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IN ORDER OF PRESENTATION

Effects of Environmental Colour Perception among the Elderly. A Critical Review

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ABSTRACT

This study analyses 37 previous colour studies published in AIC Congresses and Meetings from 2002 to 2015. They are selected from various disciplines discussing about colour perception and visual cognition in the Elderly. Focusing on how could the results of these studies affect ageing population in physical environments, as residential architecture or care homes. The study reviews factors such type of setting, method of assessment, type of colors and type of context. How would an interior space change someone's well-being? Could colour schemes influence someone's spatial perception in a particular way?

1. INTRODUCTION

With reference to the several stages of life, the perception of colour in persons changes with age: it is a well known fact that children watch and react to strong contrasts (Torres Barchino, Serra Lluch, and Delcampo Carda 2015). When they grow up, they react to subtler shapes. Later, in adolescence, their reactions and responses to colour mature and are more defined (Millicent 1995). In the third age, emphasis should be made on the fact that there is a loss of pigment in the eye cones (Gramunt Fombuena 2010) and the lens become yellowish (Baget i Bernàldiz and Fontoba i Poveda 2013). Therefore, the reality of older people's colour-schemes becomes yellowish and, as a result, environmental colour perception is altered.
Nevertheless, due to vision complexity, colour among the elderly has been assessed on limited occasions. Until what point is there a loss in the ability to perceive colour and how should we act taking into consideration these facts?

2. METHOD

As part of our review, in this paper a summing-up of recent chromatic experiments about colour perception among the elderly is carried out. This paper has managed to summarize 37 researches on colour related to various perspectives published in AIC Congresses and Meetings and dated from year 2002 to 2015.
Secondly, it discusses how is colour perception in elderly by identifying conclusions obtained throughout the analyzed experiences in order to find its significant impact on ageing population. Factors such as type of setting, method of assessment, type of colours and type of context are reviewed. According to this, we seek to increase knowledge of this field of study.
Finally, this paper concludes by arguing how colours or coloured environments may influence residential spaces for the elderly's colour perception; causing certain behavior; creating negative or positive perception to surroundings and task given; and influencing self- sufficiency and well-being.

3. DISCUSSION OF RELATED RESEARCH

The present table summarizes in a clear and concise way the 37 previous research studies analyzed, focusing in research methods, colour discipline studied and categories of variables featured.

Author	Type of context	Context setting			Assessment Method					
		Actual	Made-up	theoretical	Environment	Psychology (emotion, colour	Physiology- age effects (desaturat,	Physiology- illumination	Physiology- colour discrimination- naming- contrast	
009)	Residential-housing			x	x			x	x	
o Gomes and Lott Daré 2011)		x			x			x		
her 2002)				x	x			x		
ng, Seo and Lee 2015)		x			x			x		
2009)	Elderly visual changes		x				x		x	
et al. 2015)			x				x	x		
2003)			x				x	x	x	
ri 2003)			x				x			
ri 2005)				x			x			
et al. 2003)				x			x			
er et al. 2009)			x				x		x	
t al. 2003)	Cataract vision		x		x		x		x	
009)		x	x		x		x			
ke et al. 2009)			x				x	x		
, Ikeda, and Shinoda 2003)			x					x	x	
et al. 2005)			x				x	x	x	
et al. 2007)		x			x		x		x	
et al. 2008)			x				x	x		
im, and Lee 2012)			x		x			x	x	
ssamee et al. 2007)			x		x			x		
et al. 2003)			x				x			
, Okajima, and Funai 2005)			x		x			x		
009)	Chromatic light		x		x			x	x	
-Minoda et al. 2009)			x		x		x	x		
11)			x		x			x		
l. 2011)	Colour emotion					x				
oto et al. 2007)	Colour communication (signs, object, typography…)		x					x	x	
oto 2007)			x		x	x				
im, and Lee 2011)		x		x	x				x	
o 2009)				x			x		x	
o and Moreira Da Silva 2013)			x						x	
ksamsuk 2015)			x					x	x	
2003)			x					x	x	
07)			x		x	x				
rawongphana et al. 2013)		x						x	x	
omcheepsawat 2015)			x						x	
Bodrogi, and Schanda 2008)	colour harmony		x			x			x	
)		6	26	6	16	4	16	20	19	4
research studies		16,2	70,2	16,2	43,2	10,8	43,2	54,1	51,4	10

"able 1. Research summary from the review about colour perception in the elderly.

The analysis of the literature shows several significant factors that should be pointed out -necessarily brief, but we have confident that it has an enough overall picture- as below.

3.1 Made up or actual context setting

Firstly, 70,2% of the research studies had been carried out in made-up or simulated settings. An actual environment is important to provide an actual state of the subjects for better understanding. Thus, in actual setting, subjects probably behave normally and this will contribute to obtain more accurate findings.

3.2 Light and colour

Secondly, it is found that 54% of the studies have shown the importance of light. Illu-

mination is introduced as a changeable factor of their experiments and it allows for creating the experienced atmosphere. Light and colour are inseparable for the visual experience of space.

3.4 Architectural environment evaluation

Interestingly, this review has found only (4) studies focused on residential/housing for the elderly. Nevertheless, it is found that 43,2% of the studies take the effect of the environment into consideration. This fact demonstrates that architecture and interior spaces are present in most experiments. Thus, architectural colour environments are considered an essential factor in order to obtain reliable results. It is relevant to note how indispensable is this factor but researches focusing on architecture for the elderly are scarcely studied.

3.5 Number of participants

The literature review also has revealed that in 56,7% of the research studies have participated between 2 and 50 subjects. In over two thirds of those have participated between 2 and 23 subjects. Only in 10,8% of the research studies reviewed (4) have participated between 50 and 100 subjects. It should be noted that there are only two researches in which participate a large number of subjects, specifically 185 subjects (Fu et al 2009; Wuerger et al 2009). In order to carry out a research that represents a population characteristics, as the elderly population, and to obtain applicable results to this population, it seems logical to think that a substantial number of subjects that participate in the research is required.

4. CONCLUSIONS

In conclusion, this paper attempts to justify theoretically the effects of colour on elderly people through real experiments of literature analysis from several disciplines that demonstrate the high level of importance about colour, light and elderly. As it has been shown, the analysis of the literature make as believe that more studies in actual settings are required and be adapted in further steps of current research, this fact could allowed the participation of a greater number of subjects. Furthermore, most old people in interior spaces, as care homes, are affected by a whole range of visual impairments. The most common problems could affect the design of build environments for seniors, this is why these impairments need to be understood through empiric experiments. Understanding colour perception effects of ageing is necessary because they may all have a profound influence on the way in which older people perceive their environment. Thus, the way of they use their spaces must be adjusted in the formulation of these impairments throughout any design strategy, in order to magnify or minimize the elderly people spatial difficulties. Therefore, the future research direction should be to study on the relationship between environmental colours in interior architecture and the physical (visual comfort), mental (stimulation) and spatial (self-sufficiency) wellbeing of the elderly with a subsequent design of new addressed and complete built environments.

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REFERENCES

Baget i Bernàldiz, M., and Fontoba i Poveda, B. 2013. Información y consejos para promover la salud visual en personas mayores. Fund. Agrup. Inst. l'envelliment la UAB.
Gramunt Fombuena, N. 2010. Memoria y otros retos cotidianos: vive el envejecimiento activo. Obra Social.
Millicent, G. 1995. Psychoneuroimmunology. In Innovations in healthcare design : selected presentations from the 1st 5 Symposia on Healthcare Design, ed. S.O. Marberry. N.Y: Van Nostrand R., p. 115–120.
Torres Barchino, A., Serra Lluch, J., and Delcampo Carda, A. 2015. The Colour of Light for Childhood Education Centers, Spaces for Better Learning. In BIGlights. Light: Science, technology and emotions, Valencia: Universitat Politècnica de València, p. 30–34.

REFERENCES IN AIC CONGRESSES | FROM 2002 TO 2015

In *AIC Color 2002, Proceedings*, eds. V.Golob, S.Jeler, and Z.Stjepanovic. Maribor: Univ. of Maribor
Oberascher, L. 2002. Colour and Light: Orientation and Well-being in Health Care Facilities, p. 48–54.
In *AIC Color 2003, Proceedings*, ed. A. Hansuebsai. Bangkok: Chulalongkorn University
Ikeda, M., Obama, T., Kusumi, A., Shinoda, H. 2003.Color appearance of color charts observed with a cataract experiencing
Kusumi,A., Ikeda,M., Shinoda,H. 2003. Duality of Color Perception with Colored Eyeglass for Different Color Appearance
Okajima, K. 2003. Color Perception of the Elderly -Basic Researches and Applications-, p. 413–416.
Sagawa, K. 2003. Age-related Luminance and span of categorical colours for designing visual signs for older people, p. 431
Shinomori, K. 2003. Age-related changes in temporal characteristics of achromatic and chromatic channels, p. 426–430.
Suzuki, T., Yi, Q., Sakuragawa, S., Tamura, H., and Okajima, K. 2003. Comparison of Response Speed to Color Stimuli bet
Young Adults with and without Filters Simulating an Aged Human Lens, p. 442–446.
Werner, J. S., Delahunt, P., Ma, L., and Webster, M. A. 2003. Renormalization of Color Mechanisms Across the Life Span,
In *AIC Color 2005, Proceedings*, eds. J. Nieves and J. Hernández. Granada: Int. Colour Association
Obama, T., Ikeda, M., Sagawa, K., and Shinoda, H. 2005. Range of similar colours with and without cataract experiencing g
Shinomori, K. 2005. Ageing effects on colour vision -Changed and unchanged perceptions-, p. 7–12.
Suzuki,T., Okajima, K., Funai,T. 2005. Development of senile miosis simulator adapting to variable illum. in colour environ
In *AIC Color 2007, Proceedings*, eds. G. Ye and H. Xu. China: Color Association of China
Kawamoto,K.,Wake,T.,Yasuma,T. 2007.The Difference of Categ.Color Percep. between Young Adults, Elderly(...)and Col
Miyamoto, M. 2007.Comparative study of evaluation structures to the interior color coordination between elderly and young
303.
Obama, T., Pungrassamee, P., Ikeda, M., and Haocharoen, P. 2007. Effect of Haze of Cataract Eye to Color Perception of El
Pungrassamee,P., Ikeda,M., Haocharoen, P.,Obama,T. 2007. Effect of Environment Light on Color Appearance with the (...)
Sato, M. 2007. Intergenerational Study on Image of Color concerning Interior Elements in a Living Space, p. 304–307.
In *AIC Color 2008, Proceedings*, eds. I. Kortbawi, B. Bergström, and K. Fridell. Stockholm: The Swedish Colour Cent
Obama,T., Pungrassamee,P., Ikeda,M., Hansuebsai, A. 2008. Size Effect for Color Appearance with Foggy Goggles (...)Eld
Szabó,F., Bodrogi,P, and Schanda, J.2008. Colour Harmony Impression of Young and Aged Observers, p. n51.
In *AIC Color 2009, Proceedings*, eds. D. Smith, P. G. Armytage, M. Pope, and N. Harkness. Sydney: The Colour Soci
Burke, T. 2009. Tonal Contrast in Ambulant Dementia-specific Residential Environments
Fu, C., Xiao, K., Karatzas, D., and Wuerger, S. 2009. Changes in Colour Perception with Ageing.
Ikeda, M. 2009. A neglected but an important Color Perception of Elderly People.
Inoue, Y. 2009. Effect of Chromatic Light on Detail Identification, Color Distinction and Impression of Lighting Space.
Kimura-Minoda,T., Yamashita,T, and Ayama, M.2009. Glare Evaluation of Color Led for Young and Elderly.
Katemake,P.,Wijirudee,W.,Ikeda,M., Pungrassamee,P.2009. Legibility of the Eld. under Mesopic and Photopic Vision with lo
Pinheiro, M. C. 2009. Colour Design and Aged Vision.
Wuerger, S., Fu, C., Xiao, K., and Karatzas, D. 2009. Colour-Opponent Mechanisms are not affected by sensitivity changes
In *AIC Color 2011, Proceedings*, eds. V. Schindler and S. Cuber. Zurich: pro/colore.
Caramelo G., C., and Lott Daré, A. C. 2011. Light, Colour and Texture: The Appeal of the Senses to Improve Independence
Ou,L., Luo, M.R., Sun,P., Hu, N., and Hung-Shing,C. 2011. Age effect on colour emotion: An examination by looking into
responses
Park, J,Kim, S,and Lee,J.2011. Research on the Elderly People's Color Distinction scope subsequent to Color.
Yim, O. 2011. Analysis on color perception characteristics of senior people by the method of decreasing color differences.

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