

INFLUENCE OF COLOR TEMPERATURE AND LIGHT LEVEL ON APPRAISAL OF PHOTOGRAPHIES IN EXHIBITIONS

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ABSTRACT

Light designers in Museum and exhibition galleries can nowadays choose between several artificial lights. It is possible to choose different color temperatures and illuminations. The choice of the best color temperature of artificial light in museum have been studied, but they usually test only direct sources without taking into account the ambient light. The meaning of work of art showed is not take into account either. We conducted an experiment with photographies, lightened with accent lighting at different color temperatures, changing the ambient light color temperature and illumination. We asked observers about their interpretation and appraisal of images.

Keywords: exhibition lighting, ambient lighting, accent lighting, color temperature, photography

INTRODUCTION

Museum and exhibition galleries often take advantage of natural general lighting completed by an artificial localized lighting. At the evening and the end of the afternoon, the general lighting is replaced by artificial lighting. Since few years, in addition to halogen sources widely used for localized lighting, other light sources are available, as metal halogen or LEDs. Those two sources are available in several color temperatures so nowadays a wide variety of ambiances is possible.

The question is about the choice of the color temperature of the artificial sources: does it have to be warm or cold? Several studies have been made about preferred color temperature on work of art [1] [2] [3] [4] [5]. Their conclusion are very diverse, depending upon the experiments configurations (postcard images, CRT). But, the interaction between general lighting and direct lighting was not take into account

A previous study we made [6] about preference of color temperature showed that

preference changes with color temperature of the ambient lighting and also with the level of ambient light.

We noticed too that preference choice of observers about color temperature strongly depends upon the content of the images showed. We did not find in literature a study taking into account all the parameters present in a museum : a general lighting, an accent lighting and artworks, that are support of meaning. This last factor is important because the goal of lighting designer in museum is to adapt the light to the meaning of artworks.

To continue the experiment we now are doing another test taking into account the changes in ambient lighting (color temperature and illumination level) and we add a semantic test to understand how color temperature influences the interpretation of images perceived by observers.

PRINCIPLE OF THE STUDY

Printed photographies

We choose 4 digital photographies about common subjects (landscape, seaside, urban view). We printed them on an Epson 4800 calibrated with icc profiles. The prints are 20 x 30 cm on glossy paper.



Fig. 1: Images of the experiment

Light configuration

We use a dark room to do our experiment. Two opposite walls are containing the same 4 photographs. In the previous experiments [6], we did a paired comparison with two images next to each other, lightened with different color temperatures. But because it is difficult to know the state of adaptation of observers, few concrete data are available about mixed chromatic adaptation [7], we decided not to put the two spot lights next to each other but on two different walls.

Accent lighting

The first wall is lightened with profile spots, with a warm light (halogen type, 4100K plus converting color temperature filter to reach 3000K). The opposite wall is lightened by a cold light (halogen type, 4100K plus converting color temperature filter to reach 5000K). The average illumination on object is about 200 lux.

General lighting

The general lighting can be put on warm (3000K) or cold light (6500K). The average illumination is 200 lux. It can be dimmed to dark.

Illuminations on photographs are then 400 lux, that is right with the CIE rules about preventive conservation rules of illumination for modern photographs during temporary exhibitions for a short time [8].



Fig. 2: test room configuration

Scenario of the experiment

We conducted 4 experiments, changing the ambient light color temperature and illumination:

1. General lighting at 6500K and accent lighting at 5000K next to accent lighting at 3000K, 200 lux.

2. General lighting at 3000K and accent lighting at 5000K next to accent lighting at 3000K, 200 lux.

3. No general lighting and accent lighting at 5000K next to accent lighting at 3000K, 200 lux.

4. General lighting at 3000K and accent lighting at 5000K next to accent lighting at 3000K : 50 lux.

Table 1: List of the tests with variations in general lighting settings. The accent light 1 is at 5000K, and the second accent lighting is at 3000K for all the cases.

	General lighting		Light configuration on images	
	Color temperature	lux	Wall 1	Wall2
Test 1	6500 K	200		
Test 2	3000 K	200		
Test 3	0 K	0		
Test 4	3000 K	50		

	6500K		5000K		3000K
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Observers

We work with 35 observers, with no special scientific knowledge in color nor photographs, like usual museum public.

Task of the observers

The observers have to answer questions for each image and each light configuration.

Semantic questions

Observers have a questionnaire with the following questions:

- In witch season was took the image : winter, spring, summer, autumn

- At what time was it taken in the day : morning, midday, afternoon, evening
- What is the dominant color of this image : red, green, blue, magenta, cyan, yellow
- General feeling associated : pleasant/unpleasant, happy/sad, calm/arouse, natural/artificial, not colorful/colorful. The scales are going here from 1 to 9.
- Do you like this image : 1 (no) to 9 (a lot)
- Others remarks :

Questions about the general feeling associated with images were chosen with International affective picture system [9] and the work about Image Quality Semantics [10].

RESULTS

We are actually conducting the experiments and did not analyze all the results yet. We should find a strong correlation between the changes in color temperature and the level of ambient light and the appraisal and interpretation of images by observers.

CONCLUSION

This study should help museum designers and curators to choose the best lighting for the work of art. The best lighting is the one that, within the tolerances of conservation recommendations, allow visitors to understand the purpose of the artworks showed. Nowadays, light designers can choose almost any color temperature they want, with the new light materials available like LEDs or metal halogen (in practice, different light for each artwork exposed is usually not necessary as an exposition shows some coherent pieces). Light design for museum should evolve with new possibilities.

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