

# GEORGE LEGRADY

From analog to digital

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Text & Interview by Alejandro Quiñones Roa

***“George Legrady’s work spans almost four decades and incorporates a range from analog photography to digital interactive installations. A pioneer in embracing computers with his artistic work”<sup>1</sup>***

George Legrady has exhibited internationally and is broadly recognized as one of the early digital artists that researched the semiotic and cultural implications of software produced images. His work encompasses a wide range of digital experiments from digital graphics to databased analysis, not to mention his advanced research on data visualizations and 3D rendering. Works such as **“Pockets Full of Memories” (2001)** and **“Swarm Vision” (2014)** have raised new questions in media art and interactive art, establishing new research methods in contemporary arts.

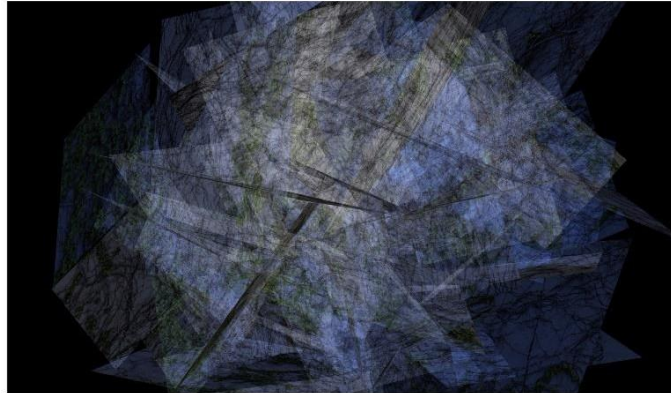
George Legrady was born in 1950 in Budapest, Hungary. At the early age of 6 he and his family immigrated to Canada under political refugee status to Montreal, as a result of the Hungarian Revolution. There he attended French elementary and English high school. He studied for 2 years at Loyola College in Montreal, where he was inspired to start photography. At age 20, he bought a one-way ticket to Paris and travelled in the Middle East for a year and followed with a one semester study at Goddard College in Vermont, known for its alternative, contra-culture ideologies. He was accepted into the Master of Fine Arts program in Photography at the San Francisco Art Institute in 1974 and graduated in 1976.

His early works were photo documentaries depicting the life of Cree indigenous communities in northern Canada, followed by semiotic studies of the analog photographic image. Legrady had his first artistic contact with computation in the early 1980s in the studio of the AI artist Harold Cohen at the University of California in San Diego, while appointed as visiting faculty in photography at Cal Arts. At that time, he began to reflect on the potential of computation for investigating the photographic image.

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<sup>1</sup> Legrady, George and Iker Gil. “Making Visible the Invisible”. (2010) MAS Context website, accessed March 14, 2023 <https://mascontext.com/issues/information/making-visible-the-invisible>

Legrady's more renowned artworks were exhibited in Centre Pompidou in Paris, PS1, MoMA in New York City, the American Museum of Art, the Smithsonian Institution in Washington, and the Centre for Art & Technology (ZKM) in Karlsruhe among others. Legrady is distinguished professor in the Media Arts and Technology PhD Program where he directs the Experimental Visualization Lab at the University of California, Santa Barbara. He leads a transdisciplinary approach to technology and computation, focusing on a creative exploration in the fields of data visualization, visual language, machine vision, computational photography, and interactive digital installations.<sup>2</sup>



*"Anamorph Voronoi" (2020)*

Legrady's most recent artworks include a variety of digital generated still-images, created by custom software to challenge our understanding of digital photography, by manipulating algorithmically the creation of visual compositions. Among these works are the **"Phantom Waves"** series, and the **"Anamorph-Voronoi"** series to name a few. In Legrady's oeuvre the notion of a digital signal that changes its frequency and disturbs a visual composition is essential. In the **"Phantom Waves series"** for example, the patterns emerge through phantom frequencies generated when the signal goes beyond the tonal range of individual pixels.<sup>3</sup> As a result, the encoded signal transforms into the two-dimensional field, where digital graphics are explored.

Similarly, in **"Voice of Sisyphus" (2011)** the artist alongside audio spatial engineer Ryan McGee and composer Joshua Dickinson presented a sound installation, in which sampled pixels in a projected digital photograph were translated into audio signals. Frequency filtering and image processing was applied to the image, while the pixel clusters were transformed into audio waves. In **"Voice of Sisyphus"**, the synesthetic transformation from one medium to the other is crucial, to emphasize the transmutability of digital data.

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<sup>2</sup> The Experimental Visualization Lab, accessed October 5<sup>th</sup>, 2022. <https://vislab.mat.ucsb.edu/>

<sup>3</sup> George Legrady studio, accessed October 5<sup>th</sup>, 2022. <https://www.mat.ucsb.edu/legrady/>

**“Voice of Sisyphus”**, opens a paradigm in which Noise is not repelled but wanted as an aesthetic statement, since it is the product of complex computational processes. As George Legrady states in his text “Shifts in the Photographic Paradigm through Digitality & the Aesthetics of Noise:

“In the digital image, noise may be assumed to be extraneous, unwanted, out of context, disruptive, positioning it as something to be purged to purify the quality of the image. The noisy image came to be discovered in parallel with the evolution of the age of the machine in the late nineteenth century, an integral component of the process by which technical devices functioned. Scratches on a film, dust on a negative, chemical stains and all such things that were in the way of the perfect image have been reconsidered for their aesthetic value, extending the complexity of how we decipher images.”<sup>4</sup>



*“Pockets Full of Memories” (2001 - 2003)*

This extended complexity in George Legrady's works opens the door to unseen and possibly unwanted images, that illustrate a hidden face of reality, otherwise impossible to depict, and proposes new artistic processes based upon engineering methods. It also enhances the

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<sup>4</sup> Legrady George. *Shifts in the Photographic Paradigm through Digitality & the Aesthetics of Noise*. On Digital Art through the Looking Glass. 2019

aesthetic panorama of digital art, by encouraging the viewer to ask for the nature of images, their materiality, media, and purpose. The notions of noise, trans codification, and dynamic change are therefore deeply integrated in Legrady's pieces, illustrating the technological accelerated transformation of digital media, and reflecting on the devices these pieces are made with.

## INTERVIEW WITH GEORGE LEGRADY:

### What are your current projects?

At this time, we are redoing the **"Voice of Sisyphus"** installation for an upcoming exhibition titled "Topologies of the Real" in Shenzhen, China curated by Zhang Ga in March 2023. This multimedia installation consists of a time-based study of a single photograph, realized as a continuous performing audiovisual composition. It is presented as a multimedia installation with a large cinematic projection and 4 channel audio. This link describes the original 2011 version:

[https://www.mat.ucsb.edu/g.legrady/glWeb/Projects/vos/17\\_VofSisyphus.pdf](https://www.mat.ucsb.edu/g.legrady/glWeb/Projects/vos/17_VofSisyphus.pdf)

We are upgrading and combining the software from OpenFrameworks and Processing to Python to fit current software environments. The updated version will have as visual input images captured through a camera at the exhibition site. Some of the challenges include how to replicate and implement the various image filters to simulate the interesting complex sounds in the original versions. The software selects regions of the image, reads the values of the sequence of pixels, then processes the sequence by a Fast Fourier Transform translating the data to sinewaves that are then filtered in varying ways then output to audio data which are spatialized in real-time by large speakers placed in each corner of the exhibition space. Ryan McGee developed the engineering translation from pixel values to audio sounds and spatializing the output to 4-channel surround sound, and Joshua Dickinson, who is trained in music composition, finetuned the filtering of the audio sinewaves to arrive at an aesthetically pleasing audio experience. Here is a video sample of the version presented in 2017 at the ZKM in the exhibition "Datumsoria": <https://vimeo.com/767684234>.

Another on-going work is to analyze and produce images with Generative AI software that have appeared since spring 2022, and that have captured the public imagination. The software returns, complex photographically coherent images in response to a text prompt or an image prompt. In collaboration with a small group of graduate students this past fall, we investigated and tested how these software work. In the process I created a series in MidJourney 3 on the themes of "imaginary workspaces" and "living spaces" where I tried to implement a set of interactions that produced image outcomes that are outside of the stylistic trends associated with this technique. The challenge is how to warp and push the software to produce unexpected images that conform to specific conceptual and aesthetic directions informed by my artistic and research work addressing the veracity of the photographic image. For instance, the results in the **"Imaginary Workspaces"** seem to have a cinematic staging narrative of dystopian scenarios: <https://www.mat.ucsb.edu/~g.legrady/glWeb/Projects/iw/workspaces.pdf>

whereas **"The Alchemist's Study"** have a surreal sketched appearance: <https://www.mat.ucsb.edu/~g.legrady/glWeb/Projects/ai/alchemy.pdf>. I presented this past winter an analytical paper on the syntactic and semantic aspects of image synthesis at a visual semiotics conference co-organized by Maria Giulia Dondero at the University of Liege in late January, 2023: <https://www.mat.ucsb.edu/g.legrady/conf/23/liege.pdf>



*Voice of Sisyphus (2011)*

Two other projects are worth mentioning. During the Covid-19 period (March 2020-2021) given the situation of isolation, I worked on two projects that I could work on my own outside of collaborative interactions. **"Anamorph-Voronoi"** is a custom software developed with Jieliang Luo off-and-on over 5 years which explores both anamorphic perspective and Voronoi image placement in virtual 3D space. The software takes a collection of image files and organizes them based on the Voronoi mathematical model, each image facing a different viewing position resulting in a configuration of different anamorphic perspectives. As an example, in the series **"Anamorphic-Lattice"**, six family black and white photographs are reproduced 30 times so that 180 images are interlaced in the virtual space to create a composition that reminds some of Piranesi's drawings:

<https://www.mat.ucsb.edu/~g.legrady/glWeb/Projects/ana/lattice.pdf>



*"Imaginary Workspaces" (2022)*

Beginning in 2019 and continuing through 2021, I realized another series titled "**Phantom Waves**". Images:

[https://www.mat.ucsb.edu/~g.legrady/glWeb/Projects/pw/phantom\\_waves.pdf](https://www.mat.ucsb.edu/~g.legrady/glWeb/Projects/pw/phantom_waves.pdf)

The series consists of abstract still-images generated by frequency modulation. Two frequencies of varying values, one moving horizontally from left to right, the other vertically from top to bottom intersect at each pixel space in a two-dimensional image to result in abstract patterns with multi-layered complex details. The patterns emerge through phantom frequencies generated when the signal goes beyond the tonal range of individual pixels. This series brings attention to the nature of the digital photograph as fundamentally a sequence of numbers that can be manipulated mathematically to result in images that do not exist in the world but are produced algorithmically. These fall within the artistic category of Generative Art, an iterative human-software collaboration where the artist selects numeric parameters by which the software generates tonal values for each pixel within the two-dimensional image space. The **Phantom Wave** images are visual expressions resulting from tweaking oscillating frequencies applied to pixels within a 2D matrix space to arrive at images that could not have been realized without computation and mathematical modeling.

**When thinking about reconstructing and reinterpreting you own past works, what characteristics are left behind of transformed for a new version?**

One of the greatest challenges of creating works in digital media arts, in particular interactive installations is that the technology changes over time, and the recreation becomes one of reconfiguration. For those of us who began to work in digital media

in the early 1990s, digital reconstruction has been a necessary part when representing works from that era as the software environment continues to change. The initial design is in most cases, a conversation with the technology of the moment, and the cultural questions of the moment. Recreating the project years later must to some extent involve a re-interpretation impacted by the technologies afforded at that particular time.



*"Fire & Smoke (Man in Montpellier, France and truck on fire outside of Montreal)" On The Road exhibition (2013)*

**In relation to your latest lenticular image projects, how are these photographic images related to digital media? Do you think one could reflect on digital technology by means of analog media?**

The lenticular technique is a visual representation of a scene that suggests either 3D stereoscopic depth or animation. In most cases, a sequence of photographs is presented with the intent to show transition. In the case of the series I created from 2011 to the present, such as **"Refraction" (2011)**

<https://www.mat.ucsb.edu/~g.legrady/glWeb/Projects/re/refraction.html> or **"On the Road" (2013)**

<https://www.mat.ucsb.edu/g.legrady/glWeb/Projects/otr/OnTheRoad.pdf> the intent is to explore the potential of limited animation by which to create a basic narrative, the transition from one state to another. For each of the panels I used 3 photographs, a starting situation, a transitional situation, and a resultant situation. The placement of the spectator determines what the viewer sees and the movement from left to right or distance allows for complex visual overlaps.

The lenticular technique has been around for many years from the early 20<sup>th</sup> Century, so analog-based. Digital technology provides the advantages of greater precision in the production phase. I consider my historical condition to be an interesting one. I began working in photography prior to computation, so was able to understand and experience the issues and concepts specific to both analog and digital technologies. I began in documentary photography, which is about representing the world, and soon moved towards a more formal and conceptual one, which was to create artistic works that were based on analytical questions about syntactic formulation of the photograph, and the semantic nature of the photograph – how meaning is constructed through the photograph.



*"Refraction" (2011)*

### **How does the process of designing an analog or a digital interaction differ?**

One of the great discoveries when I first began to work with computation was the UNDO button. In the digital world, one can undo and redo as needed, as everything is a sequence of numbers. One can replay a sequence of steps, of decisions, or assembly. In the analog world, this cannot be done. Once a process is activated it cannot be undone. Digital means discreet numeric elements that are assembled to proceed a certain way.



**Given that you started reflecting on the potential of computation for investigating the photographic image since the early 80s, you have experienced the technological transformation of computers over the decades. How do you think the advancement of technology and the acquisition of newer, cheaper cameras and computers have changed the way we understand photography? What implications bring this advancement to analog photography?**

It's a process of democratization. The more people have access to tools and techniques the more it becomes part of the general cultural fabric. It allows for multiple voices to be heard and seen, and potentially this can lead to as-of-yet unexpressed perspectives. On the other hand, a broader access and use of a technology does not necessarily lead to innovation unless there is an effort to go beyond conventionalism. The other question may be to what extent does the broader use lead to new discoveries as new insights may require "thinking-out-of-the-box" and this requires going against conventions and beyond existing values.

**In your solo exhibition Refraction (2011) the title refers to the change of the direction of a wave when it enters a different medium. This is a constant on your work since you started researching on media art. An example of this is "Voice of Sisyphus", where samples of pixels are transformed into audio waves to generate an algorithmic composition. How did your interest in this type of synesthetic media arise?**

During graduate school at the San Francisco Art Institute, I was learning about images, how images are constructed, etc. There was another group of individuals I connected with who were engaged in discussions about critically analyzing how images function and communicate. References from anthropology, semiotics, political discourse, etc. were discussed. I think the combination of these two sets of conversations have let me to critically evaluate the fundamentals of digital technologies. And then at some point, it became apparent that once something is digital (a stream of numbers) the approach can be multimodal and data from one mode can be easily translated into a different mode – so data become interchangeable.

**Over the years, the Internet and graphic software have become extremely relevant for artistic creation, these tools are as essential as cameras for photographers, as they have defined the way we share, archive, comment and look at images. The synesthesia implicit in some of your artworks points to the importance of digital media processes more than the art object itself, as viewers experience the digital translation between one sense and the other. How important is for you to address the issue of artistic processes and digital media through your artworks?**

I am interested in using digital technologies by which to communicate one's perceptions about life, the world, because as previously mentioned, there is great precision in how data can be configured and assembled, but then I am also aware that technologies are not neutral interfaces. They impose a meaning onto the data they process, so the resultant content becomes an expression of not only what one wants to communicate but also filtered through the technological forms of cultural

time in which they are used. We have known about this even with analog technologies. For example, photographs from different eras look different as they carry the imprint of the technologies used at that time.

**In your installation “Pockets Full of Memories” the use of large datasets provided by the audience and organized by an algorithm that positioned objects of similar characteristics together address the topics of memory and semiotics through digital media and the Internet. How do you think that algorithms encompass a bias in the way we understand images? Moreover, do you think that algorithms could shape the way we perform and exhibit ourselves in virtual public spaces?**

For the **“Pockets full of Memories”** installation I was fortunate in being able to collaborate with the late Timo Honkela and his team, a computer scientist specializing in the Kohonen Self-Organizing map algorithm (SOM). The Kohonen SOM was an early artificial neural-network algorithm. The algorithm spatially positioned data based on their similarities, meaning that a collection of objects, let's say like fruits, would be arranged spatially so that each of the item would be placed in relation to other fruits according to their properties described by metadata.

Properties like color, shape, size, texture, etc. would determine how each items in the collection would be spatially close to or distant from each other within a 2D or 3D matrix. The Kohonen algorithm is described as an unsupervised self-organizing algorithm, meaning it learns without human guidance through iterative re- processing of data to arrive at a stable distribution of all of the elements.

Such algorithms are used extensively in all aspects of applications where data is processed. Bias enters the equation whenever weights are assigned to any of the metadata properties. If a human intervenes assigning greater priority to a set of metadata over others, or to how the metadata is positioned in relation to others, that can lead to bias.

Bias in image synthesis is extensive at the level of training sets. Training sets consist of millions of images that are tagged by text. These training sets are then used to influence or create new images in response to text prompts. Much of the bias is unintended as it enters the system through the processing of data where thousands of individuals are given the task of labeling images, and through this process, cultural and ideological biases unintentionally influence how images convey and represent values.

**The Digital Art Archive team thanks George Legrady for his contributions to the world of media art, his outstanding research as a scholar, and his thoughtful collaboration.**