EXHIBITION REVIEW

Colour and Vision: Through the Eyes of Nature, Natural History Museum, London, 15 July – 6 November 2016

Reviewed by Kevin J. Hunt

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The opening installation in *Colour and Vision: Through the Eyes of Nature* is by the light artist Liz West, who uses dichroic glass to create spectrums of pure light. *Our Spectal Vision* (2016) introduces a core theme of the exhibition – the relationship between colour and perception – inspired by Isaac Newton's seven-fold colour spectrum and blue morpho butterflies from the National History Museum's collection. The role of colour in nature, the physics of light, and issues of cultural and sensory perception are all combined to create a striking entrance that acts as a passageway into *Colour and Vision*, whilst also exploring the "entrancing" or meditative qualities of an environment transformed by light.

Fig 1. Liz West, Our Spectral Vision (2016), installation view. Photo: © and courtesy of Trustees of National History Museum, London

As a transitionary space between the museum and the exhibition, *Our Spectral Vision* requires both darkness and light in order to saturate the room with carefully controlled colour. The theme of experiencing light/vision out of darkness (aided by the development of light sensing cells) continues as the viewer is lead through a series of rooms with bold colours, and subdued lighting, that explore eyes as part of what Steve Parker calls the "visual arms race" (2016: 23) integral to the survival of species through natural selection. At the heart of the exhibition is an attempt to chart the evolutionary journey of eyes and their symbiotic relationship with their surrounding environments. The word "attempt" is used because of the complex array of scientific information that informs the understanding of eyes in their numerous forms. The brilliance of the evolutionary process is that it pursues a series of chronologically staged advances that, retrospectively, present a narrative record of continual advance in response to environment. At the same time, there are numerous advances across different species and evolutionary variations – both convergent and divergent – filled with offshoots, alternates, developmental dead ends and mutations that did not fit with the qualities most desirable to advance life.

Fig 2. "Specimen Tower" in *Colour and Vision: Through the Eyes of Nature* (2016), installation view. Photo: © and courtesy of Trustees of National History Museum, London.

The exhibition tackles the paradox of delivering a core narrative about evolutionary advance whilst simultaneously acknowledging the wide array of evolutionary solutions to developing vision by initially focusing upon one of the most successful and familiar variants of the eye: the “simple” camera-like eye, with its single opening for light, which is found in many animals (including vertebrates, like humans). The camera eye design evolved in less than 500 million years, a comparatively rapid development in the roughly 4.5 billion years of Earth’s existence, providing one type of eye (with its own myriad of variations) to compare and contrast with the alternatives, such as the “complex” compound eyes evolved by many insects. As the exhibition makes clear, the more sophisticated the brain perceiving the visual information the less complex the eye potentially needs to be. This important relationship between sight and cognition recalls the neurological connections that bridge sensory perception and socio-cultural interactions – the ability to “read” information and contextualise it appropriately. However, this fascinating theme is relatively peripheral due to the primary concern with the development and purposefulness of colour and vision across nature.

The different branches of evolution mapped onto the floor in one of the main exhibition spaces provide a sense of the complexity under consideration. Reasoned scientific estimates of how many times eyes may have evolved independently (in different animal groups) ranges from below 50 to over 100 (Parker 2016: 35), with each independent variation itself prone to numerous evolutionary paths. The branched maps indicate how the scientific goal of producing an overview of evolutionary variation, in terms of species, has itself evolved as a form of visual information: an infographic, or series of interrelated infographics, celebrating the breadth of possibilities enabled by natural selection.

Before the viewer progresses over the floor maps, an interactive display presents a wall of human eyes – photographed and submitted by members of the public through Instagram – which introduce the beauty of the eye and the diversity of nature as distinct from the beauty of vision as a process. It feels slightly contrived as a means of delivering audience engagement through social media, but the results are captivating. Looking someone directly in the eye is a heavily loaded cultural and social phenomenon. As the exhibition makes clear the evolution of eyes to aid predatory instincts, to know when to hide, or to enable the use of colour and vision to help identify a suitable mate is key to survival and the passing on of genes. The act of looking another creature in the eye could often signify a confrontation ending in anything from demise to reproduction. Being able to dispassionately observe a variety of eyes, including those with imperfections and ailments, provides a strong counterpoint to the communal experience of colour and light provided by *Our Spectral*

Vision. This time it is the identity and colouring of individual eyes (seen as part of a constantly modified display of multiple eyes) within which viewers are encouraged to see the ongoing story of genetic variation, threat, and attraction.

Fig 3. "Wall of Eyes" in *Colour and Vision: Through the Eyes of Nature* (2016), installation view. Photo: © and courtesy of Trustees of National History Museum, London.

Related to the concept of variation, the range of sight experienced by different animals is simply but effectively conveyed by an interactive touch-screen exhibit (a version of which is hosted on the National History Museum's website). The visitor can move a central vertical line within a single landscape image to experience a direct comparison of the qualities of light, colour, and visual acuity appreciated by different creatures: the generic human capability is shown on the left of the line; other animal capabilities are on the right. The breadth of the colour spectrum an animal can perceive (dependent upon the cones within the eye), combined with the number of rods in the eye (facilitating night vision) as well as the capacity for focusing vision (aided by the evolution of lenses), influence levels of clarity and the resulting type of visual experience.

Dragonflies, for example, have compound eyes that contain such a wide range of light sensitive opsins they have the potential for extraordinary colour vision, experiencing a panoramic view of their environment that includes seeing polarized light (Brahic 2015). Snails see without focus or colour, akin to some examples of early photography that pick out blurred but emergent forms. Geckos see with excellent colour vision at night, due to highly evolved rods within their eyes. Giant clams see through a series of pinhole eyes without lenses; they cannot combine the information together, so their perception is of an abstract sparkling "afterimage" type effect, which seems otherworldly as a perceptual mechanism but is functional enough to enable basic defensive reactions to potential threats. In terms of extended sensory perception, any creature that can perceive the infrared portion of the spectrum can visualise heat – such as a pit viper snake, which sees in terms of thermal imaging. The colours of plants and flowers, whilst appreciated for their vibrancy by humans, can appear very differently to insects seeing ultraviolet light, revealing an alternate set of visual cues that influence behaviour (such as guiding towards pollen-rich areas).

The beauty of the world, however, is often a by-product of a series of survival techniques and strategies. Some of the most striking examples of rich colour in flora and fauna are due to practicalities of survival rather than any aesthetic considerations. The iridescent mother of pearl inside an abalone shell, for instance, is present because the finely structured surface developed because of its hard protective qualities. The remarkable ability of that material to reflect a spectrum of structural colours is otherwise inconsequential, however beautiful it might be.

The examples of structural and pigmented colours provide insight into the underlying form of colour production. The dichroic glass used in West's installation, which also features in other displays throughout the exhibition, is an example of how structural colour is produced by minute structured surfaces – such as those found on certain butterfly wings or in abalone shells – that can diffract, refract and/or reflect different frequencies of light (potentially cancelling out some colours whilst enhancing others). By comparison, pigmented colour is produced by substances that selectively absorb, scatter or reflect different wavelengths of light; so the yellow pigment in canary feathers absorbs or scatters all wavelengths of light except yellow, which it reflects, and flamingos are a pinky-red colour because of the high level of carotenoid pigments in their diet (Parker 2016: 74-78, 83).

Fig 4. "Blue Morpho" in *Colour and Vision: Through the Eyes of Nature* (2016). Photo: © and courtesy of Trustees of National History Museum, London.

A section exploring camouflage explains different aspects of mimicry and display. The warning colours of nature, based around contrasting patterns of bold colours such as bright red or yellow paired with black, sometimes signify real danger to predators (through toxicity or other defences) but sometimes merely mimic the threat as a beautifully and effectively orchestrated bluff. Partly in relation to the idea of acculturated meanings, viewers are invited to place colour tabs near to emotive words positioned on a wall display (happiness, anger, sadness and so on) to build a visual map of associations between colour and human responses. While the resulting picture of associations is familiar, the context emphasizes humanity's place as an animal responding to the environment. This simple exercise has far reaching ramifications about how to design and interact with the world. Although semiotics teaches that certain human visual codes are arbitrary in the combination of signifier and signified, *Colour and Vision* **posits** that some signs are also drawn from nature. The broad assumption that red means "stop" or "danger," that yellow means "warning" or "caution needed," and green signifies "go" or "satisfactory" carries across into everyday situations from traffic lights to industrial hazard signs, children's toys to computer displays (Parker 2016: 111).

The final section of the exhibition, which turns towards the relationship between culture, technology and evolution tends to raise questions rather than answer them. The connection between artists and scientists as two core groups fascinated by issues of visual communication is gently probed throughout the exhibition, starting with *Our Spectral Vision* and supported by occasional parallels and mentions given to overlaps between science and art. Claude Monet is mentioned briefly in relation to the problem of painting light/colour when the interrelated qualities of both are continually changing – his solution was to frequently revisit the same scenes to visually "map," and thereby try to understand, the often dramatic changes. In this sense, Monet's paintings of haystacks are not really about haystacks; they are a series of optical experiments recording the relationship between light, colour and human vision. But it is in the final exhibit – a short documentary – that science, art, culture and nature are brought together in a more fundamental way. The documentary brings together a series of observations about light and colour from the key scientists involved in the exhibition, Greg Edgecombe and Suzanne Williams, with commentary from two artists whose work and experiences are profoundly related to colour and environment, Neil Harbisson and the aforementioned West.

West's observations combine with the scientific commentary to insightfully contextualise core ideas about sensory engagement with environment, but Harbisson represents a profound extension of those core ideas as a living example of how technology can enable the evolution of new and alternate forms of sensory engagement. Harbisson was born with an extreme form of colour blindness called achromatopsia, which limits his vision to seeing only in grayscale. Using an antenna fused to his occipital bone, Harbisson has engineered a form of synaesthetic crosstalk between the senses by experiencing the wavelength frequencies of light as sound vibrations. His ability to hear light extends beyond the normal human limitations of the spectrum to include ultraviolet and infrared frequencies, which theoretically also enables him to hear heat. As Harbission explains, this reinvents his experience of colour by developing a set of personal sensory responses to the wavelengths that potentially conflict with typical associations. The colour red, for example, has the longest wavelength within the visible colour spectrum of humans, which translates into a meditative low sound that Harbisson finds very calming – a very different sensory cue to the acculturated notion of warning and danger.

By opening out the potential for technological, neurological and cultural appreciation of colour and light as experiences and forms of expression that are still evolving, *Vision and Colour* sets up expectations of philosophical and artistic engagement that are acknowledged rather than fully explored. When one walks through the black curtain to leave the small cinema space of the documentary, it is a slight surprise, and disappointment, to arrive in the glaring light of the giftshop. But if an exhibition leaves visitors with a desire for more, and does so by showcasing future possibilities and ground-breaking research that continues to inform the understanding of the senses, then it has achieved its key aims.

References

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