A New, Screen-based Aesthetic

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Humans see the world by reflected light, and until recently visual representations of the world have been made on reflective media, whether painted on walls or printed on photographic paper. Art (here, broadly meaning visual representations of the artist's world or viewpoint) was most commonly accessed by seeing the paintings or etchings or rotogravures hanging in one's home, or by picture books, or by the art on display in local museums or one's church. This is no longer the case.

Over the past 25 years, the concurrent emergence of electronic screens and the explosive growth of digital cameras have greatly changed the way we see and represent the world. This change is fundamental and so profound as to represent a new aesthetic, almost a new notion of reality, and arguably a cultural shift on a huge scale. LED-powered billboards now blaze across the highway, distracting drivers with the intensity of their images, and Jumbotrons show fans in the stadium a world they do not see with their own eyes. This article explores the profound influence screens are having in shaping a new aesthetic.

Reflected vs. transmitted light

Reflected light is the normal way for humans to view the world around them, in a spectrum that runs from the very near infrared to the near ultraviolet.

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Figure 1: Cincinnati Art Museum has replicated many of the characteristics of screen-art in this display of "Museum Treasures." High luminance contrast, saturated color, and bright subject are characteristic of today's ubiquitous screens — yet this is a live display, with a real oil painting, and real people (not mannequins). Photo by Hatch Photo Artistry, LLC. Used by permission.

Reflected light is light which has struck a surface and is differentially absorbed by the surface. What returns from the subject to our eyes has differing wavelengths and energy, which we interpret as differing color and brightness.

Reflected light can never be 100% of the source light; if we look into the sun we see nothing but dazzle, void of detail. As it is, reflective surfaces (paper, walls, blackboards, newspapers, Picasso portraits and daVinci ceilings) all return but a small percentage of the source light to our eyes. By their nature, oil paintings, drawings, and photographic prints are, relatively speaking, dark and subdued.

Transmissive light sources, on the other hand, pass light directly to our eyes. Stars are transmissive. Light bulbs and LEDs transmit light, but objects seen in that light are seen in reflected light. Stained glass is transmissive (though very imperfectly so); so are images seen on electronic screens.

As will be seen, there are physical, emotional, and cultural consequences of seeing reality rendered via the extended (and ubiquitous) use of screens.

Screen-Watching is Ubiquitous

Modern screen-based electronics are more than wide-spread in America, and America only ranks 6th in daily screen use. Figure 2 (Meeker, 2014, 96) shows worldwide usage of screen devices in various nations of the world (as of May 2014). In the Unites States, usage of such devices (TV, laptop/pc, smartphone, tablet) averages 444 minutes PER DAY. In other words, we were bombarding our eyeballs for 7.4 hours every day. By 2016, Meeker finds that Americans are not looking at screens for 9.9 hours a day, and that over 3 billion photos are uploaded daily. (Meeker 2016, 90)

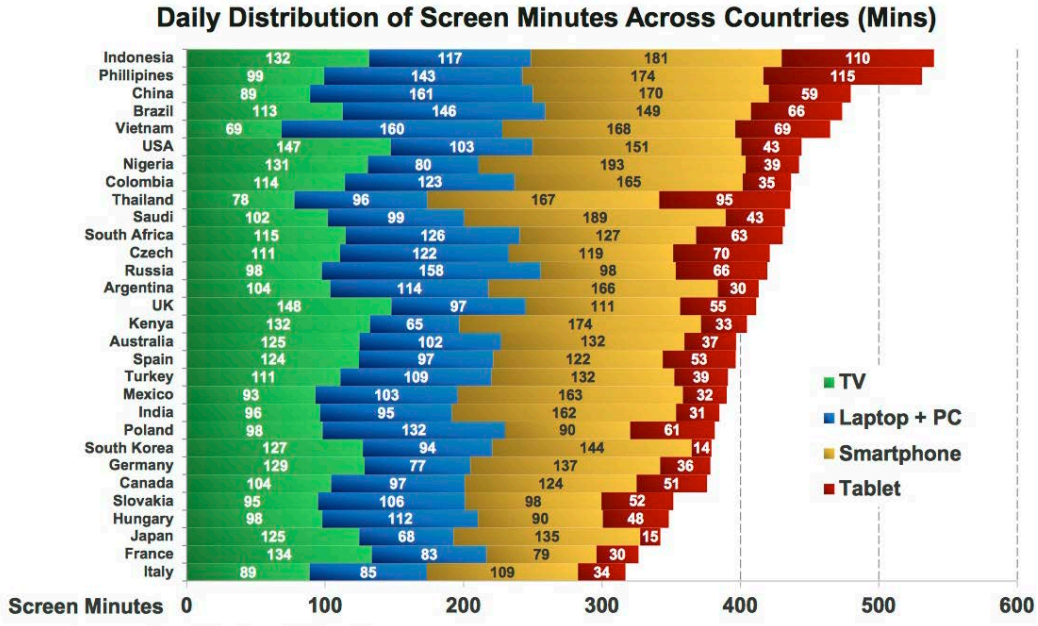

Figure 2: Daily distribution of screen minutes across countries in May, 2014 (Meeker 96). Used by permission.

Starting with TV, Americans have been watching electronic screens of one sort or another many hours a day for more than 60 years. But this article looks at the last 25 years since 1990 because there are differences between pre-digital TV and modern computer screens – today's screens are even brighter and are viewed at closer distances than the old living room TV of the 60s and 70s. They also emit more blue light than pre-digital TVs. With the advent of the PC/ laptop in the 1990s, almost two full generations Americans have been close-up screen-watching for much of their waking lives.

Nor is the use of screens restricted to the financially well-off. As of 2011, even the poorest families (those below the Federal poverty line) in America did not lack for screens. Of the poor,

1. Half have a personal computer, and one in seven have two or more computers.

2. More than half of poor families with children have a video game system, such as an Xbox or PlayStation.

3. 43 percent have Internet access.

4. One-third have a wide-screen plasma or LCD TV. (Rechter and Sheffield)

Screens are not only ubiquitous, they have been developed for maximum impact.

Screen Development Stressed Brightness, Contrast, and Color

Initially, screens were fuzzy and hard to read. Screens were optimized to overcome this problem by making them brighter, more colorful, and more contrasty. There were practical reasons for screens to be developed for those characteristics. The goal was legibility, and brightness, contrast, and color all contribute to legibility.

In their study on the effects of luminance and color contrast on the search of information on display devices, Finnish researchers (Ojanpäa and Nasänen) concluded that for black-and-white alphanumeric information, the speed of visual perception decreases with decreasing contrast. In other words, the greater the contrast, the easier it is to read text on a screen. In their research, they found that luminance contrast (dark vs. light) between background and subject (text or numbers) was more important than color contrast in enabling test subjects to read text and recognize numbers.

However, color contrast still plays a role in discriminating whether what we see belongs to background or subject. In research oriented more

towards arts than towards screens, researchers Dresp-Langley and Reeves determined that when luminance values of background and subject are the same, color contrast makes the difference in determining which areas of a painting or drawing belong to foreground and which to the background. Less saturated colors appear less “colorful” than saturated ones, and their results “point toward a hitherto undocumented functional role of color saturation in the genesis of form, and in particular, figure-ground precepts. (Dresp-Langley and Reeves, 1)

In other words, if the background and subject are uniformly bright (luminous), color saturation plays a strong role in helping humans discriminate objects as being subject or background. This in turn helps us identify what it is we are looking at, whether a painting of a bull on a cave wall, or a Picasso drawing of a yellow cock, to use two of their examples.

With this research in mind, it is not surprising that screens are generally optimized for intense color and strong contrast. Early screens suffered from low pixel count and imprecise control of contrast. In short, they were blurry and hard to read. As monochrome gave way to color, this problem only intensified. Accordingly, screens were designed to maximize contrast and to heighten visibility, even in bright rooms. Today’s screens are vastly more refined, with higher resolutions making images clearer, yet the predilection for intense color, bright luminance, and high contrast remains. By now it is a way of life, the way things are supposed to be. This has been the state of affairs for at least 25 years, and is by now a paradigm — a normative value most people are never even aware of or think about.

Physiological and Neurological effects

The bright, contrasty, colorful screens of today have powerful psychological and physiological effects. To some extent, as Marshall Macluhan proclaimed 50 years ago, the medium IS the message — and the

message is that the stimulus provided by screens is strong, even at a physiological level. Extended screen watching affects various brain functions, acting primarily as a stimulant. Some of the effects are content-related: gaming, for instance, releases dopamine and stimulates cravings and may contribute to screen addiction (Dunckley). But other effects are related to the screen's emissions, regardless of the content.

For instance, getting on the computer before bed, or reading your Kindle or other tablet device, affects your ability to get to sleep and negatively affects REM sleep, which starts later and last less time. Apparently, the overall blue light emitted by such devices persuades your brain that the sun is shining and you ought to be awake! Incandescent lighting does not have this effect, nor do earlier fluorescent tubes (Chellapa et al.)

It turns out there are three kinds of sensors in our eyes, rods, cones, and a third type, discovered in 2002, called "intrinsically photosensitive retinal ganglion cells." These can't pick up on extremely low-level light, but they do signal changes in ambient light. They tell the cells in your brain which control the pineal gland to start and stop the release of melatonin, which in turn regulates sleep. These retinal ganglion cells are most sensitive to blue light (the light associated with daylight), which is why blue light is bad for your sleep (Meeri). And the closer to your eyes the blue light is, the more stimulating it is – a simple matter of physics. Two hours of tablet use can decrease melatonin levels by 22% -- keeping your body revved up and alert when it would otherwise be sleeping. (Beil).

Blue light has other effects on the body. Sustained exposure to screen light (and any light source emitting in the blue to near ultraviolet portion of the spectrum) can contribute to or even cause macular degeneration. (Sunnex 1).

Screen Addiction A Growing Phenomenon

Many people can't leave their devices alone. Today, people pick up their smart phones an average of 150 of times per day, according to experts interviewed on NPR (Zomorodi and Goldmark). That rate is increasing. Internet addiction has been recognized since 2005, (Janssen) even though it has not yet been included in the new edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), the standard reference tool put out by the American Psychiatric Association. This non-inclusion is a matter of intense debate.

The concept of internet addiction has been broadened to include screen addiction in general. It appears there is a cluster of elements at play. One element is related to the types of activities performed on screen devices (gaming, sexting, texting, social media interaction of all sorts, editing and viewing photographs). Gaming, for instance, shows that dopamine increases during play and that carvings or urges for gaming prduces brain changes that are similar to drug cravings. (Dunckley, para.7). One element is related to the content being watched (nature of images, YouTube movies, instructional videos, pornography). And the third element, one may surmise, is the screen itself, glowing, alluring, stimulating, and addictive.

However, this article is not about screen addiction. The point is that extensive screen use can create a desire for MORE — more content, more stimulation, more intensity— and that this craving continues to feed the extended screen watching habit worldwide. This addiction is reinforced by the physical and design characteristics of screens in use today.

So far, this article has shown that the world is awash in screens, and that screen-watching can have profound effects on physiology and psyche. The design and evolution of screens may have had other profound effects as well. The author contends that technological evolution and proliferation of screens have created a pervasive paradigm.

Digital Photography and the New Aesthetic

At the outset of this article, it was observed that the rise of screens and digital photography are linked. Since digital photography requires electronic screens , the linkage is automatic. Digital cameras capture photons and store events as binary data, but the computer — whether inside the camera or the one data is downloaded to (or both) — makes decisions about how to interpret the data and display it.

Although many digital cameras have exposure controls (ISO value, aperture, shutter speed, focus, exposure compensation, and lens focal length), other common controls (white balance controls, color intensity controls, contrast controls) affect not the capture itself, but the interpretation of the recorded data. What you see on the camera back is a compressed JPEG image, created by algorithms in the camera's motherboard. The visible image is the result of the screen characteristics and the computer's judgment of what looks best, not just to human eyes, but to screen-watching humans in particular.

What the computer thinks looks best is, more often than not, bright, colorful, and contrasty. Just like the screens people have been watching many hours a day for 25 years. Camera manufacturers develop RAW (uncompressed data) interpreters and look-up tables which favor intense, luminous images and use these to create the JPEG images you see on screen.

Camera display screens are intentionally designed to be bright, contrasty, and colorful. Why not? They are built to resemble their larger cousins, and are optimized for the same sorts of values. The vast majority of these images are never printed, they are only captured, then uploaded, either to a photo site or a social media site, and "shared" with hundreds or thousands of screen-watchers around the world.

This article contends that screens have become the chief means people have of seeing art in general and photography in particular. And the

characteristics of those screens (with their physiological effects) are guiding our collective notions of what the world looks like.

An additional set of circumstances lends weight to this opinion. Increasingly, the only way many young people get to know art, or anything about art history, is through their screens. There are visual art classes, but most of these concentrate on activity and skills, not on aesthetics or art history. Art appreciation and art history classes are reserved for college, and in the rush to prepare for a paying job, fewer and fewer people attend them.

Screens have become the primary way photographic "art" is viewed

As of 2010, there were approximately 47,000 visual art teachers teaching K-12 in the United States. Most taught 7 different classes in a week, averaging 22 students each (Parsad and Spiegeleman). That's 7.4 million students getting some exposure to art – not just visual art. Given that the student population in 2010 was over 54 million, it is plain that only a small percentage of children are getting exposed to art in any form. The days when schoolrooms had books of paintings by the masters are gone. One hour of art instruction per week cannot have as much influence as 7.4 hours of screen watching per day.

Compare that dearth of exposure with the flood of images being taken and uploaded. Worldwide, as of 2014, the total number is in excess of 1.8 billion images per day uploaded and shared (Meeker 62). Few of these are art by any stretch, but all are attempts to capture some aspect of reality that appealed to or was meaningful to the photographer.

Using art in its broadest sense, art is being learned and known primarily on screens. And the bulk of todays "art" is photographic. The world being depicted in on-screen photographs is vastly different than the world of print photography – and the on-screen version is affecting what

are considered to be high-quality prints. One look at what's online or on TV, tells the story. The world is being presented as "Claritin clear," as if that really were what the human eye perceives.

Even among serious photographers, photographers who consider themselves artists, photo competitions are now largely held on-line, by submitting small JEPG images for evaluation. There are thousands of such competitions, most money-raisers for the sponsoring body. Even print competitions mainly work this way, with electronic images being used to "jury in" images which will later be judged as prints.

There is some taste of this in professional competitions, such as those run by the Professional Photographers of America. In these competitions, physical prints must include a digital reference print, and digital submissions are now allowed.

Conclusions

It seems reasonable to conclude that after 25 years of being bombarded by screens, with their intrinsic bias towards the bright, contrasty, and colorful, young people without other ways of knowing, would take it for granted that what they see on screen IS the visual and artistic reality that the whole world (so far as they are aware) shares. What you've experienced for your whole life is normal for you.

The shift from reflective to transmissive communication of visual information has, we believe, conditioned Americans for so long and with such intensity, that it has in fact created a new, probably pan-national, notion of the beautiful — in other words, a new aesthetic.

Implications

There are several implications for reflective or traditional art inherent in the new aesthetic. First, in the on screen world, subtlety is out. It's technically possible to produce subtle images on screen, but they are not valued. This spills over into the reflective art world, especially

photographic prints. Prints on metal, metallic papers, pearlescent papers, and other specialty surfaces ape the saturated colors and steep contrast curves seen in on-screen art. “Regular” prints are processed from digital files by labs which automatically boost color, etc … unless one is working with a fine art printer. Ordinary images get the “enhanced” treatment as a matter of course.

A secondary effect is that existing reflective art may look dingy to youthful eyes. Works which have acquired the patina of age, or which have simply faded, simply don’t impress – even experienced eyes may see reflective works differently after a couple of decades of working on computers.

A third implication has to do with the permanence of art. Computer screens recreate the image thousands of times per second; but the image does not exist when the power is turned off. File storage technology changes completely about every 10 years. It does not take long before files must be move to the new medium, or become lost. Slides? Gone. Videotape? Historical? Floppy disks? What are they? CDs – hard to find a CD player. DVDs? Going the way of the Cloud.

Today’s inks and papers, ironically, are extremely light-fast and durable. They require no electricity or high technology to view and appreciate. Two hundred years without significant fading is not an uncommon standard, provided UV-resistant glass is used in frames or storage is in acid-free covers.

Finally, this paper has made every effort to be dispassionate, reporting on the new aesthetic as a phenomenon, not as a deplorable or laudable shift in taste. One may speculate, however, that it may not be long until the “Claritin clear” view seen on screens makes the outer world itself look flat, stale, and unprofitable, and “virtual reality” appear endlessly more appealing than the drab and ordinary view out our urban windows. What is certain is that this bell will not be unrung until display technology changes yet again.

Should the interconnected world be disconnected, reflective art, and unconditioned human eyes, may yet regain their prominence. So the new aesthetic may be a temporary one, lasting only as long as the interconnected world endures.

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