From Noise to Signal: Digital Photographic-Based Works on Paper (1986-1990)

George Legrady

``… within the next ten years the conventional camera we all use today will be replaced by a digital camera that takes photos on a floppy disk that is `processed' in a normal personal computer with the type of software presented in this book."

[1988] Gerald J. Holzmann, "Beyond Photography: The Digital Darkroom", Bell Lab scientist

George Legrady, Santa Fe Art Colony Studio, Los Angeles, 1988

From the fall of 1986 until approximately 1990, I realized a series of inkjet works-on-paper that may be the first generation high-resolution, pixel-based photographic digital images printed directly from digital data of images created by a computer equipped with an analog-to-digital video capture board and custom software. Some of the images were processed through software for image processing, while others were created purely by code. Ideas and themes explored in these images were informed by conceptual art rule-based processes, Information Theory's various definitions of communication such as entropy, redundancy, with signal as ordered information and noise as random information. Visual themes also focused on a semiotic exploration of the visual staging of images captured from television broadcast news. These resulted in a series of 57 distinct compositions, and approximately 98 actual prints, possibly the first such digital photographic-based works transferred digitally from software in which the images were directly transferred to a prototype printer, the Fuji Jetgraphix system, at a lab near UCLA. This paper describes the evolution of these works, and the transitioning and integration of computer processing in my photographic and artistic practice in the mid to late1980s.

Background

I had acquired computer-programming skills in the fall of 1981 in the studio of the painter Harold Cohen, a professor in the Visual Arts Department at UCSD. Harold was developing an artificial intelligence-based software titled "Aaron" that produced painterly images, guided by complex aesthetic rules that Harold had translated into code according to studies of how he, as an abstract painter, made creative decisions in the painting process. Harold generously gave me access to his studio for a period of 3 years, until my move to Los Angeles in 1984. The system in the studio, a PDP-11 and eventually, a VAX both by DEC Corporation, were producing their visual output on a vector-based, phosphorous Tektronix 4010 screen, drawing lines by a green electronic beam. For his museum exhibitions (Tate, Stedelijk, etc.), Harold had designed custom pen plotters on wheels that sent sonar signals picked up by microphones placed at each corner of a large paper on the floor on which the plotters were drawing as a way to keep track of the location of the plotters.

At that time, my artistic work was in large-format, studio photography of subject matter that explored the semiotics of the photographic image, driven by conceptual questions. This approach in the 1980s fit into an aesthetic direction described as "staged photography". While learning programming in Harold's studio, I held a visiting faculty position in Photography from 1982 to 1984 at Cal Arts, and in 1984, became an assistant professor in photography in the School of Fine Arts at USC where I remained until 1988. While at USC I began to look into possibilities in merging my interests in a conceptual approach to photography and the integration of computational processing. Fueling the planning and thinking of how to proceed, I was fortunate to meet two inspiring individuals in the Annenberg School of Communication at USC, social scientist Daniel Dayan, a student of Roland Barthes, was a communications and semiotics specialist and

the engineer, pioneer computer artist A. Michael Noll, formerly a Bell Labs researcher, had recently arrived on campus.

The possibility of digitally capturing a photographic image became a reality around 1985 with the release of the AT&T Truevision TARGA raster graphics image capture videoboard added inside a desktop IBM personal computer AT. The Targa system made it possible to digitize high-resolution, pixel-based images at 16 bit or 32768 colors by connecting to an analog video source such as a video camera or any television signal and the Targa would capture and translate the signal to a digital pixel-based image. My exploration of this system began in 1986 when I was able to acquire a few workstations in 1986 through funding support from IBM's "Project Socrates" academic donation program, and USC's Innovative Research, and Innovative Teaching awards.

From Noise to Signal, Exhibition Announcement, USC Atelier Gallery, Santa Monica Place, July 7 to August 30, 1987

Authority of the News (1987), Fuji jetgraphix prints. Collection Santa Barbara Museum of Art (2017)

My first exhibition of these "digitally direct from-data-to-paper" took place at the USC Atelier, an off-campus outreach fine arts University of Southern California gallery located at the Santa Monica Shopping Center. For my exhibition "From Noise to Signal" from July 7, 1987 to August 31, 1987, I presented my first Fuji inkjet works-on-paper and staged the gallery to look like a computer production office, as the space in the mall, located on the top floor, could have been previously occupied as an office. I brought my computer equipment to the gallery and worked in the gallery on various days throughout the exhibition. In this way, the public could view the exhibited images and also witness the image creation process of how digitally captured and processed images evolved, and additionally how such a computer system worked[1].

Subject Matter & Themes
The subject matter for the creation on this system was limited to lens-based images coming through analog video capture from television or a video camera. From the video stream, still frames could be captured, and digitized into pixel-based files. Once digitized they could be manipulated and processed through software I would write in C programming language. As TV was the only visual source, I became intrigued by the visual and semiotic staging of TV news in particular at ABC News, for instance in the ways the newscasters were placed, the pattern backgrounds behind them, the textual labeling of news footage, the look of how small windows with news events were placed with shadow backgrounds. The process of dissecting the pixel relationships and reconfiguring them through software became a key exploration, essentially influenced by Claude Shannon's various concepts deriving from "Information Theory", in specific the relation between noise and signal, each being communication but one meaningful, the other unplanned. Various semiotic texts such as Roland Barthes's "Rhetoric of the Image" in Image-Music-Text were inspirational in how to semantically explore the digital image as a linguistic structure, given that it consisted of pixels ordered symmetrically within a 2D matrix, and that each pixel consisted of specific numerical values, such as horizontal and vertical locations and color values. Once extracted, they could then be mathematically evaluated and changed based on how each pixel's values related to its surrounding pixels.

Conversation in the Vernon Collection at LACMA

[1] *George Legrady Will be Minding The Store*, by Zan Dubin, July 5, 1987, described in the Los Angeles Times the exploratory process

The Vernon Collection donated to the Los Angeles County Museum of Art, consists of over 3600 master works of the history of photography. The collection acquired an image of mine at a photography auction[2] in the 1990s. The image, titled "Conversation" produced around 1987, was one of the early works I realized on the Targa system. The whole process of digitally transforming and manipulating a photographic image through software was radically new, but nonetheless belonged to a long tradition of image alteration since the founding of the medium. One of the challenges of the photographic medium had been its uncanny resemblance to the real when it fact, as a product of technological creation, it is a constructed image. The early works therefore explored the potential of image transformation in such a way that there was little need to hide the manipulation, as it became quickly evident that digital images could be significantly manipulated without detection.
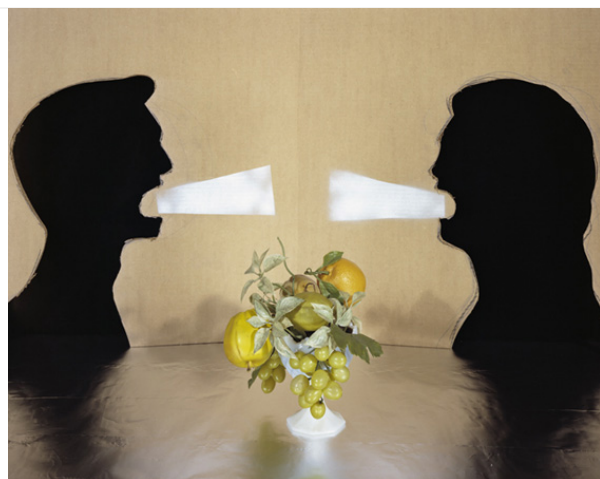
Still Life, 1983, C color photographic image, 28.5" x 36.25"

Conversation George Legrady (1988), Ink-Jet print, LACMA-Vernon Collection

"Conversation" was based on an earlier work titled "Still Life" which I assembled out of studio props and photographed with a 4x5 camera around 1981. I was inspired to create the digital image based on my discovery at the time of Claude Shannon's definition of noise-and-signal as defined in his influential Information Theory (1948), a theory that has been instrumental in the development of telecommunications, and much of digital technologies today. The source image is a captured still from an Italian 1960s film in which the male and female actors (possibly Marcello Mastroianni and Sophia Loren) are having an argument I used text characters deformed through software and random, spatial positioning to convey the energy, the activity but also the "noisy" nature of their communication.

The transition from staged photography to constructed digital photography was a natural step for my way of exploring the digital image as it involved a process of construction and staging. At the time, there were very few artists working in the digital photography medium, that I knew of given that hardware with basic image quality was just beginning to enter the market and one had to write one's own software to process and manipulate digitized images.

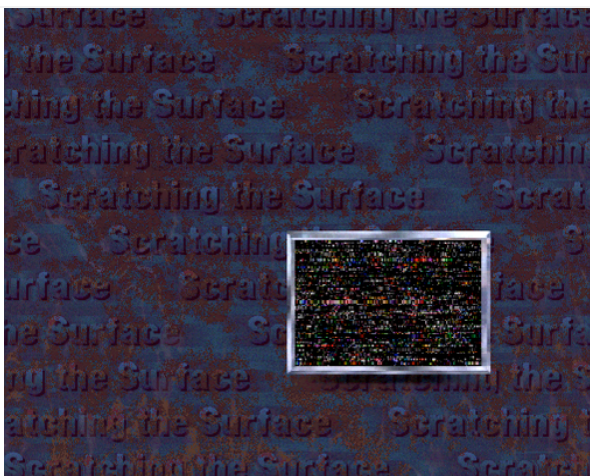### *Beneath the Surface / Scratching the Surface* (1988-1989)
These two images are part of a series that explored various components of television news visual staging as a way to create new visual works. The intent was to feature the formal staging elements such as background texture and floating windows, and then to introduce custom software process as a way to produce aesthetic treatments. They are examples of still-image works where extensive computation was used as the medium by which to build the artwork. To begin, a textual/textural pattern was generated. The image on the left uses the phrase "Beneath the Surface", the other has "Scratching the Surface", suggesting a questioning of the narrative – what is on the surface and what is beneath. A color to the background was added to each of them. The image on the left also has a blurring effect added which creates a greater visual distance in comparison to the image on the right. A software that randomly eats away at the image was then applied. Its color on the right was sampled from a digital image of a rusted surface. The three-dimensional floating windows were most probably designed in Wavefront technologies' "Visualizer" software

which had a metallic finish option to be added as textures to virtual objects. They are used here to reflect news photographs. The same news photographs were then processed, scrambled, filtered resulting in the abstract textures inside the windows. The shadows beneath the floating windows were added by hand to simulate their floating above the background texture.

Beneath The Surface (1988), Fuji jetgraphix, ink jet works on paper

Scratching The Surface (1988), Fuji jetgraphix, ink jet works on paper

The process of printing the image directly from computer-based data took place by transferring the data from the computer onto a 5 ¼" floppy disk, from which the data was transferred to tape and the Fuji inkjet printer would then read the tape to print the image. The Fuji Jetgraphix prototype printer was located at UCLA Professor Mits Kataoka's lab. Artists who printed on the Jetgraphix included the painter Lee Mullican, Robert Heinecken, Graham Nash and others.

Exhibitions (of early Fuji inkjet works on paper)
. *George Legrady: From Noise to Signal*, USC Atelier, 1987
. *Photography of Invention*, National Museum of American Art, Smithsonian, Washington, DC, 1987
. *Digital Photography*, SF Cameraworks, San Francisco, California, 1988
. *Fotografie, Wissenshaft und Neue Medien*, Kunstforum, Dusseldorf 1988
. Honorable mention, Computer Graphics, Ars Electronica, 1989
. *"Virtual Memories: New Electronic Photography",* curated by Mike Mandel, Friends of Photography, 1991
. *George Legrady: From Analogue to Digital*, National Gallery of Canada, Canadian Museum of Contemporary Photography, Ottawa, Canada, 1997-1998

Resources
. *Beyond Photography*, Gerald J. Holzmann, prentice hall, AT&T Bell Labs, 1988,
http://www.spinroot.com/pico/
. *Composites*, Nancy Burson 1986
. *An Introduction to Information Theory: Symbols, Signals and Noise, JR Pierce, Dover*
. *Computers, Pattern, Chaos, and Beauty*, Clifford A. Pickover, Dover 1990
. *Cult of Information*, Theodore Roszak 1986
. *Image-Music-Text,* Roland Barthes, 1978
. *Mode of Information*, Mark Poster 1990
. *Scientific American*, November 1973, "Recognition of Faces", by Leon Harmon, pp. 70-82, "How can a computer recognize a human face" was at the time explored but unanswered….
. All the studies and research between 1986 to 1989 eventually resulted in a paper "*Image, Language, Belief in Synthesis*" which I presented at the College Art Association first panel on digital media art in 1989, and which then was published in "*Critical Electronic Issues in Media*" edited by Simon Penny, SUNY Press. 1994.