

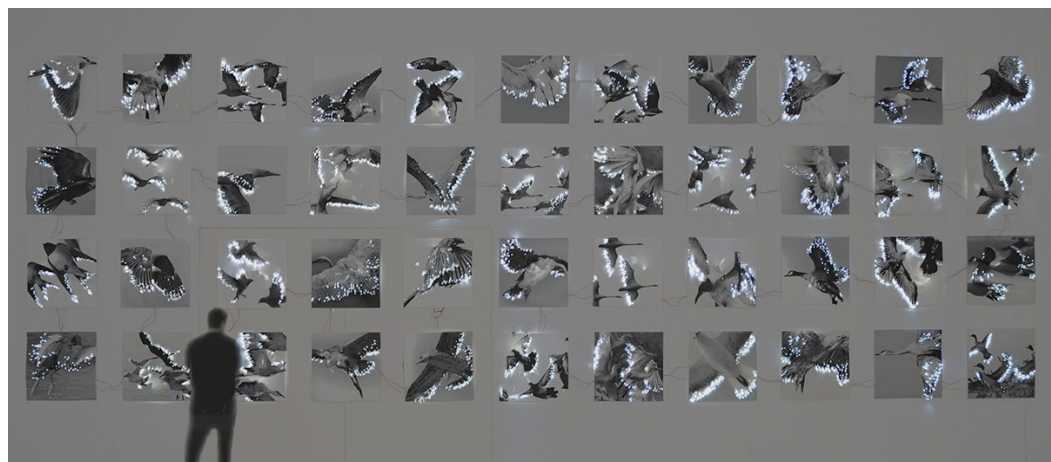
Using Light + Art to Create Healing Environments by lyn godley design studio

I believe that art has the power to change lives, that beauty is transformative and that works of art have the power to inspire, soothe and feed our souls. And just as the need to create calls to artists, the appreciation of beautiful works of art has been part of the human psyche since the beginning of time.

I believe that light has healing abilities that we are only beginning to understand. Developments in light therapy are proving its capacity to affect a wide range of symptoms, from reducing depression and stress, changing sleep cycles, relieving pain, and increasing the rate of healing. I am convinced that we can use light to create calming environments on a physiological level, as well as aesthetic.

I believe that, as designers, and artists, and humans, we have a responsibility to make this world a better place, to relieve suffering wherever possible. And I believe there is a way to combine the visual power of art and the physiological power of light to create healing environments that have measurable positive impact on our patients, the elderly, their families, and caregivers.

My work with lighting has been artistic, and has ranged from chandeliers and table lamps to curtains that illuminate, to using light to constantly draw across a façade of a building. About five years ago I was offered a solo show on very short notice, and did not have time to create a new body of 3D pieces. So I thought, I will just draw large lamp forms and find a way to light the drawing itself, merging hand drawn nature themes in which I fed hundreds of fiber optic cables to create pixels of light in the drawing. Shortly after that exhibit, I was offered a solo show in Cologne, for which I filled the gallery with 75 images of birds in flight with points of light along the wing tips and tails. This was the first show that I had at which I could play with the gallery lights, dimming the gallery lights so the fiber optics showed up more, or turning them down so low that the fiber optics became like a constellation in the night sky. We typically kept the gallery lights at an ambient level, no bright spot lights focused directly on the artwork, but still bright enough to see the imagery and move around the room. And that is when things got very interesting.



InFlight

During this month long exhibit we witnessed many viewers sit down in the gallery for up to three hours and return multiple times to do the same. They did not want to talk to each other, or the curator; they just wanted to be there, sitting quietly with the work. This is not a typical response; the average amount of time viewers spend in front of a piece of artwork is 30 seconds. Multiple hours are not the norm. The calming effect on the audience was unexpected, and I spent the next year researching to find a reason. Visiting Museum and Hospitals, Talking to Doctors and Art Historians, and digging through research databases.

Beauty and the Brain

I went back to study not only the creative act of making art, but also the appreciation of art. What is it about art that calls to the viewer? What calms us when we get lost in Monet's Water Lilies? What feeds our soul when we sit in front of the dualistic frenzy of a Pollack? How does Art transform and heal us? Just as the need to create calls to artists, the appreciation of artistic creations has been part of the human psyche since the beginning of time.

Anthropologists believe that the universality of artistic behavior, its spontaneous appearance throughout time across the globe, and the fact that it can be recognized across cultures all suggest that art stems from innate needs and desires. Aesthetic expression and appreciation are inherent to our species.

Human beings do not wait for aesthetics until they have full stomachs and a roof that doesn't leak. Poor people create the body decorations that illustrate the pages of National Geographic; they built the cathedrals of Europe and created the sand painting of Tibet. Poor people turned baskets and pottery into decorative arts. These artifacts do not reflect societies focused only on "lower-order" needs. Aesthetics is not a luxury, but a universal desire.

In "Who's Your City" (2008), Richard Florida shows that where we live, more than any other single factor, determines whether you're happy. After polling more than 30,000 people he found that of the top five criteria affecting happiness, the top of the list was aesthetics. The higher people rate the appearance of their community, the higher their overall happiness. Florida calls this the "Beauty Premium".

In brain scan studies at CalTech, the sight of a well-designed product such as an iPod, an Aeron Chair, or a Capresso coffeepot triggered an involuntary reaction of those synapses in the motor cerebellum that govern hand movement. Instinctively we reach out for attractive things. Beauty literally moves us.

*I stood in front of a work of art that was both
unexpected and exceedingly beautiful.
It sent me into a trance. Time ceased.
My body was fixed. But, my brain was active.
It spoke to me and said,
"I feel happy."*

Anonymous Art Lover

Most people have experienced the transformative effect of art at some point in their lives. In fact, the reaction has a name, Stendhal syndrome. According to Wikipedia, it is a "psychosomatic disorder that causes rapid heartbeat, dizziness, fainting, confusion

and even hallucinations when an individual is exposed to art, usually when the art is particularly beautiful or a large amount of art is in a single place.” This positive feeling could be so intense to some that they would call it sublime.

In recent studies, when certain pieces of art were judged to be especially beautiful to a particular person, their pleasure/reward center was stimulated to the degree they judged the art as beautiful. It could well be part of a broader physiological correlate of Stendhal’s syndrome. Thereby, the altered state associated with this condition may not be psychosomatic at all, but instead physiologic in origin.

Our innate preference for a soothing painting or sunny park over a dark alley has a scientific basis. A 2011 University of London study found that blood flow increased 10 percent to the "joy response" part of the brain when subjects saw a beautiful painting — just like when you look at a loved one. The findings give credence to what we’ve always suspected, that visual art has a strong, positive physiological effect on the brain.

Art + Healing

The arts have been evident in healthcare settings from the Early Renaissance through to the modern period, enhancing environments where patients and doctors strive towards better health. Many hospitals today are filled with artworks that could rival many museum collections in an attempt to humanize the infirmed, alleviate bleakness, and leave a lasting impression on patients, staff and visitors.

Art Therapy

It is only relatively recent that in an effort to measure how art positively affects the well being of patients, scientists have begun to examine the correlation between art and healing. Many hospitals take part in art therapy programs, having the patients engage in arts activities. The arts can help reduce stress and anxiety, improve well-being and enhance the way we fight infection.

Much of art therapy, however, requires a facilitator, which is limited by available man hours and staffing budgets and therefore limits the number of patients that can take part. For this reason a growing number of hospitals are beginning to look to the potential of passive participation, wherein the viewer is transformed by visual exposure to the artwork rather than engaging in active participation.

Art collections in hospitals in recent years are beginning to rival museums. In Cleveland, Ohio, on days when the Art Museum is closed, art lovers visit the collection at the Cleveland Clinic, which has a collection so large they offer audio tours for both visitors and their patients.

For every day a patient lies in a hospital bed, it takes roughly three days to achieve his or her previous level of functioning, according to Dr. Lisa Harris, an internist and chief executive of Eskenazi Health, affiliated with the Indiana University School of Medicine. "If an art installation gets a patient out of his room or paintings take a person's mind off their pain and lower their stress levels, the art isn't just decorative anymore. It's part of the entire model of care," said Harris, who oversees a \$1.5 million art program, funded entirely by philanthropic donors that launched last December.

Nature and Art

Studies show that our ability to directly access nature can alleviate feelings of stress. The impact of stress in hospital settings and its link with psychological, physiological, and behavioral dimensions of wellness is a major consideration in healthcare settings. Visual exposure to trees, water, and other nature as a restorative measure dates as far back as Ancient Rome. A growing amount of scientific evidence suggests that nature elements or views of nature can be effective as stress reducing, positive distractions that promote wellness in healthcare environments. Views of actual landscapes, or images depicting nature can speed recovery in patients.

Patients with a view to nature, instead of a nondescript wall, are more likely to experience hospital stays that are 8.5% shorter, with fewer negative observational comments from nurses, and significantly fewer strong, post-surgical painkillers. In a hospital setting, Roger Ulrich's landmark 1984 research revealed that the view from a surgery patient's window influences recovery. Those who saw trees recuperated almost a full day faster and required fewer doses of pain medication than those facing a brick wall. One study found that drug use for anxiety dropped significantly when the patients were exposed to nature based artwork.

While not quite as effective as exposure to actual nature, scenes of nature in artwork have been shown to reduce anxiety and discomfort. Views of simulated landscapes, or images depicting nature can also speed recovery in patients. One study at East Alabama Medical Center found that drug use for anxiety dropped significantly when the patients were exposed to nature based artwork.

Patients in a Swedish university hospital who were recovering from open heart surgery experienced the least post-operative anxiety when looking at pictures of natural scenes that included water, compared with pictures of abstract art, a control picture, or no picture at all.

But it is not just about depicting nature in a realistic representation. It also has to do with proportions.

Ratios of the layout of the image such as in the golden ratio which has to do with proportions that we instinctively feel to be well balanced and pleasing to the eye. Much of the most successful artwork falls into these same proportions.

Further studies have shown that humans break down all visual information into symbols, and by using those symbols we can mimic the effect of the actual stimuli. It is not critical to depict exact representations of nature to achieve the same reactions.

Edward O. Wilson, insists that our natural affinity for life is the very essence of our humanity and binds us to all other living things. In his book *Biophilia*, he describes our instinctive bond with nature, rooted in our biology to be attracted to nature, and to find solace in it whether real or depicted.

The self-similar patterns of Natural Fractals appear everywhere in nature and have been called a "universal aesthetic" and the fingerprints of nature. These are the fractals occurring in nature, not the computer generated models. These are self-similar, not self-identical such as the computer generated versions which appear stiff, mechanically repetitive, and artificial. Naturally occurring fractals are self-similar, so they look looser,

softer, less rigid and mechanical. Simply being exposed to Natural Fractals has been shown to reduce stress significantly, up to 60%.

Natural fractals are measured in density levels, and people are repeatedly drawn to patterns approximating $D=1.3$. More and more studies are finding that some of the most lasting art, design and architecture follows this optimal density: is found in oriental rugs, Islamic tiling, and even Jackson Pollack's painting. All display the organizing principles of natural systems, the geometry of life.

These patterns are found in coastlines and riverways, in snowflakes and leaf veins, or the continued overlap and scaling size of rose petals...or the repeated pattern created by feathers... or the flow of water and tributaries...This may begin to explain my own pull towards particular imagery.

Choosing images and patterns that calm and heal, previously not really knowing why, just knowing that it felt right to me. What I intuitively knew about art and how we drawn to particular visual images, patterns, colors, and proportions, we now know scientifically.

Light + Healing

I also looked at what part the light in my work could be playing. There is a long history of the benefit of light to human health and psyche.

It was Richard Kelly, a pioneer in lighting design, who was one of the first to question the "Experience" of light, both natural and artificial. He coined the theory of "Light Energy Impacts", with three different types of lighting (play of brilliance, ambient luminescence, and focal glow) that began a language for architects to understand the effects of lighting in architecture, comparable to how humans relate to natural light found in nature, and how we carry those experiences into our relationship with artificial light. He wrote extensively on the ability of light to calm, or stimulate, or focus. Artificial light takes us back to our relationship with nature.

Light Therapy

Beyond the visual stimulation, there is growing evidence that exposure to certain wavelengths of light has numerous healing benefits on the human body. Regular contact with ultraviolet radiation supplies us with Vitamin D and spurs melatonin production while also improving sleep, work performance, memory, mood, and even logical reasoning.

Patients exposed to morning sunshine need pain medication nearly 25% less often. We also need the natural variations of light over daily and seasonal cycles, without which we get listless and depressed. Using artificial light to mimic the wavelength of natural light to help our systems get back on track. Light Therapy is used to cure depression, most notable Seasonal Affective Disorder (SAD); with some research results stating it is as good as the standard antidepressant approach, with fewer side effects and much less overall risk.

Light that Heals

LED light rays absorbed deep into the tissues of the body promotes wound healing and tissue growth, as well as better blood flow, increased supply of oxygen, and reduction of stress.

Biologists have found that cells exposed to near-infrared light from LEDs -- that is, energy just outside the visible range -- grow considerably faster than those cells not stimulated by such light. This form of light increases energy inside cells which results in speeding up the healing process. NASA, which was using infrared (IR) LEDs for plant growth experiments in space, found that if IR LED light rays were delivered deep into the tissues of the body they could promote wound healing and tissue growth. They found that IR LEDs increased cell growth by 155 to 171% in humans and wound size decreased up to 36%. The study concluded that, "the use of LED for light therapy... will greatly enhance the natural wound healing process, and more quickly return the patient to a pre-injury/illness level of activity."

Studies of the effect of both red and blue wavelengths show positive responses; better blood flow, increased supply of oxygen, reduction of stress, and faster healing of wounds.

Light for Pain

When human skin is exposed to blue LED light at a specific wavelength, the radiation is absorbed – the light penetrates the skin. This triggers various processes that relieve pain: Medical researchers have been examining these special effects for some time, since blue LED light has been shown to stimulate the body's own processes, which in turn leads to natural pain relief. Blue LED light at a wavelength of 453 nanometers leads to more nitric oxide (NO) being released in the area of the skin that was exposed to it. Current research into the exact biological effects of blue LED light shows great promise in the field of pain therapy, and hence opens up a whole new field of application. The great advantage of this mode of action is that it is natural. Blue LED light merely stimulates self-healing processes by releasing the body's own NO – without the need to introduce chemical substances or pharmaceutical actives. As a result, blue light therapy rules out the danger of potentially harmful side effects that can occur when medication is used during treatment.

Non-visual Light as a mood changer

Just as the ear has two receptors, one to hear and another to keep us balanced, so does the eye have two receptors; one that allows us to see, and another that we are just beginning to understand the scope of its functions. This huge milestone in the research of neurobehavioral responses to light came in 1998 with the discovery that the mammalian eye contains specific nonvisual photoreceptors which are distinct from the visual photoreceptors that allow us to see. These nonvisual photoreceptors are involved in the regulation of circadian, neuroendocrine and neurobehavioral responses that are distinct from the classical visual photoreceptors that allow us to see. Thus, light-waves influence hormone secretion, heart rate, alertness, sleep propensity, body temperature, and gene expression in humans, and there is preliminary evidence it might be useful for anxiety.

These receptors respond to particular light wavelengths even in mammals whose optical rods and cones are nonworking. Which means that even the visually impaired are being physiologically affected by light.

“Light has biological and behavior effects — why not build on it?” Says George C. Brainard, a professor of neurology at the Jefferson Medical College at Thomas Jefferson University and one of the leading researchers in the field of Light and Human Health predicts that over the next decade or two, health benefits will come to be considered one of the primary attributes of light bulbs along with energy consumption, aesthetics and brightness.

“You have to start thinking of light as a drug” states Terry K. McGowan, director of engineering for the American Lighting Association, which is quickly getting on board with LED bulbs that can not only change light brightness and color, but also wavelength.

Summary

What does all of this have Light Therapy to do with my art? We already had seen the evidence that supported the impact of the imagery we had been using. We then went back to my work and looked at the specification of the LEDs we were using to illuminate the fiber optics. When we had originally installed the lights we were only looking for the brightest LEDs we could find, we were not interested in wavelength. What we found was that the LEDs we used were the same blue wavelength used in many of these studies focusing on healing.

Although the exposure is at a much lower level than most Light Therapy, there is research that supports the benefits of lower doses of Light Therapy as exhibiting positive results as well. These findings support the effect of “calming” that we witnessed during the solo exhibit in Cologne, resulting in an overall positive physiological reaction to the light wavelength exposure.

What we don’t know is what is the measurable level of intervention, or what is the baseline of light intensity for a quantifiable effect. Nor do we know the ratio of effect of the light versus the imagery. What we do know is that over a month long period, we observed a calming reaction that we are going to continue to explore and duplicate.

What I am proposing is using both visual (art imagery) and physiological triggers (light wavelengths) to heal. Suppose we could push this multi-sensory aspect of healthcare art installations, with more interactive engagement not only on a visual level with imagery and patterns and color, but also on a physiological level through optical receptors both visual and non-visual. Artificial light takes us back to our relationship with nature, and our relationship with light is part of whom we are and how we are programmed to operate. Together, light and nature are where we come from and still provide sustenance for whom we actually are. By incorporating particular wavelengths of light into environmental art installations that have a positive physiological affect on the body, we can further aid in the healing process creating environments for wellness that work on a physiological level as well as visual through passive, non-invasive exposure to art installations.

I am not claiming that this work will replace painkillers or anti depressants, just as art alone will not cure cancer, but if it can act as an intervention at all, then shouldn’t we be trying it?

I am looking to:

- Explore the potential for healing interventions through low levels of light therapy incorporated into environmental art installations.
- Learn more about how light therapy can be used in environments of healing.
- Identify particular locations and users that could benefit from these interventions.
- Obtain partners in research.



Dew-mi O'my