ARE NEW LIGHT SOURCES AFFECTING OUR CREATIVITY?

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ABSTRACT
After more than 120 years of living under the warm, cozy and colour reliable light source of the incandescent lamp, we are now forced to replace it for a more energy efficient light source. The process of phasing out all incandescent lamps has already begun in many countries, and user concern regarding new energy efficient light sources is starting to grow. The most faithful electrical light source for colour rendition is soon to disappear.

This paper aims to discuss the importance of the incandescent lamp as a source of creativity and as the light source for all social and cultural development, as well as to discuss some of the possible implications and opportunities that the ban of the bulb may create for artists and lighting designers, questioning whether the qualities of light found in energy efficient light sources will be harmful or conducive to creativity.

Keywords: Colour, Colour rendition, Light, Energy efficient light sources

1. INTRODUCTION
In many countries the process of phasing out all incandescent lamps is already underway and user concern over the suitability of energy efficient lamps is starting to grow. How are we going to cope without the incandescent bulb? Isn’t the mercury inside CFL lamps also hazardous for the environment and for the user? Will colour pigments look the same under CFL and LED sources? What about colour harmony and contrast; will they be affected under these new types of light? Are the Energy Commissions aware of all the consequences that the ban of the light bulb can create?

The perception of colours varies under different light conditions and therefore colour pigments and light cannot be treated separately. This unbreakable relationship between colour pigments and light has been for artists one of the biggest sources of inspiration throughout art history. Would new light sources be a new source of inspiration for contemporary artists and lighting designers? Or would it affect creativity in a negative way?

There is a considerable lack of information regarding the advantages and disadvantages of new light sources available on the market, and it is perhaps now necessary to define guidelines in order to assist consumers to achieve the best lighting condition possible in areas where high quality lighting is required. Although this subject is vast, this paper intends to compare the lighting qualities of the incandescent lamp with those of the new energy saving light sources that are now to replace them.
2. From daylight to LEDs

Light can be considered as one of the revealing elements of life. In the beginning, human beings were accustomed to following the natural rhythms of daylight, going to bed after sunset and waking up again early in the morning at sunrise. Natural light was indeed for many years the only source of light. Many years had passed before mankind was able to take a piece of wood from the fire and carry it into his cave to use as a source of light. As the knowledge increased, natural materials like wood and twisted fibers were drenched in animal fat to provide even more light when ignited.

All the way through history mankind continued to discover and develop new sources of light that could improve quality of living, and evolution brought with it other ways of producing ‘artificial light’, and candles, oil lamps, and incandescent lamps came to life to increase the amount of light that an artificial light source could give, prolonging the autonomy and lifetime of the light source to fulfill needs for modern life. Finally in 1878 the first light bulb was produced emitting the same amount of light created by 16 burning candles. The light bulb was not only a source of light, but also a source of creativity, and the light source of all social and cultural development. The same primitive man that was accustomed to working from sunrise to sunset was now able to work day and night, 365 days of the year.

Ever since, a technological battle has been underway to produce more efficient light sources that give greater lumen output per watt and have a longer lifetime, lately with the great objective of not harming the environment. The significant change from candlelight and gas lamps to the incandescent light source is now being significantly changed once again, to discharge lamps in the current period, and even more recently to light emitting diodes (LED).

Given the low efficiency of the incandescent lamp and the political ambition of countries to be 'green', on 1st September 2009 a new law was established to begin the process of phasing out all incandescent lamps within the EU in the next couple of years, forcing users to replace all traditional light bulbs for compact fluorescent or LED technologies. Are the lighting qualities of the incandescent lamp replaceable by LEDs or CFLs? No they are not. Will there be any difference in the way we experience artificial light by this change in light quality? Yes it certainly will. One of the main reasons for this is that even if incandescent lamps are considered an artificial light source, the light they emit still comes from a 'natural process'; a burning process. The light that CFL and LED sources emit however can be considered as a 'chemical light'. Even if these light sources are more efficient by giving more light per watt consumed, the results in quality of light are different, and so far the light of an incandescent lamp cannot be reproduced by any other type of light source.

2.1 Colour reliability v/s ‘energy friendly’ light sources

Light is responsible for colour. Light is colour and colour is light. It is a fact that the perception of colour varies under different light sources and therefore colour pigments and light cannot be treated separately. It is exactly this intimate bond between colour pigments and light that is often underestimated and sometimes even ignored by people when selecting the right lighting qualities for indoor and outdoor spaces.

For more then 120 years we have been living under the warm, cozy and colour reliable light of the incandescent bulb. We are accustomed to experiencing life under the full-spectrum light of the incandescent lamp and we feel comfortable with this type of light, basically because it has always been faithful to colours, and its properties do not change from lamp to lamp, but also because it relates to our primitive daylight experience; to our inheritance as outdoor animals.

With the new qualities of light that CFLs and LEDs bring into the environment we will have to re-educate ourselves in
order to have the same confidence in colour differentiation since the major drawback of CFLs and LEDs is that neither of them are a full-spectrum light source, and the light they emit varies in appearance from lamp to lamp. It has also been observed that the difference between an incandescent light source and a compact fluorescent or LED source has not only to do with the colour rendering index, but with the perceived brilliance of reflectance that any given hue has under different lighting conditions. It is my belief that the colour rendering index is now partly unreliable when comparing the quality of light of different energy efficient light sources. There is definitely a need for finding new indexes that can help to analyze colour appearance under these new types of lamps. So far, visual assessment is the deciding factor when choosing the right manufacture of LEDs or CFLs for a particular light application.

2.2 LEDs and CLFs: a new source of creativity?
The perception of colour varies under different light conditions and therefore colour pigments and light cannot be treated separately. Is exactly this intimate bond, between colour pigments and light that has been for artists one of the biggest sources of inspiration throughout art history. Would new light sources be a new source of inspiration for contemporary artists and lighting designers? Or would it affect creativity in a negative way? Walking through a contemporary city today can be an unexpectedly colourful experience where thousands of coloured lights perform new scenes for people’s enjoyment.

The latest technological achievements in lighting fixtures has given lighting designers and artists the chance to bring into projects multi-coloured sources in a simpler manner than before, offering a new approach to the use of coloured light in architecture and urban spaces. The innovative RGB fixtures, this time simple to handle and easy to implement in architecture, offer a never-ending number of colour combinations introducing for the first time ever changing colour schemes of thousands of colours continuously looping within a short period of time.

Colour-changing systems are becoming more and more popular as the preferred way to light up cityscapes, landmarks, façades and lately even indoor spaces.

If we look back to art history, we can see that as far as the mystery of light and colour was not solved, art movements had their own beliefs related to such concepts. As an example, the new discoveries from the 19th century by Newton and Goethe generated at the time, a whole different attitude from artists to the use of colour in painting, changing dramatically their techniques of representation. All through history, artists have been exploring the colour phenomena very carefully to find new ways to express themselves, changing their method of representing light and colour according to their latest experiences.

At the present time the new technologies in RGB fixtures and energy efficient ‘white’ light sources can be considered the ‘new discovery’ of our times on our journey to try to solve the mystery of light and colour. The new energy friendly light sources, including RGB and white light sources, are now offering artists and lighting designers a whole new way of working with light and pigment; both as an art piece and as a space to be experienced in architecture. It is my belief that these new light sources can be an enormous source of creativity for artists and lighting designers if they explore and study this new ‘colour phenomena’ carefully and if they are informed of all the advantages and disadvantages that these light sources have.

On the contrary, if artists and lighting designers start to underestimate this intimate bond between colour pigments and
light, ignoring its importance when selecting certain light qualities for indoor and outdoor spaces, then their creativity might be affected in a negative way. The lack of knowledge on this new ‘colour phenomena’ plus the unsatisfactory result visible in their design will imprint their future work with a lack of creativity.

3. DISCUSSION
We are in a moment of history where new light sources are available on the market with lighting qualities that were not available before, and that are definitely not comparable to any other kind of light source, but still these new sources do affect our colorful daily lives, and artists and lighting designers are now required to try to get the best out of them.

It is an invitation to research and test the dynamic interaction between coloured light and colour pigments, as well as with the different nuances and colour reliability that white LEDs and compact fluorescents can give. It is also an invitation to go back to nature, to improve the daylight conditions indoors and to develop guidelines and parameters for those spaces where high quality lighting and high colour rendition is needed. There is a considerable lack of information regarding the advantages and disadvantages of new light sources available on the market, and it is perhaps now necessary to define guidelines in order to assist consumers to achieve the best lighting condition possible in areas where high quality lighting is required. This information should reach not only every discipline working with colour light and/or colour pigments but also every individual that considers energy efficient lamps as replacement for the traditional light bulb.

4. CONCLUSION
Knowing that the light qualities of the new ‘energy friendly’ light sources are poorer than that of the incandescent, that the colour rendering is still not high enough, that the spectrum is not continuous at all, and that colours lose their brilliance under these ‘energy friendly’ light sources, are we still confident our creativity won’t be affected under this new light? It is my belief that it depends solely on how much information we get, and how we handle and approach this ‘new phenomena’. They will affect our creativity as long as we don’t have a better understanding of the consequences and of how the result of our work will be affected.

Art is about contrasts, balance, colour harmony and disharmony. All these aspects are perceived differently under different light sources, and we can see it as a threat to our creativity but also as a new source for it.

On the other hand, and talking about the phasing out of the incandescent lamp, I do believe that we could still ‘save the planet’ only by replacing traditional bulbs with low energy consumption light sources in areas where a high colour rendering is not needed, such as hallways, storage rooms, outdoor areas etc, and keeping incandescent lamps in areas where a high colour rendering is necessary, as well as by controlling the duration of which the lamps are in use.

One thing we can all agree on is that the light emitted from LED and CFL light sources is still not as inviting and colour reliable as that of the incandescent lamp. Our traditional and “energy inefficient” lamp, source of creativity, and source of all social and cultural development, is still incomparable to any other artificial light source.

REFERENCES