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Colours in office buildings under a clear sunny sky: the occupants' point of view.

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COLOURS IN OFFICE BUILDINGS UNDER A CLEAR SUNNY SKY. THE OCCUPANTS' POINT OF VIEW.

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Summary

This paper presents the results of a Daylight P.O.E. research undertaken in an office building in the city of Biskra, Algeria. The field work took place during summer in the building of La Caisse Nationale de l'Assurance Sociale (a major state insurance company) and twenty four office (42% of the total number of offices) were studied. The present results are mainly dealing with the topic of colours. The collected data was examined by means of statistical analysis methods. The results of this research work provide information on the state of colour design in a recent kind of buildings. Also, it reveals occupants' relationships to colours and gives by the way a first idea about what could be called 'contemporary colour culture' in a particular, but large area from the Islamic world. Furthermore, its outcomes should constitute a nowadays reference for office design in Saharan Desert context.

Keywords: Color, Office design, POE, Algeria, Sahara, Clear sunny sky, Daylighting

INTRODUCTION

Nowadays, office building design became a major topic in architectural theory and practice as well as other associated field of research (i.e. environmental psychology, environmental ergonomics, work sociology...). From an architectural point of view, an office is an enclosed space with openings providing a view to outside and allowing the admittance of natural light and air as well as noise, dust.... Despite the stylistic characteristics, colour is revealed by the literature as a main criterion for the office design (Aronoff and Kaplan, 1995; Fischer, 1983). Its role in the occupants' perception and effects associated to natural light promote it to the range of an inescapable factor to be taken into account in the office design process. The present study stands out of the common colours related investigations because it consists on a field research work and not an experimental one. The setting selected for is an office building in a hot semi-arid region where the clear sunny sky dominates. The office workers were asked about their perception of colours as well as the colours in their respective offices.

THE RESEARCH METHOD

The diagnostic Post-Occupancy Evaluation (POE) method was used in this research (Zimring, 2002). POE evaluates, systematically, a building upon a major criterion: the occupant's needs. The diagnostic POE is considered by some authors as the main post-occupancy evaluation (Fischer and Vischer, 1997). The diagnostic POE includes complementary techniques to the questionnaire (subjective responses) consisting on observations of the investigated place and physical measurements (objective observations). The diagnostic POE should be thus more appropriate for a daylighting evaluation because it considers the subjective and objective aspects of daylight together. This evaluation was initially based on the POE method for daylight (Hyyge, et al, 1996) but was adapted to the climatic and cultural specificities of the case study's context (Belakehal et al, 2003). The results presented in this paper are limited to the questions dealing with colours and only one question is about daylighting. The questions were about: i) the importance of colours in front to other office design parameters, ii) the preferred colours for offices, iii) the significance of colours importance, iv) the office workers' satisfaction about the general environment of their offices (including colours), v) their opinions about the furniture and walls colours, and vi) their judgment of the luminous ambience in their offices.

THE CASE STUDY

The present field investigation took place in a contemporary office building located in the urban setting of the city of Biskra. The city is located in the northern part of the Algerian Sahara which is characterized by a semi arid hot climate and a clear sunny sky almost year around. The office building houses a major state insurance company (Caisse Nationale de l'Assurance Sociale). The building is five storey high organized around an uncovered courtyard with four facades (Fig. 1).



The majority of offices are of a small size. Open plan offices are few but exist in every floor. The offices are limited to the upper floors. Windows vary in areas but could be classified as big and small size with few solar protections. Some areas present particularities that excluded them from this investigation such as the medical and the computing section. Activities undertaken in these sections, the kind of furniture and their arrangement are so different from the other parts of the building that they could not be compared with. The offices colours are cream for the walls as well as the floor and white for the ceiling (Fig.2).



The desks are often dark grey or brown coloured but with clear coloured work surface whilst the dark brown, grey and green dominate the other furniture colours. A questionnaire was administrated, face to face, to thirty nine occupants (20% of the total number of occupants) in twenty four offices (42% of the total number of offices).

IMPORTANCE OF COLOURS

The office workers were asked to give a decreasing order of importance, from most important (number 1) to less important (number 10), to ten (10) significant parameters in office design. These parameters are: i) quietness, ii) good ventilation, iii) lesser colleagues' number, iv) good lighting, v) nice view outside, vi) privacy, vii) large area, viii) general environment (colours, decoration, floor...), ix) winter sun, and x) coolness.

The answers, of the office workers reveal that the colours are not important as the other parameters. The parameter 'general environment' which includes colours is mostly rated from 7th to 10th position respectively by 10%, 21% and 38% of the office workers (Fig. 3). Quietness is the first important parameter for office design (46%) (Fig. 4), good ventilation is the second (18%) and the fourth one (21%), coolness the third (23%), and a reduced colleagues number as the fifth important parameter (18%). They also were asked to state which among the following the reasons they thought making colours significantly important which among the following reasons they thought making colours significantly important in office design: i) colours will stimulate better productivity, ii) colours will create a good in office design, iii) colours will provide a good visual quality, iv) colours will making lighting better and v) colours make workers relaxing. A significant number of them perceive the colours as a source for a good working ambience (56%) and make them relaxing (44%). Nearly the quarter only of the office worker said that colours are making lighting better, providing good visual quality or stimulate better productivity.

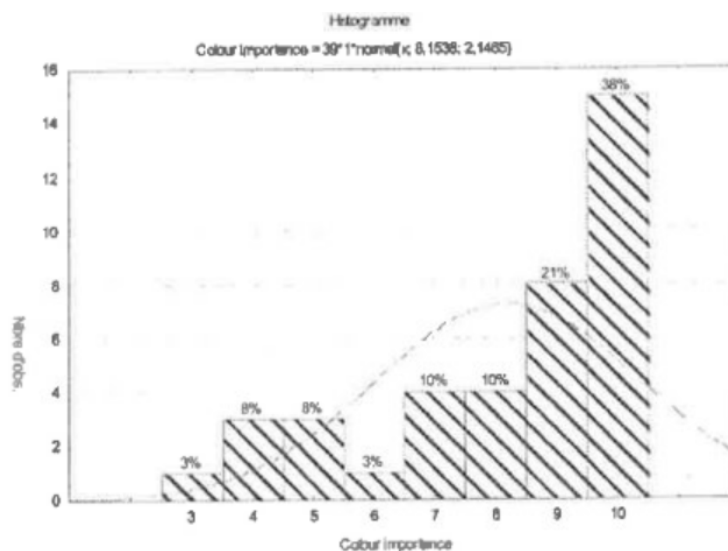
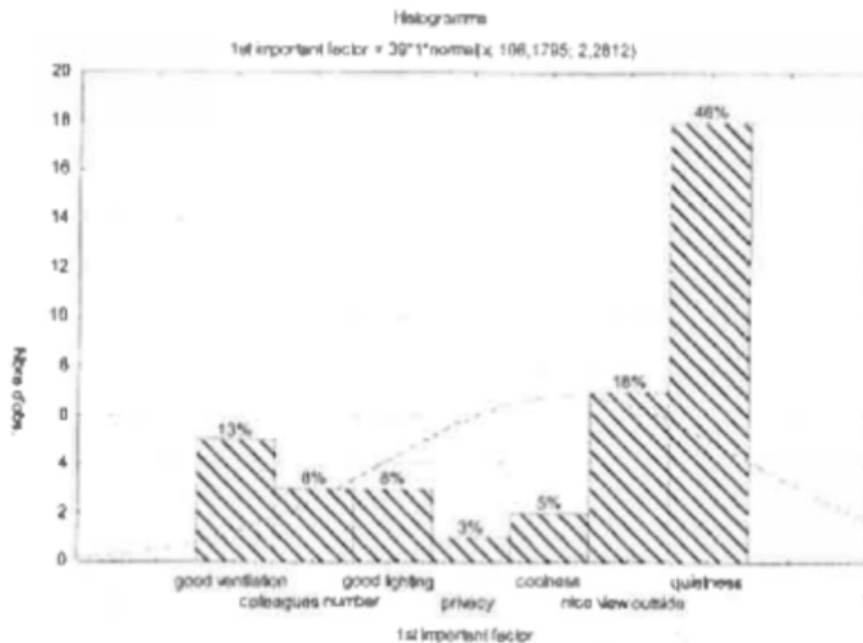


Figure 3. A Graphic showing the importance of colour according to a scale from very important (number one) to not important at all (number 10).



Preference for Colours

Office workers have to select their preferred five colours for an office among ten proposed ones. The five selected colours are classified in a decreasing order from the most preferred colour (number one) to the less preferred one (number 5). The proposed list consists on a variety of colours including common colours for office (cream and brown) as well as vivid and bright colours. Cream and White are the most first preferred colours by the office workers. respectively 33% and 31% (Fig. 5). Cream is still the second preferred colour (33%). Associated to the yellow, cream is also the most preferred third colour (26%) with the neutral grey (21 %). The fourth preferred colour is the light blue (26%) and the fifth one is the neutral grey (26%).

Colours in the Cnas Office Building

Firstly, the office workers were to answer how much are they satisfied with the general environment (including colours) in their offices. A five scale allows them to express their satisfaction from 'very satisfied' (number 1) to 'not satisfied at all' (number five). They have, then, to express their opinions about the furniture and walls colours (dark, clear...). More than the third (38%) of the number of the office workers answers that they are 'somewhat satisfied' about the general environment of their offices but nearly the quarter (23%) is not satisfied at all (Fig.6). The furniture colours are not often perceived as suitable, clear or dark (respectively 31%, 36% and 31 %) and rarely bright (3%), classic (5%) or vivid (0%). The walls ones are significantly perceived as clear (56%), quietly suitable (31%), very quietly dark (15%) and infrequently unsuitable (3%), bright (0%) or vivid (0%).

Colour and Light

Asked about the luminous environment in their offices, nearly the three quarters (74%) of the workers said that it is suitable whilst nearly the quarter (23%) perceive it as too clear and a few ones as too dark (3%) (Fig.7).

A multiple correspondences analysis reveals an association between the office workers' opinion about the luminous environment and their satisfaction about the general environment including colours (Fig. 8). The statistical analysis shows that the most satisfied workers are those perceiving the luminous environment as suitable. Oppositely, the less satisfied are those perceiving it too dark. Due to the real character of this in-situ research work, this revealed association makes significant the link between natural lighting and colours among other design factors.

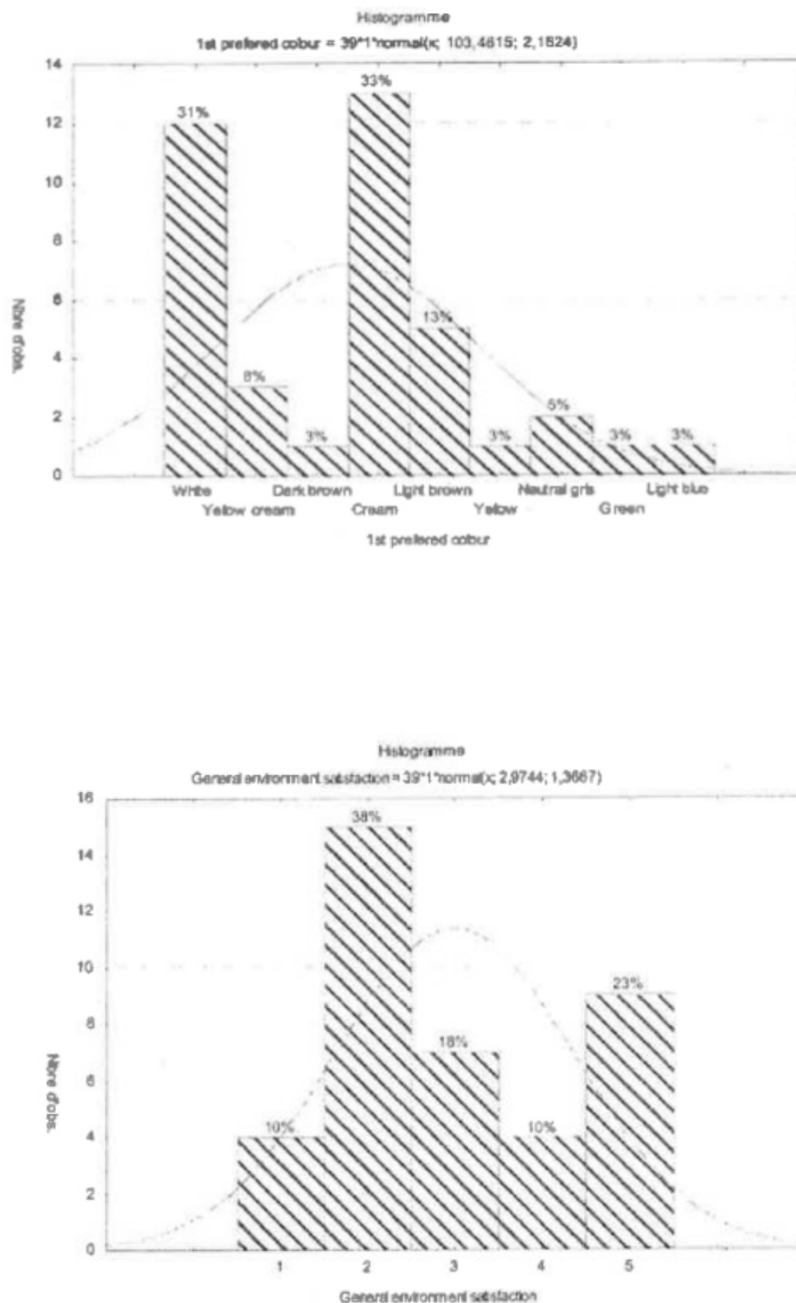


Figure 6. The office workers' satisfaction rating about the general environment (Including colours) of their offices.

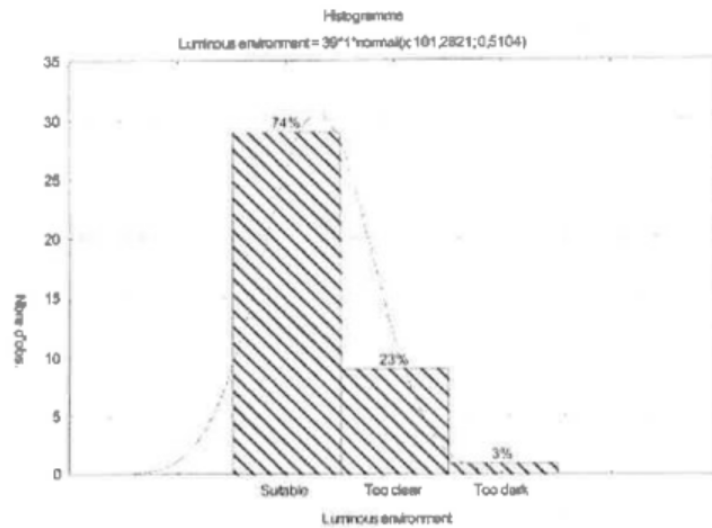


Figure 7. The office workers' evaluation of the luminous environment in their offices

A second link associating colour to daylight was revealed by another multiple correspondences analysis. This latter is applied to all various data collected by the different techniques of the Daylight POE (questionnaire, behavioural map, photometric characterization and architectural survey). This analysis shows that a luminous environment described as shiny by the office workers corresponds to various parameters including a yellow colour for the office walls (Belakehal et al, 2009) (Fig.9).

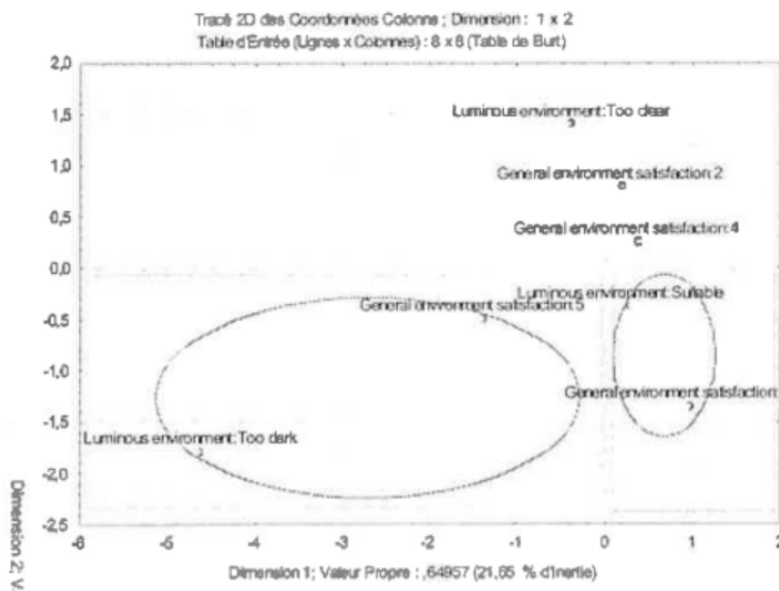


Figure 8: A graphic showing the links between the office luminous environment evaluation and the satisfaction about the office general environment (including colours)

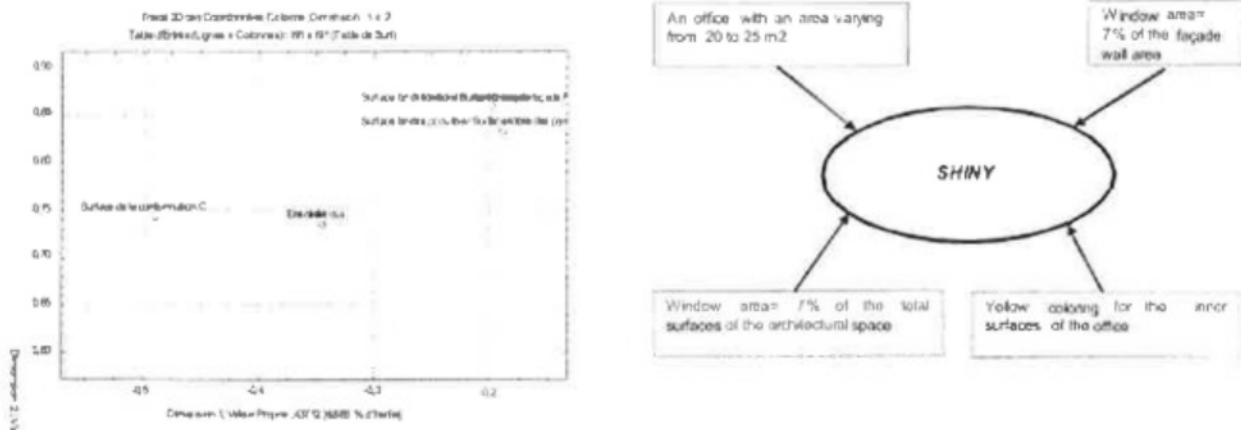


Figure 9. The translation office statistical analysis results (left) to design guidelines (right) for office ambiances: Example of the shiny luminous environment which includes the yellow colouring for the office walls.

CONCLUSION

The research outcomes reveal that colours seem not to be as important as other physical and social environmental parameters (respectively quietness, good ventilation, coolness and limited colleagues' number). The colours are perceived as a parameter involving mental wellbeing (good working ambience and relaxing) for office workers but not necessarily inducing neither physical comfort (aesthetics, visual quality, better lighting) nor improved behaviour (better productivity). The preferred colours are the clear and subtle ones. Vivid and bright ones seem not to be so attractive for the office workers. This result may be related to the general urban and architectural environment of these workers where the clear and cream colours dominate. It may also be associated to the harsh Sahara desert milieu where the CNAS building is located and from where its occupants are mainly native from.

However, the satisfaction level of the occupants about the offices' colours lets suggesting the development of such colours. This could be done by means of enrichment and variation of furniture, walls, ceiling and floor colours. Colours and light are to some extent linked from a perceptual point of view (the office workers' satisfaction). The colours could also be a component for a specific luminous ambience. This topic should be widely investigated through more abundant research works in order to found a contemporary luminous-coloured culturally specified ambiances.

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