

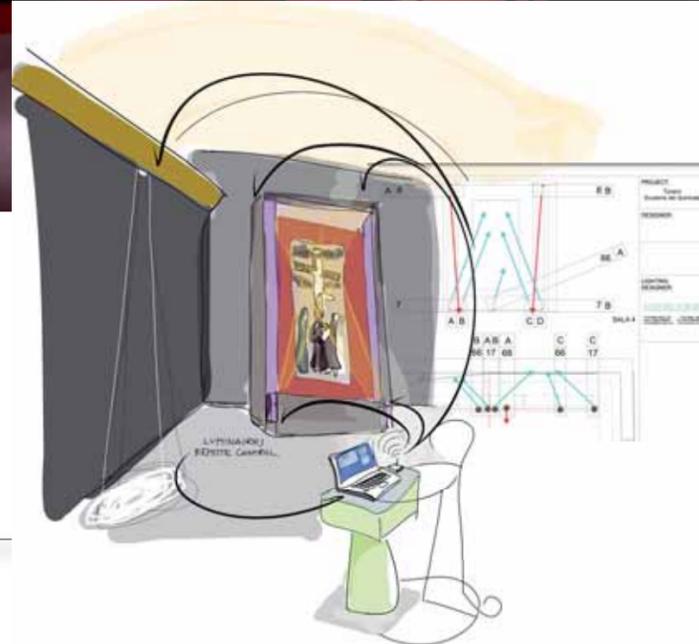
The revolution has begun

A new approach to the lighting of artwork reveals convincing results: the realisation of the Titian exhibition in the Scuderie del Quirinale in Rome.

With text contributions from Alison Ritter, Dr. Gianluca Poldi, and Giancarlo Castoldi



The illumination of paintings has become a complex process. A lighting designer needs to be able to program light with skill.



The Titian exhibition at the Scuderie del Quirinale in Rome helps researchers understand how purposefully applied LED light can enhance the viewer's appreciation and understanding of a work of art. Students in lighting programmes around the world are lectured on the value of perception and told that a lighting designer needs to understand human perception in order to be able to

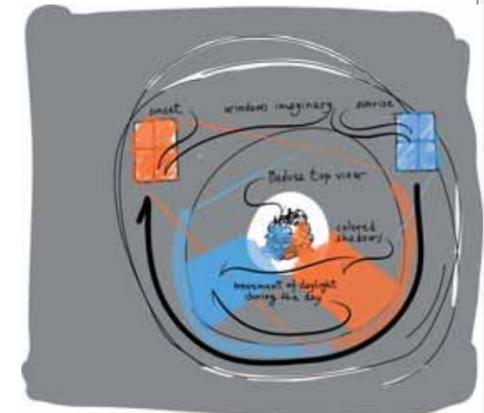
illuminate any architectural space. The students nod and take notes, maybe even do some practical exercises to help them put the theory into practice, graduate and start their career in practices that know nothing about the topic. Practising lighting designers – the ones whose task it is to "get jobs" so the practice can survive – have little time to go deeper into any topic, let alone pursue continuing education to keep up-to-date with the latest facts and findings. It is easy to copy and paste

schemes in the belief that if a product works in location A, then it is bound to be fine in location B as well. If a space does not look right in the end, it can be argued that the product was not sophisticated enough – the bad workman blames his tools syndrome.

A lighting designer needs tools: light sources, luminaires, reflectors, optics. But to be able to use those tools he needs knowledge and specific skills. When it comes to illuminating paintings, he now needs a deep understanding of neuroaesthetics as the following report shows.



Bernini's Medusa. Analyses of the art piece, the daylight conditions and the artist's intention pave the way for new lighting design approaches and strategies.



Lighting works of art by Titian

Text: Alison Ritter

Photos: Targetti; drawing by Francesco Iannone



After the discovery of the possibility to render visual works of art three-dimensional – based on a deeper understanding of the theory of neuroscience – Francesco Iannone and Serena Tellini from Consuline in Milan/I designed the lighting for an exhibition of the works of Lorenzo Lotto, which was shown at the Scuderie del Quirinale in Rome in 2011. Targetti developed a DMX-controlled fixture (Photon Free) in accordance with the designers' brief that would allow the spectral composition of the light emitted to be adjusted to bring out the colours or qua-

lity of the paintings. Visitors to the Lotto exhibition perceived the paintings as if with different eyes. By addressing human mirror neurons the lighting was able to arouse an emotional response from the person contemplating a work of art. Neuroaesthetics explains this phenomenon well: the sub-discipline of empirical aesthetics uses neuroscience to explain and understand aesthetic experiences at the neurological level. Francesco Iannone quotes Joachim Ritter after viewing the Lotto exhibition in 2011: "We have to stop talking about light and un-

covering the power of light for others, and start asking the people what they see". Iannone refers to this as a legendary phrase, and obviously took it very seriously.

The Titian project takes Consuline's design approach a step further. The exhibition that recently opened at the Scuderie del Quirinale in Rome is an ambitious attempt to demonstrate the convincing results and responses gathered from the Lotto exhibition and to create an arena, a cultural laboratory, for collecting research data. A new LED projector, based on Consuline's pre-

vious concepts for lighting works of art, has been developed. The advantage of the new directional luminaire (Ledò) is that it can be track-mounted and the spectral composition adjusted by remote control (instead of climbing a ladder). The innovative solution was developed by Targetti together with TCI, who designed the wireless system. The projector is an excellent tool – in the right hands. The lighting designer needs to understand what neuronal interaction he wants to stimulate, and be able to define the required luminous intensity, the position and

angle of the luminaire, the beam angle and the spectral composition of the light. This is the true value behind the process of designing with light, and is indeed a huge responsibility on the part of the designer. It is about understanding the context and applying the technology with skill. The designer needs to engage with the work of art, comprehend the use of colour and its intensity, understand the artist's intention – get inside his head – and this does not only apply to paintings. Iannone and Tellini are going through a similar process with the illumination of Bernini's Medusa (c. 1630), a project that is still in progress in Ancona. They saw this "magic" work in the Bellini († 1516) exhibition, on the frescoes by Ambrogio and Gregorio Zavattari (1444) in Theodelinda's Chapel in the Cathedral of Monza, and when lighting Caravaggio in the museum in Cremona. The technology is available to achieve truly amazing results, but in every case the result depends on how sensitively – and skillfully – the designer handles the light.

The layout of the Titian exhibition is designed so as not to focus emotional attention on one single work, but rather on groups of works. Soft lighting supports the three-dimensional effect of a centrally positioned work, while the eye is drawn to compare background or surrounding impressions. This mirror action is triggered by a purely perceptual mechanism designed to support human vision: we need to understand the space we are in, and see if there are other persons in that space, and if we are safe. Our brain works this way whether we are in a lonely forest or in an art gallery.

The Titian exhibition serves both a cultural and a scientific purpose. A study will be carried out with visitors over three months in a space separated from the main exhibition where there is a reproduction of a Titian

painting illuminated using conventional methods, which can be compared with a Titian lit using solid state lighting and the new design approach. The public will be asked to respond to some basic questions and the data will be collected. The idea is to encourage people to respond spontaneously, to record whether they perceive a difference. When this article went to press, the experimental room was still in development.

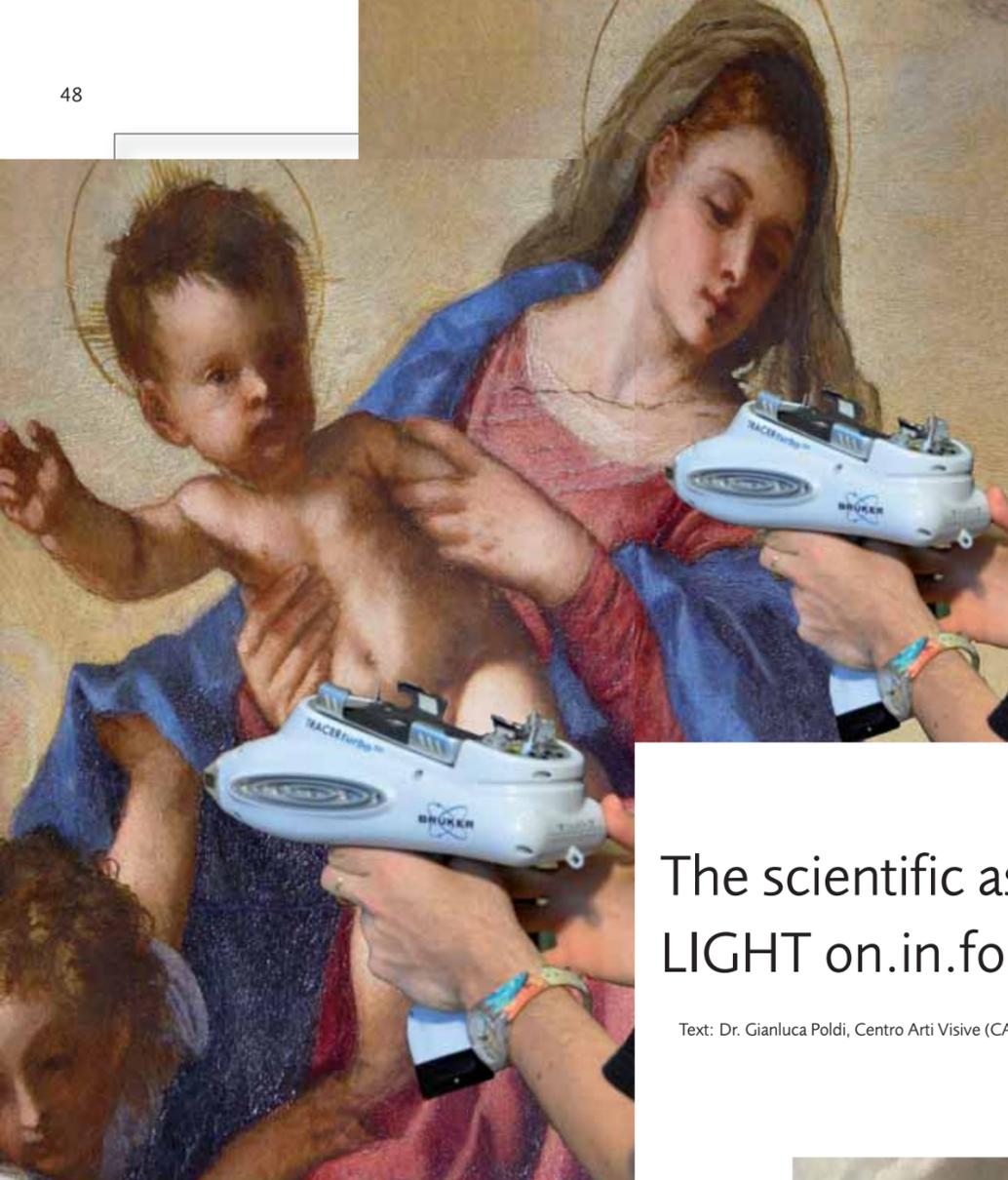
The design team is part of a research project organised by the Centro Arti Visive, CAV (Centre for Visual Arts) at the University of Bergamo, the goal being to discover how LED lighting can deepen viewers' experience of two-dimensional and three-dimensional works of art. The studies they are pursuing in Rome at the Titian exhibition are just a start to obtain feedback. The CAV team would like to carry out a more extensive research study to collect data from around the world, making the findings available and opening up a lively debate about the failure/ability of the general public – as opposed to experts or peers – to understand the value of lighting. A critical analysis of the data will be undertaken to understand whether and how a specific quality, angle or intensity of the light applied can affect or support a viewer's appreciation and understanding of art. These CAV experiments will be continued, developing the format over time to reach a sophisticated level but still connected to people's vision of art. In that sense the CAV project can be regarded worldwide as cutting-edge.



The Titian exhibition: concept and realisation.

The exhibition can be viewed in Rome until 16. June.





The scientific aspects of the LIGHT on.in.for smART project

Text: Dr. Gianluca Poldi, Centro Arti Visive (CAV) University of Bergamo/I



The research involved in the LIGHT on.in.for smART project focuses on two main issues:

- ⇒ How the materials of the object to be illuminated respond to light
- ⇒ How the human brain responds to light in respect to illuminated artworks.

The first point implies the execution of scientific examinations on some representative artworks, in order to characterize the pigments used and their contribution to the final colours, taking into consideration alteration phenomena, such as fading, darkening or repainting of the original artwork. A set of non-invasive analyses are currently being carried out by the CAV team to reach this goal, including spectroscopic, colorimetric and imaging examinations, performed using portable instruments. Spectroscopic exams, in particular, deal with X-ray fluorescence and reflectance spectrometry in the visible range, the first allowing recognition of chemical elements and thus materials, the second recognition of surface pigments and their behaviour under light, according to international standards.

The second point requires specific neurological studies to be carried out "in the field", including proper tests specifically designed to acquire the opinions of a large number of people who have viewed the selected artwork under different lighting conditions. In this regard, the field of neuro-aesthetics would appear to be important, also when decoding if and how different

lighting conditions stimulate different processes and areas in the brain.

As for the previous exhibitions devoted to Giovanni Bellini and Lorenzo Lotto, for which Consuline designed the lighting, numerous analyses were performed on dozens of paintings for the Titian exhibition at the Scuderie del Quirinale in Rome this year, in order to study the pictorial technique and understand the Venetian master's use of colour.

Taking an example of one of Titian's masterpieces, the altarpiece he painted on wood for the Gozzi family of Ancona in 1520 (Gozzi Altarpiece): this work belongs to the Civic Museum of Ancona and is on special loan for the Rome exhibition. In this large painting Titian uses the precious ultramarine blue, obtained by grinding lapis lazuli stone from Afghanistan, for the Virgin Mary's cloak, the grey shades of the Angel and, when mixed with lead white, to obtain the pale blue of the sky. In contrast, he often used azurite – a blue copper carbonate, less expensive and available from Hungary – for the special blue tone for the Venetian lagoon, as we can see in the wonderful detail of St. Mark's Basilica and the famous Bell Tower in Venice.

False Colour Infrared images, obtained by matching visible images with infrared ones, enable the localization of ultramarine blue and azurite, since the behaviour of the two pigments in IRFC is different: the first has a reddish hue, while the second remains bluish.

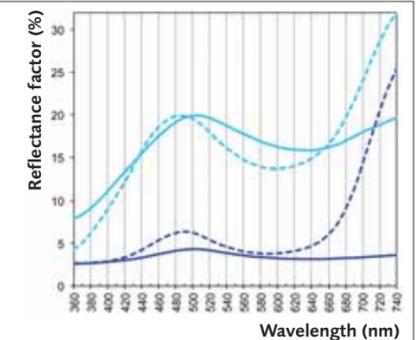
If we look at the reflectance spectra of these two blue pigments, we can see that both have their peak in the blue region of the electromagnetic spectrum (460-500 nm), but natural ultramarine (dotted lines) exhibits a strong increment in the red region (after the absorption minimum at 600 nm), while azurite (solid lines) rises very little after its minimum (at 640 nm): this means that when we illuminate colours made with lapis lazuli we have a high reflection not only of the blue component of light, but also of the red one. In fact, lapis lazuli has a

Of course, it is possible to arrive at a good lighting solution by chance, through the designer's own sensitivity to light and colour, or thanks to a conscious dialogue between lighting designers, scientists and art historians. This desired dialogue could give rise to a new approach to lighting, including the compilation of guidelines for lighting different kinds of objects.

Curator: Giovanni C.F. Villa
<http://cav.unibg.it/luce/web/en>
<http://english.scuderiequirinale.it/Home.aspx>

Lapis lazuli and azurite

- light blue water (azurite)
- - - light blue sky (ultramarine)
- dark blue water (azurite)
- - - dark blue Virgin's cloak (ultramarine)



reddish undertone and azurite a greenish one.

So, if we want viewers to be able to perceive the difference between the two kinds of blue that Titian selected specifically for different scopes, we need to illuminate them with great care, balancing the blue and the red components of the spectrum. The same could be said for the copper green (verdigris) glazes for the vegetation, for red lakes, yellows, ...

The concept of colour rendition

Text: Giancarlo Castoldi, Director of Business Development, Targetti, Florence/1

The concept of colour rendition is linked to museum lighting, more now than it ever has been – if by colour rendition we mean the freedom to select the best way to render or depict something to allow viewers to better understand it. For a long time we had no choice, except to open the curtains or turn on an incandescent lamp and use a couple of filters at the most. In fact, nobody really paid any attention to the topic! There was lots of talking, but nobody did anything.

Colour rendition has been linked to very basic concepts such as CRI and Ra values, which comprise little more than a comparison of apples and pears, the pears being the incandescent lamps and the apples all the rest. And the whole issue was based around the misconception that "halogen is perfect" – when at the most, it is less bad than other options.

These "passive" methods have always tried to measure a given spectrum according to something else. At least people lighting artwork were thinking about it! If the art piece was destined to be illuminated by a light bulb for the rest of its life, it was better try to find out how it was going to behave.

Given that it is now universally accepted that the LED cannot be measured according to such obsolete techniques, around three years ago Targetti started working with modulated spectra, focussing on some of the world's most amazing artists: from Lorenzo Lotto to Bronzino, from Raffaello to el Greco, from Velazques to Pontormo, and more. Every study was an overwhelming experience for all involved.

There are two basic facts that required consideration: there is no one light, hence there is no absolute that stands for "good light"; and

philological approaches were not on anyone's radar in the 15th century, where already everybody lamented the terrible lighting conditions under which 99 per cent of artworks were exhibited, and the boundaries between philology and hermeneutics and exegesis were not clear-cut.

The concept of colour rendition is linked to museum lighting, more now than it ever has been.

Imagine that all of a sudden you accept these facts, fear abandons you, and instead of running away scared, you start experimenting with a level of such freedom, that it becomes exhilarating.

The research and development team at Targetti started to work on fixtures that would enable lighting designers to literally compose the light they need. The most recent spotlight they have developed offers a huge range of spectra specifically calibrated for the design of illumina-

tion for art. For the first time in history, it is possible to look at a painting and see what we are supposed to see, to experience the artwork as the artist intended. The technology is easy to retrofit on most existing track systems currently installed in museums and galleries and does not

need any specific further wiring, as it is all radio-controlled. Once tuned using simple software, the settings are stored in the fixture's memory and it behaves like any standard track projector. If the artwork it is illuminating needs to be relocated, the projector can "travel" with its artwork and be re-mounted in the new location without further programming. All highly practical, but that is only half the story.

Ledò Tunable allows the designer to start navigating in a totally new

dimension, which requires ten (or more) times the experience, knowledge, awareness, professionalism, culture, modesty, intelligence, respect and passion than was required just a few months ago. Studio Consuline (Francesco Iannone and Serena Tellini) have been extremely clever in the way they have interpreted this technology and already applied it on a number of occasions, especially in the Titian exhibition, currently open at the Scuderie del Quirinale in Rome, of which Targetti is the lighting partner.

Designers interested in working with this powerful and highly flexible tool in an arts environment – art probably being the most delicate subject to illuminate in our world today – need to know what they are doing! It is doubtful whether the level of expertise required can be found in a single person or design practice, which is why it is advisable to seek knowledge and support from a restorer, a good museum curator or an art historian during the analysis phase. This was the process adopted for the preparation of the Titian exhibition and thanks to this attitude the team of lighting designers and scientific researchers have produced extraordinary results. It literally needs to be seen to be believed and to fully appreciate the power, emotions and significance of a Titian as never seen before.



The first generation of products for this task were still very technical and rather large. These luminaires have been developed and are now considerably more compact (see above).



We think light

