Photographic regenerative interfaces

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Abstract In the 21st century, photographic images are everywhere and are being further advanced with the progression in image-making through photographic technologies. The progressive and contemporary camera creates images that produce a 'fantasy through product'. These images, once used in branding and communication, tell consumers a story, illustrating concepts that cannot be seen in 'real' images from the natural world. The constructed digital image is thus used as a 'projection model' furthering communication paradigms and design technologies. The digital photographic 'regenerated' image becomes an imaginative and technical communicative tool relaying a vision. The unaltered original raw image itself becomes an interface and is further modified to create new narratives—the itinerant image becomes an inextricable link between a brand and the consumer. Novel image production methods and methodologies are necessary for human advancement in terms of science and technology and are a useful tool for development approaching Industry 4.0. This paper analyses how photographic regenerative interfaces and image regeneration methods can expand visibility and affect the world through the interlinking and symbioses of images. It also analyses how the pre-existing raw image will soon be used as a design tool, leading to potential uses of photographic regenerative interfaces for novel applications.

KEYWORDS: photography, imaging, design, technology, regenerative

INTRODUCTION

In the future, photographic digital image technology will be used to advance commercial, scientific and technological human achievements. The digitally enhanced and modified photographic image becomes a 'projection model' and is used to illustrate concepts that are not present in the natural world. Photographic regeneration is fundamental to the creation of new ideas and concepts for our digitally enhanced future. Photographic imagery creates its own evolving language — whether its foundations lie in a biological laboratory, design studio, engineering workshop or whether it's used for commercial applications. This visual language is being further explored for various novel applications through the manipulation of digital photographic images via computation

and intelligent systems, furthering enhancements of human and non-human life through digital imaging technology. First, this paper analyses the historical and contemporary context, followed by examples of applications arising from photographic regenerative interfaces.

Images have been manipulated and regenerated since our species' beginnings. Palaeolithic drawings evolved into lines and symbols, and transformed into what today we call text and writing — linear symbols became of linear writing.[1] Ideograms and pictograms became a new language. When images became lines, the arrangement of sequential singular letters allowed humans to picture for themselves images (signifiers[2]) suggested by the words created. The words became signifiers of the 'designed' lines, the gathering of lines in various forms and combinations would allow more images to subsequently manifest in our minds (images, object signs and signifiers) to relay a thought and thought processes — grouped together they (images — words) became the new cave paintings: linear constructions of symbols intertwined in an array of signifiers to become a sentence through a linear image to evoke an image in the human mind.

Image and text became inextricably linked with the creation of languages and communication. Ancient Egyptian hieroglyphs are a collection of images, combining pictures of bodies, symbols and text. The Ancient Egyptians used Hieroglyphs as a logographic writing system, using drawings, ideograms, syllabic and alphabetic elements. The images and logos are combined to relay a narrative through vision and perception, becoming a means of 'regenerative' communication. It is important to consider that permutations and combinations of various logograms, syllables and graphemes create a narrative. Standing alone, the 'unaltered' linear singular symbol or image 'regenerates' — created again, reborn with new meaning. Once it is combined with other symbols or images, thus becoming part of a narrative, a symbol becomes an 'actant'. The single linear formed symbol can be compared with that of characters in a story; joined together in sequence they make a story, a narrative, image and message. The linear passive 'inactive' symbol thus becomes 'active' once combined with other players (symbols/image/text), thus becoming a regenerative symbol, which can be used in a plethora of different ways. Once the symbols are carefully and imaginatively arranged in a sequence, a concept or vision is created. Therefore, in Ancient Egyptian hieroglyphs the unitary actant placed in a logographic system, used collectively, forms a signified message to illustrate context and a concept, to convey vision, processual communication and sound.

In a similar way today, the static linear inactive raw photographic image itself becomes active again and is reborn and revived, being regenerated through various methods of manipulation to create new images, combined with other images to create a new narrative and language and visual processual communication to the image's viewer. It could be suggested that photographic regenerative interfaces are the application of singular pre-existing images used collectively to portray a vision, in which the regenerated image is the interface itself, an interface that can be useful for future technological advancements, where images are repurposed, and are useful in the fields of design, medicine, architecture, robotics, branding and communication. Photography is likely to become a tool to create highly digitally enhanced images that go beyond the imagery available in the natural world and will enable enhanced and predictive technologies in future.

The new image that came from text was exceptionally advanced as it could also relay emotion and feeling, in a word alone, or words grouped together to form a sentence, translating movements of pictures or emotions and relaying them to our mind's eye.

One could argue the splinter in our mind's eye became the earliest form of a 'photographic regenerative interface'. It could be suggested that:

> Our eye photographs the symbol, our mind visualises and processes the image, our body, being, memory and vocabulary — becomes the interface to relay the message to 'others'.

Knowledge becomes the collective gathering of all our mind's photographs in one place. The mind, body, soul and spirit cohesively and collectively harbour all images we have ever seen, whether they may be in the books we have read, or images we have seen or imagined, which also nowadays enable humans to make decisions. The saying that when you die you see your life flashing before you exists because all the memories from your life are stored in your visual memory: pictorial memories of the good and bad times, the birth of a baby, your first kiss, etc. It is all in our visual memory. The storage capability of our brain is unlimited; it contains the images accumulated over a whole lifetime. The images we see every day, of images which come from novels, reference books social media stories, films, advertising, all in combination with our emotions. Actual visual starting points manifest themselves at night in our dreams and nightmares. Our mind reflects them back to us — the images erupt from our minds, as, over the course of our lives, we do actually see too much to comprehend. Why is it the last thing you think of at night sometimes what you dream about?

Imagine a world without photography, a world where there are no photo albums, no advertising billboards, no photographic prints, no film, no television, no smartphone, no Instagram. How would humans function in this world? Communication would possibly be achieved through creative art; painting and illustration would enable us to look at the world through others' eyes. Humans would get their amusement through the hues of the sky, the designs and patterns in ecological environments and the stars in the night sky. We would depend on the earth's flora and fauna to fulfil our desire for wonderment. Birdsong would seem far more relevant to our daily lives. Entertainment would consist of the theatre, performance and dance. The *commedia dell'arte* could still be the prevalent method of entertainment. Crucial questions arise from such a hypothesis, such as how technology and science would have developed without the multiple ways we currently use photography[3] and imaging to understand diseases and pathogens using microscopic imaging,[4] to biological imaging and endoscopy (Figure 1). Photography in this century has become a fundamental part of our everyday lives, in which we rely on its objective viewpoint of our world and the universe.

It could be argued that images are constantly manipulated these days, so as to distort the truth of the world, such as the plethora of fabricated news stories which are used to captivate, engage and target us for capitalistic and political gains. But the manipulated image is not a new phenomenon; many iconic images have been 'doctored' to make us believe different perspectives. Over the years, many such 'doctored' images have been culprits of this, as images were used for propaganda and political gain over populations. In 1855 Antoine Wiertz predicted the future of photography, calling the camera a machine:

> For some years it has been the glory of our century to have given birth to a machine which daily astonishes the mind and startles the eyes. Before another century is out, this machine will be the brush, palette, colours, skill, experience, patience, dexterity, accuracy, tonality, varnish, model, realisation, the extract of painting'.[5]

The regenerated image was accurately predicted by Antoine Wiertz in 1855. The machine that produces an image, 'which daily astonishes the mind and startles the eyes', is

Figure 1: Materially engineered squid beak (Shergill, 2021) photograph and material engineering of squid beak chitosan composite

Source: Experiment is based on Zhang, X., Hassanzadeh, P., Miyake, T., Jin, J. and Rolandi, M. (2016) 'Squid beak inspired water processable chitosan composites with tunable mechanical properties', *Journal of Materials Chemistry B*, Vol. 4, No. 13, pp. 2273–2279.

the camera, a machine which has become synonymous with various tools that today act and behave like a camera: smart devices and digital technological image making.

The birth of the camera allowed us to take the thoughts and visions that we had in our minds and relay them to others. The camera's evolution as a means of communication in the 21st century has allowed it, and the image it creates, to influence political agendas like never before.

In any park today you will see more people taking photos, and uploading the content and images to the worldwide web, than talking to another human. This immersive context is adaptable as it allows audiences to share in an individual's 'mind image moment', and can be used as a tool to influence others. A visual hegemony through the images in media, not least social media, plays a critical role in visual and political perceptions, having strong influence in the creation of power structures. Politicians are using image and text as a visual rhetoric, allowing social media such as Instagram to play fundamental roles in the perception of a politician or political group, encouraging the public to perceive, understand and/or evaluate the political agendas, messaging and actions of the politician, thus influencing the public via a strong visual angle.[6]

In this century, children and adults prefer images over text. They would rather scan an image for information rather than choosing to read a complex text. Furthermore, the image is enlivened by the smartphone's backlight making the digital photograph stand out even more. Today's images are a gateway into another universe, a permanent optical portal, allowing humans to practice a kind of 'optical ontology'. The image is 'present and instant' and allows for immediate interpretation. Our minds are bombarded by billions of photographs and moving images every day. The whole world in the palm of your hand.

Humans relate to the photographic image psychologically, as if it were a mirror. Photographic media depends on the empathy of the viewer. Fashion photography is an explicit example of this. Catalogues from the 1950–70s allowed readers to visualise how they could look or achieve a lifestyle aesthetic. The branding and marketing of that product allows the reader to become an exact image replica of that lifestyle.

Photography allows you to believe that if you wear a certain product you *'become'* the person you saw in the image. If you buy *that car* from the ad, you can attain that lifestyle. Advertisers and brand managers see it as a game of tennis, trying to keep people believing that through trying to attain the lifestyle presented in the image they want to 'live in' will allow them also 'to live and have a life' — encouraging them to believe that they have the whole world in the palm of their hand.

The world in the palm of your hand can be influenced by the purchase of that image, whether it is the material object in that image or the aesthetic lifestyle or political agenda you are being encouraged to buy into, with or without you knowing. The image that has been 'bought into' allows the consumer to become the person in the advertisement, whether this desire occurs consciously or unconsciously. Advertising campaigns by Gucci, Balmain, Calvin Klein and Christian Dior, with the creation of concurrent 'new looks', resonate with the desire to achieve lifestyle aesthetics through a semiotic fashion system.

Businesses innovative methods and methodologies, along with a brand's talent for structuring semiotic, branded systems for products with varying price points, allows consumers to purchase into their vision of that brand irrespective of their social class. A company can achieve global domination through branding. The image is integral in influencing the consumer. The image that one generally sees is not a 'natural' one, as even prior to the digital age images were being retouched with the aid of specialist airbrushing and hand retouching skills. The original image was altered or manipulated, and is thus regenerated, creating an 'idealistic' lifestyle, influencing the consumer through the creation of 'perfect skin' and a 'perfect life'.[8] It is feasible that the regenerated image is the interface between the brand and the consumer, allowing for a conducive and productive relationship.

Over the years, I have photographed for many magazines and campaigns helping to make people believe and buy into this fantasy, photographing for many magazines, such as *Vogue* and *Harper's Bazaar*, and creating campaigns for advertising companies worldwide (Figures 2 and 3). I have enjoyed creating a fantasy so that a brand may add happiness to people's lives. Creating beautiful images allowed me to make people believe in that fantasy through product. This led me to create more artistic images and poster campaigns for some blockbuster films. The images at times were made up of a collage of images that were once discarded on the cutting room floor. At times, the client desired a different background, in which case we would purchase extra images from Getty images or TrunkArchive, which would then be photoshopped and 'regenerated' symbiotically with the images I had taken for the commission. My image, as well as the other images, the components of a final image, would thus be regenerated and used for the branding and commercial exercise.

It could be suggested that this symbiosis of images is the foundation of further research into photographic regenerative interfaces. The transformation of images into text has been proven to make people understand a narrative, and has been used in many ways. In advertising, for example, text infiltrating an image creates a brand logo in which image and text combine together through graphic design and typography, creating a brand identity,

Figure 2: Harper's Bazaar Saudi Arabia
Source: Shergill, 2020.

enhancing visibility and commercial success of a product or lifestyle. Philosopher, Villém Flusser articulates the rise of the technical image:

> I think there is a long history to the philosophy images — most of it is negative because due to our philosophy, it has a prejudice as far as images are concerned. It is prejudice to say that an image is only a copy — a simulation of *thought* so that, either it is forbidden to make images or images are being accepted with a great distrust — but I think this is now changing because the images no longer represent the world those new images are now articulations of thought — they are not copies but *projection* models'.

It is important to consider the image as a projection model, as Flusser is correct in stating that images are not mere thought processes, but can be used as a tool to

Figure 3: Vogue India
Source: Shergill, 2016.

advance design and communication strategies with digital photographic imagery as projection models for enhanced futures. It is crucial to understand that if photographs can be taken by a robotic Martian Rover (Figure 4) and beamed live from Mars the future use of the digital photographic image is manifold.

In the establishment of a photographic regenerative interface, it is important to consider what consitutes a technical image. Manipulated images are used as a way for the viewer to believe they live in a world which is an extension of their imagination. This transposition of an image between advertising agent and brand manager is increasingly dependent on digital asset management (DAM) companies, due to the effects of the COVID-19 pandemic. There is now more of a requirement for

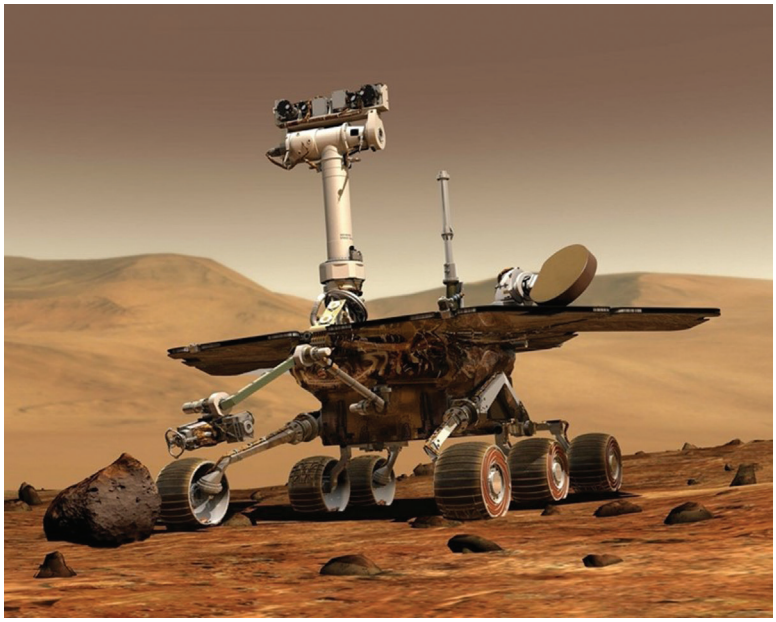

Figure 4: Image of Martian Rover, with embedded camera

pre-existing images. If we think of it as sustainable image-making, the images chosen by the brand for their campaign make up perhaps no more than 5 per cent of images from an actual photographic shoot. Ninety five per cent of the images I remain unused. However, these images are now being ordered by companies who can re-purpose them. Digital models are often a collage of images, created by digital manipulation and assets. The Digitals is the world's first digital modelling agency, and represents digital models such as Shudu Gram, the world's first digital supermodel. HUM.AI.N agency (Figure 5) is a new digital model agency where users can create a digital copy of themselves which becomes their avatar for when they subsequently create their digital being through AI. Photographic images of you and the world around you are created and repurposed to create a digitally regenerated and manipulated version of you for your virtual world. A digital world is only created through digital photographic design.

Using DAM can benefit this workflow, as the images and rights of images can be managed at the click of a button. Image management is beneficial in creating advertising and fashion imagery, allowing the consumer to imagine and achieve a lifestyle. Moreover, political agendas are benefitting from digital photographic regeneration and DAM. The practical implications are vast. To this end, a unique workflow must be designed for each client. It is important to consider how images are stored, tagged, the number of hashtags, the types of metadata and the implications for usages, all of which must be assiduously managed.

Image regeneration reuses and replicates our imaginations. These are our assets, our images, our stories — through photography we can show ourselves to the world. Each person is unique. Our interpretation of each photographic image is the perception of our minds eye. In comparison with text, no photograph can be perceived in exactly the same way as another.

DAM systems can manage individual assets for all types of photography, whether professional or amateur. A huge number of photographic images remain unseen and unused, usually languishing on smartphones

Figure 5: Mosi Stein Goya, and Unix digital models and Avatars by Richard Thornn, 2021, models made up of digital assets

Source: Courtesy HUM.AI.N agency.

or hard drives. But these images could be useful as assets.

The high resolution photographic image has become highly advanced, each one containing millions of pixels, each one individually coded by numbers with a unique language of its own. These pixels are now infused with a rudimentary form of artificial intelligence, rendering them able to move once you add computational programming to enhance this movement. However, this movement will soon be activated via a new form of matter. In the future, photography will become more than a tool. It will allow us to replicate and regenerate. I predict, in the same way as the line drawing was to the architect and the pen was to the writer, the camera will become a new tool for creating a mechanistic device for designing the world and discovering the universe. The images we see every day, images which lead to the creation of new buildings, worlds, and even augmented humans, all these images will continue to be regenerated. Digital photographic imaging is advancing continuously with the advent of photogrammetry[9] — the science of extracting 3D information from photographs. Robotic engineering, novel applications of digital photography in space and scientific imaging such medical imaging technologies can all benefit from photogrammetry.

Below are some potential novel applications of imagery and my predictions of future applications of photography, which can all benefit from DAM systems.

- *Augmented mind images*: With vision reconstruction your mind sees the image and transfers what you see in your mind onto a digital screen via neuro photo receptors. It will be possible in future to augment the images in your mind's eye via neuroreceptors to transfer them onto a digital screen.[10] Berkley professor of cognitive Neuroscience Jack Gallant has developed the beginnings of such a method.[11] Gallant has developed a way

of reflecting the images in our mind's eye directly onto a digital screen (Figure 6). The focus of Gallant's research is understanding the structure of the human visual system.[12] The potential of this research has many benefits for the future of humanity.[13] Specifically in terms of patients who are not able to communicate due to autism spectrum disorder (ASD). These types of digital processes are still in development, and their capabilities are called theory of the mind (ToM).[14]

- *Autonomous intelligent photo reparative systems*: Systems which automatically repain injuries and reconstruct human flesh with the help of robots,[15] using 3D printers and fractal software to repair human tissue via photographic methods.[16] Bioceramics are used as a biomaterial to replace bones[17] in rabbits and other animals. Camera assisted operations are being constantly developed, the use of robotics allows the surgeon to focus on the patient's body down to a micro-millimetre of accuracy during surgery. Autonomous systems are currently being tested. In future, the use of imaging and scanning devices will be invaluable as a visual aid for the autonomous system. Pre-existing images of certain biological conditions will potentially enable the autonomous systems to decipher the body and operative scenarios of the organs in elucidating how the procedure will take place in situ.
- *3D and 4D capture cameras*: These are able to take high resolution photographs through multiple sensors, and will allow computer generated and film photography to be combined, creating a new dimension in extended reality (XR).
- *Biometric surveillance*[18]: Facial recognition has ethical implications for society. As cameras continue to develop higher resolutions, humans will be constantly tracked.
- *Compositing*: The combination of real and virtual digital worlds in order to create new worlds.
- *Biohybrid imaging*: High resolution imaging of flora and fauna will be used in a similar way to the way photogrammetry is used in engineering and architecture. Biohybrid imaging will be beneficial to the body itself, not least in the creation of prosthesis.[19]
- *Photographic cosmetography*: Skin repair — human photographic cosmetic surgery.
- *Aestheticising the human face*:[20] The Da Vinci Surgical System is designed to facilitate minimally invasive surgery. This futuristic robotic system is connected to a vision cart containing endoscopes, allowing for advanced imaging across the Da Vinci system. Through this system image

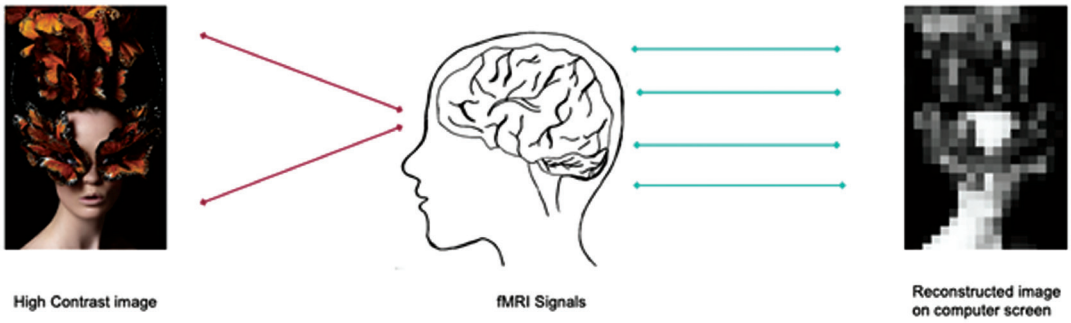

Figure 6: Visual construction of image on screen via MRI, images were shown to subjects while fMRI signals recorded from visual cortex

Source: Image based on Miywaki et al. (2008).

processing is fundamental to how the information is processed. Endoscopic optics allow for accuracy through an immersive surgical experience using high resolution three dimensional high definition (3Dhd) vision, allowing for accurate incision through physical tissue.[21] A system called IRIS displays surgical images. Plans are being advanced to develop segmented 3D models of the patient's anatomy. This system benefits from image transfers from CT scans. Further imaging related to the patient is delivered via the IRIS system, allowing for pre-operative research to be directly downloaded onto personal digital devices. These systems are not designed to be autonomous. However partially autonomous systems are currently used at the Children's National Health System in Washington DC, led by engineer Axel Krieger.[22] Biological imaging systems use predicted growth and form technologies. This is human progression through imagery, enabling parents to see how their newborn baby will grow, and allowing the photographic image to regenerate body capacity through diet and predictive technologies.

- *Smart contact lens photography*: Various companies are racing to build a successful smart contact lens, not dissimilar to a bionic eye. There are many applications for this potential product, as augmented reality (AR) is embedded in the eye, as well as a complementary metal-oxide semiconductor (CMOS) sensor built into the lens along with various other devices linked to other devices in order to download images directly from your eye.[23] The potential benefits of this system are vast. There are many ethical implications that must be addressed due the possibility of images being taken of people without their consent. However, the ease of image making would allow for the images to be assets in terms of data processing through devices, allowing images to be fed directly into a DAM image bank.
- *Diffractive photography:* I predict that a novel form of diffractive photography will challenge the notion of photography as a reflection, diffracting reality, using pre-existing reality for posthuman photographic futures. The image is no longer merely a representational model. It becomes a diffractive design tool. Nature is no-longer objectified; rationality is challenged via pixels. The superposition of photography is asserted, through quantum imaging technologies. The digital image becomes a multi-scalar photographic regenerative interface. Predictive technologies that cannot be seen by the human eye are elucidated beyond normal optics-captured light. An object is created which exists in numerous states and places.

CONCLUSION

Photographic regeneration is a growing industry, though it has not yet been labelled as such. Perhaps humans are finally accepting that the humble photograph can be so pivotal to our everyday lives. It would be appropriate for DAM systems to be put in place, with the aid of taxonomic photographic and image management systems, to create and manage a productive workflow. This workflow would organise and centralise digital assets, adaptive metadata systems, in order to assign unique descriptions to each asset, assets with asrtificial intelligence capabilities, gallery-like interfaces, creating highly efficient and powerful digital repositories, and, most importantly, systems which are user friendly and progressive in terms of advancing digital photographic regeneration. Working with progressive methods in DAM can be beneficial for future digital image regeneration scenarios and photographic futures. The image in our mind's eye, whether real or imaginary, can never be unseen. It will stay in our minds forever. It is a powerful thing. It must be effectively managed.

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