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Professional Culture of the Specialist of the Future

**THE MUNSELL COLOUR SYSTEM IN THE PROFESSIONAL
CULTURE OF ENVIRONMENTAL COLOUR SPECIALISTS**

Verena M. Schindler (a, c), Yulia A. Griber (b, c)*
*Corresponding author

- (a) Art and Architectural Historian, Post Box 504, 8702 Zollikon, Switzerland, vmschindler@yahoo.com
(b) Smolensk State University, Przewalski st., 4, Smolensk, Russia, julia_griber@mail.ru
(c) Co-Chair of the AIC Study Group on Environmental Colour Design

Abstract

The paper's aim is to examine how the Munsell Colour System has been used around the world to support the development of environmental colour research, to teach colour, and to communicate colour specifications in environmental colour design. The study explores the data collected from two different sources. First, an online survey of colour professionals was carried out from November 2017 through March 2018 in order to gauge their experience with the Munsell Colour System, the total sample size being 202 respondents (86 males and 116 females) from thirty-five different countries located in North and South America, Europe, Asia, Africa, and Australia. Second, the study used quantitative content analysis to investigate the meanings, themes and patterns of how the Munsell Colour System is applied in environmental colour design. To understand the main ways the Munsell Colour System is used both in theory and practice, we reviewed the *AIC (Association Internationale de la Couleur) Congress and Meeting Proceedings* over a ten-year period from 2008 to 2017. From a total of 2,122 papers published in the *Proceedings* books, we selected 314 that reported the use of the Munsell Colour System and examined them from the perspective of cross-cultural differences and variations with time.

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Keywords: Colour specialists, environmental colour design, Munsell Colour System, professional culture.



1. Introduction

The Munsell Colour System is a common tool for providing a colour standard in art, industries and different scientific disciplines. Since the early decades of the twentieth century, when Albert Henry Munsell explained its theoretical structure and published the first coloured paper samples (Munsell, 1913), Munsell colours developed into an internationally recognized instrument for colour specification and matching, that can be learned and used with minimal training.

Today the Munsell Colour System is still one of the most popular colour systems that finds wide application in spectrophotometric and colourimetric analysis, the film industry, the design and fashion industries, soil-profile characterization, and identification of skin, hair, and eye colour (Nickerson, 1977; Landa & Fairchild, 2005; McLeary, 2013; Cochrane, 2014; Nemesics & Caivano, 2015).

However, there is little knowledge regarding the status of the Munsell Colour System in the professional culture of environmental colour design specialists (Spillmann, 1985; Billmeyer, 1987). Even less research has examined the use of the system from the perspective of cross-cultural differences and variations with time. The current study aims to address this gap.

2. Problem Statement

Since its inception in the 1940s, the concept of environmental design has undergone numerous changes in its semantics. The meaning of the term evolved: from denoting human interactions with the natural environment and humans' impact on it to specific interior and lighting design projects and nature friendly strategies of ecological design as well as to targeting measures to create comfort and ambiance (Caivano, 2006; Schindler, 2017; Griber, 2017; Ulyanova, Sidorchuk, & Sosnina, 2017; Spihunova, Rabosh, Soldatov, & Deniskov, 2017).

As the field of environmental design developed, the range of professions focused on colour as a means of interior and exterior design also drastically increased and expanded. Currently, the community of environmental colour specialists is extensive and encompasses – alongside colourists and colour consultants – design professionals, architects and urban planners, as well as educators, representatives of science, art, and industry. Despite the different origins of the disciplines, ways of professional socialisation, types of organisational settings, forms of employment, and social milieu, together, the members of all these professions form a single professional group and share similar sets of implicit rules, values, and attitudes. They understand and practice specific disciplinary ways of thinking or “habits of mind” (Chick, Haynie, & Gurung, 2012, p. 2) and are based on the unique “signature pedagogy” (Shulman, 2005, p. 52) that frames their professional culture. Defined as “a form of [professional] life which is comprised of a cluster of material and symbolic practices organized around a body of specialized knowledge, shared by a group of qualified practitioners” (Hong, 2001, p. 3), the professional culture of environmental colour specialists encompasses as a universal element (Evans, 2008; Iarskaia-Smirnova, 2014; Abramov, 2016) distinct patterns of using diverse colour order systems.

In contemporary environmental colour design numerous colour systems co-exist that “seek to include all colours in a topological model, giving a specific position to each colour and proposing some kind of logic that determines the whole organization” (Nemesics & Caivano, 2015, p. 1). They are based on various principles, have different notations, and unequal pragmatic and commercial purposes (Stromer,

2002; Spillmann, 1985; Spillmann et al., 2009). Despite the fact that no particular colour system is accepted within environmental design as a universal standard, some systems are more useful than others for certain specific problems (Silvestrini & Fischer, 1998; Dayneko, 2014). Moreover, colour systems are popular to various degrees in different countries and from one time period to the next (Kuehni, 2003; Kuehni & Schwarz, 2008).

3. Research Questions

The present paper aims to examine how the Munsell Colour System has been used around the world to support the development of environmental colour research, to teach colour, and to communicate colour specifications in environmental colour design.

4. Purpose of the Study

The study is designed to examine data collected from two different sources. First, an online survey of environmental colour design professionals was carried out from November 2017 through March 2018 in order to gauge their experience with the Munsell Colour System. Second, the study used quantitative content analysis to investigate the meanings, themes, and patterns of how the Munsell Colour System is applied in environmental colour design.

5. Research Methods

5.1. Participants of the online survey of environmental colour design professionals

Participants in the online survey were recruited through an AIC (Association Internationale de la Couleur) Study Group on Environmental Colour Design (SG ECD) publicity campaign. The project was publicized internationally through the Study Group mailing list and website, social media channels (Facebook and Twitter), as well as through the partner organisations (AIC Study Groups on the Language of Colour (LC) and Colour Education (CE) as well as the Inter-Society Colour Council (ISCC)). In addition, SG ECD members forwarded the survey to their contacts. Participants were surveyed with the help of an online form and were required to be environmental colour professionals.

5.2. Survey instrument and measures

The survey collected data in a standardized form. The design, wording, order of questions, and the response categories for each question were drawn from brainstorming ideas.

The cover letter of the questionnaire included information about the aims of the study, potential benefits resulting from the survey, details of what will happen to the information provided as well as the contact names and addresses of the researchers.

The questionnaire included four closed questions with pre-coded response options:

- (1) Have you ever used the Munsell Colour System in your research?
- (2) What was the focus of your Munsell Colour System research?
- (3) Which other colour systems have you used in your research?
- (4) Do you plan to use the Munsell Colour System in your future projects?

Questions 2 and 3 were multiple-choice questions in which participants were asked to select all responses that apply. These two questions also allowed an “Other” response followed by free text.

In addition, the survey collected social and demographical information about age, gender, country of residence, highest level of education, and occupation.

The questionnaire was initially tested for length and clarity on a pilot sample of members of the target population. Before its release the questionnaire was modified. The final survey was built and administered online using Google Forms, a tool within Google Drive for creating online survey forms.

5.3. Content analysis, materials and procedure

To understand the main directions of the use of the Munsell Colour System both in theory and in practice, we reviewed the *AIC (Association Internationale de la Couleur) Congress and Meeting Proceedings* over a ten-year period (between 2008 and 2017).

The codebook that we created for this study specified five areas to be coded. First, we determined if a paper was relevant to the study. If the Munsell Colour System was not used directly in the research, the paper was coded as not relevant and withdrawn from the further analysis. Relevant documents were then coded in the second area. Here we determined if it was connected with environmental colour design or not. Two additional categories that were coded at this stage included the countries of the authors and the year the paper was published. Finally, papers that specifically used the Munsell Colour System in environmental colour design theory or practice were coded in a final, fifth area. This was the key category of the study. Here we categorized the main focus of the research into the following sub-categories:

- (1) Interior;
- (2) Exterior;
- (3) Analysis of an Existent Environment;
- (4) Colour Planning;
- (5) Colour Design;
- (6) Colour Research Experiments;
- (7) Colour Theory;
- (8) Teaching Colour;
- (9) Other.

The coding scheme was developed deductively. To generate a list of coding categories we used a theoretical model of environmental colour design research (Schindler, 2017) and looked back at how the concept of environmental colour design has unfolded since its inception.

All the documents were analysed by the authors. To ensure the consistency of coding, we developed a coding manual, which included category names, their definitions, rules for assigning codes, and examples (Weber, 1990).

5.4. Data analysis

The data from the online survey of colour professionals was collected and collated automatically. Descriptive statistics, such as frequency counts, were used to summarize findings from the sample. Statistical analysis was completed in SPSS.

The case study method and detailed contextual analysis in depth of a number of cases employing the Munsell Colour System was implemented to reveal the impact of this colour system on environmental design on all scales of urban space. The fractal approach was used as a tool to understand the environmental colour design as a system (cf. Mandelbrot, 1975, 1982; Gleick, 2008; Zhukov & Lyamin, 2016).

6. Findings

6.1. Survey participant characteristics

The total sample size of the online survey respondents was 202 (86 males and 116 females) from thirty-five different countries located in North and South America, Europe, Asia, Africa, and Australia (Figure 1).

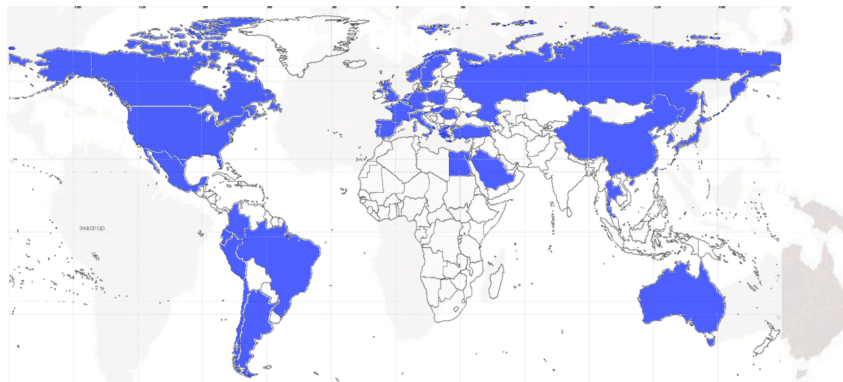


Figure 01. Geography of the online survey of colour professionals

Participants were classified into three age groups: under 25, 25–50, and over 50 years (Figure 2, left). More than one-third of the respondents (39%) held a doctoral degree, 28% a Master’s degree, and 18% a Bachelor’s degree. A further 14 % had different professional degrees (MD, JD, etc.) (Figure 2, right).

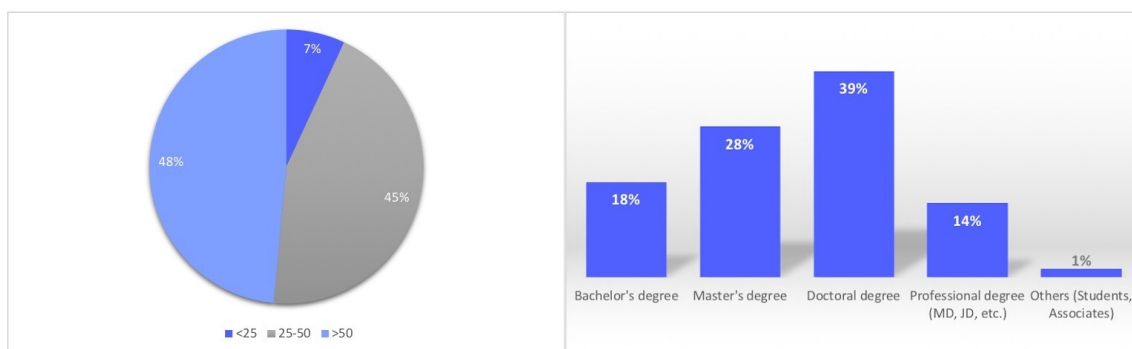


Figure 02. Participant age (left) and highest level of education (right)

Focused around a specific interest in colour as a means of environmental design, the range of professions of the survey participants was extensive and included colour consultants, architects, landscape planners, artists, designers, art historians, psychologists, educators, managers and directors of colour-related institutions, engineers, professionals with medical training, and more.

6.2. Socio-demographic profile of the Munsell Colour System users

Two-thirds of the survey participants (66%) from thirty-two different countries reported some prior experience with the use of the Munsell Colour System in their research (Figure 3, left). The overwhelming majority of colour professionals who did not use the Munsell colours resided in South America (44%) and Europe (38%) (Figure 3, right).

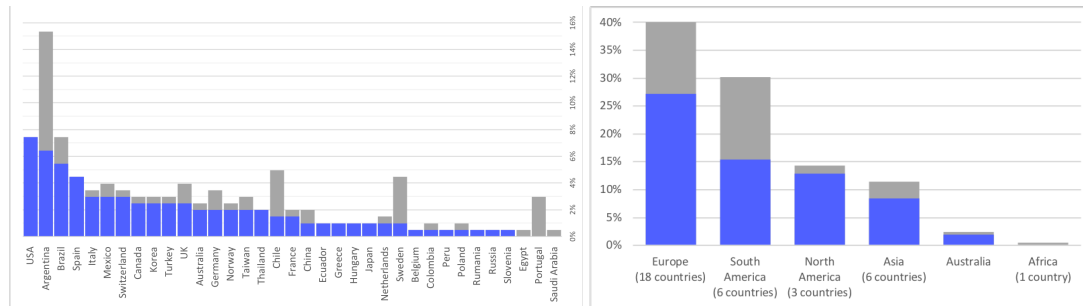


Figure 03. Experience with the use of the Munsell Colour System reported in different countries (left) and across continents (right); the total number of participants is coded in grey

This study did not reveal the existence of a sufficient correlation between the gender of colour professionals and their experience with the use of the Munsell Colour System ($\chi^2=0.508$, $p<0.05$). However, there were variations identified across age groups and participants with different levels of education (Table 1). The Munsell Colour System was more likely to have been used among participants over 50 years of age (59%) compared to those in the 25–50 age group (37%) and the under 25 years age group (5%) ($\chi^2=16.725$, $p<0.01$). Colour professionals with Doctoral and Master’s degrees used the system more frequently (48% and 23% respectively) than respondents with different educational qualifications ($\chi^2=13.277$, $p<0.01$).

We also measured the popularity of the Munsell Colour System between representatives of various professions (Figure 4, left). Our analysis revealed that it was more often used by colour consultants, technicians, educators of all levels (school teachers, university professors, and lecturers), researchers and scientists, artists, and architects than it was by students, landscape architects, managers, and directors of colour-related institutions.

Table 01. Gender, age and education of the Munsell Colour System users

	Response Categories	Have Used the Munsell System	Have not Used the Munsell System	Total
Gender	Female	74	42	116
	Male	59	27	86
Age	<25	6	8	14
	25–50	49	41	90
	>50	78	20	98
Education	Bachelor's Degree	19	17	36
	Master's Degree	31	26	57

	Doctoral Degree	64	14	78
	Professional Degree	17	11	28
	Others	2	1	3
	Total	133	69	202

6.3. The focus of Munsell research.

More than half (53%) the sample reporting any prior experience with using the Munsell Colour System applied it in colour teaching. Almost the same number of respondents used this system in colour theory (50%) and colour research experiments (45%). About one quarter of the survey participants (28%) applied the Munsell Colour System in colour design. One-fifth of the colour professionals used it in colour analysis of an existing environment (20%) as well as in interior and exterior solutions (20% and 17% respectively) (Figure 4, right).

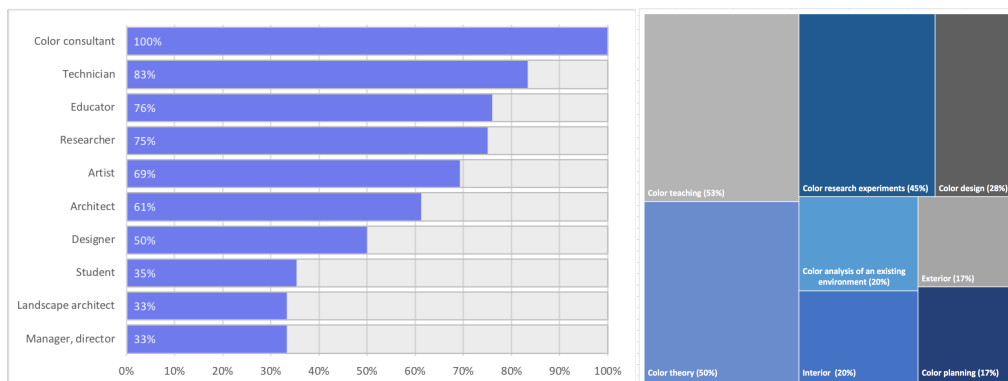


Figure 04. Popularity of the Munsell system considered between representatives of various professions (left) and the focus of Munsell research (right)

6.4. Experience with other colour systems.

Only one quarter of the surveyed colour professionals (25%) reported the use of one single colour system in their practice (Table 2). Most of them used Pantone (9%) or Natural Colour System (8%). The overwhelming majority of those surveyed applied two and more colour systems.

Table 02. Experience with colour systems and collections

Color System Used in Prior Research	%
Only Pantone Colour System	9 %
Only Natural Colour System (NCS)	8 %
Only Munsell Colour System	5 %
Only CIE	1 %
Only RGB	1 %
Only Coloroid	1 %
Two and more colour systems	75 %

The list of colour systems named by participants included twenty-one different colour standards. In this Munsell Colour System Survey, the most frequently indicated colour systems were the Munsell Colour

System (66%), the Natural Colour System (NCS) (61%), and Pantone (50%) (Figure 5, left). The top ten rating in terms of popularity also included RAL, the Practical Colour Coordinate System (PCCS), CIE, Coloroid, the Ostwald Colour System, OSA-UCS (Optical Society of America Uniform Colour Space), and RGB.

Almost half of the survey participants (46%) expressed the wish to use the Munsell Colour System in their future projects (Figure 5, right). Only 15% of colour professionals do not plan to use this system in their work. The study revealed a sufficient correlation between the previous experience of respondents with the Munsell Colour System and their willingness to work with it later. Those who have already used the Munsell Colour System in their research responded more enthusiastically to the prospects for its continued application in their future projects ($\chi^2=37.389$, $p<0.01$).

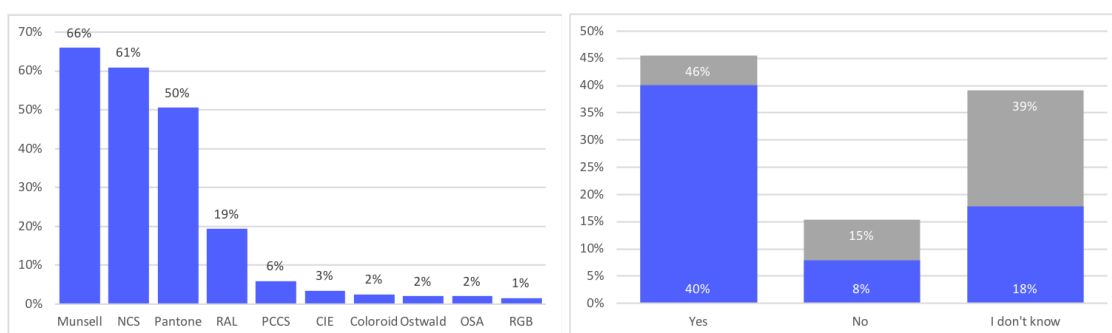


Figure 05. Frequency of use of different colour systems (left) and willingness to work with the Munsell colour system in future projects (right); the number of participants with prior experience with the use of the Munsell Colour System is coded in blue (as a percentage of the total number of online survey participants)

6.5. Frequency of use of the Munsell Colour System in the AIC research

In order to measure the popularity of the Munsell Colour System in the Association Internationale de la Couleur (AIC) research, we conducted content analysis of 2,122 papers published in the ten *Proceedings* books of the AIC spanning a period from 2008 to 2017. Documents were retrieved from the *Proceedings of AIC Congresses and Meetings* database available at the Association Internationale de la Couleur web page (<http://www.aic-colour.org/congr.htm>). It is worthwhile noting that the real quantity of articles included in each of the books in many cases differed from the quantity specified in the Conference program or *Proceedings'* introduction, e.g., the *AIC 2009 Proceedings* include 251 papers, but seven papers appear twice, and in the AIC Conferences web page the total number specified is 238 papers, because many authors did not show up at the conference. The *AIC 2014 Proceedings* do not include all the papers, because they were published as a book after the conference and were not intended to be the *Conference Proceedings*. The *AIC 2016 Proceedings* do not mention the invited speakers nor do they include an abstract or paper by them.

First of all, from the total number of 2,122 papers, we found 314 papers reporting the use of the Munsell Colour System either in theory or practice. Across all the papers mentioning the Munsell Colour System, the greatest number was written in 2011 (21%), 2017 (18%), and 2009 (17%) (Figure 6).

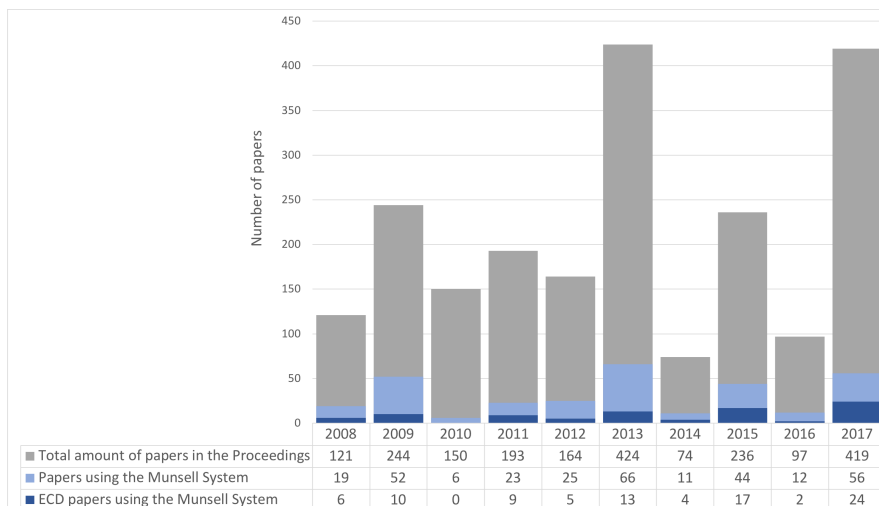


Figure 06. Number of papers in the Proceedings books of the Association Internationale de la Couleur published in the years 2008–2017

Secondly, we reviewed all the 314 selected papers for their relevance for environmental colour design and found ninety relevant documents that we included for coding in the other categories listed in Section 5.3. Almost two-thirds of them were written in 2017 (27%), 2015 (19%), and 2013 (14%).

Finally, we classified the content of these ninety papers in terms of their environmental colour research goals, instrumentation, and focus and then traced their changes across time and countries (Figure 7).

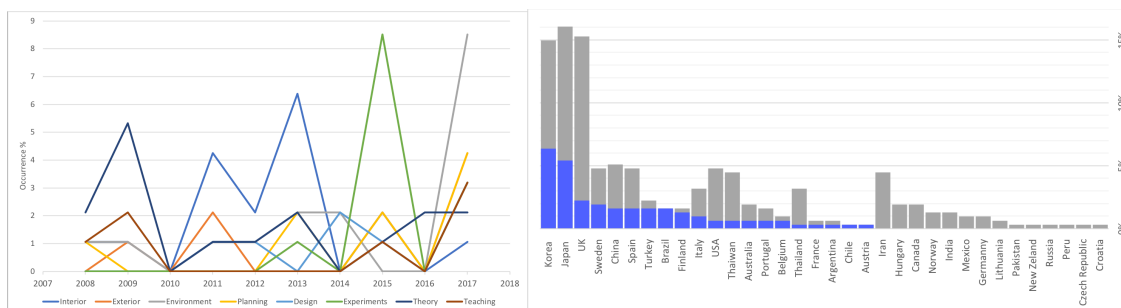


Figure 07. Changes over time in the content of papers applying the Munsell Colour System in environmental colour design (left) and geography of the authors of AIC papers, using the Munsell Colour System (right). The number of authors from each country is coded in grey; the number of authors who applied the Munsell Colour System in environmental colour design is coded in blue

7. Conclusion

This study found that various colour professionals and scholars from a wide range of disciplines employ the Munsell Colour System in their work and research. Our findings confirmed the popularity and extensive use of this tool for providing a colour standard in contemporary environmental colour design.

In the professional culture of environmental colour design specialists, the Munsell Colour System co-exists with the Natural Colour System (NCS), Pantone, RAL, the Practical Colour Coordinate System (PCCS), CIE, Coloroid, the Ostwald Colour System, OSA-UCS (Optical Society of America Uniform Colour Space), RGB, and other internationally recognized instruments for colour specification

and matching. The interrelationships among the systems and patterns of their usage significantly correlate with social and demographical information about age, country of residence, highest level of education, and occupation of the environmental colour professionals.

An interesting outcome is that the highest number of ECD papers using the Munsell Colour System appears at AIC 2017 in Jeju (Korea), followed by AIC 2015 Tokyo (Japan). This fact is in line with our findings concerning cross-cultural differences and the use of the Munsell Colour System and different experience with this colour tool reported in various countries and across continents.

Our study did not reveal the existence of a significant correlation between the gender of colour professionals and their experience with the use of the Munsell Colour System. However, concerning the age of those surveyed, the results show a tendency towards professionals over 50 years of age using the Munsell Colour System more frequently than younger people. As well, almost half of the survey participants holding advanced degrees use the Munsell Colour System in their research. This situation confirms a potential lack of knowledge about colour systems among students of environmental colour design and architecture that should be addressed (Janssens & Mikellides, 1998). To disseminate knowledge about the relevance of colour in the design process and to establish a theoretical and practical basis for cross-cultural discussions concerning integrating colour in the planning and realization of the built environment has been one of the main goals of the Study Group on Environmental Colour Design of the International Colour Association since its creation in 1982.

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