos agora percebidos em um espaço liberto da convenção tridimensional, o que constitui um paradoxo visual e mais, um campo inédito de exploração para as artes plásticas.

Num momento em que o pós-modernismo declara a falência do novo e institui um domínio interminável de citações e referências, os meios tecnológicos podem significar uma outra fonte para a discussão da imagem, expandida e fértil. De alguma forma, um passo a mais como este em direção ao binômio Arte e Ciência parece recuperar o espírito de Leonardo da Vinci, símbolo de uma época onde os saberes científicos, filosóficos e artísticos se integravam. O holofractal parece portar algo de revelação, que muitos artistas cinéticos da Modernidade, como Moholy-Nagy e o nosso Palatnik, acreditavam, em sua visão ao mesmo tempo racionalista e romântica do mundo. Trabalhando com ondas eletromagnéticas, Kac e Ormeo criam imaterialmente, dando a ver volumes sem massa, sem peso, tornando visíveis idéias e formas que são puras abstrações matemáticas. O

leque de opções que possuem em termos de combinações possíveis entre sinais, imagens, cor e movimento é de tal ordem, que aos artistas cabe selecionar e construir esteticamente o objeto de seu interesse, no caso, a flutuação das palavras, a leitura diferenciada a cada ponto de vista no espaço, a sua transmutação em imagem e em tramas de cor. Fascinados pelo trabalho de uma descoberta verdadeira no campo da Tecnologia e da Arte, Kac e Ormeo dão assim os primeiros passos no sentido de uma compreensão total de seus novos meios, naquilo que eles ainda poderão contribuir para a experiência estética. Ao espírito de Leonardo eles incorporariam também o de Nam June Paik. De uma coisa, entretanto, eles estão certos:

— Com esta síntese de meios, a arte ganha de fato um novo instrumento.

Quando?
(1987/88),
by Kac and
Botelho.



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in the newspaper
O Globo, Rio de
Janeiro, 11/22/1988.

Um unicórnio na matemática

Reynaldo Roels Jr.

A obra recebeu o título **Quando?**, e sozinha é toda a exposição **Holofractal** de Eduardo Kac e Ormeo Botelho, na Galeria de Fotografia da Funarte, aberta até a próxima quinta-feira. São dois paralelogramos que giram continuamente, um em sentido horário (um holograma cilíndrico), o outro no sentido anti-horário (uma imagem de vídeo projetada em telão). A rotação, ao contrário do que enuncia a geometria quando sóbria, não tem 360° , mas 720° : os paralelogramos têm assim, não seis faces, mas nove, também em total desacordo com os enunciados da geometria antes do porre (ou paralelogramos tem seis lados, por definição, ou não são). Sobre quatro das faces, flutuam cinco blocos de palavras: A luz/Ilude/A lente/Lenta/Mente, um poema lido em ordem normal no holograma, e em ordem inversa no vídeo. A todos estes movimentos soma-se o do espectro cromático do holograma, que se modifica de acordo com a posição do espectador.

Kac já demonstrou diversas vezes a sua inteligência em lidar com linguagens que empregam a alta tecnologia, a *arte high-tech*. Ao contrário de outros muitos artistas, que fazem do meio um fim, Kac tem a consciência de que os instrumentos servem para dizer algo, e não para serem exibidos como em um circo e cujo conteúdo se resume à acrobacia tecnológica. **Quando?** foi o resultado de dois anos de trabalho com Ormeo e uniu a holografia ao computador através da geometria fractal (“um novo ramo da matemática desenvolvido nos Estados Unidos pelo polonês Benoit Mandelbrot”, como explica ele).

Quando? apresenta ainda uma particularidade: o holograma não foi obtido diretamente por nenhum meio mecânico (fotográfico), e sim através de um programa de computador (normalmente, o holograma parte do registro da imagem de algum objeto real). Se se tratasse de um paralelogramo concreto, **Quando?** seria inviável, prática e teoricamente. Se confrontado com a intenção poética dos autores, este lado talvez pareça o mais pirotécnico da obra, logo, o menos importante.

Mas a aparência logo se desfaz, quando ao lado de obras de outros artistas que trabalham em um limite próximo: pensar a impossibilidade. Os labirintos de Jorge Luis Borges são um exemplo; as xipófagas capilares de Tunga são outro. Absurdos lógicos que são, podem, contudo, ser pensados e demonstrados possíveis, dentro de campos específicos. (Há o caso do unicórnio e outros mitos: mas sua inexistência é apenas obra do acaso, e não resultante de um absurdo lógico.)

Muita da força da arte vem exatamente desta capacidade, a de ajudar a romper com enunciados de verdade logicamente indiscutível, mas que revelam ser de natureza apenas paradigmática. As relações entre o cubismo e a topologia são conhecidas, como também a pintura do Renascimento e a perspectiva, que matematizaram o real visível e ajudaram a derrubar a velha concepção teocêntrica da Idade Média. Não se trata de afirmar que as obras citadas terão o mesmo efeito avassalador sobre as estruturas de saber contemporâneas. Mas são cunhas que se colocam aos poucos, e cujo resultado será sentido, cedo ou tarde.

Holopoetry: from “Holo/Olho” (1983) to “When?” (1988)

Eduardo Kac

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 around the hologram—he or she constantly modifies the structure of the text.

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 the Modernists Marinetti, 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 attempting to open up a new path, holopoetry began in 1983 by freeing words from the page, using a system that allows duplication and mass production. 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 at random by the observer, 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. Color is not simply color; it has a poetic function as well. A letter is not just a letter but also a pictorial shape.

If we compare the elements of language with the basic concepts of Euclidean geometry, as Bense has done in the analysis of visual texts [1], 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, holopoems, which free the text from the page and project it into space, would have dimension 3.

But a hologram need not necessarily be three-dimensional 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. Euclidean geometry then becomes a part of fractal geometry, since dimension 2 is in between dimensions 1.9 and 2.1, for instance. To work with holographic fractals is to generate holographic images with 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 [2]. Taking Bense's analogy a step further, we might try to conceive 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). Perhaps the aesthetic experience generally, or the poetic experience specifically, will be enriched if the viewer or reader sees a work that is alternately a text and an image.

Neither the present essay nor the fractal holopoem **Quando?** (When?), which I shall discuss here, purports to offer definitive solutions for the problems that arise on this new path. The object is rather to explore experimentally the limits, and the prospects, of holopoetry.

Holopoetry

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 from wood, plexiglass, glass and metal. The Brazilian neoconcrete poets made such experiments in the 1950s and 1960s [3].

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 the meanings and the relation that 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 give it a mobile structure and thus extend its expressive power to encompass time, since the words are not fixed upon a surface but rather float in space. For instance, in **Quando?** 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').

Holopoetry started out as a research project on the possibilities of hologra-

phy in poetry and visual art, and each of my holopoems made between 1983 and 1988 explores some of these possibilities. Current emphasis is on experiments with the interval or passage from the poetic to the pictorial and vice-versa.

Holopoems

Holo/Olho (Holo/Eye), my first holopoem, made with Fernando Catta-Preta (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 was an attempt to recreate, in its own syntax, a structure that would correspond 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 with Catta-Preta between 1984 and 1985. This is the work that best illustrates the concept of *discontinuous space*, because the use of three reference beams (laser beams aimed at the holographic film rather than at the object, when the image is produced) allowed us 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.

Also with Catta-Preta, 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 [4]. The holopoem **Chaos** combines neon and holography. The letters *C*, *H* and *A* are chaotically 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 neon, flashing on and off and eliciting *SOS* from the word *CHAOS*.

Also in 1986 [5], 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 N° 2 displays the same structure, only this time in a space that is both real and pseudoscopic. This piece, which is a study of an unorthodox way of visualizing a hologram, 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 worked with computer artist Ormeo Botelho to create the holopoem **Quando?**, which was digitally synthesized using fractal software. The concept of fractal dimensions is of the utmost importance for this work and thus calls for closer analysis.

Fractal dimensions

The interaction of art with other fields of knowledge, such as physics and mathematics has been important to the pictorial and poetic vocabularies over the last century. By the next century, this interaction will be of fundamental importance, and one of the spotlights that will illuminate this interdisciplinary dialogue is the concept of fractal dimensions developed by Benoit Mandelbrot in his fractal geometry [6].

Classical mathematics, employed in physics, derives from Euclidean geometry and is based on the mechanics of Newton. Echoing Galileo, Cézanne was inspired by the mathematics of regular shapes when he advocated the method of “see[ing] in nature the cylinder, the sphere, the cone” [7].

Around the turn of the twentieth century, however, some researchers broke radically with Euclidean and Newtonian notions, stimulated by the discovery of new mathematical objects, for example, Koch’s snowflake, Cantor’s sets, Peano’s curves and Hausdorff’s dimensional continuum. Contemporaries of Cubism and atonal music, these and other mathematicians showed that pure mathematics contained a wealth of possibilities that went far beyond the simple models applied to natural forms. Like twentieth-century art, modern mathematics developed by overstepping the limitations imposed by its close links with nature. Today the influence of non-Euclidean concepts — the fourth dimension, n-dimensional geometry and relativity theory — in avant-garde art of the first 30 years of this century is well known, especially in the works of artists such as Malevich, van Doesburg, Larionov, Picasso, Weber and Duchamp [8].

Mandelbrot has provided a new approach to the study of natural forms, and particularly of their irregular character, which deviates from Euclid's regular geometric forms. For over 10 years he has been developing a new geometry known as 'fractal', from the Latin *fractus* (irregular, fragmented). Fractal forms have dimensions between those defined by whole numbers. Fractal geometry draws from the work of such men as Koch, Cantor, Peano and Hausdorff and analyzes the irregular shapes of nature in an unprecedented way. It is not just a branch of twentieth-century mathematics; rather, it is a new mathematical, philosophical and cultural synthesis that brings together pure mathematics, the natural sciences and computer graphics. Its influence extends to physics, chemistry, biology, geology and meteorology as well as to filmmaking, graphic design and art.

In order to illustrate the concept of fractal dimensions, Mandelbrot states that "clouds are not spheres, mountains are not cones, coastlines are not circles, and bark is not smooth, nor does lightning travel in a straight line" [9]. On the contrary, various forms in nature are so irregular and fragmented that, compared with the Euclidean vision, they present a higher degree and a different level of complexity: fractal curves have a dimension between 1 and 2, fractal surfaces have a dimension between 2 and 3, and "it is possible to generate fractals with a topological dimension 3 whose scaling irregularities raise the fractal dimension to $3 < D < 4$ " [10].

Self-similarity and holism

One of the most important basic concepts of fractal geometry is that of 'self-similarity'. This is easy to understand because it is close to our intuitive notion of 'dimension', but it is not necessarily expressed by a whole number. A straightline ($D=1$) is similar to any part of itself, just as a square cut from a larger square ($D=2$) is similar to the larger square and a cube cut from another cube ($D=3$) mirrors the larger cube. The change in scale does not affect the characteristics of the objects, which for this reason are called 'self-similar'. A fragment of such a mathematical object can be described in the same way as the main figure.

Fractal objects are also self-similar, but, unlike the simple forms described above, they are generated by complex, nonlinear dynamic systems. Fractals are structured through feedback processes in which there is a "nonlinear relation between input and output" [11]. They are thus placed between mathematical order and the chaos of forms; they are the products of the unprecedented relation between the two, and they illustrate the transition from one to the other, revealing just how complex the region of transitoriness is. Realistic, irregular computer-generated images, such as mountain simulations, are visual expressions of mathematical calculations; on the other hand, abstract, irregular computer-generated images reflect the fractal forms found in nature.

This fascinating new frontier for artistic exploration can be investigated with a computer through random numbers, so that in the works resulting from this process there is a complex mathematical structure that can generate a new type of holistic space, where the fragment mirrors the whole and enlargement implies

increased resolution.

Although common sense assigns an effective dimension of 3 to the holographic word-image, I believe that its dimensional complexity can also be understood through the concept of ‘statistical self-similarity’ [12] developed in fractal geometry. According to this concept, the structure of certain objects does not change statistically on any scale, and at the same time it proves to be different in detail on different scales. Statistical self-similarity may be defined mathematically by a dimension whose numerical expression is a fraction.

Just as in a fractal the degree of irregularity and/or fragmentation is similar on all scales, a hologram of an object contains in any one of its fragments the entire information about the object, but only as seen from those view points allowed by the scale of the fragment. It is as if the structure of the hologram itself were statistically self-similar. This conclusion allows holographic space to be approached from the point of view of fractal geometry as well and suggests the creation of holopoems in which the entire linguistic spatial modeling is digitally produced, so that the work quite literally gains a new dimension. In connection with holography, the generation of fractals in computer graphics with an output in space is one of the most fertile possibilities for the art of the future.

Quando?

The fractal holopoem **Quando?**, created with Botelho, is my first experiment of this kind. In our first meetings, we tried to define three elements: the text, the fractal, and the relationship between them. After months spent discussing and conceptually formulating the problem through wireframe tests with solid rendering and animation, we decided to use a fractal software program generally employed in mountain simulation to create a monolithic abstract shape rotating around its own axis, alternately disclosing and concealing the words of the text as it spins.

I also wanted to create a 360° hologram, but not a 360° image that could be seen as one sees a sculpture or an ordinary object. It was then that I realized that the fractal might rotate so as to accomplish almost two full turns inside the hologram and thus widen the 360° space to nearly 720°. This gives rise to a perceptual paradox only made possible by holography: although one sees a 360° Plexiglass 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 and being seen as abstract forms. In this case, the text loses its meaning 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.

Conclusion

The expressive possibilities of holographic fractals or fractal holograms as an art form are much broader than this first work can suggest. For computer graphics, holography is the tool that makes it possible to draw the image out of the monitor and set it free in space. For holography, it is computer graphics that makes it possible to create mathematical shapes of great complexity such as fractals. Finally, for art, the integration of both techniques allows their complementary use, so that one helps to overcome the aesthetic limitations of the other.

Holography challenges us to accept the existence of three-dimensional objects with no palpable existence. Fractal holography challenges the viewer to see in space holographic images of a dimension other than 3 — a visual paradox that dramatizes the immateriality of the holographic image.

With holographic fractals, the viewer's consciousness is invited to go beyond Euclidean geometry and penetrate a new territory as rich and irregular as the boundaries between order and chaos.

References and notes

1. M. Bense, "Textos Visuais", in M. Bense, *Pequena estética* (São Paulo: Perspectiva, 1975) pp. 176-177.
2. Sign, here, is used as in semiology; a word is a symbolic sign, and a photograph an iconic sign.
3. From 1959 to 1962 *Suplemento Dominical do Jornal do Brasil* (Sunday supplement of the Brazilian newspaper *Jornal do Brasil*) published manifestos by the neoconcrete poets and reviews of their shows and publications. The neoconcrete poets were Ferreira Gullar, Reynaldo Jardim, Osmar Dillon, Theon Spanudis, and Albertus Marques. I have recorded an interview with Reynaldo Jardim which, to this date, remains unpublished. For more information on Ferreira Gullar's neoconcrete poetry, see: Luzia Navas-Toríbio, *Gullar's Pre Concretismo Neo*, Polikron, São Luís, Maranhão, 1991.

4. During this period I was working as artist-in-residence at the laboratory of New York's Museum of Holography.
5. This piece was imaged by Larry Lieberman in his Ohio laboratory, through the Jason Sapan Holographic Studios in New York.
6. B. Mandelbrot, *The Fractal Geometry of Nature* (New York: Freeman, 1983).
7. F. Elgar, *Cézanne* (London: Thames and Hudson, 1974) p. 104.
8. L. Henderson, *The Fourth Dimension and Non-Euclidean Geometry in Modern Art* (Princeton, NJ: Princeton University Press, 1983).
9. Mandelbrot [6] p. 1.
10. R. Voss, "Random Fractal Forgeries", in *Fundamental Algorithms for Computer Graphics*, Rae A. Earnshaw, ed. (Berlin: Springer-Verlag, 1985) p. 811.
11. H. O. Peitgen and P. H. Richter, *The Beauty of Fractals* (Berlin: Springer-Verlag, 1986) p. 5.
12. Voss [10] p. 808.

On Kac's computer holopoems

Joan Truckenbrod

Computer holography emerges in this exhibition as a new form of artistic expression. Holography allows artists to create elusive three-dimensional environments that have a unique visual presence. Blended with color fields these holograms become elegant visual statements. Computer graphic systems, on the other hand, allow artists to create visual representations of totally imaginary objects or environments — worlds completely created by the artist and visualized with the aid of computer three-dimensional modeling systems.

The synthesis of computer graphics and holography is a dynamic vehicle for artists who can now make “real” their fantasies and imagined spaces. Through the use of computer graphics and holography these imaginary projections take on the sense of reality — the characteristics of reality that holography projects. The other exciting dynamic of computer holography is the artist's ability to create transformation or change in the three-dimensional object or space. In traditional holography the object maintains its integrity from any perspective or angle that it is viewed. Using the computer to create the holographic image, the artist fabricates an object or space that is dynamic, that transforms as the viewer changes position. Thus the piece becomes a kinetic work of art.

Eduardo Kac's artwork creates a new context for communication using computer holography. Text is normally deciphered in a linear manner with meaning assigned in response to the order of the letters. These holograms might initially create a sculptural appearance, but upon examination the viewer discovers that the letters change their order when viewed from different perspectives.

Through the use of straight holography or through the combination of pulsed holography with computer holography, Kac creates a unique synthesis of imagery and ideas. In some of his works, like in “Omen”, he creates a smoked-filled space and then injects a series of floating letterforms. Meaning changes in time and space. Movement through the hologram induces new meaning. Ordering of the letters and the consequent meaning of the word is dependent upon the orientation of the viewer. This artwork is the horizon of a new form of artistic expression.

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Holopoesia e a crítica

João Guilherme Sanders Quental

No dia 22 de novembro de 1988, na Galeria de Fotografia da Funarte no Rio de Janeiro, teve início a exposição dos poemas holofractais de Eduardo Kac e Ormeo Botelho.

Se existe a possibilidade da junção perfeita entre arte e técnica, se o metafórico começa a ser evidenciado na máquina, nada mais fascinante que observar essa tentativa na literatura. Até porque as distorções do fazer literário possuem uma dimensão peculiar no fato de que ele é suficientemente “refratário” para mostrar bem os sucessos e fracassos de uma nova técnica. Nada mais capaz de reagir nitidamente a uma nova tecnologia que a palavra. Seu envenenamento deixa traços difíceis de se esconder. Assim como seu enriquecimento.

Os poemas holofractais são ótimo exemplo disso. A tecnologia está presente, mas não cabe a ela a primazia estética. Existem elementos novos na palavra, como a instabilidade da cor, a variação cromática, os movimentos das formas e da cor, assim como uma busca de uma nova sintaxe, fora do limite da “página em branco de Mallarmé”, que não apenas legitimam a obra como a tornam de uma alta qualidade estética. E tolas são as interpretações que colocam a holografia como um mero receptáculo de sintaxes já existentes, como se essa nova tecnologia só fosse capaz de resolver velhos problemas, e não criar novos. Libertando a palavra da página, fornecendo uma independência do suporte, o holopoema cria novas possibilidades de leituras, inclusive uma “não-leitura”, onde o poema aparece como uma forma não-verbal.

A tecnologia empregada por si só não é suficiente para que a palavra, inicialmente unidimensional, perca seu ainda novo e não totalmente assimilado lastro bidimensional e salte, naturalmente, para as três dimensões. Mas para que esse salto exista, é preciso um auxílio que independe do criador: cabe à crítica esclarecer o leitor, já que, embora original, a holopoesia (como aliás infelizmente qualquer obra de arte) depende de apoio externo para se tornar plenamente viável.

Poesia na Era do Chip: Eduardo Kac mostra holopoemas e ‘computer art’ no MAM

Carla Lencastre

Eduardo Kac usa holografia para fazer a poesia ultrapassar os limites da página impressa. O resultado é a holopoesia da exposição “Novos Holopoemas” que será inaugurada hoje, às 19h, no Museu de Arte Moderna. Além dos trabalhos holográficos, o MAM estará exibindo “Luz Elástica”, uma exposição internacional de computer art, organizada pelo próprio Kac. As duas mostras ocupam o salão principal, no segundo andar.

Desde 1988, Kac trabalha com computação gráfica para gerar hologramas. Os holopoemas em exposição no MAM foram criados nos últimos dois anos, em Chicago, e já foram mostrados ano passado no Museum of Holography em Nova York. Para fazer um holograma tradicional, o objeto tem que estar bem firme — o movimento não é registrado. Já em um computador, é possível gerar um objeto movimentá-lo e, então, fazer o holograma. Pode-se, por exemplo, criar uma caneta, fazê-la levitar e transformá-la em uma flor. No caso dos holopoemas, basta um simples movimento do olhar para que a palavra que está sendo vista se transforme e ganhe outros sentidos.

— A grande vantagem é que, no computador, fico livre dos limites físicos da matéria. Sem me prender às leis da física, posso me concentrar no movimento. Trabalho com textos, mas não tenho nenhum interesse em fazer esculturas com palavras. Por isso comecei a usar o computador— conta Kac.

Seu primeiro poema com computação foi “Quando?”, exposto em 1988 na extinta Funarte. Em seguida, Kac foi para Chicago fazer mestrado em holografia e computação gráfica no Art Institute. Lá, desenvolveu o aparelho que permite criar os hologramas através de computador. Atualmente, ele dá aulas de computação holográfica no Art Institute de Chicago, mas está no Rio desde a semana passada para acompanhar seus “novos holopoemas”:

—Ainda estou descobrindo a técnica, então tento fazer de cada peça um ensaio. Minha idéia é partir de fragmentos abstratos para formar uma palavra. Estou interessado na linguagem como escrita e não como representação sonora. Quando parto uma letra, ela se fragmenta. Quero me deter nessa representação visual.

Além de mostrar seus holopoemas, Eduardo Kac organizou a mostra de computer art, com trabalhos de artistas que moram nos Estados Unidos. A exposição não é extensa. O objetivo foi mostrar tendências diversas da arte por computador, como fotografia, pintura e animação. Entre os artistas está Dean Randazzo, que também usa o computador para fazer hologramas.

Recent experiments in holopoetry and computer holopoetry

Eduardo Kac

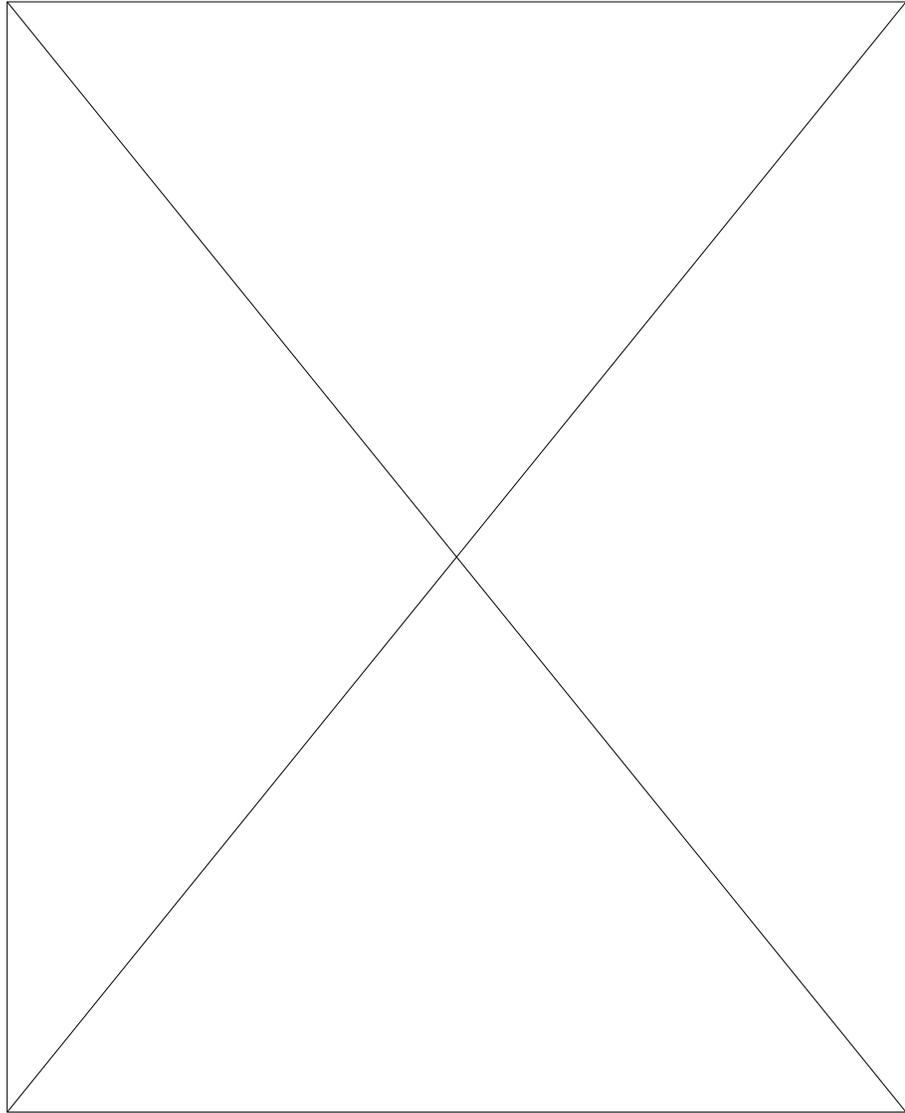
Holographic poetry is better understood in the context of the multiple directions that visual poetry took in the twentieth century, and in order to make clear some theoretical issues of holopoetry which will be discussed ahead I shall proceed to summarize some of the highlights in the development of this literary genre.

Drawing from a long tradition of verbal-pictorial synthesis that goes from ancient Greece to the experiments with white spaces of the French Symbolist poet Stéphane Mallarmé at the end of the nineteenth century, several poets in the early decades of the twentieth century moved beyond the line as the structural unit of poetry. In search for what he called “wireless imagination”, the Italian Futurist Filippo Tommaso Marinetti launched in 1909 a manifesto that would have profound impact in modern art and poetry. The Futurists moved beyond the free verse and developed what they termed *le parole in libertà* (free words), i.e., verbal compositions in which words took on visual properties and were freely arranged on the page so as to reflect dynamic aspects of modern life. At the same time, Guillaume Apollinaire sought a Cubist approach to poetry. In certain poems he employed fragments of sounds and images among words scattered on the page to convey the perception of a given scene or moment from a variety of perspectives, paralleling the pictorial strategies of his friends Picasso and Braque. In other works he created compositions of concise visual rhythm and rarified semantical density. In the poem reproduced below, which was originally published in 1914,¹ he develops an appreciation of the female first name “Linda” (which means “pretty”) through a random sequence of anagrams:

A

	Adnil	
	Danil	
	Nadil	
	Nalid	Alnid
	Dilan	Aldin
Linda	Lanid	Ildan
Ilda	Landi	
Nilda	Naldi	
Indla	Dalni	
Indal		
Lnida		
Lndia		
Lndai		
Lidna		
Lidan		

One of the outstanding contributors to the development of visual poetry is Russian Vasili Kamensky, whose work is as important as is little known. Working in an experimental atmosphere that would lead to the birth of Constructivism in the 1920s, Kamensky developed what he called “zhelezobetonny”² poems, which he defined as being organized in the space of a single page and whose elements, mostly nouns, were connected by non-syntactical (i.e., visual) associations. In his most innovative book, *Tango with Cows*, published in 1914, he pushed the limits of typography. The book includes the poem “Telephone”, which I reproduce below in its first complete and visually accurate English translation³:



Taking advantage of the code of the typewriter, with its regular spacing and its vertical and horizontal movements, American poet E. E. Cummings imploded the linear configuration of words and reinvented the poetic space with the resulting fragments. His most innovative texts, written in 1916 and onwards, have rigorous structures, often creating visual rhythms with left and right margins, punctuation marks and the alternation between standard upper and lower cases.

In 1944, Italian poet Carlo Belloli published *Testi-Poemi Murali* (“Wall Text-Poems”) and *Parole per la Guerra* (“Words for the War”), two collections of works that were marked by economy of poetic means. These works consisted of words laid out on the page in complex arrays and patterns. The meticulous use of typography was meant to allow for visualization of the words before they could be read and interpreted. In an introduction to *Testi-Poemi Murali*, Futurist P.T. Marinetti wrote⁴ that Belloli’s text-poems “anticipate a language of word-signs set in the communicational network of a mathematical civilization which will be marked by restraint in the use of dialogue, gestures and feelings”. Belloli is still active today and open to new possibilities for visual poetry.

After the Second World War, Romanian-born Isidore Isou came to Paris and, taking further the work of Dada pioneers Ball, Hausmann and Schwitters, led the movement called “Lettrism”, which focused on the letter as a new poetic compositional unit. Isou, Lemaître, Dufrière and the other lettrists aspired to revitalize poetry and painting, initially by replacing the verse with clusters of phonemes freed from semantics and by solving the abstract-figurative dichotomy with the sole presence of visual representations of language within the pictorial space. The Lettrist group is still working in France today.

Visual poetry acquired world-wide attention in the ’50s and ’60s, when Concrete poetry was launched as an international movement as a consequence of experiments performed in Switzerland and Brazil. Working in Switzerland in the ’40s, Bolivian-born poet Eugen Gomringer was aware of the work of Max Bill and other concrete visual artists, who inherited the name “Concrete Art” and the interest for geometric abstractions from Theo VanDoesburg. In search of new possibilities for poetry akin to the non-representational investigation of the concrete painters, in 1953 Gomringer published his first book of concrete poems, *Konstellationen* (“Constellations”), in which poems are composed with white spaces and few words - sometimes with only one word.

In the same year, Augusto de Campos wrote *Poetamenos* (“Poetminus”), a set of poems inspired by the “tone-color melodies” of composer Anton Webern in which several colors are integrated into the non-syntactical structure. The colors gave reading directions and functioned as theme designators. Still in 1953, Ferreira Gullar finished his book *A Luta Corporal* (“The Corporeal Struggle”), where poems are written with fractured words and imploded syntax. In addition to Gullar’s and Augusto de Campos’ work, Concrete poetry was developed early in Brazil by Haroldo de Campos, Décio Pignatari, Ronaldo Azeredo and Wladimir Dias-Pino. In 1956, Dias-Pino published *A Ave*, experimental book-poem in which words in a sequence of loose sheets eventually are replaced by holes, graphic lines, and colors, giving rise to new processes of reading. In 1959, Gullar, Reynaldo Jardim and others launched Neo-Concrete poetry, producing installation-like and interactive three-dimensional poems out of hard materials, like wood and glass, that had to be manipulated by the viewer in order to be read. Yet, in 1964, Pignatari and Luiz Angelo Pinto developed a new kind of poetry to be written without words, which they called Semiotic poetry. It consisted of sequences of intermingled designs, like a black square or a white triangle, for example, to which semantical meanings were attached. If the black square was given the meaning “tomorrow” and the white triangle was given the meaning “yesterday”, the image

of a black square inside a white triangle would signify something different from, say, two black triangles juxtaposed to a white square. The scope was to expand syntax and signification beyond a linear writing process. In 1967, Wladimir Dias-Pino launched “Poem/Process”, a movement that proposed the creation of poems without words and that defended the use of new processes beyond the graphic compositions familiar in print-based poetry.

Among the relatively recent, as well the ongoing poetic research with which holographic poetry could be related in broader terms are the interactive computer poem “Cybernetic Landscape I”⁵ created by the American Aaron Marcus in 1975 in anticipation of Virtual Reality, the videopoetry of Ernesto Melo e Castro, from Portugal, which was first created and broadcasted in 1969 and resumed in the '80s, the holographic pieces German Dieter Jung produced in collaboration with diverse writers, the interactive text “The Legible City” by Jeffrey Shaw, who was born in Australia and works in Germany, the multimedia writing by American Richard Kostelanetz, the Hyperpoems by American writers Jim Rosenberg and William Dickey, and the digital-poetic incursions of Brazilian André Vallias.

Theoretical Issues in holopoetry

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 the pictorial 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 seeks to create 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 will be called here *textual instability*. By *textual instability* I mean precisely that 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. I shall make it clear that I still consider the holographic poem under the general category of text, a verbal composition that operates within the linguistic code. Its difference in relation to other kinds of visual poetry is 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 suggested⁶, 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. That does not mean that one cannot go back to the viewing zone where any specific word appears; it is possible to see the same word again but the word seen just before or right after could be different, or relate to that specific word differently. But the point is not to try to draw similarities between holopoetry and other forms of experimental writing. Instead, the specificity of the former is what must be emphasized. 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 seek to 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, if we wish, 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.⁷

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 will be called here the *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, where 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 grey 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.

New holopoems

While still living in Rio de Janeiro, Brazil, I produced seven holographic poems, from **Holo/Olho** (1983) to **Quando?**(1987/88).⁸ These early pieces were made either in Brazil or in the US. In 1989 I moved to Chicago, where I have been able to work and experiment on an ongoing basis. Below I describe briefly the poems I made since my arrival. These descriptions are meant solely as initial guidelines for the reader of the actual holopoems and by no means are intended to exhaust their signifying possibilities.

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 sort of 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 create 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) is modified by the letter “shien” (S), to produce “shamaim” (sky, heaven). The word “mavet” (death) is modified by “shien” to suggest “Shmvot” (Exodus). The word “mah” (why?, what?), is modified to form “shamah” (desolation, destruction). At last, the word “mash” (to trough off, to remove) becomes “shemesh” (sun). The resulting 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 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 s/he looks straight to the holographic space. In order to perceive each word, the reader must invent his/her own topological code. One must look for the words diagonally and decide if s/he 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 can see the visual transition between the sets as an attempt to produce a semantical 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”.

Computer holopoems

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 simply computer holopoetry. Because I write computer holopoems in a process of stereo-

scopic synthesis, as opposed to the well known method of optical recording I use for my other holopoems, they allow me to manipulate each element of the text with more precision. I believe that computer holopoems will let 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 computer holopoems I hope to 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 modelling 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; 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 viewable in white light.

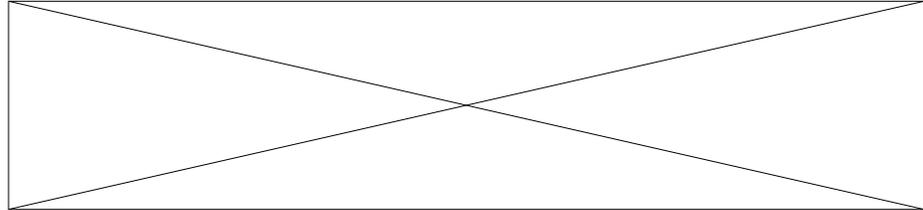
The first computer holopoem I created in Chicago was **Multiple** (1989), in which the sequence of numbers 3309 is seen floating in space. As the viewer moves past the numbers, they rotate around a pivot point, changing to an abstract pattern and then to the word POEM (and vice-versa); at first the three-dimensional 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 s/he 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 forms. This process is reversible.

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.

Souvenir
D’Andromeda
(1990),
Eduardo Kac.



In **Omen**⁹ (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 **Abacadabra**, **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/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 axis. 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 somewhere 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 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 “Selves” 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, s/he 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.

Conclusion

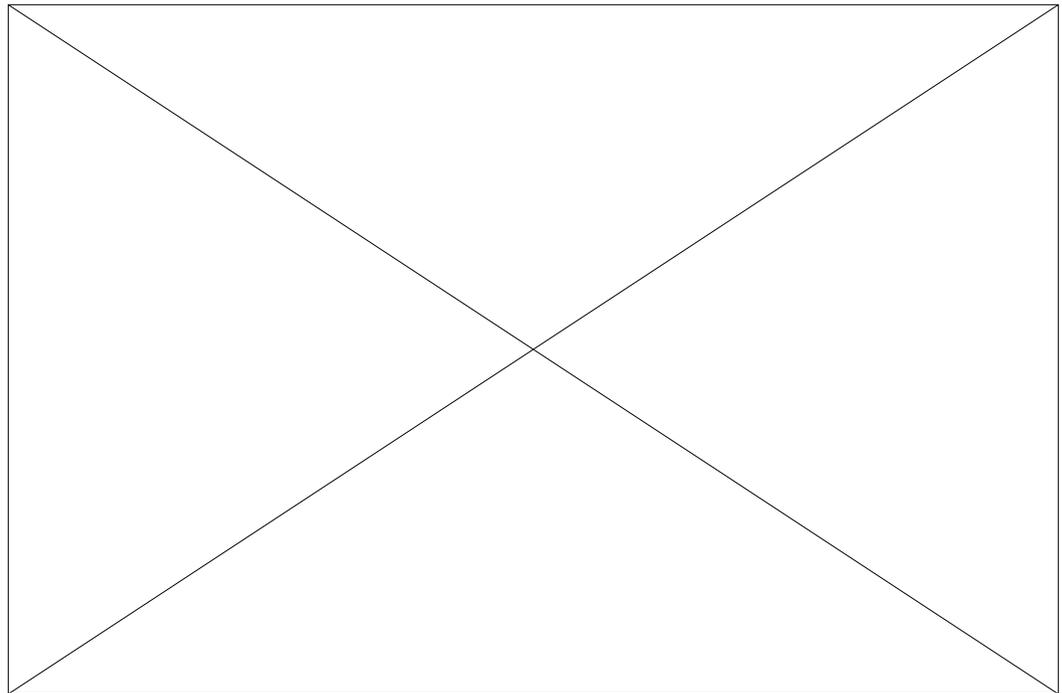
The theoretical issues discussed in this paper reflect my quest for a new poetry capable of expressing the global changes under way in this fin de siècle, such as the cultural relativism promoted by post-structuralism and deconstruction, the new speculative scientific thinking boosted by digital visualization techniques, the holism of telecommunications networks, and the interactive cyberspace of emerging Telepresence and Virtual Reality. Contemporary cultural and scientific studies are breaking away from old models. In society at large we see a questioning of the fundamental positive-negative polarities that formed the structuralist approach, and in the so-called scientific discourse we see the emergence of chaos theory, which destroys the notion of deterministic predictability and helps to form the new holistic paradigm in conjunction with Relativity and quantum theory. Because language shapes our thoughts which in turn shape our world, we can surmise that, in poetry, syntax is one of the basic issues at stake. I’m interested in a syntax of disruptive events; in animated language that evades and deflects interpretation. I’m interested in interactive reading/writing and in propagating light as its medium. In holopoetry, texts are networks animated by motion scripting and discontinuous rendering of words.

References

1. This permutational poem was part of a set entitled “Quelconqueries” and first appeared in the magazine *Lacerba*, published by Ardengo Soffici and Giovanni Papini. See *Apollinaire; Oeuvres Poétiques*, pp. 656-673 and pp. 1146-1148, Éditions Gallimard, Paris, 1965.
2. In his book *The Look of Russian Literature; Avant-Garde Visual Experiments, 1900-1930* (Princeton University Press, Princeton, NJ, 1984, p. 123), Gerald Janecek translates “zhelezobetonny” as “ferroconcrete” or “reinforced concrete”. He explains: “The striking similarity between the translation “concrete” here and the much more modern Concrete Poetry movement that began in the late 1950s is an accident of English homonymy. The latter movement defines “concrete” as “tactile, material” (as opposed to “spiritual, abstract”), while Kamensky thinks of “concrete” as something made of hardened cement, as in a building, sidewalk, or other such structure.”
3. I translated this poem in collaboration with Russian artist Sergey Mavrody and Puerto-Rican designer Raul Silva.
4. Quoted by M.E. Solt in *Concrete Poetry: A World View*, p. 38, Indiana University Press, Bloomington, 1970.

5. A. Marcus, "Aaron Marcus", *Artist and Computer*, Ruth Leavitt, ed., pp. 13-15, Harmony Books, New York, 1976.
6. J. Derrida, *Of Grammatology*, p.58, The John Hopkins University Press, translated by G. C. Spivak, Baltimore and London, 1976. Derrida states that the writer "writes in a language and in a logic whose proper system, laws, and life his discourse by definition cannot dominate absolutely. He uses them only by letting himself, after a fashion and up to a point, be governed by the system. And the reading must always aim at a certain relationship, unperceived by the writer, between what he commands and what he does not command of the patterns of the language that he uses".
7. J. Derrida, "Structure, Sign, and Play in the Discourse of the Human Sciences", *The Structuralist Controversy; The Languages of Criticism and The Sciences of Man*, R. Macksey and E. Donato, ed., p.64, The John Hopkins University Press, Baltimore and London, 1982. Derrida: "Freeplay is always an interplay of absence and presence, but if it is to be radically conceived, freeplay must be conceived of before the alternative of presence or absence beginning with the possibility of freeplay and not the other way around."
8. See E. Kac and O. Botelho, "Holopoetry and Fractal Holopoetry: Digital Holography as an Art Medium", *Leonardo*, Vol.22, No. 3/4, pp. 397-402, 1989.
9. For a more detailed description of "Omen", please see E. Kac and H. Bjelkhagen, "Holopoem blends pulsed and computer holography", *Laser News*, Vol. XI, No. 1, p. 3, 1991.

Amalgam (1990),
by Eduardo Kac



Originally published
in *Display*
Holography (Fourth
International
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H. Jeong, Editor,
Proc. SPIE 1600,
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Poetry in motion in the space-time continuum

Louis Brill

In a darkened art gallery, a viewer encounters a collection of holograms, known as Holopoems. Here the boundaries of print poetry have been pushed to a new dimension, as each word-poem slowly dances about, inevitably challenging viewers to unique subtleties as point of view, degrees of animation, relative positions of letters and words all combine into a telling statement of a moment in time or culture.

Observing a Holopoem, individual letters begin to appear, twisting and turning as they line up through a luminous smoke. An “e” appears followed by an “s” and a “y”. Each letter emerges in a shifting form as their random placements create any number of word possibilities: SEES?, SEX?, YES?

Suddenly, the word appears; it is EYES. It floats in a cloud of smoke transforming its elusive presence into a complete poetic experience. EYES is a Holopoem, a literal form bordering on the realm of the metaphysic where more is said by the relationship of the words to their space than their dictionary meanings. EYES, for example is really about one’s ability to see, and sometimes not see as one’s vision is clouded over. Eduardo Kac, creator of Holopoems, establishes the smoke as ambiguity, because of its dual nature, both in blocking vision and as a transparent medium

Through Holopoems Kac achieves a literary quest, where the viewer contemplates the word as much for how it is dimensionally composed as to its intended meanings. In this case, “EYES” is a Holopoem titled **Omen** (1990), where the combination of word and smoky surroundings creates an extended metaphor that expresses, as its creator Kac notes, a “hazy vision of a future occurrence.”

Eduardo Kac, who was born and raised in Brazil, was always intrigued with the power of words as expressed in literature and poetry. It inspired him as an artist to explore semantics and to experiment with the interplay of syntax to reshape the basic compositional unit of how a poem is created. He dabbled in linear verse and free verse, he moved beyond the printed page to deal in large spaces through graffiti, he tried multimedia. In 1983 as Kac recalled,

“The burning question was, might not words exist in a ‘pure poetic form’ strictly as their own entity? But how? I knew the media I couldn’t work with. What I could not see was what I could use or make work to express poetry with the fluidity and malleability I wanted....Inevitably it dawned on me that holography of which I had heard about as some kind of 3-D medium might be the liberation I was seeking for poetic syntax. A way of putting it all in a new dimension so to speak. In turn holography led to computer graphics and I knew I had found my direction”.

Kac embarked on creating an architecture of form and function that became inseparable from syntactic and semantic perception of text. Kac’s merging of holography and CGI created the medium he sought where pen and paper had been replaced with discontinuous space and non-linear time. As Holopoems came into their own, the word forms began to mature. Each piece was staged with a title

different than its verbal material, allowing each poem to evolve to its own layer of complexity.

For example, **Souvenir d'Andromeda** (1990) is the title of a Holopoem represented by the word LIMBO. It is literal yet ambiguous. As Kac observes, *"Its title refers to the future when a space traveler might bring a gift that is obviously a different form of expression than what we have on Earth....LIMBO connotes oblivion, or emptiness; rhythm is marked by a fragmentation of solid parts that reshape into its word form (and vice-versa) which floats in a space surrounded by nothingness."*

Holopoetry generates its own grammar. Its rules are conceived in a four-dimensional space where point-of-view and time become the pivot point of how a poem is expressed. With computer graphic metamorphing capabilities, HOLOPOETRY introduces poems whose visual behavior of verbal elements in space expands their meanings. Kac explains:

"Ultimately holographic poetry is not just the mere luminous reproduction of 3-D words, but more the possibility of writing poetry in a space whose laws are different from either the printed space or the surrounding world."

Finally with the hologram's image reconstruction process, the viewer's physical motion defines each poem's creation. By reversing their head motion they can "assemble" or "disassemble" each poem.

In creating a Holopoem Kac first begins by selecting the appropriate word or set of words. Once the words have been conceived he approaches his Macintosh computer and, using software programs for image processing, three-dimensional modeling, and animation, he begins to model all the characteristics of how the Holopoem composes itself. As to the creation of the letter forms Kac noted:

"Sometimes I work with library fonts and sometimes I create my own. Light, shape, scale, texture, and direction of movement of the letter forms are all focused to create the proper rhythm of the poem."

As the final poem is composed it is filmed from a computer monitor using a 16mm Bolex camera loaded with black and white film. The film is developed and reviewed. Once accepted it is prepared for the final step — the hologram. At this point the movie film is placed in a special film/hologram transfer system known as an integral printer. Here each frame of celluloid is transferred to its equivalent form as a holographic image. Each Holopoem is a composite of 87 frames of movie film. The completed hologram is developed, mounted, and displayed.

Kac is now an instructor of computer holography at the School of the Art Institute of Chicago. The Holopoems have grown into a collection of work that has toured many galleries and conferences throughout the United States. Last year they graced the SIGGRAPH art show in Las Vegas. In October of this year a small collection of Holopoems and computer graphic/holography works of Kac's students is appearing at the CyberArts International (Pasadena CA) art gallery.

As to the future of Holopoems the potential is vast. Kac is working on HAVOC, a composition of 39 words that will be integrated into a single poem. The big dream as with any poet is the ultimate discovery, the publication of a book. But this is not any book. Its "pages" will be embossed holographic foils each containing an animated holopoem, truly a case of poetry in motion.

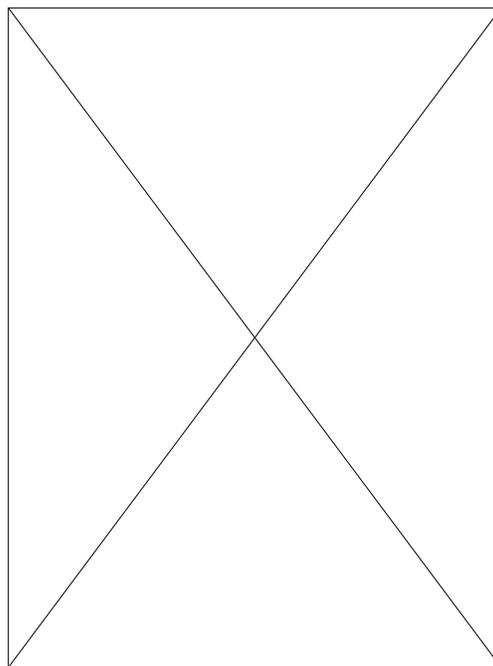
Holopoetry, Hypertext, Hyperpoetry

Eduardo Kac

I will start by examining briefly the course that led to the development of holopoetry ten years ago. It was in 1983 that I created my first holopoem, but my interest for linear and visual poetry developed early in adolescence. A turning point for me was winning at seventeen years of age a national poetry contest in 1979, in Brazil, with a short poem in verse entitled *Dúvida* (“Doubt”). The poem was published the same year in the literary supplement of the Rio de Janeiro newspaper *Tribuna da Imprensa* and in the following year in an anthology, *Cem Poemas Brasileiros* (“One Hundred Brazilian Poems”), published by Editora Vertente, from São Paulo. The structure of this as well as of other poems I was writing at the time followed syntactic conventions and used the line as breath unit. I started to participate in recitals and in public readings.

In the late 1970’s Brazil was slowly going through a period of redemocratization, following more than one decade of military dictatorship, torture of political prisoners, and censorship. I became interested in body politics, and found myself reading Wilhelm Reich, Herbert Marcuse, and Roland Barthes, among others. Having diligently read and studied the work of the most important modern and contemporary Brazilian poets as well as some of the most prominent modern and contemporary American and European poets, I noticed that works that openly expressed what I perceived as political issues related to the human body were absent from Brazilian poetry. I also studied poets of the past such as Catullus, Martial, Aretino, Bocage, Rimbaud, and others, who had celebrated the body free-spiritedly. The poetry I developed after that had strong political overtones and was

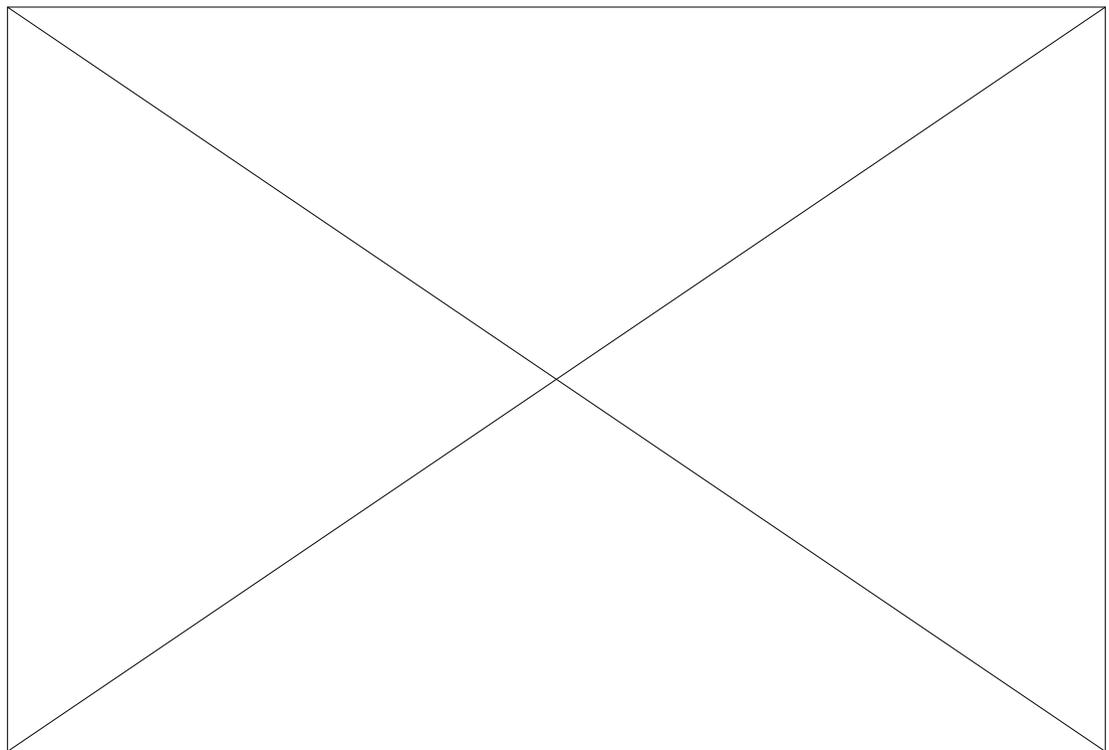
Pictogram Sonnet,
1982,
by Eduardo Kac.



built on the “forbidden” vocabulary I found absent from the modern and contemporary work I admired. This style focused on semantic content without ornamentation or euphemism. I decided that this poetry would also incorporate other elements considered inferior or unacceptable by critics but which would be empathic with the audience, such as calembours, slang, and humor, and that it would be written specifically for public performances, rather than for book publishing. This work was definitely addressed to the man and the woman on the street. Throughout 1980 and 1981, and part of 1982, I gave weekly performances in public and private spaces, in Rio de Janeiro and other Brazilian cities, with other young poets working along similar lines. During this period I also created graffiti-poems, object-poems, and sticker-poems, which expanded the scope of my performances. The idea of approximating the letter and the human body culminated in poems in which I performed so as to create the letters themselves with my own body. This whole project was documented in its three-year span in varied forms, including books¹, magazines, newspapers, film, television, and radio coverage.

Although during the first years of the 1980s my attention was centered on the work described above, I would occasionally create visual poems that were not at all related to the programmatic intervention I was carrying out. Because they did not fit into my main activity, however, I set them aside and never published them. “Pictogram Sonnet” and “Caros Ouvintes” are examples of these unpublished texts. My interest for visual poetry continued to increase as my dedication to oral and versified poetry decreased. Between 1982 and 1983 I was very unsatisfied by what I then considered the blind alley of visual poetry. Aware of the multiple directions the genre had taken in the twentieth century I experimented with different media. I created visual poems with a mechanical typewriter; I used collage tech-

Caros Ouvintes,
1982,
by Eduardo Kac



niques; I collaborated with professional graphic designers and photographers; I wrote poems with a cadence between prose and verse; I produced animated poems for electronic media, such as electronic signboards and videotext networks. Some of these works I published in an artist's book entitled *Escracho*, early in 1983.

It was clear to me that one of the main forces behind the rebirth of visual poetry in the twentieth century was the popularization of paper-print technology. So, I concluded that I would have to move beyond the shortcomings of the print medium and try to think my way outside this form. I was no longer interested in creating physical, three-dimensional object-poems, since this form 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. Always with an amateurish interest in Optics, I had read an encyclopedia article on holography published in the early 1970s. I went back to this article, but could not understand how a three-dimensional image could be recorded on a two dimensional surface. The idea seemed fascinating, however. When I saw a hologram for the first time, early in 1983, it became clear that this medium had the potential solution for the aesthetic problems I was struggling to resolve. I then set out to develop a textuality to be modulated by the elusive nature of holographic space which would be experienced with its own rhythms, somewhere between the two-dimensional surface of the page and the solid three-dimensional form of the object. The new poetry I was going to develop would focus more on syntactical issues rather than on semantics. In the following years I became a holographer and subsequently a computer animator. This has enabled me to be in control of the execution of all stages of my work and to learn through my experimentation in the laboratory about the limits and prospects of holographic writing.

A definition of holopoetry

I have discussed elsewhere² the development of holopoetry from its inception to its current stage. In the next two sections I will proceed to outline holopoetry's general principles and to discuss recent pieces not documented before.

My work in holography can be understood in the context of language art and visual poetry, two genres that explore the fusion of word and image. I create what I call holographic poems, or holopoems, which are essentially holograms and computer holograms that address language both as material and subject matter. I try to create texts which 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. My 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. If the reader has never seen an actual holopoem, he or she needs only to consider Eliot's³ words literally, that is, as something that in fact takes place as a visual-poetic phenomenon:

Words strain,
 Crack and sometimes break, under the burden,
 under the tension, slip, slide, perish,
 decay with imprecision, will not stay in place,
 will not stay still.

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. My holograms define a linguistic experience that takes place outside syntax and conceptualize instability as a key signifying agent. I use holography and computer holography to blur the frontier between words and images and to create an animated syntax that stretches words beyond their meaning in ordinary discourse. I employ computer animation techniques to create a new kind of poetic composition, which undermines fixed states (i.e., words charged visually or images enriched verbally) and which could be defined as a constant oscillation between them. My holography is both an investigation of the processes of language and of holographic meaning.

The temporal and rhythmic organization of my texts play an important role in creating this tension between visual language and verbal images. Most of my pieces 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.

I strive toward conceiving of 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.

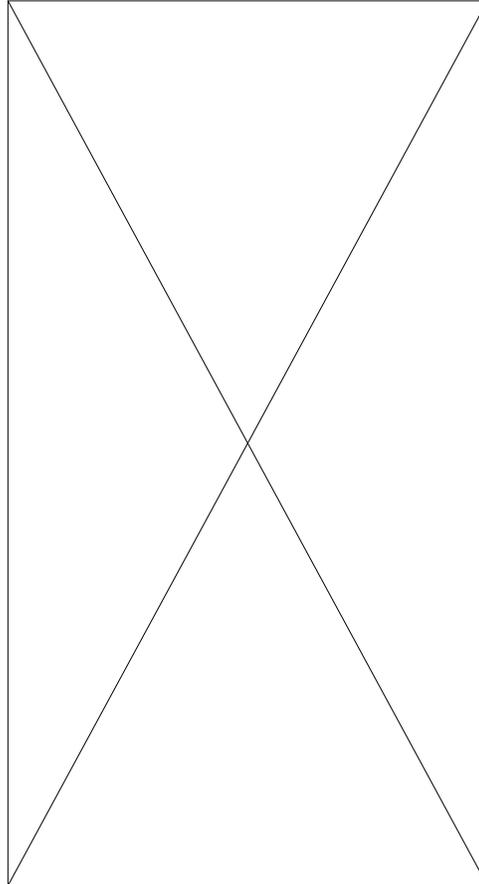
Because of their irreducibility as holographic texts, my poems resist vocalization and paper-print reproduction. Since the perception of the texts changes with viewpoint, they do not possess a single “structure” that can be transposed or transported to and from another medium. The combined use of computers 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 try to investigate the possibility of creating works that emerge from a genuine holographic syntax.

Recent holopoems

Astray in Deimos⁴ (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.

Three frames from the animation used in **Astray in Deimos**, by Eduardo Kac, 1992.



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

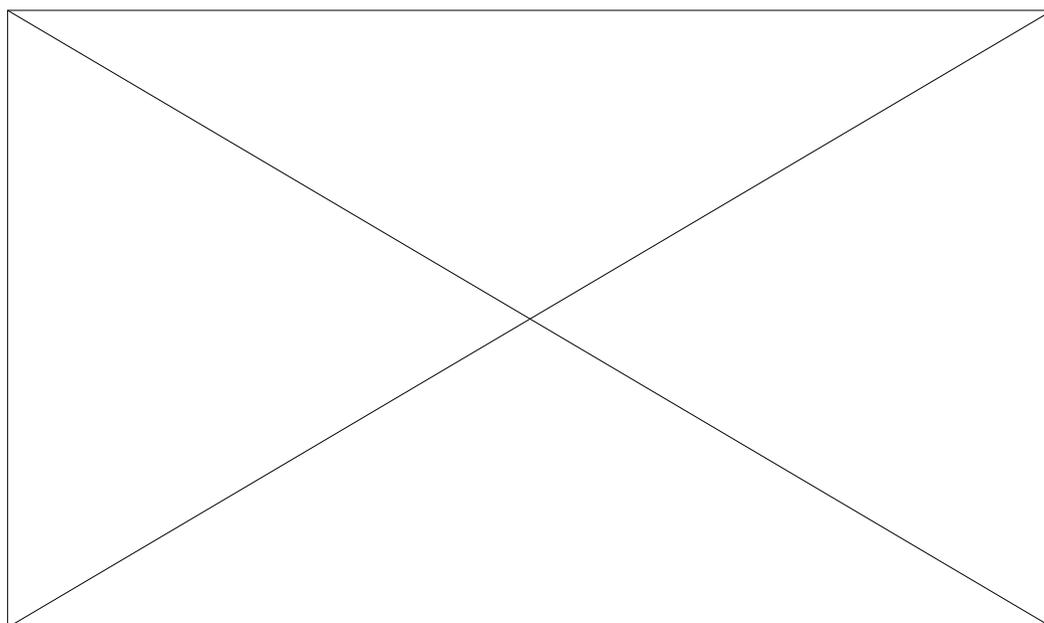
the nonsemantic forms. These in-between verbal signs attempt to communicate at the level of abstract visual signs which have no extra-pictorial reality, at the same time that they operate under a specific framework provided by the words at the poles (EERIE and MIST). This can be very difficult at first 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. What I ask readers to do when looking at **Astray in Deimos** is to read the metamorphosis between EERIE and MIST with the same emphasis they read these two individual words, but without necessarily 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.

Havoc⁵ (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

Frame from the animation used in **Havoc**, 1992, by Eduardo Kac.



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 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 parenthesis.

The title of my next holopoem is **Zephyr**⁶ (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 animation⁷ 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 behaviour of words in space, viewers have read other words (LONE, LOVE) in this piece also.

I used three masters in this piece. The first master contains two letters, L and E, with space between them equivalent to two other letters (I and F, which are absent of this hologram). 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 second master contains the word IF, formed by the two letters extracted from the word LIFE. This word 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. The word IF is positioned in the perceptual field so as to match the space left in the first master.

Both are integrated into one entity, but they also dissolve into one another. A third master was added, containing stylized images of flames forming a ring around the ripples. 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 master holograms which were later overlapped for the recording of the final transfer on a single sheet of film.

The first master 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 master 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 sort of 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 master 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.

Hypertext, or composition by networked fields

I will introduce at this point some remarks about hypertext, because the

mobility afforded by this new form is relevant to the rapprochement I will suggest later between holopoetry and hyperpoetry. The term hypertext was created by Theodor Nelson in the 1960s to describe a kind of electronic text, read on a computer screen, that is fundamentally different from print in its nonhierarchical structure. The printed book was a breakthrough in relation to papyrus scrolls and older forms of recording the written word, among other reasons for its mechanical reproducibility, patterned linearity, and random access to information. Similarly, hypertext is a breakthrough in relation to the printed book because it is interactive, calls for nonlinear forms of text construction, and allows the reader to navigate through multiple pathways.

The interactivity that hypertext purports affects in a fundamental way the very notion of text. Quite often in literary and poetic hypertexts, the reader can not only make personal choices in terms of when and where to see what, but can also make changes to the very text he or she is reading. Arguably, one always makes personal choices in the process of reading a book but, with few exceptions, the book is conceived by the author so that the reader starts on the first page and naturally ends on the last page. This linear sequence is not transposed to hypertext, where the verbal material is organized in discrete units linked electronically. Authors conceive of their works so that the reader has many choices along the reading path, transforming the literary work into a more open-ended experience than we are accustomed to. This experience is pushed further when readers are allowed to contribute to the texts. While one is used to making notes directly on a book, what is less common is the ability to delete parts, change letters or words, or add something new to the very text one reads. This ability is at the very core of hypertext. Because the text is represented digitally in the memory of the computer or on a floppy disk, and not as analog physical marks on the surface of a printed page, often authors will allow readers to modify the text and therefore alter it in a variety of ways.

The nonlinearity of hypertext can be stated in two ways. First, one can create a network of linked texts which, in themselves, are traditional linear texts. For educational purposes it might be interesting to create an electronic document that links nonlinearly an important literary work to a variety of analytical essays and scholarly references of names, historical events and places mentioned in the text. The public would read the work in traditional fashion, but would be able to access any other relevant essay or book written about the literary work from any passage in the text. Second, experimental writers can benefit from hypertext by radicalizing its features and generating electronic poems or novels that cannot be experienced as such in print medium. The verbal material in this case has to be organized as a multinodal network and the reader has to make constant decisions about what directions to take in order to move through its interconnections. The very organization of the text as network, the design of which will vary from author to author and from piece to piece, is as important as the individual blocks of verbal material encountered by the reader along the multiple reading paths. Instead of Olson's composition by field⁸, "where all the syllables and all the lines must be managed in their relations to each other", and where "a series of tensions are made to hold", we now think of composition by networked fields where tensions spill out and overflow.

If in addition to electronic text an author works with sound and motion pictures, the author extends hypertext to the realm of hypermedia, thus multiplying even more the nodes (or the resources in each node) in a network. From an instructional perspective, it becomes possible not only to inform the reader about a geographical reference in a novel, for example, but to show a short electronic movie about the site. From the perspective of experimental writing, the author gains access to a whole new set of instruments with which to enhance or expand the range of the work. It is true that television already delivers electronic images, sound, and texts to every household, and that videotape rental multiplies the options of the audience. But hypermedia raises new sets of literary problems about the authority of the author, the structure of the work, and the role of the reader. What is equally important, hypermedia might expand the realm of literature as it promises interactive access to very large amounts of data linked in a complex network of nonsequential audiovisual information.

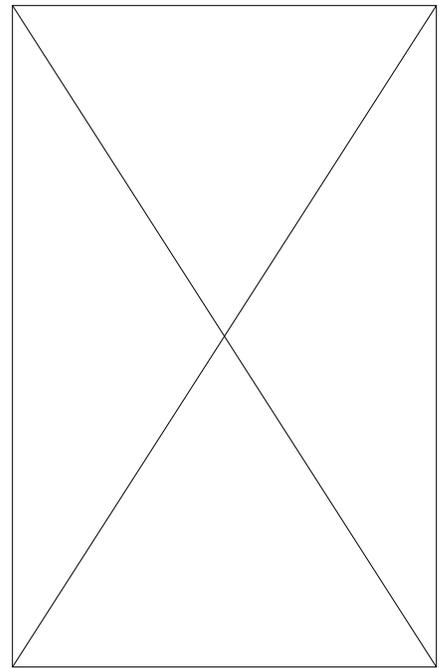
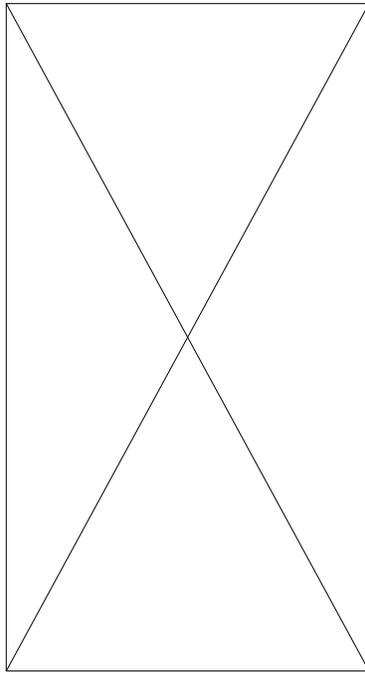
Storms, a hyperpoem

Looking closely at the cultural dimensions of hypertext, it strikes me that in many ways the discontinuous and metamorphic poetry I've been developing since 1983 with holography shares with hypertext, and with the hyperpoetry created by myself and by others, the same interest for the model of the network, for the readerly interactivity, and for the giving up partial textual control on the part of the author. I ask myself, however: if holopoetry promotes a disengagement of the linearity typical of traditional poetry and of the graphic simultaneity of visual poetry, can or should it be considered a kind of hypertext? Holopoetry, which links one letter, 3D graphic fragment, or behavior of a text to myriad others, questions the motionless structure of print-based visual poetry, just as it also questions the authorship and readership created by it.

In 1993 I finished **Storms**, my first hyperpoem, which can be read on any Macintosh computer. It is organized in vocalic and consonantal bifurcations. To navigate through the poem one is invited to click on a letter at any given time. In some instances, navigation can also take place by clicking outside 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. When the reader does make any choice, the word on the screen is dissolved and blends into the next word. The poem does not have an ending. This means that one can continue to explore different textual navigation possibilities or quit at anytime by pressing the Command key and the Q key.

After I finished the first draft of this hyperpoem, I noticed that its structure was very similar to the diagrams of sefirotic systems typical of the Kabbalah. This made me realize that I could push it further, by borrowing some links I observed in a particular sefirotic system. Kabbalistic writing and mysticism have always had a formal influence in my work, and this influence has resulted in holopoems such as **Abracadabra** (1984/85), **Lilith** (1987/89, with Richard Kostelanetz), **Shema** (1989), and **Multiple** (1989). The difference here is that this time there is a remarkable similarity between the actual structure of my hyperpoem, which promotes the branching from one textual unit to another, and the structure of this metaphysical Tree.

Sefirotic system according to Pa'amon ve-Rimmon, Amsterdam, 1708 (left), and link structure of the hyperpoem *Storms*, 1993 (right)



In poetry, words are not used, as in ordinary discourse, just to make a point, but to craft a verbal composition. In linear poetry the presence or absence of accent in a word is like the presence or absence of accent in another word. Syllables become units of measurement. Verbal messages are works of art because poets of all eras and nations have always carefully selected and arranged words in a particular way, so that their qualities (aural properties, connotative or denotative meanings, graphic form) can resonate within the poet's particular system. As wrote Louis Zukofsky⁹, "condensed speech is most of the method of poetry (as distinguished from the essentially discursive art of prose)". While this is still true in hyperpoetry, what seems to be at stake now is a disengagement of the textual distribution characteristic of print. The node – and not the syllable – from which links irradiate is the new unit of measurement. The writer now defines the work as crisscrossing axes of combination. 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. In each node the poet will deploy text or add sound and moving images to it. In *Storms*, I decided to work with text alone.

Conclusion

Holopoetry explores motion, displacement, and metamorphosis. In my holotexts I employ a syntax of dislocations that continually drive graphemes from their position. In some poems I use only one word, but in my multiword poems each word is a node or point of intersection. No word is the origin or beginning. Even in the single-word pieces that employ some kind of sequence, this sequence

is never hierarchical (i.e., linear) and never assumes a fixed beginning or end. Words are axes which radiate linked words that surround them – but quite often a word loses graphical integrity and becomes temporarily something else, a sign or an abstract pattern with no extra-linguistic or extra-pictorial reality. This textual drift suggests, ultimately, a view of the word and the world as malleable.

In electronic hypertext, one chooses paths but each locus displays words on a two-dimensional computer screen, which are scanned by the eye in linear fashion, like in print, from top to bottom, from left to right. In holographic texts the reader can't add to the existing elements, at least not yet, but in addition to choosing paths the readers encounter a space where the graphical substance of the verbal material is under constant disturbance, being transformed, morphed, or disintegrated in a new signifying process.

The writer that works with holography or hypertext 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.

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. A rare example of important international digital poetry was shown in the exhibition “p0es1e digitale dichtkunst”¹⁰, curated by André Vallias, in Germany, in 1992.

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, videotapes, videodiscs, videophones, computers, virtual reality, CDs, CD-ROMs, telepresence, and holography. In a literary culture still dominated by print, the author of experimental prose or poetry that can only be read in electronic or photonic media will have a hard time reaching 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 language.

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- 2- See: E. Kac, “Holopoetry and Fractal Holopoetry: Digital Holography as an Art Medium”, in *Holography as an art medium*, ed. Louis Brill, *Leonardo special issue*, Vol. 22, Nº 3/4, pp. 397-402, Pergamon Press, Oxford (UK), 1989; and “Recent Experiments in Holopoetry and Computer Holopoetry”, in *Proceedings of the International Symposium on Display Holography*, ed. T. H. Jeong, SPIE Vol. 1600, Bellingham, WA, 1991, pp. 229-236.
- 3- T. S. Eliot, “Burnt Norton”, in *Collected Poems, 1909-1935*, (New York: Harcourt, Brace and Company, 1936), p. 219.
- 4- The holopoem **Astray in Deimos** is in the permanent collection of the Museum of Holography, in Chicago. I am greatly indebted to Loren Billings for her continuing support.
- 5- The holopoem **Havoc** was supported in part by a New Forms Regional Grant, a program administered by Randolph Street Gallery and the National Afro-American Museum and Cultural Center, and funded by the Inter-Arts Program of the National Endowment for the Arts and The Rockefeller Foundation, with additional support from the Illinois Arts Council and Randolph Street Gallery.
- 6- The holopoem **Zephyr** was partially supported by a grant from the City of Chicago Department of Cultural Affairs, and the Illinois Arts Council Access Program.
- 7- C. Olson, “Projective Verse”, in *The Avant-Garde Tradition in Literature*, ed. Richard Kostelanetz (Buffalo, NY: Prometheus Books, 1982), p. 252.
- 8- Particle systems can be described as a kind of animation technique in which large amounts of very small three-dimensional objects (computer-generated particles) are set to motion simultaneously under a combination of random factors and algorithmic control. Parameters used to animate particles include life span (i.e., for how long do they move), speed, quantity, size, color, starting and ending point, and direction of travel. Once the animation starts, hundreds or thousands of particles move by themselves under constraints set by the artist. There is no need to create key frames or to set motion paths for individual particles.
- 9- L. Zukofsky, “A Statement for poetry”, in *Prepositions* (Berkeley and Los Angeles: University of California Press, 1981), p. 20.
- 10- This group exhibition took place at the Galerie Am Markt, in Annaberg-Buchholz, Germany, from September 12 to October 3, 1992.

Photonic Webs in Time: the Art of Holography

Eduardo Kac

INTRODUCTION

Every medium has a code, a set of rules or conventions according to which determined elements are organized into a signifying system. The English language is a code as is perspective in painting and photography. In the first case, the elements are phonemes organized into words and sentences according to a social convention: the syntax of English. In the second case, the elements are dots and lines organized into pictures according to a geometric method.

An artist or movement can break the conventions of the medium, as has done Cézanne with painting, Moholy-Nagy with photography and Cummings with the English idiom in poetry, and create new elements and rules for combining them. If this is done, the level of predictability (or conventionality) is lowered and unpredictability is increased — becoming more difficult for the immediate audience to understand it. But once these new rules are learned and the ideas behind them widely understood, the level of unpredictability is lowered and they become new conventions that can be accepted by the audience.

Holographic artists exploring the medium — as opposed to advertisers using holography, who favor a high level of predictability — are breaking several visual and cultural conventions. As a matter of fact, holography is so new that many questions are left open about the nature of the medium. Therefore, any attempt to clarify the issues raised by holography on a cultural level has a prospective (and not conclusive) tone, concentrating more thoroughly on general points and on the promise of its potentialities than on the records of its historical achievements so far.

THE ETYMOLOGY OF "HOLOGRAM"

The word “photograph” was first suggested by French-born pioneer Hercules Florence in 1833¹, as a consequence of his attempt to use light to print labels and diplomas on paper with a silver coating. But while photography as we know it today was invented by Niépce as a culmination of centuries of research in that direction, holography, as many other inventions in the twentieth century, was the by-product of a search for something else. Namely, a method for improving the quality of images recorded on an electronic microscope.

As opposed to photography, holography did not come as a consequence of centuries of perfectibility. Dennis Gabor, its inventor, needed in 1947 what was to be later called a laser to make three-dimensional holograms, but he invented holography almost fifteen years ahead of the appearance of the first laser². Even in the early sixties, when the first three-dimensional holograms were made, the technique was labeled “a solution in search of a problem” by the press. More than thirty years have passed since the invention of holography, but the character traits

of the medium as such and its cultural meaning remain incognito.

As observed before, Gabor coined the word “hologram” — which is widely used to the detriment of the word “holograph”. While the former corresponds to the nomenclature established by its inventor, the latter is used only by those who try to imply that the hologram is an extension of the photograph or by those who are not concerned with their differences. The point to be made here is that the word “hologram” is more precise in naming its referential object.

“Holos” stands in Greek for “total, complete”; “gramma” means letter and writing. It has the same roots of “graphein” (“to write”). In ancient Greece, however, the letter was also used as a number, i.e., as a system for the measurement of distinguishable unities (therefore the current use of the suffix in “kilogram”, which doesn’t mean writing with weight but the unity formed by one thousand grams.) So if “gram” designates the unity and “holos”, the total, the word “hologram” means the unity of the whole as well as the wholeness of the unity — which the word “holograph” could never express. Actually, “holograph”, in any dictionary, designates “a document wholly in the handwriting of its author”. So, since in a hologram each part is similar to the whole, a spatial characteristic that will be addressed later, only the word “hologram” should be used and the misleading “holograph” avoided.

A HOLOGRAM IS NOT A PICTURE

By avoiding the word “holograph”, one is also avoiding the equivocated idea that holography is a kind of photography. After 150 years of developments, photography is a medium the conventions of which are now well established and accepted by the public. Therefore, a comparison between both media might take advantage of the general acceptance of photography not to imply kinship but to serve the purpose of examining a few questions by contrast.

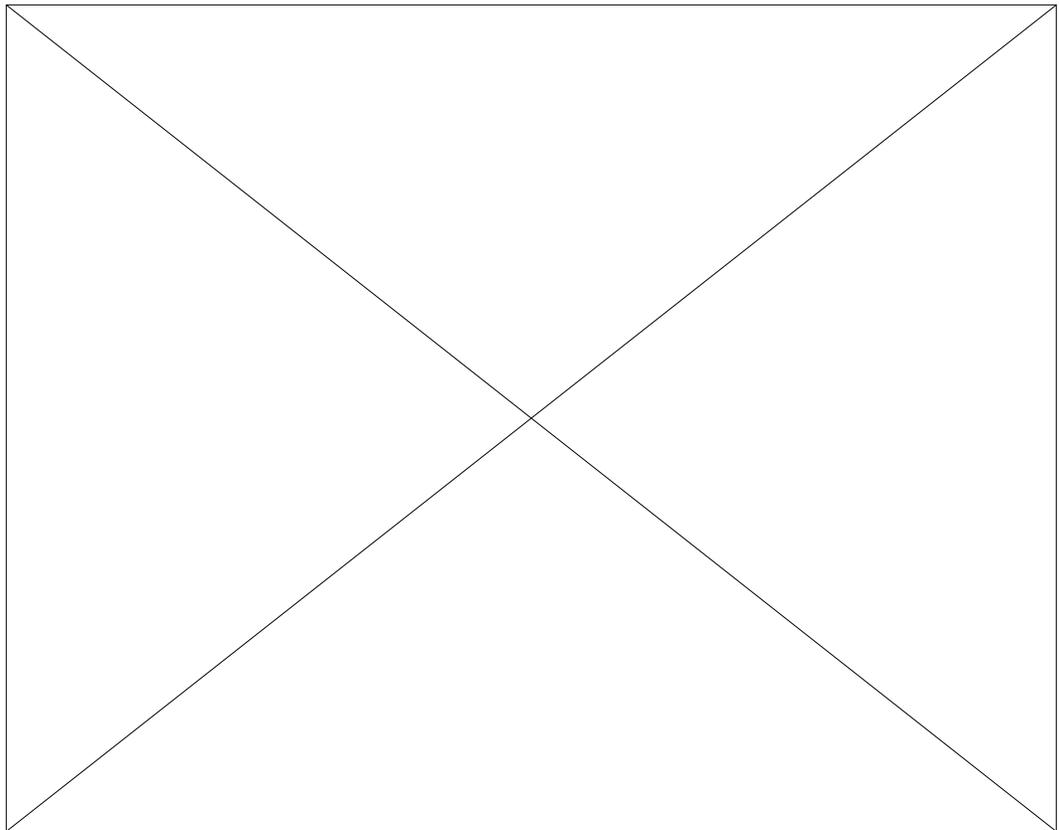
Although Niépce and Florence were also interested in photography as a printing technique, the use of the camera by Daguerre and Talbot gave shape to the medium’s capability of taking accurate pictures of people as well as real objects and scenes. As observed in 1928 by French writer Pierre Mac Orlan,³ from then on, photography evolved in two basic directions: one, the historical and journalistic approach, has foundations in the recognition of the photograph as a reliable method of documentation; the other, the creative approach, is based upon the invention of non-documental images by means of cropping, solarization, montage, negative manipulation etc. This is not to say that photo-journalism is not creative work. The case in point is that in either situation referentiality or imagination are the primary elements of the image. In both cases, though, one wouldn’t be wrong in stating the truism that whether taken with a camera or not, the photograph is ultimately a two-dimensional image and photography is a picture-making technique. It is the art of fixing an image on a plane in such a way (with varying degrees of shade) that the image becomes the plane.

Here a distinction should be made. As opposed to the photograph, the hologram is not a picture and holography is not primarily a picture-making technique. If this is true, all attempts to analyze holography from a straight pictorial

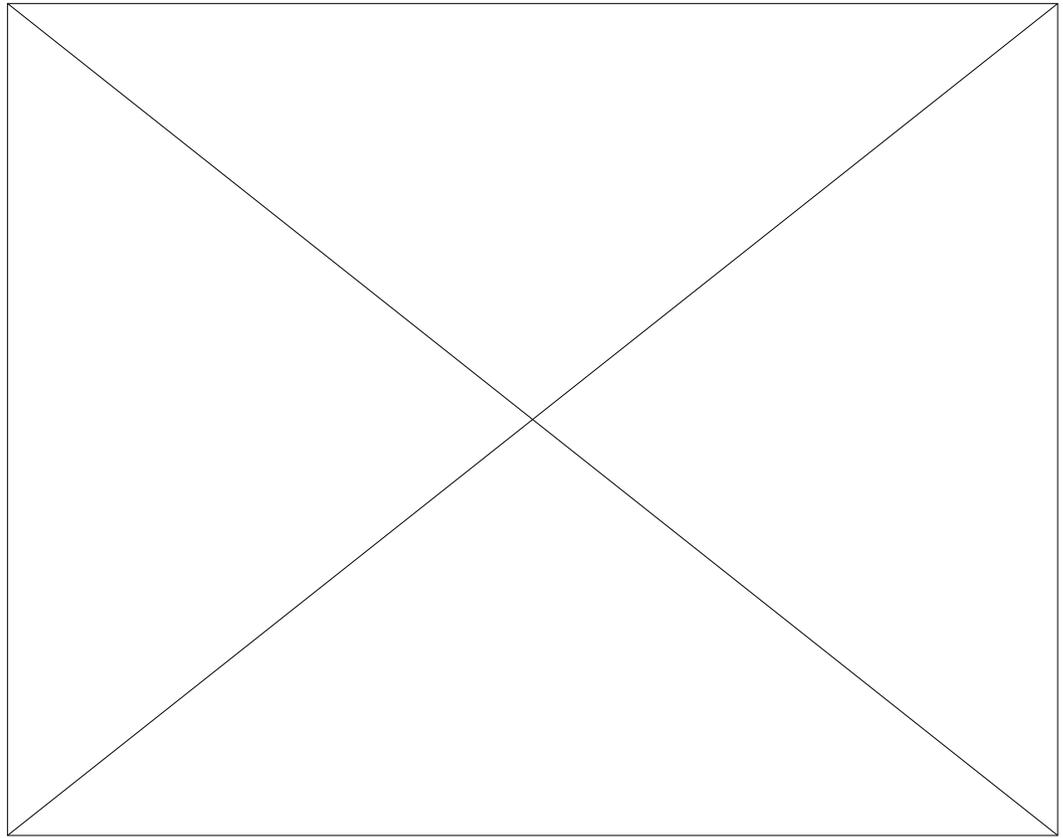
viewpoint, or taking simplistic novelty holograms as if they represented the whole world of holography, will prove to be misleading. An examination of an ordinary fact, such as shopping in a supermarket, might make us aware of something that otherwise would be unnoticeable. Every time one goes shopping in a supermarket, one realizes that the checking out was speeded up by the use of a laser scanning process that “reads” the Universal Product Code (UPC) and provides price, an itemized receipt and inventory data to the store computer. The device located inside the scanner that bends the laser light in the direction of the product and back to the microprocessor is a hologram (or a set of holograms) in a glass wheel. This hologram (or set of holograms) doesn’t bear an image at all. What it actually does is just to perform the function of a lens; i.e., it only diffracts light in a particular way. Holograms that do not display images but instead do perform as optical elements are gaining ever more industrial and scientific applications. So if we can not only think of but actually use holograms as optical elements and not like pictures, if they can perform rather than bear an image, they are not extensions of photographs but a new way of recording, storing and retrieving optical information, i.e., information carried by light waves.

The way a hologram stores optically an image can be compared to a certain extent to the way a computer disk stores digitally an image. The digital image has to be transformed into 1s and 0s to be recorded on the disk and to be read by the software on the hard drive. The holographic image has to be codified into an interference pattern to be recorded on the film or plate. This pattern diffracts an incident beam of laser or white light so that the microscopic pattern can be translated into a visual image.

In the scanning process, the laser emits a beam that passes through an expander where it is enlarged and bent by a mirror. The beam is split into complex patterns by the rotating holographic disc. The patterns are deflected onto another mirror which angles them toward the scanning window. Light is reflected back to a detector where it is converted into electrical currents that can be read by a store controller.



Every point on the surface of the hologram “sees” and records the object from a different viewpoint.



To say that the hologram is distinct from the holographic image means that the first is just the storing medium, while the second is what is stored. All the fluctuations, changes, inconstancies, leaps, turbulences and rhythms perceived in complex holographic art pieces are the result of careful work on the level of the mutable structures by which the visual information is stored, and not on the level of the images themselves. To say that the hologram is not the holographic image means that one cannot “retouch” the image because one can only “touch” the storage medium. The sensorial response to holographic images (and very clearly not to holograms) is ambiguous in the sense that the person who tries to grab the image knows that he/she is not looking at an apple, but nevertheless tries to clutch the luminous image only to have the unusual experience of contrast between vision and touch. The beholder is not looking for deception, he/she is not wanting to be fooled, but wants to have an acute contrasting experience based on the identification of the appearance of a familiar object and its non-correspondent tactile contours. The distinction between a hologram and a holographic image also means that damaging the hologram does not damage the image, because the later is recorded all over the emulsion. In a photograph, as seen from the viewfinder, for every geometrical point on the surface of the object there is one and only one correspondent geometrical point on the surface of the image. In a hologram, as seen from the film holder, for every geometrical point on the surface of the film there is a complete view of all the available information of the object. If one point is missing, the other points will reconstruct the complete image of the object without any problem.

This distinction between the hologram and the holographic image, raised by the example of the supermarket scanner, might ultimately mean that, when looking at holograms that do display images, chiefly at art pieces with complex space-time relations, one should concentrate in appreciating the rhythm orchestrated by his or her own dynamic perception of the informational structure of the piece rather than try to reduce to a monoscopic vision a sensorial experience that demands extensive binocular probing. In other words, the idea of a hologram as “perfected photography”, capable of reproducing “better” the appearance of an object (the advertising approach) gives place to the understanding of the hologram as a medium for encoding complex spatiotemporal information (the artistic approach). The complexity of the way information is stored in the hologram might even in certain cases challenge the binocular (or “stereoscopic”) perception of images and space by sending absolutely different images to each eye, therefore deterring perception of three-dimensional “objects” to favor a dynamic amalgam of images.

The holographic image, as optical information, is ultimately a spatiotemporal one, and not a volumetric or in-relief one, as distinct from the stereoscopic or anaglyphic drawing or photograph. Anaglyphs and stereographs produce an immutable image of a localized relief without surrounding space, from which the temporal dimension is extracted, while holograms produce images surrounded by actual space the parallax of which has to be perceived in duration.

THE QUESTION OF REPRESENTATION IN HOLOGRAPHY

Because holograms are a way for recording, storing and retrieving information, and because they can display an image or replace certain objects in their function (or even perform certain functions that objects cannot) without displaying any image, they pose a complex question regarding the way they represent (or not).

It is very clear from the outset that holograms don’t represent anything, in the same way that a computer disk doesn’t represent anything either. Holograms present things (images) or are things (diffraction gratings in a supermarket scanner). This isn’t so complex a question. But holographic images, yes, they do represent in a way that is peculiar: it is a result of the characteristic traits of the medium as such but is also a consequence of our esthetic code, i.e., the conventions according to which we associate an image to something exterior to itself, as in the case of a holographic portrait. The problem comes from the fact that the syntax and the elements of the vocabulary of holography are not yet widely known, making it very difficult, even for the scholar, to “read” holographic images. The ones that are very easy to “read” are the ones that try to resemble photographs or objects, that try to take advantage of the viewer’s knowledge of another signifying system to convey a straightforward message, usually for advertising or decorative purposes, for commercial rather than for inquiry aims. Those images are of no interest to this essay, because they mislead the viewer by making him/her think that holograms are “optical illusions” rather than a means for recording, storing and retrieving optical information. The emphasis shall be placed in the uniqueness of the holographic image, and not in its reduction to other systems that training and

habit have already mastered.

In “On Longing”, Susan Stewart demonstrates unwillingly this reductionist approach to holography, or to what she names imprecisely “holographic art”, i.e., mass produced stock-images sold as souvenirs or decorative gadgets. Stewart writes:

The complex technology of “holographic art” erases its author and its referent; what matters is that it works, not that it points to something outside itself. Its contents seem strangely unmotivated, strangely out of key with the technical sophistication of its mechanisms: a woman’s face, a parrot in a cage, scenes that resemble those of romantic greeting cards. Content is emptied of interpretability. While modernist art delighted in “making strange” the everyday, this technical art delights in turning the strange into the obvious, in mapping mystery onto cliché. Holographic art is an art like that of commercial television, a mystification of technology accomplished in a gesture which proclaims the innocuousness of all content. In fact, without this univocal and mimetic content, we would not be able to distinguish artistic from scientific uses of the holograph.⁴

Content, in the case of the images that Stewart herself recognizes as resembling greeting cards, are not emptied of interpretability but full of predictability. Those images are designed not to cause strangeness, so that they can be promptly associated to well known images, so that they can convey transparently their content as pictures that resemble other pictures. As says Nelson Goodman, echoing Berkeley, “Pictures in perspective, like any others, have to be read; and the ability to read has to be acquired.⁵” A simple image of an anonymous woman’s face, even if it is in three-dimensions, does not demand the discovery of rules of interpretation. It relies on the experience of looking at actual faces as well as in the experience of looking at pictures of faces. Stewart also mentions, using the word “holograph”, that we already described as inappropriate, the “mimetic content” of these particular kind of holograms as if all holograms, including true holographic art pieces, had “mimetic content.” Mimetic means imitative, and to imitate is to mirror the appearance, is to resemble. Even if a hologram of an apple can be said to mirror an apple, that doesn’t mean that it represents an apple. We just saw that the woman’s face in Stewart’s “holograph” does not represent a particular woman or women in general; at the most it represents another picture of a woman’s face. So what happens here is not that the referent is being erased; simply, the referent of the image in this case is not an object but another image that poses no interpretation problems. As Goodman explains, some pictures we read by automatic habit; “practice has rendered the symbols so transparent that we are not aware of any effort, of any alternatives, or of making any interpretation at all.⁶”

Not all holograms, though, try to minimize their unique characteristics so that they can be grasped as quickly as they would if they were photographs. Baudrillard states that “we are left to know what kind of objects and forms will be hologenic, because the hologram’s destiny is not one of reproducing three-dimensional movies as movie’s destiny was not one of reproducing theater and photography’s destiny was not one of appropriating the concepts of painting.⁷” But to

think in terms of “objects and forms” is still to think in terms of volumes and reliefs, and not in terms of empty space or in terms of a four-dimensional space-time continuum. Baudrillard asks: “why will the simulacrum in three-dimensions be closer to the real than the one in two-dimensions?” And he himself provides the answer:

It intends to be, but its paradoxical effect is, inversely, that of making us sensitive to the fourth dimension as concealed truth, secret dimension of all things, that all of a sudden assumes the power of an evidence. (...) In short, there is no real: the third-dimension is the imaginary of a two-dimensional world, the fourth, of a three-dimensional universe... Scaling in the production of a real which becomes even more real by addition of successive dimensions (...): It only is truthful, it only is truly seducing that which plays with one missing dimension.⁸

The “real”, like the object of observation in quantum mechanics, depends upon observation, it changes when observed, it is only real when it can be observed. Every observation corresponds to the cultural standard of a certain society at a given time, and the images produced within this framework change together with the model employed to observe, describe or represent any particular notion of the “real”. Baudrillard uses the holographic image as a symbol for this cultural relativism:

The meaning, the truth, the real, they can only appear locally, in a restricted horizon, because they are partial objects, partial effects of equivalence and mirroring. Every reduplication, every generalization, every passage to the limit, every holographic extension (whim of explaining exhaustively the universe) makes them emerge in their own derision.⁹

Some holographic images said to be “realistic” will only be so if we state that our notion of the real is changing, because it will be only then that we will be able to establish a symbolic relationship between those images (that challenge our senses and our very notion of what images are and how they work) and the world. In the Renaissance, man placed himself in a vantage point to organize the sensorial (irrational) data of the surrounding world with mathematical (logical) rules, interrupting symbolically its chaotic flux with a schematic picture that expressed the supremacy of his viewpoint; the man of the twentieth-first century is experiencing the satellitization of the gaze, he is looking at the world as a whole from its orbit, not from inside like the Renaissance man did with perspective, but from outside, like we do with holography, to have a totaling view and to be able to scrutinize and control it more firmly, as we try to do with the weather (forecast satellite) or with our neighbor country (military satellite). We now measure the smallest temporal unit to be ever measured: the “femtosecond”, or a billionth of a millionth of a second. We now play with atoms at our will in scanning tunneling microscopes linked to immersive virtual reality systems. Even gravity we seem to start to neutralize, with superconductive ceramics. Whether in a microscopic or a macroscopic scale, we are redefining our models. The luminous holographic

image, for example, is a clear statement about matter and energy as a continuum rather than distinct entities. Why would an image made of a less dense state of this continuum look more or less realistic than an image made with a denser state? The notion of what is or what looks realistic will follow the ongoing paradigmatic change. “Realism is a matter not of any constant or absolute relationship between a picture and its object but of a relationship between the system of representation employed in the picture and the standard system”, as wrote Goodman.¹⁰

Is a holographic image more “realistic” than a photograph if it is a scientifically more accurate “optical illusion”? Is a hologram an “illusion” in any instance? In order to answer these questions one has to clearly define what one means by illusion. Gombrich explains that in art-historical writing the term illusionism does not connote that illusion or even deception is the main aim of art.

[The term illusionism] was introduced by Franz Wickhoff in 1895 in his famous publications of the Vienna Genesis, an early Christian manuscript, to characterize the deft style of brushwork which had survived from Hellenistic times. The idea that anyone should have confused the illustrations of the manuscript with reality obviously did not enter his mind. What he wanted to convey, quite rightly, was the difference between this style and other, less illusionistic, methods.¹¹

The term illusionism therefore never meant that the viewer would be deceived by an image and think that he/she is looking at the object rather than at a representation. But an argument might be raised that the aim of illusion is to create in the viewer the same response that the viewer would have to the object in similar conditions of observation. Descartes knew that “no images have to resemble the objects they represent in all respects (otherwise there would be no distinction between the object and its image)”¹² and, furthermore, as clarifies Goodman, what deceives depends upon what is observed, and what is observed changes with interests and habits. Writes Goodman:

In looking at the most realistic picture, I seldom suppose that I can literally reach into the distance, slice the tomato, or beat the drum. Rather, I recognize the images as signs for the objects and characteristics represented — signs that work instantly and unequivocally without being confused with what they denote.¹³

In a complementary view, Gestalt psychology explained that apparent motion, like in movies, for example, is not the result of a mistake in the observer’s thinking but a “perceptual fact”, i.e., a fact as real as the so-called real movement. Wolfgang Kohler ironically says¹⁴ that it would be hard to convince an audience that the movement perceived in a movie is the result of thousands of mistaken judgements made in a couple of minutes. He contends that the apparent movement is “perceptually real”, and that it proves that visual processes resulting from local stimulations occurring in different places under particular temporal conditions do interact one with the other. Likewise, one could say that an apparent tomato is perceptually real – discarding the meaningless idea that holograms are illusions. A

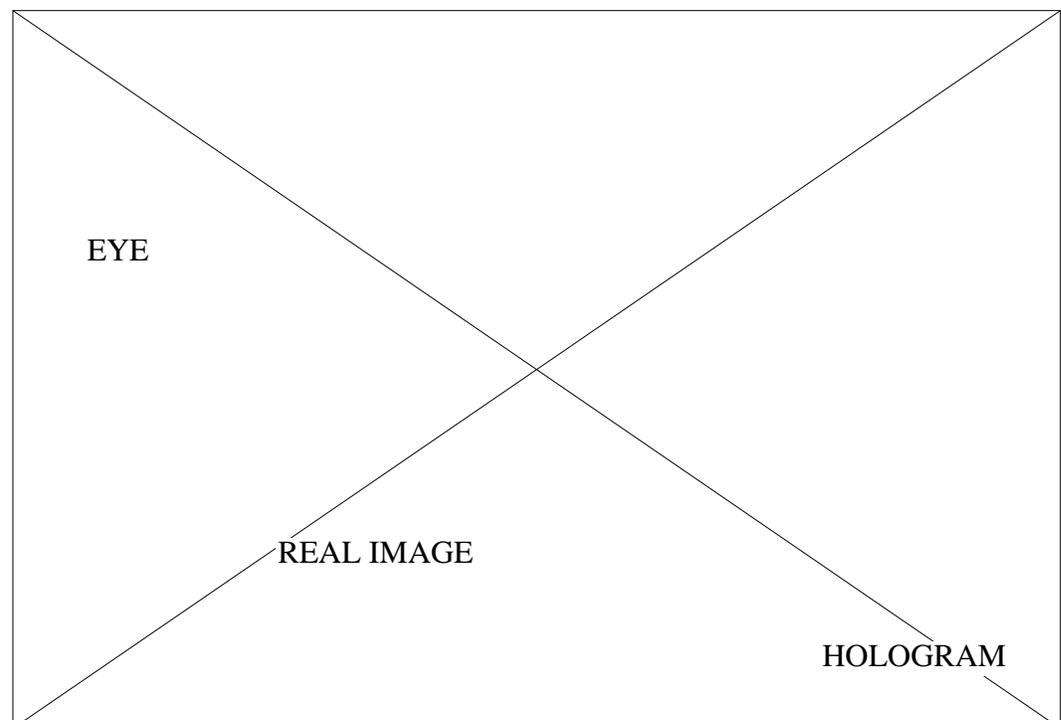
hologram resembles another hologram more than it resembles any object, which, of course, doesn't mean that a hologram necessarily represents another hologram. Representation is a matter of context and illusion a matter of how one understands the relationship between objects and images that represent objects. In informal discourse the word illusion implies absolute pictorial fidelity or unawareness of the distinction between a representation and an object, which ultimately does not occur in any aesthetic setting such as galleries or museums.

The holographic "real image", i.e., the one that stands in thin air between the viewer and the hologram changes our notion of depth, leading the layman to eventually say that there is an illusion, that "it looks as if the thing was really there". Baudrillard explains that holographic "real space" provokes a perceptual inversion, it contradicts our expectations. "Instead of being in a vanishing field for the eye, we find ourselves in a inverted depth, that transforms ourselves in a vanishing point"¹⁵. But he thinks that the holographic image has a spatial presence that eliminates the sense of illusion usually associated with conventional representation.

The hologram is the inverted fascination of the end of the illusion, of the scene, of the secret, by means of materialized projection of all available information of the subject, by means of materialized transparency. (...) The hologram doesn't have exactly the intelligence of the trompe-l'oeil, which is that of seduction, of always proceeding, according to the rules of appearance, through allusion and ellipse of the presence.¹⁶

Going further with his argument, he concludes that, to a certain extent, this process represents the end of aesthetics and the triumph of the medium, like in stereopho-

A holographic real image is formed when diffracted light rays crisscross and come to focus in three-dimensional space, between the holographic plate and the viewer.



ny, “that sophisticated in itself puts an end to the charm and intelligence of music.”¹⁷ But does stereophony put an end to the intelligence of music or does it offer another way, with a different “intelligence”, of enjoying it? Different ways of producing and recording music will result in different ways of listening, as exemplified by contemporary experimental pieces composed specifically for magnetic tape. While music played live demands a deductive auditory response (for watching the musicians play influences the listener’s perception of music), recorded music suggests a more inductive listening (for stereo-listening brings only a part of the whole spatial-acoustical experience of a live concert). The same is valid for the hologram: while tangible objects and shapes trigger deductive perception, holographic images demand a more inductive perceptual response.

The perceptual and conceptual experience of a hologram will continue to change as new technologies make possible new aesthetic adventures. Writing in 1972, Rudolf Arnheim acknowledged the impact of the then new pulsed portrait:

As holography is perfected, it begins to exhibit the terrifying rigor mortis of all new advances toward illusion. I look at the life-size portrait of the inventor, Dennis Gabor. He stands before me in full volume. As I move from the left to the right, I see a part of his shirt that was hidden before by his jacket, and the reflections on his eye-glasses change. I see his head first from the left, then from the right. So complete is the illusion of the man's three-dimensional presence that his immobility makes him a frightening corpse. The strength of the spell makes me ungratefully aware of what is missing. Instead of an image of a live man, I see a real ghost faking life. It will take a while before this new advance toward realism loses the power of seeming to be reality. It happened before with the motion picture, the stereoscope, the sound film.¹⁸

In this observation about holography, apparently the only one he ever wrote, Arnheim did not address the problematic notion of “illusionism” and expressed a view of image-making that one might regard as tainted by an evolutionist positivism: holography as progress or “advance toward realism”, which he equates to “advance toward illusion”. To advance toward realism is a contradiction in terms, because the goal of an absolute realism or illusionism is obviously unattainable, since all forms of representation work against the background of social conventions which change historically. Actually, Arnheim's commentary reveals other interesting contradictions, which may result from his unfamiliarity with the medium or from the attempt to read the holographic image with the critical apparatus one applies to the now familiar code of straight photography. How could holography be an “advance” if the hologram of a live man represents a “frightening corpse”? This definitely sounds more like a technological setback — an unsuccessful attempt at realism. How can the illusion be “complete” and still make us aware of what is missing? It seems that what is missing is not the living subject of the hologram (Gabor died in 1979), but an appreciation for the unique features of this medium. Arnheim looked at the holographic image and didn't read it as an image, but as a rhetorical “ghost”, i.e., the dematerialized appearance of a

person. It is as if to the uninitiate a photograph could represent a live man, but a hologram could not. In other words, it is as if it were natural to read photographs and unnatural to read holograms, but we shall not lose sight of the fact that the ease with which we look at photographs today was acquired through a long cultural process that goes back at least to Brunelleschi and Alberti. The rationale behind his commentary breaks down at the end, when he mentions what happened to film and the stereoscope, which no longer seem "to be reality". If these media lost that mimetic "power" it is because their visual conventions have been assimilated by society at large — a fate that awaits holography and that will be beneficial to it. Holographic art will only earn the consideration it deserves when trained and untrained observers alike can look at a hologram and not be haunted by spirits, specters, apparitions, phantoms, and other supernatural beings of critical discourse.

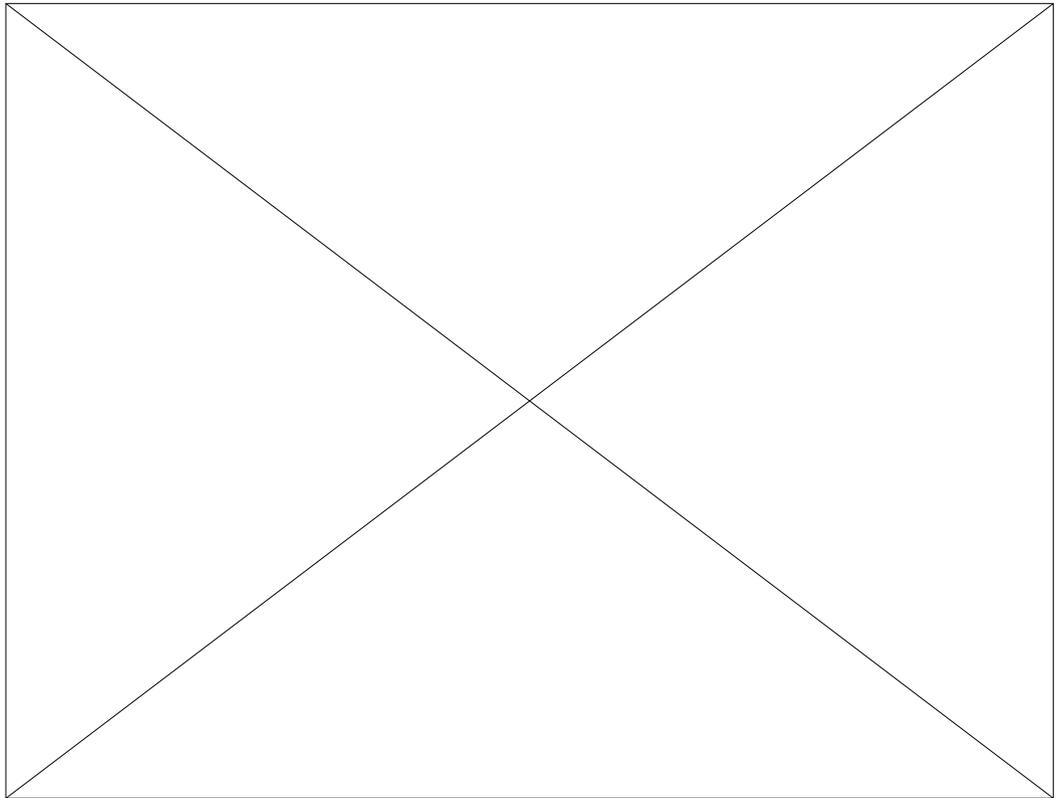
Holographic images possess several characteristics by means of which they represent things (like in a portrait of a person) or produce self-referential signs (like an abstract composition) and the study of them all would be beyond the scope of this essay. The fact that holographic images demand binocular perception in motion (as opposed to stereographs and anaglyphs) and the fact that they can produce a relief desirably identifiable with the relief of recognizable objects are two prominent aspects and therefore shall be addressed. But we will discuss these features in their reversed perceptual manifestation, the inside out relief and the non-stereoscopic vision (but still binocular), because of their unique holographic qualities.

PSEUDOSCOPY AND RETINAL RIVALRY

In the sixties the only kind of existing holograms were laser transmission holograms, i.e., holograms only visible by means of a laser. Those red images displayed in normal conditions a convex relief as such. The optical relief, because it was as convex as the relief of the object, was called "orthoscopic", from the Greek "orthos" (right). But if the light source was kept in place and the hologram flipped around, the relief appeared concave. The inversion also happened if two objects were used as models, one in front of the other. The one that appeared closer in the scene appeared further away in the image. This overall reversion was named "pseudoscopic", from the Greek "pseudo" (false) and is caused by diffracted light rays crisscrossing in front of the film plane.

The "pseudoscopic" phenomenon was discussed in 1868 by Herman von Helmholtz. Studying the image formed in a stereoscope, where two flat photos taken from a distance correspondent to the distance of human eyes are seen simultaneously to give the impression of relief, Helmholtz observed that the perception of relief and solidity was not produced by the movement of the eyes but by binocular perception. He described an experiment that showed that the impression of relief was still produced in a stereoscope despite it being illuminated with an electric spark of very short duration. The spark lasted for less than the four thousandth of a second, during which there could not have been, according to Helmholtz, any

In holography, the behaviour of a pseudoscopic image in time resembles that of a mirror image. The rotation of the sphere in the world of the looking glass equals that of the sphere in the real world, but its time is reversed.



recognizable movement of the eyes. He also noted that the image perceived with the right eye is different from the one perceived with the left eye, “otherwise we should not be able to distinguish the true from the inverted or “pseudoscopic” relief, when two stereoscopic pictures are illuminated by the electric spark.”¹⁹ Helmholtz describes the pseudoscopic image on the stereoscope saying that “what should be further off seems nearer, what should stand out seems to fall back.”²⁰

The volumetric image in holography, as opposed to the stereograph, has the quality of reversing itself in all dimensions, the three-dimensions of space and that of time too. It makes no ultimate distinction between left and right, between up or down, between surfaces of curvature positive or negative, between temporal increase or decrease. But instead of traveling through the looking-glass, the holographic image travels the other way: it draws out the image from inside the mirror to our space. The pseudoscopic and the orthoscopic images are symmetric in relation to time; when shaving or making up in front of a mirror, a person moves to the right to see the left side of his or her own image. To see the left side of a pseudoscopic image, the beholder has to move to his or her left side. To see the underside of the pseudoscopic image, the beholder has to move upwards. Perception takes place in time, even if it is a reversible time.

This unusual perceptual experience has a correspondent model in Physics, where “time reflection symmetry” holds that any physical situation should be reversible in time. “According to this principle, if time could be reversed (i.e. run backwards) the time reflection of a particular physical situation would correspond to what one would normally see by reflecting the situation in a space mirror, except that all the particles would be replaced by their anti-particles.”²¹ In a similar but distinct way, the pseudoscopic image replaces relief by anti-relief, left-

right parity by anti-parity and direction by anti-direction. For the holographic artist, pseudoscopy might be more than a stereoscopic “relief inversion”; it might be one possible element for the creation of unexpected rhythms and images with highly unpredictable volumes.

In his investigation of the stereoscopic image, Helmholtz also noticed that binocular vision does not simply coalesce the two distinct images projected on the retinas. He advocated that if one of the pictures in the stereoscopic pair is white and the other black, the resulting picture appears to shine. This phenomenon, called “stereoscopic lustre”, according to Helmholtz proved that a “complete combination of the impressions produced upon both retinae” does not take place, because if that would be the case “the union of white and black would give grey.”²²

We know that our normal perception of objects in the world out there depends on the fact that each eye sees a slightly different view of the same object, uniting both views into a coherent whole: what we call, after Julesz, cyclopean vision.²³ The regularity of this principle reflects the constancy of the conditions of observation that we have, which helps us in the elaboration of concepts about the world based on this regularity, like the relationship between what is seen as solid objects and what is felt by touch as solid objects. The action of the senses as an interconnected system also reflects this regularity that grounds our binocular vision. Jean Clair argues that for an artist like Duchamp, “who was repelled by the physicality, the odorous corporeality, of painting, by its excessive grounding in the sensory world, the stereoscopic image showed the way to a purely ideal configuration, the intelligible result of a synthesis certainly closer to the brain — and to the working of a *cosa mentale* — than to the retinal effect.”²⁴

Although not having had any further artistic consequence before holography, what Helmholtz described as “retinal rivalry” in the stereoscopic image is a *cosa mentale* that challenges the regularity of our perception of three-dimensional objects in the world. This is how Helmholtz described it:

There are some very curious and interesting phenomena seen when two pictures are put before the two eyes at the same time which cannot be combined so as to present the appearance of a single object. If, for example, we look with one eye at a page of print, and with the other at an engraving, there follows what is called the “rivalry” of the two fields of vision. The two images are not then seen at the same time, one covering the other: but at some points one prevails, and at others the other. (...) Hence the retinal rivalry is not a trial of strength between two sensations, but depends upon our fixing or failing to fix the attention. (...) If we leave the mind at liberty without a fixed intention to observe a definite object, that alternation between the two pictures ensues which is called retinal rivalry.²⁵

This phenomenon can also be observed holographically, but in a somewhat different way. First, in the stereoscope the two flat images are placed side by side, defining very clearly which eye sees what image. In the hologram, all images are recorded simultaneously on the emulsion and it is the diffracted light that sends towards each eye a different image, making it harder to know “from where” the image is coming. Second, while in the stereoscope each image remains flat, in

holography each image can be fully three-dimensional, which makes focusing of the eyes more complex. Third, at last, vision in the stereoscope is motionless, while in holography, as in normal vision, the eyes move relative to what they see, scanning the spatial amalgam of the rivaling images.

Some holographic art pieces will display a very complex field, the components of which can only be seen, in discontinuous fashion, when the eyes of the beholder are placed in the direction of the diffracted light. In those cases, the amount of recorded information, and the way this information is presented, neutralizes the action of binocular vision as a system that unifies two different views into a single one. The expectations brought by the viewer are neutralized as well, and he or she cannot perceive individual solid objects but an inconsistent field, where objects and forms shift and coalesce.

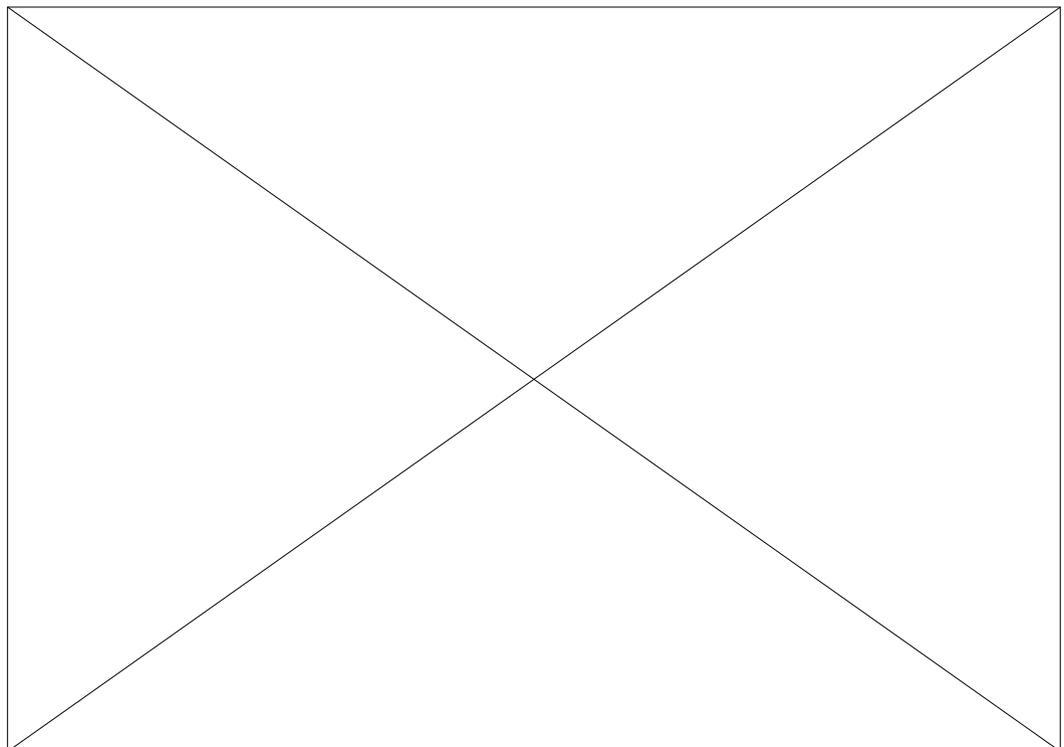
Retinal rivalry becomes therefore one element in the vocabulary of holography, establishing a new visual parameter. In holography it is not an exceptional structure or just a “curious experiment”, as Helmholtz describes it in the case of the stereoscope. It is a distinctive feature that checkmates our perceptual and symbolic conventions, for our response to visual stimuli depends, as we have seen, upon habits and conditions of observation. If each of our eyes perceives an absolutely different image, vision becomes a somewhat more complex and intense process, and demands with it that the beholder questions the very nature of his previous experiences.

PHOTONIC WEBS: TIME-DOMAIN HOLOGRAPHY

We need not examine in detail the technical development of automatic imaging systems, from early nineteenth century until now, to understand that it

A) In normal conditions, each eye perceives a different viewpoint of the same object.

B) Retinal rivalry takes place when each eye sees a completely different image.



created the historical, aesthetic, and material conditions for the current digital synthesis of holographic images. In a clear development of painting's aspiration to truth and veracity, photography first attempted to fix images as seen in nature. The camera obscura, used by painters for centuries, became the photographer's essential tool. In the next stage, photographers tried to capture different moments of an action. Muybridge's analysis of motion and Marey's chronophotography paved the way for cinema. As a consequence, Edison and the Lumière brothers showed that images representing motion could not only be recorded as stills but set to motion themselves, allowing us to see representations of the recorded events as a temporal flux. Much later, video technology instantiated the recording, eliminating the temporal gap between the action and its playing back and, therefore, reinforcing the congruity between the representation and the reference. More recently, personal computers seem to have demolished photography's truth ambition by allowing anyone to manipulate photographic images and to easily recombine them in any desired way. If photography forced painting to redefine its direction in the beginning and middle of the nineteenth century, today computers have a similar impact on photography. How does holography fit in this context? Holograms are already routinely synthesized from secondary sources, including silver photography, video, film, sensing devices, and computer graphics.

Many holograms created today involve electronic image manipulation and digital synthesis, and draw from other artistic fields, such as photography, film, and video. These holograms explore time more intensively than holograms created without the computer and reveal a very important aspect of the medium. A lot of the computer holograms created by scientists or commercial holographers are motionless, or at best have very limited motion, because their images usually aim at reproducing a virtual environment or object with the visual stability typical of laser holography. Since the object in most laser holograms is three-dimensional and stationary, many holographers use the computer to make stationary virtual objects. Holograms thus produced emphasize space instead of time, and volume instead of movement.

Based on a study published elsewhere,²⁶ I have identified seven domains of holographic temporal manifestation. Not suggesting a hierarchy or the absolute predominance of one category over the other, I propose a critical taxonomy based on the presence or absence of sequential imagery and the nature of its manifestation in space. While it is obvious that many of these identified time-features will coexist in certain kinds of holograms, it is also true that in many cases one feature might be predominant in determining the kind of experience the viewer has with the piece. What follows charts holography as an art of time and organizes its structure according to seven principles:

1. **SYMULTANEISM.** Holograms that present the viewer with one stationary object or construction organize the space so that it can be immediately and simultaneously perceived by two or more observers in like manner. This allows the viewer to probe a space that remains consistent for the duration of the experience. Most of John Kauffman's colored rock pieces would fall under this category.
2. **TIME SUSPENSION.** When a hologram is made that captures light phenome-

na as its subject matter, the dynamic behavior of light patterns is suspended at the moment of recording. Whenever illuminated, the hologram becomes active again and in its diffractive power reactivates the patterned choreography of the original propagation. Paul Newman's *Light Forms* are a good example.

3. FREEZING. A holographic frozen moment implies the use of a pulse so short that it captures a symultaneist scene out of an original dynamic context, in which free motion is not a constraint. Harriet Casdin-Silver's recent series of hybrid nudes may be included here.

4. LINEARITY. A linear hologram is one in which a serie of images is stored in such a sequence that its frames are meant to be experienced in a particular order. Any other directional readings become distractive in this case. Victor Komar's holomovies are as linear as traditional movies.

5. TIME-REVERSABILITY. Holographic images can be conceived to be seen in a flux that is bi-directional. No beginning is implied and no conclusive end is suggested. The experience of time-reversible holograms revolves around the possibility of eliminating oppositions such as forward and backward, since these two become equivalent. Dean Randazzo's *Pasqualina*, for example, explores tonal transformations that are meant to be reversible in time.

6. DISCONTINUITY. Discontinuos holograms break with the homogenous three-dimensional space reconstructed by a symultaneist hologram, shattering it into discrete viewing zones. These viewing zones can only be seen from restricted points of view. The space created is multifaceted, with controlled zones of visibility, gaps, and visual leaps. Many of Rudy Berkhout's early holograms explore this principle.

7. REAL-TIME. Real-time holography is computed on-the-fly and projected freely in space in response to the viewer's command. This "holographic video" can be controlled through the use of dials and other kinds of interface. Still in the early stages of technological development, this technique has not been explored by artists yet. The most prominent example is the apparatus being experimentally developed at the Massachussetts Institute of Technology. One day we will speak of real time transmission of holographic images.

In an article discussing the uniqueness of the digital moving image as distinct from other forms of cinema, Gene Youngblood wrote: "Cinema is the art of organizing a stream of audiovisual events in time. It is an event-stream, like music. There are at least four media through which we can practice cinema — film, video, holography, and structured digital code —just as there are many instruments through which we can practice music. Of course each medium has distinct properties and contributes differently to the theory of cinema, each expands our knowledge of what cinema can be and do."²⁷ This observation is of particular interest because it emphasizes holography as a time-based medium, and not as a three-dimensional imaging technique. The prospect of digital holographic movies of the

future notwithstanding, the multimedia nature of the computer compels us to a redefinition or, at least, to an expanded definition of what holography is. Computer holography, as practiced by a small but increasing number of artists around the world, multiplies the expressive possibilities of the medium and asserts time, expressed as changes and transformations, as its main aesthetic feature. Holograms become interactive events that can be perceived in any direction, forward or backward, fast or slow, depending on the relative position and speed of the viewer. Unlike the unidirectional "event-stream" of film and music, as mentioned by Youngblood, four-dimensional holograms are "buoyant events" with no beginning or end. The viewer can start looking at any point. Time is suspended from its extended continuum and can flow forward or backward.

The computer sparks a unique form of visual thinking in which visualization of concepts becomes almost instantaneous and any hypothesis is tested by means of immediate practical experimentation. With holographic video and desktop holographic laser printers being developed today it is clear that in the future holography will merge with digital imaging systems in new and unforeseen ways. In "Design and Immateriality",²⁸ Abraham Moles observed: "Design by holographic models may still be far in the future, but the concrete activity of design even now partakes substantially of immaterial techniques, or usage of artificial representations, images, and diagrams composed by image-generating machines." This is also true in the fine arts and one can only expect this usage of immaterial techniques to increase. Or, as Frank Popper put it, "the future of holographic art lies no doubt in its combination with video and/or computer art."²⁹

CONCLUSION

One of the facts that make it delicate to discuss holography from a non-technical point of view is the historical infancy of the medium. By trying to address some of the key issues of holography today we are putting ourselves in the position of the essayist that, around 1869, tried to encompass the cultural meaning of photography. It is clear that by then photography had already been popularized to a certain extent, but no argument should be further developed concerning the transformations that the medium went through in the following one hundred and twenty years. When Nadar photographed Paris from a balloon, he could never imagine that an artificial satellite would in the future photograph Paris from outer space.

We have already seen holographic images produced from satellite orbits. Would these images symbolize that more than one hundred years from now holography will play a major social role, comparable to what photography means socially today? It is hard to say.

Holography is a new medium, and as such is already remapping our perception of the world. As observed linguist Ferdinand de Saussure, recalling physicist Niels Bohr's dictum, "Far from it being the object that antedates the viewpoint, it would seem that it is the viewpoint that creates the object"³⁰, and in holography the viewpoint is an ever changing one.

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Statement on Holopoetry

Eduardo Kac

My work investigates the nature of language and its relationship to visuality, issues that are of interest both to literature and the visual arts, particularly as explored by visual poetry and conceptual art. I create what I call holographic poems, or holopoems, which are essentially digital holograms that address language both as material and subject matter.

I create visual texts which 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. My 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. My holograms define a linguistic experience that takes place outside syntax and conceptualize instability as a key signifying agent. I use holography and computer holography to blur the frontier between words and images and to create an animated syntax that stretches words beyond their meaning in ordinary discourse. I employ computer animation techniques to create a new kind of visual-poetic composition, which undermines fixed states (i.e., words charged visually or images enriched verbally) and which could be defined as a constant oscillation between them. My conceptual holography is both an investigation of the processes of language and of holographic meaning.

The temporal and rhythmic structure of my works play an important role in creating this tension between visual language and verbal images. Most of my pieces 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.

The 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 try to investigate the possibility of creating works that emerge from a genuine holographic syntax.

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Holopoetry: The New Frontier of Language

An Interview with Eduardo Kac by IV Whitman

“Everything has been said . . . provided words do not change their meanings and meanings their words.”

Goddard, *Alphaville*

According to some critics, Brazilian poet Eduardo Kac might be ahead of his time. The axiom, which was no less responsible for describing the likes of John Cage, Guillaume Apollinaire and Marshall McLuhan, is fitting for the likes of this young artist who is a descendant of the legacy of visual poetry and also a skilled arbiter of the new media of art, namely, technology.

Kac’s works are each exhortations to view and interpret media and language with new eyes. A digital field reduced to semantic structures and “discontinuous syntax,” as he likes to say, provides an environment where the text moves in space as the viewer attempts to perceive the textually woven color field Kac calls the “holopoem.”

Because the varieties of perception are infinite with a holopoem, this new breed of highly refined and meticulously calculated art is as mystifying to the viewer as it is to its maker. Kac has taken language and added a twist to the traditional left to right, top to bottom reading process: the “z” axis and a new kinetic factor. This fourth dimension not only allows the words to float, but, more importantly, gives the words new meanings as they are layered, forced on top of each other, appear and disappear, in clouds of mist and fields of color.

Born in Rio de Janeiro in 1962, Kac experimented with a variety of poetic techniques before he worked with holography in 1983 and began to create his holopoems. The following consists of excerpts from an interview during the course of two hot July days in the summer of 1993 in Chicago where Kac is an instructor in the Art and Technology Studies Program at the School of the Art Institute of Chicago.

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The two of us walk toward Lake Michigan at dusk on Sunday night—microphone in hand as we move down the street. Cars drive by and, finally, as we reach the lake, the water slaps the concrete jetty we sit on. The sky is clear and the air is warm and humid; hardly the Chicago one would imagine. But, it’s summer. Our conversations begins to pick up and I turn on the recorder. I interrupt Eduardo mid-sentence in order to officially begin our interview.

WHITMAN: . . . say that again. I liked what you said about . . .

KAC: If I had to take a poet's work to a desert island, I would take Cummings' because I think he is unique in several ways. First of all, Cummings was not creating his unconventional style just to write non-semantic, abstract compositions. He always wanted to communicate something but felt that traditional means were not sufficient for him to express what he wanted to express. He needed to change the nature of the medium he was working with. I emphasize that a lot because I felt that I could not work with the traditional, printed page medium anymore. I had to change my medium altogether to be able to do what I wanted. And although Cummings did not do that exactly, he made use of the graphic components of our written language in a way that was highly visual: the white space, the breaking of the line, the regular spacing of the typewriter. The geometry of writing implied the typewriter.

I do not use holography as it was handed down to me, as holography is normally understood. I really change the way, or at least I came up with my own way, of using it, in a way similar to the way that Cummings used the typewriter. The typewriter was meant to write linearly and he said there is something else here that is not being explored. So he examined what its potential was. Hendrik Nicolaas Werkman was another important artist, poet, and typographer who used the typewriter in innovative ways in the mid '20s. His 'tiksel's', a series of typewritten visual compositions made between 1926-27, are remarkably beautiful. Holography is traditionally known for the duplication of three-dimensional objects. I do not, however, believe that three-dimensionality is what holography is all about. Creating a three-dimensional rigid structure with a hologram would simply be an extension of the two-dimensionality of the printed page which, to me, is missing the point. What I do is try to recover a temporal dimension to the word that otherwise would be lost in the third dimension. Holography has a unique potential for storing information in a non-linear way and this is what I try to explore more than anything else.

I use what I call "discontinuous syntax." So, instead of creating compositions that remain fixed on the surface of the page or the film or that remain stationary as a three-dimensional volume, I break that space in different ways. Each piece deals with this problem in a unique way. But what underlies them all is that I break that space into zones in such a way that you can never have the full gestalt or the full view of the poem at once. It's totally broken into different viewing zones that ask you to navigate in that space, oscillate with the poem, and create your own reading. So there is this breaking down, this collapsing of the two-dimensional, stable surface which physically makes my writing possible.

WHITMAN: Do you see your work in any way similar to what the Cubists were trying to explore in regard to the concept of simultaneity?

KAC: No. Simultaneity is a characteristic of print-based visual poetry and is not a characteristic of holographic poetry. Most visual poets from the 10's to the 70's wanted to create texts using the same kind of structures the painters used. The line, the color, the graphic forms—all were used together on a two-dimensional surface

in a way where there is pretty much no hierarchy. You can look at the background, you can look at the landscape on the background or you can look at the people in the foreground of the painting. You can concentrate on different areas, if you will, but the picture acts as a whole. All the elements are working together simultaneously on the picture plane to create unity, that *whole*, which is the painting.

What visual poets tried to do by using typography and new printing techniques was to break away from the linear structure that characterized poetry. They tried to work more along the lines of the painter and the visual artist. Therefore they gave up the line, the one dimensional line, as the base for writing and assumed the two-dimensional surface of the page as a new compositional unit. From then on it was a clear step to the three-dimensional, solid form of objects. I think that there is a clear direction towards a four-dimensional immaterial medium which is holography because I am dealing with three-dimensional space as well as time.

A lot of the syntactic and semantic efficiency of visual poems created by poets associated with movements such as Futurism, Cubism, Lettrism, Concretism, Neo-Concretism, Process/Poem, and Poesia Visiva, resulted from precise information about each letter or graphic sign. By that I mean that each letter has a specific color and size, each letter has a position on the page, each letter has a relative position in relation to another letter on the page and there it stays. But all this breaks down in my writing. Words and letters don't have a specific position. The position changes depending on what point of view you see the poem from. And, therefore, I emphasize less the structure than the behavior. The simultaneous structure implies a stationary, stable composition that you can look at and the behavior implies a more interactive, a more discontinuous syntax. The letters *do* something as part of their signifying process.

Additionally, if we are both looking at a holopoem, what I see will be different than what you see. We are both looking at the same physical point on the surface of the hologram, but I will see it differently than you. We will never have a complete perception of the text because there isn't such a thing. It is a text that implies non-completion and that leaves a lot of room for the reader to create his or her own paths and choices and decisions.

I believe in the more interactive, viewer-activated text that really depends on the reader to release its potential in a way that is not metaphoric, but in a way that is actual and literal, actively involving perception and cognition together—to probe the text, to change the text in order to read. So reading becomes this very kinetic, very dynamic activity, sometimes even sending completely different inputs to each eye—which I call “binocular reading” because, in a sense, for the first time you are really reading with your two eyes.

This has never been meaningful in the process of reading itself. Looking at the printed page here, what I see with my left eye is just a different viewpoint of what I see with my right eye. Retinal rivalry is not a poetic issue, but what matters is that in a holopoem you can read a text that is fluctuating, that has this conflict

between the two inputs.

WHITMAN: But you are creating a new non-language from whence comes the difficulty of trying to reconcile the dilemma people have when they see a language that no one speaks but you.

KAC: Isn't that what poets do?

WHITMAN: It is! But there is friction between this non-sense and sense which I think could be called "idea" in regard to your work.

KAC: It's true that there is a tension between sense and non-sense, meaning and non-meaning. But what's different is that now you have a text in which you are in between, and most of the time you spend there. When you are in that transitional zone, what you see oscillates without having to flow in any particular direction. My idea is to ask you, the viewer, to read something in between those two or more words. I do this by making the letters force their way into each other and dissolve into each other in order to suggest meanings between the words in a way that I could not do with straightforward language.

For example, if you think of two extreme concepts, black and white, you can clearly think of a third term—gray. Gray defines a very clear zone between those two ideas. Now if you think of metal and sugar, there isn't a word that clearly defines the mid-point between those two ideas. Why is that relevant? Well, that's what poetry is all about. It is the investigation of hidden meanings and hidden possibilities in language. What I want to do is reach that middle point between sugar and metal without inventing a word. I want the words to battle, let the words go at it, let the words collapse, let them dissolve, let them move and let the viewer explore that transition in space and time and try to respond to these words.

WHITMAN: So, you are dealing with two things that depend on the viewer's movement in front of the hologram, that is, the optic sensations that occur with the left eye and the right eye and the tension that is created there optically, as well as the interpretive tension, that is, trying to figure out what the words are trying to say and that fight that goes on there.

KAC: Exactly. And you see the words express that conflict in a sense in **Amalgam**, (1990) for example, because the poem has words such as "vortex" and "flow" where there is something implied which is a very subtle, very quiet, very congenial motion contrasted with something that is wild, chaotic, that drowns, and implies destruction.

WHITMAN: A classic example would be **Adrift**, I think . . .

KAC: In **Adrift** [1991] you see the word "subtle" and you pretty much don't quite see anything else at that point if you're looking right there. When you see the word "subtle" in black against a color background, you don't see anything else. So you

are looking through a viewing zone. As you leave that viewing zone the word disappears altogether and you see the words “lightning” and “when,” almost disappearing. You then see the words “gears and” and in the viewing zone that you are in now you don’t see “butterflies,” or “breathe,” for example . . . So these are discontinuous viewing zones and they never allow you to grasp them at once. Also, when you move in front of the holopoem, you perceive different viewpoints and you perceive the words changing and floating.

WHITMAN: What has been the role of the computer in your holopoems?

KAC: Computers have given me more freedom in terms of typographic creation and spatial organization, but more importantly they have allowed me to explore new linguistic behaviors. In **Adrift**, for example, I combine digital and holographic spaces. The letters in the word “breathe” are blown away like leaves by the viewer’s gaze. Also, computers have stimulated me to try to push further the principle of syntactic discontinuity. For example, in **Adrift** the passage between viewing zones kind of flows; it’s not abrupt. But in many other of my pieces there are big gaps between the viewing zones and these gaps do not have any semantic function, like the white space in “A Throw of Dice” by Mallarmé or in the concrete poem. They are empty. It’s just emptiness: non-semanticized space that has a structural function in the reading process but that does not resonate as silence in the way that the white space on the page does.

WHITMAN: So, in formalist terms, you don’t have positive and negative space?

KAC: Right . . .

WHITMAN: You just have positive space.

KAC: That’s an important discussion right there because of these dualisms— positive and negative, presence and absence. The black ink of the printed page in the concrete poem stands for the voice, the sound, or the word as opposed to the silence of the white space. I do not operate within that dichotomy at all. I am much more interested in the graphic substance of the word and I de-emphasize the acoustic dimension of the word. I am more interested in the word, the written word, the specificity of the written word, in itself as a non-secondary system in relation to the spoken word. I am not aiming at an oral resonance of these words. These holopoems cannot be recited; they cannot be performed at all and I find that to reveal the ultimate specificity of the discontinuous syntax. They are not meant to be performed; they are meant to be experienced as a new kind of written word, a new kind of visual poetry that exists in a space that invents its own rules.

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We get up from our concrete seats beside Lake Michigan on Columbus Drive and Jackson Blvd. around 8:15 p.m.. A fire burns in the distance to the north, somewhere in Chicago, and dragonflies are everywhere. We walk a few blocks to the

School of the Art Institute of Chicago and take the stairwell to the basement which echoes with our voices as we walk down its painted brick hallways. We continue our conversation from the lakeside . . .

WHITMAN: So, how could one discuss your work thematically?

KAC: Thematically? Well, I think poets have always written about the same things: human concerns, life and death, relationships, love, hate, the things you see, the things you think about. Sometimes I look at what I've done so far and there really isn't a thematic concern that I try to pursue. As far as that goes it's very spontaneous, you know. I don't have an agenda for themes.

But if I look back at what I've done so far, the Cabala, the permutation charts of the Cabala You see, in Hebrew the numbers are also letters, so every word has a numerological dimension to it. My first computer holopoem in Chicago was a piece called **Multiple** (1989) that consists of four signs that traverse the film plane, perpendicular to the viewer. So if you move to your left, you see the word "poem," but that word is written in such a way—tilted in space—and with a typeface that resembles numbers so much that when you look from this side you see the numbers, 3-3-0-9, which is a simple equation: $3 \times 3 = 09$. I'm attempting to recover some of the hidden meanings of the Hebrew alphabet in that piece, and, of course, all the meanings that the number 3 has in numerology and mysticism.

Abacadabra, (1984/85) my second holopoem, also was influenced by the Cabala because "abracadabra" is a Cabalistic word. **Lilith**, (1987/89) a piece that I did with Richard Kostelanetz, was heavily influenced by the Cabala. **Shema** (1989), a piece that I did in memoriam to my grandmother, the only piece in which I actually used the Hebrew language, in a sense, is also influenced by the Cabala, because I'm talking about the recovery or about the integration of the soul after death, to nature and the sun.

WHITMAN: Mysticism is one thing that all your work has in common . . .

KAC: Cabalistic mysticism, specifically. I am not interested in other forms of mysticism.

WHITMAN: But your holopoems I think are mystic in some way because they are mysteries. You have to search for these mysteries that are within them and without light they aren't there. So, there are certain things, there are certain metaphors you could use to explain them in a mystical way, but also they are elusive.

KAC: That's a word that very well describes . . .

WHITMAN: They are very elusive in the same way that mysticism or spirituality is. So if you try to describe a holopoem, you couldn't. You would have to see it in the same way that you have to experience it. And I think there is a kind of mystery in technology that you touched on. As much as we try to explain what the holo-

gram is and how the film reacts to the light, there is something . . .

KAC: Something unique! To pursue that line of thought of the themes, I can clearly see that in **Abracadabra**, **Multiple**, **Lilith** and **Shema**, I am being influenced by my interest in the Cabala.

But if you look at the other pieces, another area of concern of mine is the natural phenomenon. This amazing thing I discovered here in North-America is how fast the clouds move. Clouds here in Chicago move so fast. You don't see that in Rio. It's just that peaceful, sunny thing throughout the whole year. Here you have the typhoons, the cyclones, the earthquakes, disturbances, the earth being alive and moving and changing. I want to recover or recreate that in language: to disturb language, to make language uneasy, to make language collapse, to make language fall and break and pulverize and transform itself, escape through your fingers. I want that chaos, that recycling, that destructive power, that power that takes things away from their place. I want all of that in my poetry.

This fascination with natural phenomena that I was never so much aware of . . . you can see that in the behavior of the letters and words in the computer holopoems. They are much more disaster prone, if you will. I'm interested in appropriating this sort of natural behavior into language, but in a way that would expand what language can say beyond its ordinary use or meanings. In **Adrift** it says "subtle lightening when gears and butterflies breathe." Seeing gears and butterflies breathing is sort of seeing the whole, everything: man-made and not man-made, being alive and breathing in this convulsive environment, in this ever changing environment. This piece makes a direct reference to the "butterfly effect."

The Cosmos is another theme that recurs, I think. Curiously, Apollinaire predicted that this theme would be of interest to poets in the future. When I was 7 years old I was reading comics or science fiction books and it was no big deal to me for people to actually land on the moon, for example. I still have a comic book from 1969 in which the super-hero fights this holographic criminal. And in order for the super-hero to fight him, he has to become a hologram himself. All of that, in a sense, belonged to the imagination of a child growing up with comics and television.

So, the **Souvenir D' Andromeda** (1990) piece, in my mind, is a souvenir that somebody brought from Andromeda for you. And traveling to Andromeda and experiencing Andromeda is something that cannot be described with language as we know it here, stationary, on printed surfaces and so forth. Language has to be, in a sense, reinvented to express that space travel experience. That's something that poets always did, i. e., poems about environments they have experienced. The whole tradition of the haiku and being observational about the seasons and about nature, that's something that poets always did. So, it's along those lines.

The other piece, **Astray in Deimos**, (1992) reflects a similar interest. Imagine that

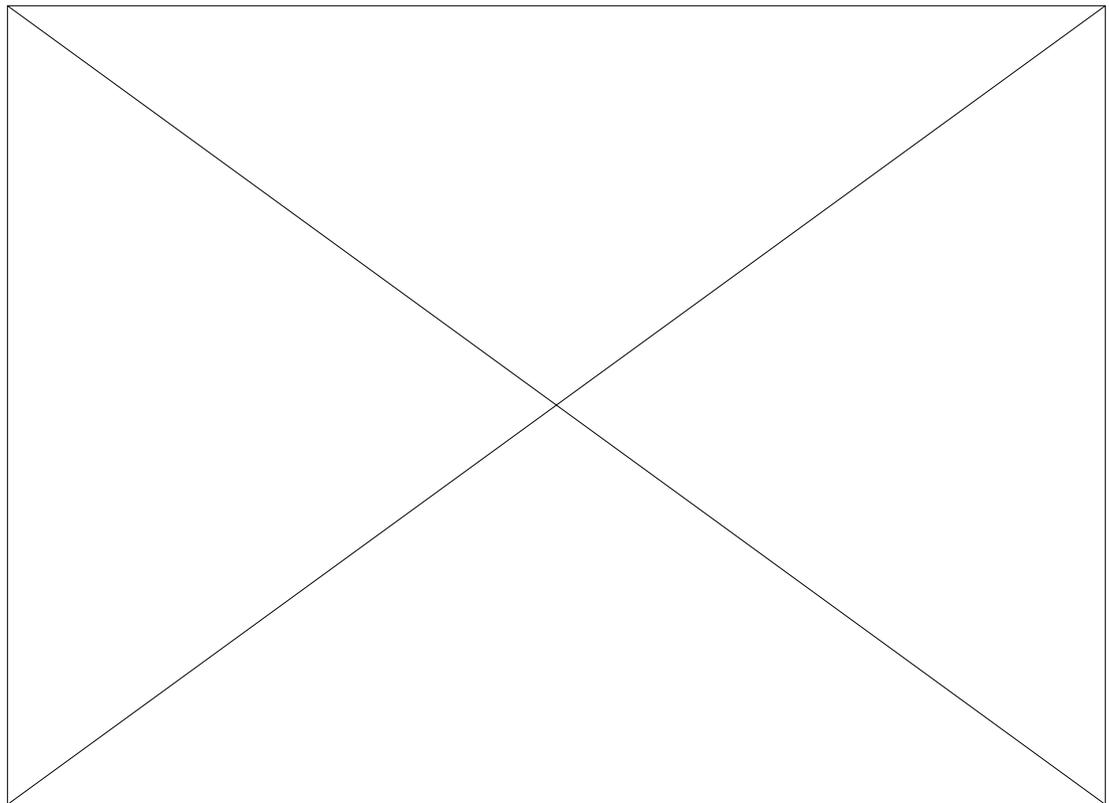
somebody visited the smallest moon of Mars and wrote a poem about it. But to express what he saw, that poem must be in a language that has that metamorphosis, that transition to convey what he felt and what he experienced about that landscape.

And another recurring theme, perhaps, is vision, vision not on a banal, mechanical level. My first holopoem is a sort of manifesto for a new way of seeing. **Holo/Olho**, (1983) “olho” meaning “eye” in Portuguese, and you have all the fragmentation in it that tries to create a syntax based on the idea that the part contains the whole and the whole contains the part. So, **Holo/Olho** syntactically tries to appropriate a unique feature of the holographic space, which is the fragment containing the whole and vice versa. It tries to recover that in the structure of language itself.

So, vision, the deeper meanings of vision and visibility, apparently, are a recurring theme, too, like in **Omen** (1990). In this piece you have the word “eyes ” that can be read in different ways and that emerges out of a cloud of smoke and then disappears, dissolving into this cloud of smoke. It is ambiguous as something you can see through but at the same time blocks your vision. **Omen** implies something that occurs in the future, so there’s that whole idea of looking into the future. There’s a whole metaphor, a visual metaphor, being created there about seeing and not seeing and that, in a sense, reflects what I feel is going on in my life.

WHITMAN: What do you think the public’s and the critic’s reaction has been to your work here in the United States?

Adhuc (1992),
by Eduardo Kac



KAC: I guess that depends on what you call critics because, you know, literary critics won't consider this poetry at all. [Claus] Clüver is one who I think acknowledges merit in what I am doing. I don't know if Clüver would be a critic; he's a comparative literature scholar. I think Richard [Kostelanetz] sees some significance in what I'm doing. Also, new media arts critic Louis Brill has written about my work. The public's reaction? I don't know. Loren Billings, the director of the Museum of Holography in Chicago, told me that a lot of families came into the museum when I had my work there and they had a lot of schools and tourists and she said they spent quite awhile looking at my work, trying to put the pieces together and trying to understand what was being communicated and so on. It's hard for me to know. I think that a lot of people may still find the work very difficult to understand because, first, people are not used to seeing holograms as art works. People are used to seeing holograms that pose no interpretive problems: holograms of clowns, holograms of reclining nudes, holograms that conform to habits of looking. Holographic art works do not, and I'm not only talking about my own, but holographic art works, the significant ones, the ones that deserve to be called so, do not conform to traditional habits. So people are just not yet used to looking at holographic art as such, period.

Visual poetry, you must admit, is not a field that is well known by the common audience. People don't know that there is such a thing as visual poetry. They have seen advertisements that were influenced by visual poems and maybe they've even seen visual poems, but they don't know there is a tradition that is a literary genre. So here comes this guy who tells them, "Okay. This is not only holographic art, but this is also visual poetry. And you can never see the whole thing from one viewpoint." Most people still look for the literal meaning of the words and most people will not allow themselves to read the transitions in the sense that they read color fields blending into one another in a Mark Rothko painting. I think that this is an issue of conventionality. As I keep making holopoems and if more people explore this concept, then it might not be so difficult to understand in the future. But I can't give up the issues I'm dealing with in order to make the work more accessible.

The whole motivation for me is to investigate new possibilities of language. I create these works because I want to see them. That's the bottom line. I only make a holopoem if it's something that I think would be great. That motivates me to go ahead and spend all the money, to spend nights in the lab and so forth. To see something that I want to see present, here, that otherwise wouldn't be. I know I won't see it if I don't make it. So there is a fascination with making it and looking at it and saying "Incredible! Language can do this. Language can behave in this way. Language can communicate this way, also." That is the biggest motivation for me to go ahead and make it.

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Eduardo Kac — The Aesthetics of Dialogue

An interview with Eduardo Kac by Simone Osthoff

A tricultural, multilingual, interdisciplinary artist, Kac has centered his work around the investigation of language and communication processes, emphasizing dialogic experiences in a world increasingly dominated by the mass media. From European descent, Eduardo Kac was born in Brazil and educated in the United States. Originally from Rio de Janeiro, Kac lived in Chicago from 1989 to 1994. He recently accepted a position as Assistant Professor of New Media, in the Department of Art, at the University of Kentucky in Lexington, where he is bringing about curriculum change that will incorporate computer imaging, interactivity, 3-D animation, multimedia, computer-holography, and telecommunications as an art form. He lives in Lexington and works all over the world via the Internet.

Kac is part of the 80's generation in Brazil, a generation that awoke from the nightmare created fifteen years earlier by the military dictatorship. During the 80's, the civilian society fought for democracy and artists took part in the reclaiming of political freedom. In the first half of the last decade, Brazilian art critics celebrated the return to the pleasures of painting. The trans-avant-garde movement, inflated by the media reached mythic proportions. However, as the decade unfolded, the diversity of the period became more clearly translated in its sculptures, objects, installations, and multimedia works. Following the Brazilian avant-garde tradition which, without ignoring local roots, engaged in the international pool of aesthetic and conceptual ideas, Kac was among the few who continued to chart new territory, becoming increasingly concerned with the experimental use of new technologies and the new set of cultural problems they raise. To his present work with telecommunications and computer holography, he brings the experimental concerns we find in his early underground performances on the beach of Ipanema.

Contemporary Brazilian art has only recently begun to receive international recognition through the works of young artists such as Jac Leirner, Daniel Senise, Leda Catunda, Beatriz Milhazes, Cildo Meireles, Tunga, to name a few. However, the rich cultural heritage these artists are coming from, remains still unknown outside Brazil. With few exceptions, such as Hélio Oiticica, who had a large retrospective traveling through Europe and the U.S. between 1992 and 1994, and Lygia Clark, whose work was on the cover of *Art in America*, July 94 issue,

Brazilian cultural production is still buried under media images of exoticism -- destruction of rain forests, magic realism, abject poverty, tropical iconography, exuberant sensuality, and urban violence.

Employing language both as material and subject matter, Kac explores in his holograms, hypertexts, and telepresence events, the perplexities of language, culture and consciousness in a new participatory paradigm. Working in the intersection of literature and visual arts, Kac investigates the verbal material in a constant state of flux, engaging the participants in a dialog that is continuously generating new meanings. On the following pages Kac talks about the development of his work from the early 80's, as an experimental writer in his teens, in Rio de Janeiro, to his performances, holograms, telecommunication events, and telepresence installations. He addresses both theoretical questions and social concerns, areas that remain inseparable in his work.

Osthoff- You seem to move very easily between different languages and cultures. Do you think that growing up in Rio de Janeiro might have anything to do with that, in the sense that Rio, as a port city, has traditionally been very cosmopolitan?

Kac- I don't feel tied to any particular place or culture, but I don't know if that has to do with the fact that I grew up in Copacabana, appreciating that multiplicity and diversity as I grew up. Many people I grew up with do not share that view, or feel the same way. My grandparents were immigrants. That may be a factor, but what makes me comfortable today, is the possibility of developing the work. That comes first.

O- You have at least three strong cultural influences. With which one do you identify the most?

K- I like to think of myself beyond national boundaries, and beyond media boundaries as well. I don't see myself as "Brazilian artist" or "American artist" or "Holography artist" or "Computer artist" or "Language artist" or "Installation artist." I find that labels are not very helpful and are often used to marginalize people. I have shown work in holography shows and the same work in shows that address word and image issues, or shows that address experimentation with new media. My name has been included in shows as representing the U.S. I have also

shown my work in Brazil, as part of national surveys. I prefer not be bound by any particular nationality or geography. I work with telecommunications trying to break up these boundaries. Obviously, Brazilian culture is an important part of my identity, but it's not the only one. I don't see why I should have to choose only one aspect of my interests or my identity as the predominant one. I am comfortable with them all. I would like them all to express themselves and be equally present in my experience. People are more complex than any specific compartment that one might want to fit them into.

O- What was Copacabana like when you were growing up?

K- Well, Copacabana has a little bit of everything. It is also the most densely populated neighborhood of Rio de Janeiro. You find people from all walks of life, tourists, transvestites, immigrants from all parts of the country and the world, intellectuals, prostitutes, movie and television stars, poor, rich, middle-class families, senior citizens, it's a mini world in itself, anything but homogeneous. On top of it all, it's very beautiful. It is a pleasure just being there and walking there. These days it's very dangerous as well, a consequence of Rio's many social problems. You have the hills with the shantytowns on one side, and the Atlantic Ocean on the other, with very tall buildings in between. Rio is a mixture of naturally beautiful mountains, gorgeous beaches, and a very cosmopolitan city of about 11 million inhabitants. As a kid, the streets of Copacabana were my playground. I grew up in a middle-class Jewish family. I had lived my whole life in Copacabana, until I left to come to Chicago. I was raised by my grandparents, who had fled Poland a few years before the war.

O- Did they have a big influence in your education?

K- Besides the fact that they supported both morally and financially my formal education up to my BA, they also had a great influence upon my life. My grandmother was a good storyteller and a great listener; she always advocated dialogue. My grandparents were always reading something, books, newspapers, magazines. Reading was an activity they were always engaged in. So, on the one hand literature, and on the other hand comics and television, were very important and influential in terms of my thinking about images in motion, thinking about the interrelationship between words and images.

O- What was the intellectual and political climate in Brazil during the late 70's?

K- In the late 1970's, the country was slowly going through a period of redemocratization, following more than a decade of military dictatorship, torture of political prisoners, and censorship. I became interested in body politics, and found myself reading Wilhelm Reich, Herbert Marcuse, and Roland Barthes, among others. There was a certain sense of recovering a lot of the things that were lost during the previous years, because of the lack of freedom, because of State sanctioned terrorism, i.e., terrorism by the State against the people. In 1979, I was seventeen. Together with this national process of rediscovery of the pleasures of being alive and being free, there was also the teenager's desire to understand himself, understand others, understand his body, understand reality, that was just typical of that age. It was almost as if the country were going through the same process as a whole, that process of discovery.

O- What were your interests at that time?

K- I read a lot. After having read and studied the work of the most important modern and contemporary Brazilian poets, as well as some of the most prominent modern and contemporary American and European poets, I noticed that works that openly expressed what I perceived as political issues related to the human body, were absent from Brazilian poetry. I discovered that poetry and writing actually had a long, repressed tradition, in the sense that poetry was a form of verbal expression that always suppressed anything that had to do with bodily functions, body fluids, body parts, scatology, plural forms of sexuality. Little by little I started to study works that dealt with these issues, going back to Catulus, Martial, Aretino, Gregório de Matos, Bocage, all the way to the beautiful Medieval 13th century "Cantigas de Escárnio e Mal-dizer do Cancioneiro Medieval Galêgo-Português" (Galician-Portuguese Medieval Songs of Sarcasm and Malediction) in which these bards sing the female body and the male body and all the bodily functions in a way that is funny and interesting. So, from ancient Rome through Medieval times through the Renaissance and the Baroque and into 19th century forbidden language poems by Verlaine and Rimbaud, Apollinaire's own "obscene" poems, to the more dramatic Antonin Artaud, in the use of scatology and the body in his poetry, and of course Marquis de Sade, I started to find that international tradition which had celebrated the body free-spiritedly. I also started to dig out a lot

of Brazilian writings that had to do with that, that were, and still are, kept buried and in certain cases have seldom or never been published as is the case of Bernardo Guimarães' and Emílio de Menezes's work. Even Oswald de Andrade, who was one of the founders of the Antropophagic Movement of the 1920's, created work in this vein as well, work which came out only a couple of years ago.

O- Were you writing poetry then?

K- When I was 17, I won a national poetry contest, which was very encouraging. Because of it, I met some other poets, writers, and artists. Then, things changed quite a bit afterwards. The poetry I developed after that had strong political overtones and was built on the "forbidden" vocabulary I found absent from the modern and contemporary work I admired. I focused on semantic content without ornamentation or euphemism. I decided that this poetry would also incorporate other elements considered inferior or unacceptable by the critics but which would be empathic with the audience, such as calembours, slang, and humor. But very quickly — everything seemed to have happened quite quickly, at that stage of my life — the work moved to the body actually freed from the text and out into space, performing and doing things. I started to write specifically for public performances, rather than for book publishing, addressing the man and the woman on the streets.

O- What made you go from the written to the performed poetry?

K- At the time I started to question a lot of assumptions we have about language, primarily on a semantic level: the stigmatization of language; how certain expressions are created that make references to animals and dehumanize men and women. For instance, you say -- "Fuck you!" as an aggressive comment. How come we got to a point where something that should reflect a very pleasant, enjoyable, orgiastic experience has now turned out to be, in our use of language, a curse? How are certain expressions created that try to denigrate other forms of sexuality that are not mainstream? How are capitalism and imperialism tied to a certain exploration and massacre of the body? I was very interested in the writings of William Reich and his views on sexuality, as well as Marcuse's. It was a concern then that related to the political context, but was also a concern that related to these issues of written language, poetry, and the visual arts. So, all the way from Marquis de Sade to Marcel Duchamp, I started to see that the human body

was a fascinating support for work. I didn't want to do body art. But I wanted to do some kind of body poetry perhaps. So I made poetry out of the raw material of the forbidden side of the Portuguese language. I wanted to turn it around and use this forbidden vocabulary with its liberating power, with its cathartic power, and create a political view that was tied in with an appreciation, a liberation, a celebration of the human body. And I wanted that to manifest itself directly in the work. The performances from 1980-82 had elements of scatology, surprise, humor, subversion, gags, and the mundane. In these poetic performances, the so-called vulgar or bad words become noble and positive. Scatological discourse and political discourse were one and the same and were manifested through cheerful orgiastic liberation. It was an attempt of using the body and working with the body as a tool, as a medium to express the multiplicity of the body, the possibilities of the body, the possibilities that involve multiple forms of sexuality as well as scatology, and everything that has been kept suppressed and repressed.

O- Did you perform alone?

K- From early 1980, to February 1982, I worked with a group of people that became interested in working along the same vein. We gave weekly performances in public and private spaces in Rio de Janeiro and other Brazilian cities. During this period I also created graffiti-poems, object-poems, and sticker-poems, which expanded the scope of my performances. In our group we had all kinds of points of view being expressed and shared with the public. Many of us also embraced multiple forms of expression, be it verbal, visual, musical, or sexual or whatever in-between forms you have. There was this view we all shared, just a general openness to any form of expression.

O- Where did these performances take place?

K- Every Friday night we performed in the heart of downtown Rio, in Cinelândia, an open area where you have on one side the National Library, on the other side the Opera House and the State House of Representatives. Theaters, bookstores, motels, banks, movie theaters and bars abound in the area. There are hundreds of people leaving work, hanging out, going to bars and just walking around -- prostitutes, intellectuals, beggars, business executives, transvestites, bankers, street kids, artists, politicians, street vendors. We found that that was the perfect place to perform, not only because it was in the heart of Rio, the very Bohemian "alive" part of town, but also because you could address a very wide range of people. It

eventually became known that we were performing regularly and some people came there specifically to see us. We didn't specify time or anything. All of a sudden, when the whole group was in the right mood, we just started shouting very loudly in all directions. We were very colorful and very dynamic, wearing sort of funny, interesting clothes. At the time, my typical costume were these scuba diving red boots. I took my Grandmother's pajamas for pants. I found this Peruvian belt and silk-screened this t-shirt with a distich that was also one of the sticker-poems -- "Pra curar amor Platônico/só uma trepada Homérica." (To cure Platonic love/only a Homeric screw). We used to travel a lot and performed in various places such as the beach, which was absolutely free, but also in theaters, where people would have to pay to see us. We would do sudden performances in the middle of social gatherings and other events. We would improvise a lot.

O- It seems to me that you were using scatology, the vernacular, multiple forms of sexuality, humor, as a political tool, and a way of undermining the phallogocentric patriarchal foundation. Was there any specific political agenda in your mind at the time?.

K- I guess the 26 years I lived in Brazil taught me not to believe in organized politics. My group believed that we could perhaps change people's lives in a smaller way, opening up their eyes to other forms of existence, forms of behavior, forms of sexuality, and forms of thinking, that perhaps they were not even aware of.

O- Were these performances the only outlet your work had at that time?

K- No. I published two anthologies of poetry, compiling work that was produced in that vein. There was also another aspect of that work -- individual performances. I did a revision of Flavio de Carvalho's "Novo Traje Masculino" piece (New Male Garment). I also did performances that were not for a live audience but for the camera. This whole project was documented in its three-year span in varied forms, including books, magazines, newspapers, and television and radio coverage. In 1983, I published an artist's book, called ESCRACHO, which is a word very difficult to translate. It can mean a number of things, like: direct, blatant, unmasked, perverted, sarcasm, to dress carelessly, to be booked in the police headquarters, demoralize, tease, make fun of, etc. Some of the work in ESCRACHO still has ties with the body-based work I was doing at the time, some is already pointing in other directions.

O- What was your revision of Flavio de Carvalho's piece?

K- I was aware of the work Flavio de Carvalho first did in the early 30's, which he called "Experiences". In 1931, for example, he wore a hat and walked in the opposite direction of a Corpus Christi procession to question the rationale of the ritual and to study the multiple consequences of his own act. The participants wanted to beat him up. Much later with Kaprow and others, this kind of work would be known as "Happenings" and "Performance Art". But Flávio de Carvalho was after something else, a psychological edge. In 1956 he designed and made this whole new male garment, which included a skirt for better ventilation, and he wore it once on the streets of São Paulo. It was shocking. People thought he was crazy, which he kind of was, in the best sense of the word. He proposed to change the way Brazilian men dress. I thought this work was a very important precursor to other ideas relating to the body. I chose to wear a skirt on a regular basis, in the same way a woman wears pants going to the supermarket or to concerts. This "being there" in a real life situation, as opposed to staging a performance, which was Flavio's case, was the next radical step.

O- It is quite common to see men wearing skirts and a general exaltation of androgyny during Carnival in Brazil. However, to do so within a day-to-day context, blurring and shifting gender distinction to that extent, was probably beyond the limits our patriarchal society, still under a military dictatorship, was willing to accept. I imagine that you must have encountered quite a reaction...

K- People yelled at and spat on me... I like to think more of activating the space around myself, making people look back and reflect on assumptions they make about people's sexuality, as well as the conventions that dictate what we can wear, what we should look like. Consequently, this work helps us question the clichés, stereotypes and stigmas that are associated with social behavior, both in language and images in our lives. On the one hand, you can look at this as an extended performance that lasted for about two years. On the other hand, you can look at it as an attempt to break down the barrier of art and life. You see, I am a Brazilian who doesn't get into the spirit of Carnival. Dressing like that, to me, had nothing to do with a carnivalesque attitude.

O- The way I see it, the limitations of the official Carnival are not necessarily those of carnivalesque strategies in the arts. I am looking at your performance as a carnivalesque-transgressive metaphor, and in that sense, it has been previously

used, not only by the Brazilian avant-gardes, in order to subvert traditional hierarchies. I am just stretching the concept beyond the four official days of Carnival, the same way you did.

K- In that sense, yes. You are saying that I have rebelled against the official Carnival, which is something unthinkable, and pretty hard to do. (Laughs) Never thought of it this way, but it makes perfect sense in light of my general disdain for any form of organized behavior.

O- I must confess, it is very hard to picture you with a skirt on.

K- At the time, I was also a basketball player and the muscles in my legs were very salient. I was dating a very sensual and charming 'morena', and I would go out with her, dressed in this pink mini skirt, wearing a t-shirt with the Anarchy symbol, and a punk bracelet. I also had very long curly hair. People could not tell if I was a gay man in the company of a straight woman, or if I was a crazy straight man, a transvestite, or if I was a bisexual. They just could not resolve what the hell I was.

O- What kind of performances did you do for the camera?

K- The idea of approximating the letter and the human body culminated in pieces in which I performed so as to create the letters themselves with my own body. I realized the only way I could push the performances further was to transform my body into an alphabet. One of these photographs was on the cover of ESCRACHO. There were other pieces. In one of them, I am making love to stylized letters that spell POEM. Each letter had graphic sexual innuendoes.

O- When did your work with performances end?

K- I realized that by early '82 I had done what I had to do within that framework, that it was about time to move on. It just so happened that the 60th anniversary of Semana de Arte Moderna (Week of Modern Art) of 1922 was going to be celebrated in February. I felt that that was a good date, and decided to take advantage of that coincidence and conclude the project at the same time that the Semana occurred. Not necessarily trying to imply any parallels, it's just that same sense of liberation. It was a liberation to do the work, and it was another liberation to move on, to get out of it. The last performance on the beach was very interesting.

O- In which way?

K- We did the whole body of performance that we used to do, with the verbal presentations, the songs, the puzzles, the surprise object presentation, the graffiti done in real time, all these different things that we used to do. Then, towards the end of the performance, we started to undress, and called upon everybody around us to undress too, and many people did. And there we were in a natural state. And then we made this demonstration, with manifestos, slogans and banners. People that we did not know, all of a sudden, appeared with cameras, with sculptures, with things. We just sort of activated the whole beach. Ipanema beach around 'posto 9' became this frantic, this interesting, dynamic place. Some people followed us. Some people sort of walked around us. Then, towards the very end, as a gesture of rebirth and purification, we all went into the ocean. We came out of the ocean, hand in hand. That was it. It was this rebirth, this stripping down of everything, this rediscovery. That was the end. It was extremely gratifying. Everybody had a great time, not only the performers, but the people. There were no physical boundaries between performers and audience; everybody was mingling together. And there was this wonderful celebration. Oswald de Andrade wrote in 1928 in the Anthropophagic Manifesto that before the Portuguese discovered Brazil, Brazil had discovered happiness. So in a sense, that performance was a rediscovery of happiness and what could have been more appropriate to celebrate the Semana... And to me that was it. That was the last performance.

O- What happened after that?

K- My interest for word and image issues continued to increase as my dedication to oral and versified poetry ended. Between 1982 and 1983 I was very unsatisfied by what I then considered the blind alley of visual poetry. Aware of the multiple directions the genre had taken in the twentieth century, I experimented with different media. I worked with multiple media -- billboards, Polaroid cameras, artist's books, fine graffiti, electronic signboards, mail art, photocopiers, videotext, and finally holography.

O- The show "Como Vai Você, Geração 80?", (How Are You, '80s Generation?) which happened in Parque Laje, Rio, in 1984, is still considered one of the most important shows of the decade, in Brazil. It launched many careers and highlighted artistic tendencies. What kind of work did you show there ?

K- I had already made my first hologram when the Geração 80 show came up. But, I was also working with public installations, billboards. I was making twenty-seven meter square murals based on Cro-Magnon cave paintings that were displayed publicly, both in São Paulo and in Rio. And that's what I showed in the Geração 80 show. On a personal level, it was very important for me to participate in that show because it defined that generation of artists, presenting the multiplicity, the diversity of media and interests, from those who were mimicking Bonito Oliva's Italian trans-avant-garde, to those, like myself, who were interested in exploring new technologies and multi-media possibilities.

O- Could you trace the formal development of your work up to this point?

K- See, my problem was, I was first dealing with traditional language, then the body became the issue. Then the body was performing verbally. Then the body became written language itself. I had moved so far away from the page, from the surface of the page, that I didn't see any going back. Having moved so far from stable surfaces, such as those of objects and those of the surface of the page, I had to find something else. I started to explore a lot of other media and became interested in holography.

O- When did holography become reality, so to speak, for you?

K- I recalled having read in '69, when I was 7, a comic book, of all things, in which the main character was going to fight this villain. And the villain was this gigantic hologram. As a kid, I used to collect comic books, and I still have this one comic book in Portuguese. The hero, in order to fight this villain, had to become himself a gigantic hologram. In some of the balloons, the villain and the hero would explain what holography was in a very indirect way. So that sort of came back to me. I kept reading about the dematerialized image, the multiple points of view, the 3D image contained on a 2D surface. But that seemed to be a pure paradox. I was intrigued but I could not visualize it. An encyclopedia article I read in my teens described the scientific principles of holography, but that was not enough. In São Paulo in 1983, a little before the Geração 80 show, an artist I had included in ESCRACHO, knew someone with little experience who was building a small holographic lab. I called him and he was willing to see me. It was there that I saw my first hologram and I realized immediately that that was what I wanted to do. So, having no clue exactly how holograms were made, or anything, it became obvious that that was the medium that would allow me to

solve the aesthetic problem I had imposed upon myself. I worked with him for a couple of years on my project, which resulted in a show -- Holopoesia, at the Museum of Image and Sound in São Paulo. A few months later, the show came to Rio. I received excellent press coverage including from many TV stations. Because on top of everything, this was probably one of the first times that art made with holography was seen there, if not the first time, I don't know, but certainly one of the first times. So there was all that curiosity about it. That was very stimulating.

O- What kind of support did you find for your ideas in Brazil at that time?

K- The new generation of art critics in Rio, including Marcus Lontra, Reynaldo Roels, and Lygia Canongia, supported my work. A few artists, like Abraham Palatnik and Anna Bella Geiger, were also supportive. Some time later, I managed to get several grants from Federal institutions, but my work was not included in the international shows that were meant to be representative of my generation. No electronic media works were ever included, only paintings and other objects.

O- Did you have any financial or institutional support during 1983-85, in the Rio-São Paulo period?

K- No. Against all odds, I was able to fund this work out of my pocket, as a college student, basically. You know, I was still in college, working part-time and doing whatever I could. I was buying film that was not available in the country, that had to come from the U.S. I was paying for my own expenses, traveling back and forth between Rio and São Paulo, which represents a distance somewhat equivalent to the distance from Chicago to Detroit, on a very regular basis, either flying, or taking the train, or taking the bus, for two years. I guess I carried the same obsession from the performance period into holography in this first phase, but you have to do that. Because it's that initial moment where you're developing, you're learning, you're exploring. This initial two-year period resulted in two shows and also some publications, and then later, in a residency at the Museum of Holography in New York in '86, and a trip to Europe in '87 to show work. Back in Rio, I presented the work in a second solo show in '86. I also organized with Flávio Ferraz, a Brazilian artist who also works with computers, the Brazil High Tech show, which was the first national survey of Brazilian artists working with new technological media specifically. That was also in 1986.

O- Where did the Brazil High Tech show take place ? What kind of work could one see in it?

K- The show was in Rio, at the Galeria do Centro Empresarial Rio, a very nice gallery in front of Botafogo beach. It attracted a lot of publicity and a lot of people. It was the most popular show in the gallery ever. There were eleven artists from São Paulo and two from Rio. We set up a database for art works. When I say database for art works, I don't mean art works that existed previously in other media that were then put in these databases, like people are doing now, Microsoft and many Museums are doing that. I mean that these were art works created for the medium of videotext, and were made therefore available, on-line, so that people could see them from any part of the country. There were also infrared sculptures, computer animations, holograms, videotheater performances, and a robot that was a mixture of sculpture, performer and gallery host.

O- After you came back from New York, did you continue to make your holograms in São Paulo?

K- No. I managed to put a simple lab together in Copacabana, two blocks away from the beach. I went to the beach to get sand to build my vibration isolation table. To pay the bills I worked as a journalist for several newspapers in Rio and São Paulo. I worked all day, came back home exhausted, and went to the lab until 2 or 3 in the morning, basically every night. It was extremely difficult, not only because of my daytime schedule, which, I guess a lot of people had to deal with too. The biggest problem was that none of the materials I had to work with were available in the country. I was never able to buy any film there. Optics were very hard to get. Everything that a holographer needs to work with is virtually impossible to get there. But when my laser broke down for the first time, that's when reality settled in, and I realized that it was impossible to continue to work in Brazil. I sent my laser back to the U.S. once. I got it back. The manufacturer said it was fixed and it just wouldn't work. Either they fixed it and it broke on the way back, or they didn't, but the fact was, I couldn't use it. I sent it back, and got it back and it still didn't work. After the third attempt to fix it, and having spent a couple years doing that, from '86-'88, I realized that this was a dead-end. I was never going to be able to actually be productive and experiment and get my work done. In the meantime, I was working in collaboration with another artist to create my first computer-generated, fully synthesized holographic piece, which resulted in my third solo show entitled Holofractal, in 1988. I realized then that I had to leave,

and the country of choice was the U.S..

O- You have always found a way to continue pursuing your interests, inside or outside institutions, being very resourceful in finding information pertinent to your work. As a journalist, you have published important interviews with some key artists in the history of Modernism in Brazil that were left behind, buried by the official accounts of art history, as was the case of the poet Luis Aranha and the visual artist Abraham Palatnik. Is this a skill you developed in the years you worked as a journalist?

K- I don't know. I guess if you really want to know what's going on, the way I look at it, you have to find out for yourself... Ultimately, this idea of researching, and finding out for yourself has always been my main tool, my main method of producing work.

O- You already mentioned Flavio de Carvalho, were there any other early artistic influences?

K- I was always very interested in the avant-garde side of Brazilian art. People are still very surprised when I mention in lectures that modern art started in Brazil with two women. And I do that right in the beginning of my lectures to make people realize that some expectations they might have about what Brazil is all about might fall apart right away. One of them is that Brazilian art is made of colorful paintings and folk objects, which is of course, only one aspect of our heritage, the one normally labeled as the "exotic and primitive tradition". But there is also, among others, a whole tradition of avant-garde innovative work, which still remains unknown. Lygia Clark and Hélio Oiticica, Abraham Palatnik and Waldemar Cordeiro are some of the artists that I admire the most in the Brazilian context. I believe their experiences transcend local issues and have a true universal contribution. What I see as a common ground in them is a total rejection of what they inherited from previous generations. They really decided to digest what had been done, break new ground, and try to find their own path, no matter the price they had to pay. I admire their lesson and yet, I definitely want to avoid duplicating their results, duplicating anybody's results.

O- Hélio and Lygia addressed the relationship between art and life, dealing with the body in a phenomenological sense. Palatnik and Cordeiro worked on the frontier between art and technology. From the beginning of your career you seem to

have continuously searched to establish a dialog among perception and cognition, sensorial experience and rationality, and these domains of human culture -- science, art and life.

K- You are absolutely right. I am fascinated both by the human body and by the possibilities of technology. These artists have always excited my imagination. The fine arts have traditionally privileged visuality and defined the viewer as this disembodied eye. I think Hélio Oiticica and Lygia Clark put the rest of the body back into the viewer, who becomes participant. And into the artist himself/herself as well. The idea of interactivity, that Hélio and Lygia always pursued in a quite dramatic way, the idea of the work as a living organism, was very important to me. The idea that the work only exists when manipulated by the viewer, that intellect and intuition cannot be separated, is something that has to do with the whole Neoconcrete movement. Hélio and Lygia blended the more rational aspect of Constructivism with the more sensorial aspect of what it is to live in Brazil, and produced very original work out of this. What some could see as antinomy, they saw as perhaps two sides of the same coin. They had already realized that there was much more to art than the production of objects. Today, however, most of these works that were meant to be manipulated are now in important collections and they can't even be touched, which is sad. Hélio's Parangolés are not being danced with. When they are shown in a museum, they are hanging lifeless. They're dry and kind of old. They were not meant to be seen that way, and it's sad that works that do not conform with tradition, that do not conform with the idea of the artwork being an object that you hang on the wall, or you put on a pedestal, end up that way. When they don't even have some kind of material embodiment, like telecommunication art events, then they just disappear. It's another problem that needs to be addressed. A new generation of curators must learn to deal with the problem of preserving, documenting, and sharing with the public, events of that nature.

O- Going back to early influences, how were the experiences of Cordeiro and Palatnik relevant to your work?

K- Cordeiro and Palatnik are different in many ways, particularly in the fact that Cordeiro appropriated the computer, a technology that existed already, for different purposes. And we must remember that the computer at that time was not an image-making tool. It was primarily for business, statistics, and number crunching. I think Cordeiro really came up with something unique when, towards the end

of his career, from '68 to '73, to be more precise, he used an IBM mainframe to make images that were very strong in political content, during the height of the military dictatorship. This was very interesting, his whole attitude of realizing that we must investigate the possibilities of new technologies for art making. The work he did during that period of time is really remarkable. Palatnik is by definition the pioneer of kinetic art in the second half of this century. He produced the "cinechromatic" light machine, as Mario Pedrosa once called them, and showed it publicly at the first São Paulo Bienal in 1951. He also worked with motion and magnetism. He came from abstract painting, trying to push it beyond the canvas towards pure light, and then he ended up starting a whole new field. That is fascinating to me. That is the kind of attitude, the kind of lesson I've absorbed and that I admire. He was addressing a fundamental question of art itself. Painters have pushed the canvas and issues of color and light in painting to a certain limit. With Palatnik, we're talking about movement and light. With Palatnik, color is free in space. Painting becomes a time-based event. You look at a Palatnik piece and you look at yourself, you are enveloped in a field of color. Light is floating around you and you are immersed in that field of light. It immerses the viewer in a color field. It's colorfield painting in another sense.

O- And international artists, which ones were more relevant to your work?

K- Moholy-Nagy is a name that always comes to mind. Moholy is an artist whose life and achievements I have studied extensively. He's an artist that I truly admire in all aspects. He always believed in light as an artistic means. He pioneered kinetic art and telecommunication art. Moholy touched on so many different aspects, so many different possibilities for light and art... but again, it is the lesson of inquiry that he left us that I think is truly remarkable. I admired and studied Rodtchenko, Schwitters, Duchamp, Takis, Tinguely, Schoeffler, Kosuth and Mark Rothko, to name a few. I like to think of language as colorfields which blend, multiply and change. What happens when you think of language in that way? In my holograms, I try to address this question. That's a connection that I started to make only recently. The point would be, what if you're thinking of the transitions in language in a way that's somewhat similar to the way you see transitions in a colorfield painting by Rothko. These ideas fascinate me because that's an impossibility in terms of language as a practical means of social intercourse. But experimental poetry is not a practical means of social intercourse. Poetry is an open ground for discovery and invention, and so is art. And when visual art and poetry and language art come together, or word and image come together in a color field

that oscillates as in my holograms, then, I feel somewhat close to Rothko, to the beauty of that colorfield that is enveloping in a spiritual way.

O- Would you define your work as visual poetry or language art?

K- If we consider these two extremes, writers going towards the world of visual arts developing what is known as visual poetry, and visual artists going towards the world of writers developing what is known as language art, I would like to oscillate between these two poles. I hope that my works would engage the viewer or the participant, both at a literary level and a visual level.

O- You coined the term holopoetry and have been searching the possibilities of holographic poetry since 1983. Could you relate your holopoems to the tradition of visual poetry as well?

K- Many contemporary artists use language, but most seem to be interested in the way language is used in the media. I'm more interested in the zone of intersection between literature and visual arts. Visual poetry, for example, has a long ancestry, which runs from Simias of Rhodes (circa 325 BC), through the Baroque poets, to Mallarmé, to Marinetti, Apollinaire, Housmann, Kamensky, Cummings, and Beloli, and to the experimental poets from the 40's and 70's, including those associated with French Lettrisme and Poésie Sonore, Brazilian Concretism and NeoConcretism, Italian Poesia Visiva, and many others. I have always been excited about the ideas that came out of the Neo-Concrete movement in Brazil, and I will give you an example from a collaboration between Ferreira Gullar and Hélio Oiticica, which I always found fascinating -- Poema Enterrado (Buried Poem), which involved viewer participation. The "Buried Poem" was built in Hélio's yard, and Gullar still tells the story today that Hélio's father was very upset because Hélio was digging this gigantic hole in their yard. But they made this hole underground and you had to go inside this underground cube. There you would find another cube. You lifted that cube, and then found another cube, and then on the bottom of this last cube, in the ground, you would read the word "REJUVENATE", rejuvenesça in Portuguese, which is just awesomely beautiful. And that captivated my imagination. How can you use a single word and, by involving the body, using space, color, and the action of the viewer, charge that single word with so much power, that it surpasses any dictionary definition that you can possibly think of, and in many cases, surpasses the whole experience of reading a 50-page poem? How can we push the word beyond syntax, beyond its limits and charge it

with energy, with meaning, that you could not do otherwise? You're involving three-dimensionality, verbal economy, and the idea of being born again. Because you're actually going underground, you're in the grave, and then you read the word. You're empowered, you're re-energized by the word, and then you come out. The power of the word, in touch with the body, and with earth, in touch with three-dimensionality of space and time. And no other art movement in Brazilian history touched on these issues as dynamically and as intensively as the Neo-Concrete movement.

O- You have basically only used words as your holographic images. Can you talk about this process of transformation between verbal and visual elements?

K- The reason I got involved with holography in the first place was again because of language. Each of my holograms addresses a different problem so to speak, a different issue. But there is something that underlines them all -- my interest in communication processes. I am not interested in holography as a 3D form; we might as well look at sculpture. I am really interested in holography as a 4D medium, as a time-based medium. In many of my holograms, you have a bi-directional path for time. I just don't think linearly, in terms of one word after another, as we normally speak and write. I just don't think in terms of art works that way anymore. In my holograms, I'm less interested in conveying the result of my thought. I'm more interested in conveying the process of my thought. That's why the language in my holograms fluctuates and oscillates and changes, and disappears. I only work with language, I don't use objects, I don't use people, I don't use any form of figure.

By not having a linear sequence, you can explore the image in any direction you want. You have a time-reversal possibility. There is no hierarchy, no climax. There is no suspense. It's almost like if you had a strip of film that you suspended in time, and that you can, in your mind's eye, project that, in any direction that you want, but not only horizontally, also vertically, diagonally, any way in space. You plan, you orchestrate time structures in space. You're really dealing with a space-time continuum and breaking it into orchestrated discontinuities. I think everything that I have done is a consequence of this fascination for communication processes in its multiple forms. Be it communicating with the body on the beach, or through an electronic medium, the fascination is with the communication process itself.

O- How would you define communication in art?

K- By communication process I mean a reciprocal space, a shared space, a space in which there is what Baudrillard has referred to as responsibility. There is room for response, interaction, interactivity, change. Interactivity here is not necessarily that of the computer, where you pretty much interact with something that is already pre-encoded, although that is also interesting because it pushes the work beyond the stable object on the wall. So, I don't have a definite solution and answers to this. And if I had I wouldn't be making art. The point of being involved in this process and creating art is an attempt to understand the complexity of these issues, and that's what fascinates me. If I had all the answers, I wouldn't be doing it.

O- Then, you are defining communication as discovery, is that what you mean?

K- Absolutely. If something is totally predetermined there's no communication. It is nothing but unilateral transmission. Communication must imply openness. Communication must imply bi-directionality or multiple directionality. In this case you are dealing with a network. It could be bi-directional as on the phone or it could be multi-party, as on a network. I think communication implies, as again Baudrillard has said, responsibility. When Baudrillard talks about restoring responsibility to the media, I love the ambiguity of this sentence because it refers to the social responsibility that the media has, but it also opens up the idea for the artist to restore the responsibility of the media, in the sense that the media must allow people to respond. The media must bring people closer, not keep them apart, as television does. The media must allow for people to interact, to share, to discover together, rather than be at the end as consumers. So this idea of shared spatiotemporal responsibility is what I truly understand by communication.

O- I understand now why you like the telephone so much. I remember a story you told me about being fascinated by the possibilities of the telephone since you were a kid, because it separated voice from gesture and facial movement. It was in the dialogic essence of that machine you were probably interested in.

K- I am a phone freak, I must confess. I like the possibility of exchanging and sharing. I like these forms of communication that involve reciprocity. Lately I have also been working with interactive navigational texts, hyper-texts and hyper-media. I have finished some pieces and I want to continue exploring that too.

There are certain things that I can only do in holography though; there is a level of interactivity that only holography has. However, there are other things that only in that labyrinth-like structure of hypermedia I can create, as I've done recently appropriating the structure of the Kabbalah tree.

O- This allusion to the Kabbalah in your work, is it a reference that goes back to your childhood? When does that tradition tie into your life and into your work?

K- As a kid, I performed Jewish rituals with my family. I studied Hebrew for eight years, which is kind of lost now because, you must admit it, if you live on Copacabana beach for a quarter of a century as I did, you really have no use for Hebrew. I love the language and I will hopefully come back to it. I don't know if at school, or out of my own curiosity, or if steered by my grandma, the fact is that I got interested in the Kabbalah and the whole mythology and literature that comes with it -- the Golem, the Dibuk, Lilith, who was the first woman, the archetype of the independent woman. I became fascinated with all that mysticism. You start thinking about Golem, you start thinking about the Dibuk, you start thinking about all these things that really excite your imagination.

And then when you talk about Kabbalah, you necessarily start talking about the way language works and how these different systems, such as the system of numbers and the system of language, not to mention many others, are related, and the multiplicity of meanings that result from these complex relations and permutations and layers of symbolic interpretations. I would not have the ambition to say that I fully comprehend nor that I have studied Kabbalah in depth. I've read about it and I keep coming back to it. Dibuk was in one of my three-dimensional graffiti's from 1983. My new "Storms" piece, from 1993, is an interactive text, the structure of which is based on a 17th century Sefirotic tree of the Kabbalah. Another interesting point of intersection there is the relation between digital hypermedia and the non-linear structure of the Talmud.

O- When you deal with language in your work, are you thinking of language as a universal category? Does it make any difference which specific language you use?

K- The fact that I am working outside syntax is very important. I remove language from its function as social intercourse and try to get to more fundamental levels. I just respond to different contexts. I will either use one of the languages I am comfortable with or do research and work with a particular language, if the

concept calls for it. Very often, because I am working outside the syntax of English, some of these pieces can work in multiple languages at the same time. Because once the words are removed from a grammatical continuum, they can be read in multiple ways and in many languages as well, not to mention that certain fragments that float in the holographic space-time can also be read as full words in other languages.

O- What is the importance of holography as a medium to the way you deal with language?

K- The reason I was attracted to holography was because with it I can create very complex discontinuous spatiotemporal events that I could not do in any other electronic medium, like LED signboards and video-text, which I have used since 1984, in Rio. There is something intrinsic about the holographic medium that allows me to work with language floating in space and time, being discontinuous, breaking down, melting and dissolving, and recombining itself to produce new meanings. That kind of work reveals a distrust, a disbelief in the idea that we can simply use language to communicate a message. We say--“ Do you know what I mean?”; “ Do you know what I am talking about?”; these sentences which we use on a regular basis express our attempt, our desire to dominate language to make language the slave of a meaning. I’m more interested in suggestion and evocation.

I believe that meaning will emerge only through the engagement of those involved in the process. In the case of the hologram when the viewer comes to see it and starts to look around, bounces his or her head, squats down, orchestrates that whole dance in front of the hologram, meanings will or will not emerge based on the personal experience of the viewer. The engagement of the viewer with the piece reveals the fact that reality, language, the way we perceive and interact, all takes place according to our point of view.

O- Other contemporary artists, Jenny Holzer and Barbara Kruger for instance, are also situated in this same intersection of word and image. The way I see it, they are using language in a more direct way, conveying straightforward messages that are presented as factual, even when they sound ambivalent. Could you comment on the different approach to language in your work and in theirs?

K- You can not resolve the problem of meaning. Words are not containers that hold “meaning” like a cup contains coffee. I don’t think one can even “fully”

understand anything or anyone. I believe that there will always be a tension between what one tries to communicate and what one tries to understand, and this tension oscillates with the dynamic web of language. I don't really believe in the idea of a message that exists prior to the engagement of those involved in the process. I really distrust the idea of communication when it comes from one end and it goes towards the other end, with no opportunity for the other person to participate. That's what happens in television, radio, the mass media, that pretty much define our collective unconscious, the mass media defining what we see, what we hear, what we are exposed to, what we dream of. I really distrust these systems when it comes down to language.

I am interested in proposing alternatives to the unidirectionality of the system of art. I think that, we have come to realize that language is truly unstable and absolutely turbulent. Language speaks us instead of our speaking the language. We would like to be in control of language, we would like to arrest this flux of events that surrounds us. I believe in negotiation of meaning, not communication of meaning. When I defend a model of language as fluctuating, oscillating turbulent and so forth, I am not talking about ambiguity in a stable model of language that can be interpreted in one way or another. I am talking about a completely different model of language, a model in which language in a sense escapes us. The realization that language has its own dynamic, and no matter how much one tries to grasp it, how much one tries to arrest it, how much one tries to condense and objectify it, it's going to continue to spill off, and spill out, and blend and merge and dissolve. When we use language in a linear way, in art and in poetry, we are in danger of bypassing the fundamental problem of our own medium, which is language itself. What about language's role in shaping our perception of the world? I am trying to deal with a problem that I see as being essentially epistemological. I am trying to reflect on the very nature of language, focusing particularly on written language. How does language shape our reality, define our own identity? How does it engage or not, our thoughts in the process of dialogue?

O- Your series "Erratum", of still images, follows this principle?

K- In "Erratum", pairs of words are seen in a field in which layers of colors embed and dissolve the verbal forms. The words are nearly homophonous and always suggest contrasting meanings. These images are hand-painted on a computer employing a whole repertoire of rips, blurs, scratches, warps, slashes, composites, scrawls, color manipulations, smears, gashes, filters, gougings, scaling, abrasions,

transparencies, inscriptions and overpastings. The semantic tension created between the pairs of words is rendered visually, as the perceptual tension created between the word fragments and the surrounding field. These works may suggest the spontaneous combination of torn posters, weatherworn surfaces, and graffiti, found on the walls of urban landscapes. These images are available on the Internet.

O- I believe that in Jenny Holzer's and Barbara Kruger's case, there is a political concern, a desire to present the work to a larger public.

K- Everything is political: a bathroom graffiti is political and so is an epistemological discussion. The "Erratum" series, and many other of my works, can be seen immediately by anybody with Internet access. The Internet links more than three million hosts in more than three dozen countries. My works are available free of charge to millions of people as we speak. This is a clear political concern.

O- World wide telecommunications create a new context for the political debate. When did you start working with telecommunications as an art form?

K- It was in 1985, around the time of the "Geração 80 Show" that I became interested in working with telecommunication processes. My bachelor's degree, from Rio's Catholic University, is in Communications but none of the things I wanted to do in the Fine Arts were really taught in schools at that time. There were no artists, no schools, nothing organized or even disorganized where one could learn holography, computer-imaging, multimedia work, not to mention telecommunications. In 1985, I took part in an on-line art gallery that was set up by a company in São Paulo. Some artists participated in that, and I had some works on-line. One could see that from any part of the country. That was something that encouraged me to continue and to try to do works that were more interactive. So around that time I met Mario Ramiro, a sculptor from São Paulo, who was working with zero gravity and infrared sources. He had done some work with telecommunications. I became very enthusiastic about it, having seen the few things he had done. We explored bi-directional fax transmissions together, developing a whole chart of expressive possibilities of the fax machine, with the support from a local fax manufacturer, who gave us the phone lines and the fax machines to work with. We also worked with fax transmissions involving a live television broadcast.

As a consequence of that work, while still in Brazil, I became interested in the idea

that telecommunications could be used for art, not only to send, receive, manipulate, and change image, sound, and text in the process, but perhaps to engage the space where the remote person, remote artist, the remote telecommunication apparatus is located. Maybe that space could be activated somehow through telecommunications. In 1988, I drew some sketches for pieces that would use remote control and remote sensing and other related ideas to push telecommunications into a more physical domain. The idea is to do the non-physical where the physical belongs, the physical where the immaterial belongs. All this to destabilize our expectation about how these things should work, to merge them, to bring them together, to see how they produce meaning when they conflict, to study the tension between them. It was not until I came to Chicago to get my Master's degree, in pursuit primarily of access to holography facilities and more appropriate conditions to develop the work, that it became possible to develop, in collaboration with Ed Bennett, what I now call telepresence art.

O- Why Chicago?

K- I received a grant from the Brazilian government to pursue my graduate studies abroad. I chose Chicago because it has a very strong tradition in holography, and you have the School of the Art Institute which has been teaching holography as an integral part of the curriculum since the early 80's. There is a nucleus in the city that is not exclusively related to the fine arts, but is interested in promoting holography. I taught studio and art history classes for more than three years at SAIC, until I moved to Lexington, Kentucky, in August of 1994.

O- You have lived here in Chicago for the last 6 years. What has been the impact of the move to the U.S. in your work?

K- Well, I was already doing the work with holography that I do now starting in '83, and I got here in '89, so in that sense, it didn't really change the work dramatically. However, it made possible for me to continue doing it, in the sense of having access to the material conditions that allowed me to take the work to the next step that I wanted to take it. That was actually the main reason why I left Rio and came to Chicago in the first place. Although it really hasn't changed much in terms of "what is it" that I'm doing.

O- Did you find a more supportive environment for your work and your ideas here in Chicago?

K- In a sense, yes. I have met and collaborated with many artists both in the U.S. and in Europe since I arrived here. I worked a lot with Bruce Breland, and the group DAX, in Pittsburgh. One of the pieces we did between Chicago and Pittsburgh was called Interfaces, in which I tried to restore some of the spontaneous quality of face-to-face conversation, using video images transmitted one at a time over the phone line. So we had no verbal or oral communication, but we would send images of faces, created live on the spot. These faces would overlap on line and this was projected on a very large screen here in Chicago, so people could see that. But this was really not work for an audience. The work in telecommunications is for anybody that participates in the work, not for the concept of somebody watching it, although you can make it available so people can see what's happening. In this case, intermediary faces were being formed. So, we were sharing and creating identities over the phone line, collaging my eyes with his face, part of his mouth with my face. These elements were ever flowing and changing. They were never quite resolved. And this was happening as a sort of conversation. And that was happening bi-directionally, continuously, live, through the phone line. That was Interface in 1990. Since 1989, I have developed with Ed Bennet the telepresence series of installations.

O- How would you define telepresence art?

K- Telepresence art can be identified in the intersection of robotics, telecommunications, and computers. It is part of a wider framework of electronic interactive art. It implies less stress on form (and composition) and more emphasis on behavior (choice, action) and negotiation of meaning. It highlights the public who, as participants, acquire an active role in shaping their own field of experience. The role of the artist here is not to encode messages unidirectionally, but to define parameters from which experiences will unfold. Telepresence art also implies the primacy of real time over real space.

O- The emphasis on experience and process seems to be central to your telepresence installations. How do you deal with this issue of real time over real space in your work? Could you talk about a specific event?

K- I create the installations to the scale of the telerobot and conceptualize a certain electronic sensorial apparatus on board. Having done that, I ask you to navigate in this space from a remote place, to move around, to make decisions and to experience this space according to your own decision making process, so there is

nothing that will determine your experience prior to you having it. For instance, in this particular case of Ornitorrinco on the Moon, which took place in '93, between Chicago and the museum Kunstlerhaus in Graz, Austria, people would come to the museum in Austria and push the buttons on the telephone and they would see a monitor, which produced a duotone-like green image, as if you were underwater. I treat the keypad as a Cartesian grid. You push the number 2, the robot moves forward immediately. You push the number 3, the robot turns right, and so forth. We keep changing the installation in all aspects. The robot is never the same, the interface is never the same, nothing is ever the same. What is it? Well, it's nothing until you make it. So you push the buttons on the phone, and you navigate around. You see the different places. You construct, through these isolated still images that you capture from the point of view of the robot, the space in your mind. But then comes the next person and navigates in a different direction, does not perceive the same thing you saw, and that person constructs a completely different space. So, the things people see, the notion of the three-dimensional space they are navigating in, all these different things are relative to the points of view that you pursue in your exploration of that space. And each person leaves that space with a different Moon, a completely different understanding of what that space looks like. It's not that they are failing to accomplish anything. No, they are accomplishing what is out there to accomplish, which is to navigate in a situational environment and construct their own experience. Sound also played an important role in this installation. A canopy of speakers produced different kinds of sounds: my voice saying over and over "I remember the day when...", Theremin sounds, etc. The speakers served to orient (and disorient) the participants, and contributed to the overall atmosphere of the work.

O- What was the telepresence installation Ornitorrinco in Copacabana like?

K- The installation was part of the Siggraph Art Show in 1992, in Chicago. People navigated in the installation from McCormick Place, where the telephone and the video monitor were, but the installation itself was in the Electronics department of the School of the Art Institute. So, people came to McCormick Place and through a monitor and a telephone link, controlled the telerobot at the School of the Art Institute and looked at the space. But there wasn't in the installation really anything that would mimic Copacabana in particular. The leaves were improvised. The images of fish were drawn from life at Woolworth. And the lizard, for example, I drew from life watching a lizard in this pet shop on Belmont street, close to where I used to live in Chicago. That's Copacabana for me. Copacabana

is my suitcase. Copacabana is like this postcard I have on the wall, but it's a postcard that is also in my heart. But my heart is my suitcase and my suitcase is on my wall.

O- What was the public's reaction after they experienced "Copacabana" through the eyes/camera of Ornitorrinco?

K- Some loved it and some didn't. Many didn't understand it. Curiously, during the Siggraph Art Show, among the 25,000 people that came to the show, this gentleman experienced the work, and started this conversation with me about the piece. He said that he believed the work was interesting but that he didn't think it was art. I was then talking to him about some of the ideas behind my work, about using communications not to simply send and receive messages, but to create an experiential context with it. He said -- "Anything is an experience. When I put my shoe on in the morning, it's an experience." The natural response to that was -- "Sure, you have an experience when you put a shoe on, but not from the perspective of the shoe"...

O- Ornitorrinco means platypus in Portuguese, a "hybrid" of bird and mammal. I find it a great name for your telerobot because it suggests so many heterogeneous mixtures. However, the idea of looking at the world from the perspective of the shoe, from the perspective of the object, or from the perspective of the other, although fascinating, seems still an impossibility.

K- Klee once wrote that objects in his studio contemplated him. Lacan speaks of objects looking back, in the sense that objects have meaning not only because we can see them, but because they are part of a much larger network of meanings, which includes language. No idea in art can be looked at literally. Look at Mondrian's "straight" lines from upclose. They are anything but straight. He painstakingly painted them by hand. Art works are not functional as chairs and tables, they can't be understood only from the point of view of their material manifestation. Otherwise, you have people visiting museums, looking at a Jackson Pollock painting, and saying the famous words: "my four-year old can do this in five minutes!" What the telepresence installation with the Ornitorrinco telerobot is all about is to metaphorically ask the viewer to look at the world from someone else's point of view. It's a non-metaphysical out-of-body experience, if you will. You are asked to remove yourself from your direct experience of the space that surrounds you and transport yourself, in space and time, to another body, to another

er situation, to another identity. You're asked to put yourself in somebody else's shoes.

O- So, Ornitorrinco in Copacabana has nothing to do with the real Copacabana.

K- Actually, our very first event with Ornitorrinco was performed in 1989, in a link between myself in Copacabana, and Ed Bennett in Chicago with the telerobot. But the issue here is not mimesis, or duplication of an existent space. I am working with geographic displacements, mythical as well as imaginary landscapes. Ornitorrinco in Eden, for instance, realized publicly in October 23, 1994, was a networked telepresence installation on the Internet, which linked Chicago, Seattle and Lexington to countless virtual sites around the world.

O- What happened during this installation?

K- This was the first telepresence art work realized on the Internet. My use of the word telepresence here refers specifically to the use of a fully mobile, wireless telerobot. The piece bridged the placeless space of the Internet with physical spaces in Seattle (WA), Chicago (IL), and Lexington (KY). It consisted of these three nodes of active participation and multiple nodes of observation worldwide. In this telepresence installation, the mobile and wireless telerobot Ornitorrinco (Platypus, in Portuguese) in Chicago was controlled in real time by participants in Lexington and Seattle. The remote participants shared the body of Ornitorrinco simultaneously. Via the Internet, they saw the remote installation through Ornitorrinco's eye. The participants controlled the telerobot simultaneously via a regular telephone link (three-way conference call) in real-time. Communication took place not through verbal or oral exchange but through the rhythms that resulted from their engagement in a shared mediated experience. As the piece was experienced through the Internet, anybody in the world with Internet access could see it, dissolving gallery boundaries and making the work accessible to larger audiences.

O- This piece creates a new communicative situation that has not been experienced before. How is the conception of new forms of communication related to the creation of new art forms?

K- By merging telerobotics, remote participants and spaces, the traditional telephone system, and videoconferencing through the Internet, this networked telep-

resence installation showed one possible direction interactive art will take in the future. If in the next century mass media's unidirectional discourse will renew its structure and its reach through pseudo-interactive gadgets, on the other hand more and more people will live, interact, and work between the worlds inside and outside the computer and new forms of interface between humans, plants, animals, and robots will be developed. With new codecs, wristphones, portable satellite dishes, and a whole plethora of new technological inventions, telecommunications media will continue to proliferate, but by no means this can be seen as an assurance of a qualitative leap in interpersonal communications. "Ornitorrinco in Eden" created a context in which anonymous participants perceived that it is only through their shared experience and non-hierarchical collaboration that little by little, or almost frame by frame, a new reality is constructed. In this new reality, spatiotemporal distances became irrelevant, virtual and real spaces become equivalent, and linguistic barriers were temporarily removed in favor of a common empowering experience. "Ornitorrinco in Eden" was experienced on October 23, 1994, for approximately five hours. Viewers from several American cities and many countries (including Finland, Canada, Germany, and Ireland) came on-line and were able to see the remote installation in Chicago from the point of view of Ornitorrinco (as controlled by anonymous participants in Lexington and Seattle).

O- Your work seems to imply that the fundamental relation today is that between appearance and disappearance and no longer between appearance and reality.

K- We live in a world where our mental images of places, cultures, and people, are no longer acquired through direct observation. We can conjure up images of the Moon, we can dream and see ourselves on the Moon, although we have never been there in person. We have memories of places we have never visited. We think of places and we have developed concepts about cultures that we have never seen, never experienced, based only on clichés that are circulated by the media, Hollywood, television, magazines and so forth.

In my telepresence installations I'm making geographic displacements that reflect that. How do you go to Copacabana, to the Moon, and to Eden without ever leaving Chicago, or Graz, or Seattle? People might expect, "Well, Ornitorrinco on the Moon, I'm going to see a moon-like installation." No, you won't. Because the name is no longer attached to the object. We live in a world where the signifier has fallen away from the signified and is no longer structured in that neat signifier-signified model that we inherited from the structuralist thinkers. Ours is a very

unstable world in which everything seems to fluctuate and be inconsistent, therefore the inconsistency between what the name means and what the place means. Well it doesn't mean anything until you're there moving around and making your choices. Again, nothing exists until you make it your own, until you claim it, until you create your own narrative, until you construct it.

O- What is the place of the body in your work today, in relation to the beginning of your career?

K- In my work in the early 80's, the body was everything. The body had to be present. It was from the sounds of the body that the work emanated. The body was the tool I used to question conventions, dogmas, and taboos -- patriarchy, religion, heterosexuality, politics, etc. The body became my writing medium at the very end ultimately. But ours is a society that can save lives or massacre other societies from afar. Physical presence is acquiring a more and more secondary role in both processes. We use remote vision to look inside our own bodies and inside celestial bodies. We collect samples of both. Ironically, the distances between different cultures shrink on a physical level but remain largely untouched on a social and political level. The perpetuation of distance as such, be it territorial or symbolic, becomes an impediment to knowledge of different cultures and viewpoints. In this sense, perhaps, the simulated experience of a new identity with Ornitorrinco (the participant "becoming" the telerobot) might have implications other than strictly artistic. Telepresence implies a removal of the artist and the artwork. This is necessary in order for me to accomplish what I want to do, which is, among other things, to break away with the complete, final art work that implies a certain sense of closure, of cohesion, of completeness.

O- Is there a late Modern attitude of investigating possibilities intrinsic to the medium in your use of technology?

K- My whole use of technology is, in a sense, to humanize it, to bring it back to the human, individual scale. But at the same time I want to explore what is unique to the media, which could be an interesting tension to explore. Technology is definitely not the focus, but without it I simply cannot do the work I do. I am using it to question a lot of the elements that inform the so-called technological "progress". The political (military) structure in which new technologies are produced, the utilitarian uses they are meant to be put to, the increase in control they imply. So there it is, you wouldn't be wrong to identify a certain late modern dis-

course exploring the specificity of these media. The curious side of this is that I am always using the lowest end of technology. I am using low-power lasers. The telerobot Ornitorrinco was made basically with Radio Shack technology, mostly paid for, to give you an idea, with the little money I made teaching part-time. My videophone, my fax, and my computer are discontinued models.

O- Your work seems to embrace the new technologies with a certain ambiguity. On the one hand we can see the enthusiasm for new artistic possibilities. On the other hand, we find a critical perspective, a concern for the social implications of these same technologies. In your telepresence events you are basically removing the artist from the artistic experience. What would the role of the artist be, in this case?

K- The artist is no longer someone that creates a closed structure to be pondered on, or gazed at. The dichotomy abstraction vs. representation no longer dominate the aesthetic discourse of our time. Artists can realize new ideas in a small scale, in the immediate present, ideas that can reflect or suggest models for new ways of thinking and for social transformation. I think that artists must have a sense of being uncomfortable, of investigating, of asking questions, of experimenting, or taking risks. When you look at stable three-dimensional works of art, the stability in these works seems to resist the fluctuation, the flow, the instability we experience in our thought processes, in our environment, in world politics, in our lives. I'm trying to acknowledge that instability and build it in the work itself.

Without the active participation of the so called viewer, none of my works really exist. And that is true of my holography, and is true of my telepresence installations. It's also true of the new work I'm doing which involves interactive multimedia works that are meant to be experienced on the computer and/or through the Internet. I've been working a lot with the Internet lately. My new body of work with telepresence installation and with interactive concepts will involve the Internet more and more.

O- The linkage between physical spaces and computer and telephone networks appears in different forms in your work. Could you comment on recent pieces that explore this concept?

K- In "Essay Concerning Human Understanding", a collaboration with Japanese artist Ikuo Nakamura, who lives in New York, a bird in a cage in Lexington had a

dialogue over a regular phone line with a plant, located at the Science Hall, in New York city. The bird's voice was converted to electric fields that the plant could sense. The plant's electric field was converted to audible sound. As this piece projected the complexities of electronically mediated human communication over nature, it surprisingly revealed aspects of our own communicative experience. This piece was experienced daily from 1 to 5 PM, during my show "Dialogues", realized in and out of the Center for Contemporary Art, in Lexington, Kentucky. In "Dialogical Drawing", two identical pieces hang on the wall: one at the Museu de Arte Brasileira, Fundação Armando Álvares Penteado, in São Paulo and one in Center for Contemporary Art, in Lexington. As people look at the pieces, and perhaps make comments about them to people next to them, they hear sounds coming from the piece on the wall. The "drawing" on the wall (a three-dimensional piece created with mahogany, wires, speakers, microphones, and circuit boards) is a bridge linking strangers in the two time zones and spaces in the remote countries. The work then becomes about the interaction of foreigners, their mastery of each other's languages and cultural references, and the conversations that might result from these interactions. During the opening of the "Dialogues" show, gallery visitors in Lexington asked museum visitors in São Paulo what that noise was in the background. It just so happened that it was raining in São Paulo at the moment. So everybody experienced the rain in South America with a new sense of wonder. This was, in a sense, a rediscovery of the fragility of the planet, and how we all are part of this huge ecological network. In UPC, another installation that was part of "Dialogues", silent letters moved one at a time across the gallery wall (via a large video projection) and across the CRT (at home, via the Internet), with no space between them. The viewer is forced to read them as individual characters. Once the visual pattern that defines the words is broken, we focus our attention on the letter, magnifying the arbitrariness and the sequential nature of language. The statement that zooms by the screen (nothingaboveortoleftandrightnothingbelow) criticizes dualistic schemes and celebrates a conception of space that implies the abolition of familiar parameters. Ironically, the title refers to Universal Product Code, white labels with black stripes of varying thicknesses used to scan the product data in supermarkets.

O- What do you think the potential for the Internet is as a venue for artistic investigation?

K- I think the potential is great. On the Net you already have art galleries with shows and independent new projects taking place. At the end of his life, Moholy

was complaining about the status of filmmaking at the time. He felt that in the 1930's and 40's, filmmaking was no longer a medium the independent creator, the independent artist could work with. Because cinema had become such a corporate-dominated medium, by Hollywood and many other film companies around the world, there was basically no room for distribution of independent films. But this is to say that we must prevent the same thing from happening with the Internet. We have examples from history. Another example that comes to mind involving the issue of communication and telecommunication comes from Bertolt Brecht. Brecht wrote a magnificent, short essay on the problem of communication. He was complaining about the fact that radio was unidirectional. He said that by being unidirectional, this media would be dominated by the producers. He said that radio must be bi-directional. Radio must empower people. Radio must be a means for social transformation, social change.

And of course, there's also the issue of censorship. I think that the Internet today has the potential of realizing Bertolt Brecht's dream of being not only bi-directional, but multi-directional. And multi-directional hopefully, also on other levels, cultural levels, allowing for expression of multiple, uncensored, points of view. That would allow people to share all kinds of insights about all kinds of aspects of culture. There is a lot of garbage too, but that is the price of freedom and democracy. However, there always is the fear and the danger of the Internet becoming corporate and becoming absolutely commercial. The Internet sort of grew out of a military network, which is kind of scary by itself, but has become a gigantic mother of all networks. Anybody can virtually transform his or her own computer into another node on this network and share. So I think that there is the potential for redefining the social role of the artist. I think we must do everything we can to prevent it from becoming this corporate-dominated commercial enterprise. The Internet should be a place, or a space-less place, that allows everybody, anybody, anywhere in the world, to move around, to share information, to have access to information, so information becomes decentralized. But when we talk about this issue, of course we run into the problem of Third World countries. If you look at the map of the Internet, you see that Africa and South America do not have the same density of nodes you see in Europe and North America. People that live in these continents are being underprivileged, left behind. This is another very important problem because you're talking about new technologies and communication media on a global scale. Think of Brazil for example. In Rio, if you pick up the phone, you don't know whether you're going to be able to get a line or not, and if you get a line, you don't know if you're going to get a connection or not. If

you connect, the line may drop at anytime. In many underdeveloped countries, even a basic thing, like the phone, is a very complex problem. I think there are layers and levels of meaning that technology has in our lives that really haven't been addressed. And I think that's true from a political view. If you look at it... Technology has the potential to empower people in many ways. If we leave technology behind in art, if we don't question how technology affects our lives, if we don't take charge, if we don't use these technological media to raise questions about contemporary life, who's going to do that?

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This interview was realized between August and September of 1994, and complemented in August of 1995.

The story of an idea

Eduardo Kac

I. Observations

- Holography was born under the verbal sign. The subject of Gabor's first hologram, shot with filtered mercury light in 1947, was a transparency with the names (not the pictures) of ten scientists. Although by no means intended as a literary or visual art work, Gabor's first hologram was composed with a non-syntactical cumulative method, which we also find in poems created by post-war literary vanguards. In Gabor's first hologram two columns, with five names each separated by commas, form a verbal portrait of centuries of optical investigations that lead to the invention of the hologram.

- The book *I AM: A STUDY OF CUMMINGS' POETRY*, by Gary Lane, published in 1976, has an interesting reference in the "acknowledgments" page: "At the start of my work, Harcourt Brace Jovanovich inspired me by releasing a full American edition of the text; *Complete Poems 1913-1962* (1972) includes even "the boys i mean are not refined," a holographic poem previously limited to a few signed copies of *No Thanks*."

As surprising as this might sound, since the first laser hologram was made in 1962, the point here is that Lane is referring to a holograph, and not to a hologram. This distinction must always be kept in mind. A facsimilar reproduction of the manuscript of the aforementioned poem was included in the *Complete Poems*

- Paraphrasing Cummings: I'm fond of that movement which creates imprecision.

- 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.

- Language is as important in art today as the traditional genres of portrait, still life, nude, and landscape were before.

- Holopoems evoke thought processes, and not their result.

- Serious writerly concept and playful readerly experience must not be mutually exclusive in a holopoem.

- It is intrinsic to the method of film the projection 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.

- Not all texts recorded on holographic film are holopoems. It is 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 matters: new syntaxes, mobility, non-linearity, interactivity, fluidity, discontinuity, dynamic behavior. 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. When that happens, new possibilities will emerge, and holopoetry will lead to other, newer areas of poetic experimentation.

II. Quotes

- François Le Lionnais: “Les principes de l’holographie pourraient servir à représenter des poèmes en images aériennes dans l’espace. Lorsque le lecteur bougerait la tête il pourrait voir des mots ou des phrases qui étaient cachés auparavant.”

In *La littérature potentielle* (Gallimard: Paris, 1973), p. 290.

- Aaron Marcus: "In a computer graphics display, the answer to the question "what does a visible language composition look like from the back" may be the conventional answer that it looks like the rear of a video CRT display. However, recognizing the possibilities of video/computer graphics/holography images, the rear-view of a typographic composition may afford a prospect into new areas of a visible language space which were previously unobserved. This is the equivalent, in terms of visible language, of moving from a Renaissance single perspective view of typographic space to a multi-perspective view in which each direction reveals new insight into the total meaning of the work."

“At the Edge of Meaning”, in *Visible Language*, Vol. XI, N. 2, Spring 1977, p. 7.

- Richard Kostelanetz: “Holography offers advantages unavailable on a flat printed page. Whereas much of my circular ‘Manifestoes’ must be read at angles that some people find uncomfortable — upside down or sideways — the letters of the words in the circular statements can in a hologram be presented in horizontal planes for easy reading. I produced such a hologram. Since the words employed in my earlier work relate to my concepts of visual poetry, it seemed appropriate that my hologram should contain circular statements about holography itself and that it should have, like much of my work, an explicit title, ‘On Holography’. The cameraperson for ‘On Holography’ was Neal Lubelsky; it was produced in 1978 at the Cabin Creek Center for Work and Environment Studies, New York.”

“My artwork entitled ‘On Holography’ “, in *Leonardo*, Vol. 13, pp. 40-41, 1980.

- William Burroughs: "The process [of sound poetry] could be carried further with visual images — permuted, overlaid, speeded up, slowed down, run backwards — which would create new images to accompany the sound track. The technical perfection and availability of the hologram would add still another dimension, whereby the images could step off the page in 3D. By using ever-expanding technical facilities, sound poetry can create effects that have never been produced before, thus opening a new frontier for poets."

An Introductory text for Henri Chopin's book on "Poésie Sonore", in Henri Chopin, *Poésie Sonore* (Paris: Jean-Michel Place, 1979), p. 9.

- Hans Magnus Enzensberger: “Hologramm/Dieser Satz hier/liegt in der Luft/Er ist so durchsichtig/und so leicht/leichter als Luft/dieser Satz hier/daß er sich langsam/vom Erdboden löst/und schwebt/dieser Satz hier/ der in der Schwebeliegt/bis er zu Ende geht/mit eben denselben Worten/mit denen er anfing/Dieser Satz hier/liegt in der Luft/.....

Catalogue of the exhibition *Dieter Jung* (New York: Museum of Holography, 1985). Not numbered.

- Augusto de Campos: "Sempre entendi que a utilização de novos mídias não assegura, por si só, arte, poesia ou invenção. Mas a massagem das mídias pode ser altamente estimulante para o artista, sugerindo caminhos não batidos para a imaginação, reciclando-a, ajudando-a a criar outras imagens e magias. A holografia, com seus ilusionismos tridimensionais, suas cambiâncias de cor e de volume, suas multileituras, é uma dessas provocações salutares."

“Alô, Holo” , in poster/catalogue of the exhibition *Triluz*, São Paulo, 1986.

• Carlo Belloli: "Il futuro è il cambiamento della realtà in libertà. La poesia visuale ha quarent'anni ma non ha ancora esaurito le proprie motivazioni. Dai nostri Test-Poemi Murali del 1944 ai recenti poemi collazionati e agli ologrammi per uno spazio virtuale, ultimi, abbiamo promosso una viva e costante evoluzione delle problematiche visuali della poesia. La spazializzazione della parola ci è necessaria, come le nostre scelte semantiche confermano il rifiuto della banalizzazione."

“Glossa di Poetica Visuale”, in Eugenio Gianni, *Póiesis; Ricerca Poetica in Italia* (Arezzo: Istituto Statale, 1986), p. 113.

• Ernesto Melo e Castro: "O espaço polidimensional e polissémico que sempre foi o espaço conceptual da poesia torna-se visível numa forma espetacular com as aplicações criativas da holografia. A holopoesia logo se coloca como a ponta mais avançada na invenção poética neste fim de século, como aquela que mais fascínio exerce e mais problemas novos levanta, longe das poéticas sentimentais ou do ainda vigente romantismo novecentista mas também das querelas post-modernistas ou protohumanistas."

In *Poética dos Meios e Arte High Tech* (Lisbon: Vega, 1988), pp. 68, 70.

III. Critical fragments

“ ‘Visual Literature’ — no doubt an arguable term, employed for want of a better one — generally comprises not only visual poetry and prose but also includes concrete, semiotic, and holographic poetry, text-objects and text-environments, at least in some of their respects, and bears upon aspects of found poetry, aleatoric writing, artist’s books and various other types of word/image works. The differentiation between these ‘genres’ — if they are to be regarded as such — as well as their general differentiation from ‘ordinary’ literature has often been discussed in terms of the various characteristic features or properties that they appear to adopt from the realm of the graphic, pictorial, sculptural or performance arts. As a result, ‘visual literature’ is commonly regarded as an ‘intermedial’ art form which challenges or even rejects all or most of the semiotic conventions usually associated with literary communication”.

Eric Vos, Professor, University of Amsterdam, The Netherlands
Third International Congress on Word and Image Studies, Program,
 Carleton University, Ottawa, Canada, 1993, p. 95.

“Eduardo Kac investigates the fluid meaning of words and phrases with holopoetry. Words change entirely and change color with just the slightest movement by the viewer. An intelligent deconstructive and poetic use of the now commonplace hologram”.

David O’Halloran, Director, Australian Network for Art and Technology
ANAT Newsletter, December/January 1993-4, Adelaide, Australia, p. 2.

“A first approximation to Mallarmé’s dream could be found in the holopoem, the poem constructed with the collimated light of a laser beam in a tridimensional virtual space. We must consider that most of the poems sculpted into a hologram, as it normally happens with all new technologies, are nothing but tridimensional adaptations of poems that already worked well on the planar surface. Depth adds nothing essential to these poems. That is what happens, for example, in some holographic works by the German Dieter Jung, which only exhibit a new spacial arrangement for lines of verse — conventional, at that — by Hans Magnus Enzensberger. But when the holopoem actually explores a truly tridimensional form of writing, the results can be exhilarating, because the holopoem places the reader before a paradoxical text. In this text, words are no longer organized according to linear and absolute links, and their syntactic relationships are found in permanent transformation”.

Arlindo Machado, Professor, University of São Paulo
Máquina e Imaginário, Edusp, São Paulo, Brazil, 1993, p. 167.

“A Brazilian experimental poet since his teens, Kac was among the first writers to realize that holography, a visual technology new to our times, could be a medium for language. In the 1980s, he created holograms in which, among other clever constructions, words from two languages meld into one another, the same letters are reorganized to create different words, a cylinder reveals a series of words, seen only in parts, that reads differently clockwise from counterclockwise (“Quando?” [“When?” 1987]). For art such as this Kac coined the epithet “holopoetry”, whose significance he has explained in several manifestos: “The perception of a holopoem takes place neither linearly nor simultaneously, but rather through fragments seen at random by the observer, depending upon his or her [physical] position relative to the poem.” Originally from Rio de Janeiro, Kac moved to Chicago in 1989.”

Richard Kostelanetz, New York-based independent writer and poet
Dictionary of the Avant-Gardes, A Cappella Books, Pennington, NJ, 1993, p. 116.

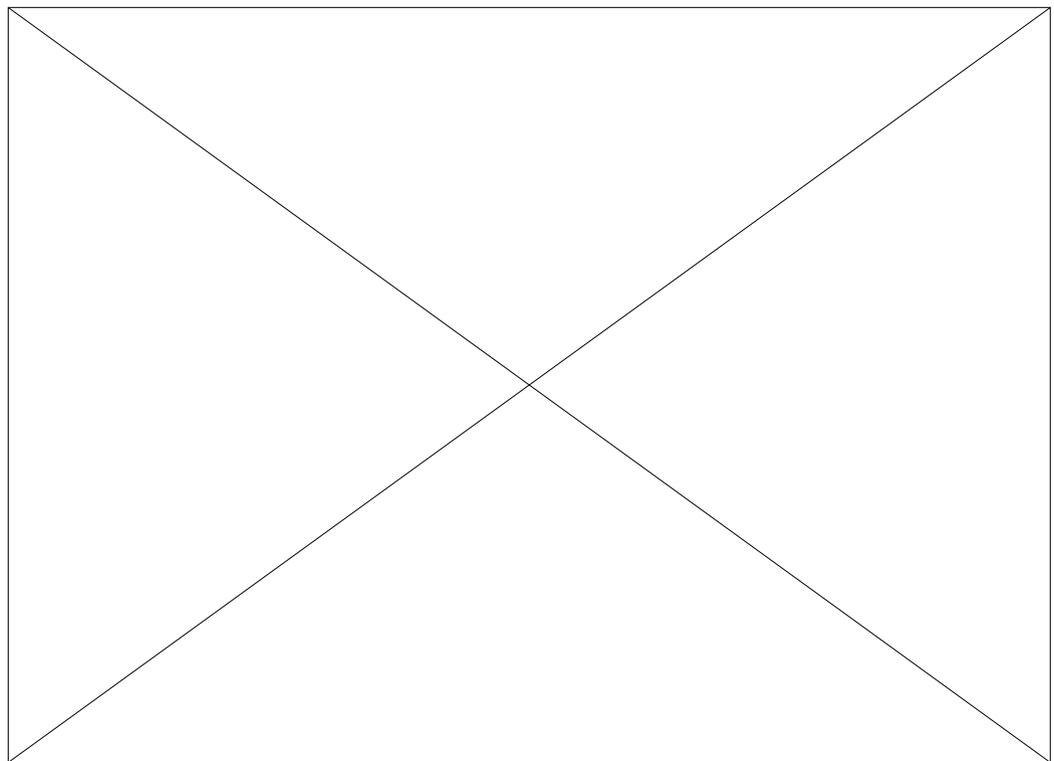
“Eduardo Kac uses a special property of holography to include several images on a single plate. These images become visible one by one, according to the position of the viewer. Kac’s holograms are like small animations in which words turn into other words as the viewer moves in front of the work. In Kac’s work the semantic space is visually metamorphed, and unexpected associations flash before the viewer beyond grammatically correct interpretations”.

Janne Koski, Curator, Rauma Art Museum, Rauma, Finland
Sähköinen Taide 95, catalogue of the exhibition, Rauma Art Museum,
Finland, 1995, p.4

“He went through poetic revolutions so quickly that there was barely time to see him reciting naked on Ipanema Beach before he had plunged into a computer McLuhan style. Holography allows him to make visible what words say and what they sometimes silence. He works on the context and on the content with the same enthusiasm; Kac’s writing begins in his mind and ends in our desire.”

Maria Victoria Infantes, writer
Karas Magazine, N. 7, Madrid, July 1994, p. 4.

Zephyr (1993),
by Eduardo Kac.



“Eduardo Kac’s holopoems should be understood in the context of visual poetry expressed with the holographic technique. Kac’s work conveys the idea of universal knowledge, since it is based on the enormous capacity the hologram has to store information. Holograms will one day be found inside computers. The verbal fragments in Kac’s holograms remind us of the residues of the Babilonic library, where all of the knowledge of the world is concentrated.”

Jörg Schepers, German independent curator
Avanguardia dell’Arte Olografica, exhibition catalogue, Perugia, Italy,
1992, p. 28

“Eduardo Kac’s computer-generated holography, coupled as it is with his visualization of word ideas to form what he calls “Holopoetry”, places him at the leading edge of holography’s artistic expressions. Computers allow holographers to create and breathe life into elegant color fields of totally imaginary objects or lightscapes, worlds totally created by the artist. Kac carries forward this ability and concept and incorporates it into language as a fourth dimension. On a computer he plays with and arranges and rearranges words, both syntactically and graphically, and through holography transforms poetry in a space whose laws are different from either the printed page or the surrounding world.”

Loren Billings, Director, Museum of Holography/Chicago
Pamphlet of the exhibition *Artistic States of Light, Energy and Matter*,
October 30, 1992 — May 2, 1993

COMPLETE LIST OF HOLOPOEMS BY EDUARDO KAC**HOLO/OLHO (HOLO/EYE)**

with Fernando Catta-Preta

25X30 cm

Reflection holograms mounted on wood and plexiglass

1983

ABRACADABRA

with F. Catta-Preta

25X 40 cm

Multicolor hologram (WL transmission)

1984/85

OCO

with F. Catta-Preta

30X30 cm

Original White light reflection hologram lost (1985)

Remade in 1989 by E. Kac as computer holographic stereogram
(WL transmission)**ZYX**

with F. Catta-Preta

50 X 50 cm

Laser transmission hologram reconstructed in white light

1985

CHAOS

30 X 40 cm

Three-color reflection hologram

1986

WORDSL 1 and 2

30 X 30 cm

Integral hologram (WL transmission)

1986

QUANDO? (WHEN?)

with Ormeo Botelho

40 cm diameter computer integral hologram (WL transmission)

1987/88

LILITH

with Richard Kostelanetz

30 X 40 cm

Pulsed hologram (WL transmission)

1987/89

PHOENIX

30 X 40 cm

Laser transmission hologram with flame

1989

ALBEIT

40 X 50 cm

Multicolor hologram (WL transmission)

1989

SHEMA

40 X 50 cm

Multicolor hologram (WL transmission)

1989

MULTIPLE

20 X 25 cm

Achromatic computer holographic stereogram (WL transmission)

1989

OMEN

30 X 40 cm

Pulsed white light transmission and achromatic computer hologram

1989/90

SOUVENIR D'ANDROMEDA

30 X 40 cm

Achromatic computer holographic stereogram (WL transmission)

1990

AMALGAM

10 X 7.5 cm

White light reflection hologram

1990

ECCENTRIC
40 X 50 cm
Multicolor hologram (WL transmission)
1990

ADHUC
30 X 40 cm
Multicolor computer holographic stereogram (WL transmission)
1991

ZERO
30 X 40 cm
Multicolor computer holographic stereogram (WL transmission)
1991

ADRIFT
30 X 40 cm
Multicolor computer holographic stereogram (WL transmission)
1991

HAVOC
30 X 120 cm (triptych)
Multicolor computer holographic stereogram (WL transmission)
1992

ASTRAY IN DEIMOS
30 X 40 cm
Multicolor computer holographic stereogram (WL transmission)
1992

ZEPHYR
30 X 40 cm
Multicolor computer holographic stereogram (WL transmission)
1993

MAYBE THEN, IF ONLY AS
30 X 40 cm
Multicolor computer holographic stereogram (WL transmission)
1993

BIOGRAPHICAL INFORMATION

Eduardo Kac (b. 1962, Rio de Janeiro) is a writer and artist who works with holography, telepresence, computers, and telecommunications. Kac's works have been exhibited in North and South America, Western and Eastern Europe, the Middle East, and Australia. Exhibitions include the Museum of Holography (New York), Museum of Modern Art (Rio de Janeiro, Brazil), and Kunstlerhaus (Graz, Austria). Eduardo Kac has published articles and essays on electronic art in journals and books in several languages. Books include "Siggraph '92 Visual Proceedings" (USA), "Art-Reseaux" (Paris), "New Media Technologies" (Australia), and "Welcome to the Wired World - Ars Electronica" (Austria). Journals include: Leonardo, Colóquio Artes, and New Observations. Public collections include Museum of Holography (Chicago), Museum of Modern Art (Rio de Janeiro), and MIT Museum (Cambridge). Participation in CD-ROMs include: ICC Artists' Database, Intercommunication Center, Tokyo, Japan; World Media Intercative 1 and 3, Berlin, Germany; Allire, Villeneuve d'Ascq, France; and European Media Arts Festival, Osnabruck, Germany. He taught history of art and technology, digital imaging, and computer holography at the School of the Art Institute of Chicago and is now Assistant Professor of New Media in the Department of Art, University of Kentucky, Lexington, KY. Eduardo Kac is a member of the Editorial Board of the international journal Leonardo. To access Kac's Home Page on the World Wide Web, please go to: <http://www.uky.edu/Fine Arts/Art/kac/kachome.html>.

Eduardo Kac,
Chicago, 1994.

