

Effect of the size and shape of the measurement area on BRDF measurements on glossy samples

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This work deals with optical measurements of the BRDF of real glossy surfaces, with a focus on the values in the specular area. It is composed by two studies: one is the measurement of the BRDF with variations of the size of the measurement area. The second is the measurement of the BRDF with modifications of the shape of the measurement area.

Both studies, size and shape, have been done on three glossiest samples of the commercial gloss scale provided by NCS. We used the black samples to avoid volume reflection from the surface of the material. The 60° specular gloss of these samples measured with a glossmeter are 95 gloss units, 75 gloss units and 50 gloss units.

We have used our goniospectrophotometer ConDOR (Conoscopic Device for Optical Reflectometry) for data acquisition. It is composed of a mobile illumination system embedded on a ring of 2 m of diameter, a 6-axis robot arm as a sample holder and a Fourier optic-based detection. Our system allows measuring in few seconds, the BRDF of the surface in 2 million of directions of observation, within a cone of $\pm 1^\circ$ of the reflected space.

For the variation of the size of the measurement area, considering the scheme of the illumination system, we have modified the field diaphragm to achieve a measurement area from 10 mm diameter to 4 mm diameter with a step of 2 mm for each sample. The angular resolution of our measurement is 0.7°, due to the divergence of the illumination beam.

For the variation of the shape of the measurement area, we have changed the motif of the area of 10 mm diameter in the field diaphragm. The angular resolution is 0.14°. Three shapes have been tested: a disk, a ring and a cross. In this experiment, quantity of light is kept the same whatever is the shape, in order to avoid linearity and straylight corrections.

In both cases, size and shape, the BRDF of the three glossy samples have been measured in the specular area, with a zenithal angle of illumination of 30° from the normal. The behavior of the specular peak when carrying out these modifications has been studied.

Results in the first study show that the specular peak doesn't change when the size of the illuminated area varies, whatever the gloss of the sample is. At this moment, we are doing modifications in our facility to reach submillimeter illumination sizes.

Results in the second study show modifications of shape of the specular peak for each sample when the shape of the illumination area varies. The glossier the sample, the more differences we have found between motifs in the central area of the specular peak.

KEYWORDS

BRDF | gloss | specular peak | goniospectrophotometer

Colour out of place: Extinction explored through art practice

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This paper proposes the concept of colour 'extinction' as a way to think through the current ecological situation, specifically the sixth mass extinction provoked by human action. This is explored through the framework of the emerging field of multispecies studies, with particular focus on the concept of 'entanglements', as defined within the wider field of Environmental Humanities, in conjunction with contemporary art practice. The author submits that art practice is a powerful tool through which to approach extinction, as it invites us to tap into an emotional connection. Colour, in particular, offers a sensorial entry into an environment, and a way to observe the presence or absence of species.

It may seem as though, if certain colours and colour combinations are lost from our environment, through the disappearance of plant and animal species, we can preserve those colours through digital images. However, the physical loss will change the collective experience of our environment completely. The combination of colours in a natural landscape is a sign of its health. If that colour balance is disturbed, the health of the landscape and its interconnected livelihoods will be affected.

As with any digital representation or record, every colour is an approximation. Colour in the natural landscape is a constantly shifting phenomenon - through seasons, times of the day, and the course of evolution - this is an experience that digital mimicry would struggle to precisely replicate. The issues of natural and digital colour are discussed alongside the idea of a nature/culture divide, as highlighted by various authors in the Environmental Humanities.

The author proposes conveying extinction and its subsequent losses through a series of artworks. It is then argued that art practice is a powerful tool to help visualise these issues. Colour studies offer theories that can feed into ecological thinking, and multispecies studies offers a strong interdisciplinary platform.

KEYWORDS

art | colour | ecology | extinction | loss | multispecies studies

Time-traveling colors: artisanal dreams and digital realization

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How could the colors of the Ottoman miniature of the 16th century inform our understanding of architectural space in the Digital Age? This paper covers the theoretical and experimental research undertaken during two doctoral residencies, at the French Institute of Anatolian Studies in Istanbul and at the Villa Medici in Rome.

The miniaturists applied a unique set of principles to their compositions in order to represent the colors of their surrounding environment. The colors of natural pigments were used as a means to visualize imaginal transgressions of the physical space and to transfigure the perceptible world. This research begins by proposing an analysis of this phenomenon through the Ottoman understanding of color and light in its optical and metaphysical dimensions. This investigation is based on the astronomer Taqi al-Din's Book of Light, the historian Mustafa Ali's Epic of Ingenious Artists and the mystic Ibn Arabi's Bezels of Wisdom.

This paper then explains how mankind's desire to materialize such artisanal dreams of chromatic defiance gives shape to the evolution of digital information technologies. The omnipresence of digital screens creates an augmented reality in which the natural colors of starlight are juxtaposed with the digital colors of electric light. These "time-traveling colors" disrupt the modern homogenous understanding of space and reintroduce the variational dynamics that are typical of artisanal cultures of representation.

This theoretical research is combined with a process of experimentation that puts the two color systems in confrontation. In order to study the principles of chromatic and spatial representation in the miniatures, several 3D modeling programs have been used as research tools. The first experimentation is based on the transformation of architectural miniatures into origami models. Due to its miniatures offering clear views of imaginary buildings, the object of study is chosen as the divinatory manuscript *The Origin of Happiness and the Source of Sovereignty* (Constantinople, 1582). Illustrated by the imperial atelier of Osman, this manuscript is preserved at the National Library of France (BNF, Supp. turc 242).

Continuing the study of color representation at the urban scale, a miniature which depicts the Byzantine Constantinople through a mystical narrative is modeled in 3D. It is part of the eschatological manuscript *The Translation of the Key to Esoteric Knowledge* (Constantinople, circa 1600), preserved in the archives of Istanbul University (IUK, T6624, f.91b). The 3D model is transformed into an animation offering an immersive experience of the miniature space. With the use of a 3D printer, the model is then used to build a colorless physical model on which virtual textures are projected in an installation of "spatial augmented reality".

The results of this research reveal the potential of architectural design tools to mediate between historical images and museum audiences. It demonstrates the ways in which new media could be re-appropriated as iconographic research tools in digital humanities. Finally, this research seeks to forge mutually beneficial links between the disciplines of art history and architecture through the technological study of artisanal colors.