Urban Furniture as an ergonomic factor, through a new color planning methodology

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ABSTRACT

This chapter approaches the color application to urban furniture as an ergonomic factor, bearing in mind that a pertinent color application to urban furniture can ameliorate its use. For this purpose a new methodology is presented, which aims to create color plans for urban environments, allowing urban furniture to stand out from its background, contributing for their better legibility, and transforming them in identification elements that will improve the orientation within the cities. The development and implementation of the new methodology will allow the determination, with a higher scientific approach and rigor, of the color planning to be applied to urban furniture in each district or urban area, of a city. This methodology will be developed through an active research, focused in case studies, including three Portuguese cities with different specifications. For each city will be defined samples areas which will encompass the most representative city zones and, there, the new methodology will be applied to all urban furniture elements, in order to validate the results and the new city color planning.

Keywords: Color, Urban furniture, Methodology, City planning, Orientation, Visibility, Disabled people, Ergonomics.
INTRODUCTION

This chapter aims to present the development of a methodology which purpose is to establish the importance of a pertinent and structured color application to urban furniture, which will make possible to create color plans for urban environments, allowing urban furniture to stand out from its background, contributing for their better legibility, and transforming them in identification elements that will improve the orientation within the cities. The development and implementation of the new methodology will allow the determination, with a higher scientific approach and rigor, of the color planning to be applied to urban furniture in each district or urban area, of a city. The new methodology will be developed through an active research, focused in case studies, including three Portuguese cities with different specifications. For each city will be defined samples areas which will encompass the most representative city zones and, there, the new methodology will be applied to all urban furniture elements, in order to validate the results and the new city color planning.

SUBSTANTIATION

This project has sought to apply color to urban furniture in a way that originates a system which will function simultaneously as an identification factor for the different city quarters and as an orientation factor for its inhabitants and visitors. In parallel, color application to urban furniture will also become an inclusivity factor, by incrementing these elements visibility.

Urban furniture isn’t a simple ensemble of decorative elements to embellish the city, it must accomplish an amount of functional requirements in order to assure its functionality and fulfill the population needs, facilitating their lives and contributing to their comfort. So, when urban furniture accomplishes its functions, it contributes to protect the health and well-being of the city inhabitants; facilitates the accessibility and use to people with visual or motor difficulties; reinforces the local identity, representing a formal family that is coherent and values the surroundings (Águas 2003). However, while recognizing its necessity, the urban furniture functional possibilities have not been used to their fullest extent, and the choice of its color or form only rarely obeys to a logic thought.
The connotations of color with the understanding of the environment have already been considered on its applications to architecture. However, these concerns rarely are extended to urban furniture plans, despite multiple warnings about their lack of visibility made by various authors.

**Inclusive Design / Ergonomic Design**

“Inclusive Design is a way of designing products and environments so that they are usable and appealing to everyone regardless of age, ability or circumstance by working with users to remove barriers in the social, technical, political and economic processes underpinning building and design”. (DPTAC 2003)

Concerning urban furniture, this definition may be applied to Ergonomic Design, as it implies the adaptation of all its elements to the city’s population needs, erasing, as much as possible, the differences between disabled and undisabled people, and contributing to the amelioration of everyone’s quality of life. The objective of an ergonomic design must be considered as an “interaction between the individual and the environment”, and “can be described in terms of personal control that can be exerted by the individual over the environment” (Brown, Bayer & MacFarlane, 1989 apud Brown, 1998:34). Whenever we design for disabled people, we are improving the quality of life for the entire population.

We must consider the impossibility to contemplate all the needs of people with high level of disabilities. However, adaptive environments should be designed in order to ensure that a higher percentage of the population can enjoy all the environment facilities, and the widest percentage of human beings must benefit from the improvement of visibility on urban furniture, and everyone, disabled or not, will feel more comfortable if the bus stop, the bench or the waste bin, they are looking for, stands out from the environment without the need of an accurate search. As Brown (1998:75) writes: Integration does not imply that every conceivable option open to all unimpaired people can be made equally available to every impaired person. It does demand, however, that there should be a sufficient range of options open to any impaired individual to enable him or her to function as a mature person and pursue a personal lifestyle as satisfying in its own way as his/her neighbour’s.

The estimates of Portuguese population, published by the **Instituto Nacional de Estatística** (Statistics National Institute) in June, 2014 ([www.ine.pt](http://www.ine.pt) 16-06-2014?), shows that Portuguese people live longer and, consequently, the ensemble of the population tends to age. So their requirements must be taken in account because, despite their limitations, elderly, and visual disabled people must be able to get out and about locally in order to age well and live
independently. The desire to get out does not diminish with old age and older people can continue practicing a large variety of outdoors activities if the environment allows it. On contrary, when it isn’t easy or enjoyable to get outdoors their quality of life will diminish, as well as their physical health. The difficulty to get around is often due to the environment poor design. Older and visual disabled people move about more frequently on foot and it presents big difficulties on poor design environments. Accessible open spaces, with good paths, safe crossings, plentiful seats, and visible signing will improve older people’s perception of supportiveness and safety (I’DGo:2012).

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**Previsions for 2060**

**Aging index:** Older people / Younger people = 307 / 100

Figure 1. 2014 Instituto Nacional de Estatística estimates for the Portuguese population

Inclusive and ergonomic design, in their recent development issues are primarily focused on people with motor limitations and tend to forget visual disabled people. Though, we must consider that the city population is constituted by an extensive variety of people, with different visual acuities and limitations and, also, by a high percentage of older people. Insofar as people grow older, their ability to see small details decreases and eyes have a
crescent difficulty of adaptation to sudden changes of light or a quick change in focus. Bearing in mind the visual limited population, only a small percentage is unable to see any color and the main part is able to distinguish luminosity differences (Lindemann et al 2004). Therefore, to have better visibility conditions, under an inclusive design perspective, urban furniture must present a good chromatic and luminosity contrast. Considering this, Per Mollerup (2005:161) states that “color can be seen from longer distances than other graphic elements” and that “in signage differentiation is the first and foremost role of color”.

**Urban Furniture and Ergonomics**

When populations increased and towns became organized, there was a need to implant systems of elements which could offer support and orientation to the cities occupants. This systems that were institutionalized from the mid-20th century are denominated — *urban furniture* — and comprehend every element, placed on the public space, constituting a wide range that includes, among others, benches, litter bins, street lamps, bus stops, kiosks, cabinets, telephone booths, drinking fountains, bollards, and signs. The urban furniture choice exceeds aesthetic beauty, or the simple wish to decorate the city and, it must accomplish its functionality requirements in order to fulfill the population necessities, facilitating their lives and giving them comfort. So, to assure its functionality, urban furniture must protect the health and well-being of the city inhabitants; facilitate the accessibility and use to people with visual or motor difficulties; reinforce the local identity, representing a formal *family* that is coherent and values the surroundings (Águas 2003). However, while recognizing its necessity, the urban furniture functional possibilities have not been used to their fullest extent.

In fact, in order to accomplish its functions, it *needs to be seen* and an appropriate color application improves considerably its visibility. Also, when the urban furniture chromatism is the same for a city area, they may be converted in effective signage and identification elements that will contribute for a better orientation within the city.

Bearing in mind the visual limited population, only a small percentage is unable to see any color and the main part is able to distinguish luminosity differences (Lindemann et al 2004). Therefore, to have better visibility conditions, under an inclusive design perspective, urban furniture must present a good chromatic and luminosity contrast. Per Mollerup (2005:161) considers that “color can be seen from longer distances than other graphic elements” and that “in signage, differentiation is the first and foremost role of color”.

In accord with the prescriptions of the *Royal National Institute for the Blind* (RNIB), UK, pedestrian paths must be
easily identifiable and differentiate themselves from the adjacent walls. Likewise, every present objects must detach themselves from the background, in order to be recognized as obstructions. Every urban furniture element — fences, bollards, lamp posts, litter bins, benches, etc. — must present a strong color and tone contrast with the environment, because they are the most effective means of improving visibility, with tone contrast usually the more effective. A conventionally pleasing coordinated color scheme can usually be significantly enhanced with good tonal contrast (Barker et al 1995:7-51), in order to stand out and be more easily recognized, among other, by visual disabled people.

So, the application of a chromatic planning to urban furniture, may originate a system which will function simultaneously as an identification factor for the different city quarters and as an orientation factor for its inhabitants and visitors. In parallel, color application to urban furniture will also become an inclusivity factor, by incrementing these elements visibility and use.

**Ergonomic Color and Visibility**

Color on environment is not a simple element for definition and unification; it becomes a visual characteristic that stands out from the chaos and complexity of the visual field. It is, also, the easiest way to achieve the identification of the different city zones, and to promote the orientation of the population, permanent or temporary, because color is the objects characteristic which the eye first perceives, even before form or texture – that’s why color and ergonomics come together. Color utilization as a mean to show the way, has been punctually employed successful in interior and exterior spaces, therefore we could assume that a sensible and general application to urban furniture, may be a way to the successful resolution of the orientation problem within the city.

Despite a recent growing concern about color psycho-physiologic connotations and its application to the environment, color urban plans scarcely refer to color application in urban furniture and signage. In parallel, a bad use of color in urban furniture and signage systems contributes to a lack of visibility that is an impeachment to the fulfillment of their functions, as well as it is a factor of social exclusion for people with deficient and older vision.

As it was stated, in order to be used, *urban furniture must be seen* and, therefore, it must stand out from the environment. However, regardless of the fact that color is the easiest and more appropriate tool to this achievement, it is rarely used with that intention. Usually the urban furniture suppliers prone the uniformity or the color
elimination in these elements, maybe as a reaction to the excessive color multiplicity present in the city, but this solution is an impeachment to the satisfactory accomplishment of its functions.

Signage also manifests shyness on color application, presenting a dominant concern about environment integration, and, as a result, becoming less visible and unable to accomplish its function completely, and creating barriers between inhabitants with and without vision disablements. Also, signage chromatism frequently restrains itself to the form and ground contrast, the black and white achromatic contrast, or even the chromatic road standards. Although, the traffic norms were planned to long distance vision, to be seen at the speed of road car driving, and, within the city they lose visibility and confound themselves with build environment colors. Therefore they become illegible for a pedestrian population that has different degrees of visual acuity.

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COLOR AND ORIENTATION

Color, inseparable from light, is an integral part of our total sensory and perceptual experience. It not only conveys information about our surroundings, but also has great impact on our psychological reactions and physiological well-being. (Durão, 2002:162)

In nature, color often appears as a mean for protection and species conservation, constituting a defense camouflage system, or a warning, as it happens with poisonous animals and plants, whose showy color warns potential predators. Color may, also, have an attraction function that allows plants reproduction or invites the mating of numerous animals.

On their evolution, human beings have inherited psychophysiological reactions which, even if they cannot be controlled or objectively explained, make color act as a necessary mean of information, communication and comprehension of the environment, as it was stated by Michael Lancaster (1996:8): “(…) The functions of color are to attract attention, to impart information, to aid deception and to stimulate the emotions.
The orientation within the city, the problem of finding a location and (or) the way to a destination, it is not always easy to solve, regardless of the individual mode of locomotion. Several authors seek to show the way for the solution of this problem. Machnow & Reuss (1976:21) put the question of a resolution through color: “Color – architecture – cities – colorful cities – color on the urban scene – how does it all fit together? Is a colorful urban backdrop enough, will more color really change our living and working environment? This is the most basic question of all. To put it differently: Is it possible to raise a city’s visual accessibility, the quality of experience and orientation, without merely underlining its character as a huge, conglomerate consumer object?”

Modern cities usually display a color amalgam that is due not only to the diversity of its buildings, but also the profusion of multicolored advertising. This chromatic confusion tends to make their inhabitants less sensitive to particular colors. On this subject, Tosca (1994:155) asserts that publicity and traffic are chiefly responsible for the depersonalization of the urban place.

Craig Berger (2005:121) stresses that cities adapted themselves to tourism and convention centers, originating the necessity for urban orientation systems. These systems that gather tourism centers, maps, symbols and graphic indications, are intended to turn navigation within the city easier to their visitors and inhabitants.

Till the middle of 20th century, the boundaries between architecture and design were well defined, however influences from other fields, like industrial design and urban planning, cause this boundaries to attenuate and their merging came to be known as environmental graphic design. With the cities development appear complex traffic and transportation webs (networks) which caused orientation difficulties, and created the necessity to design comprehensive directional systems that could help guiding people and, simultaneously, renew their identification with the city. The usual signage and directional systems, however, are designed for a distance and fast vision that one has when driving a car on roads and highways. Within the cities, these options besides loosing visibility and merging with the building colors, are not appropriate for be seen by pedestrians because, as Minah (2005:401) states: “As a pedestrian, colours are experienced in a continually changing visual field. Planners have succeeded in achieving visual order in cities by implementing repetitive architectural typologies, zoning to form hierarchy in patterns of blocks and public spaces, and similar building heights”.

Gallen Minah (2005:401) explains that most cities which managed to control the visual order are compact historical cities where already existed a hierarchy defined among their spatial elements. Modern cities are generally more dispersed and their architectonic elements are fragmented and autonomous. Because their hierarchy is less clear,
order and harmony become difficult experiences from the pedestrian point of view. The development of the contemporary city originates great diversities and complexities in their architecture which compete for visibility. Color exceeds its function of definition and unification element and becomes a visual characteristic in the midst of the visual field complexity and chaos. The same author also states: *Colour is one of the repetitive visual elements that define the formal, spatial, and material phenomena in the city. One experiences colour in a city through its combination with, and definition of, architectural elements in the visual field.*

Color application as a mean to show a way has already been successfully used, although occasionally, in interior and outdoor spaces. Its judicious and widespread application appears to be a way to solve the orientation problem as it is alleged on Taverne and Wagenaar (1992:12) – *Cities have been considered in many different ways, in terms of town planning, architectural form, as commercial and social structures, as human organisms and circulation systems. Rarely have they been considered as colour compositions. But if we compare one with another – or different parts of one – this aspect becomes obvious.*

Concerning the orientation within the city, and the identification of its different zones, we may consider city maps that differentiate them through the use of different colors. However, on the urban physical space those colors don’t show up, and there is no concern in establishing the correspondence to a real use on this space. The ideal would be to identify the city different areas by specific colors which may differentiate them and, as well, stand out the different urban furniture elements. Despite a recent growing concern about color psycho-physiologic connotations and its application to the environment, color urban plans scarcely refer to color application in urban furniture and signage. In parallel, a bad use of color in urban furniture and signage systems contributes to a lack of visibility that is an impeachment to the fulfillment of their functions, as well as it is a factor of social exclusion for people with deficient and older vision.

A coherent and structured color application to urban furniture can act as an orientation system that will contribute to the orientation within the city and become a factor of inclusivity, especially for the visual disabled people, which constitute a large percentage of the urban population.
Orientation within cities, along with the wayfinding and signage problems and the identification of the cities’ different zones is not always easy to solve. Cities are, generally, a complex mass of roads and buildings that can show an almost monotone similitude or be extremely diversified. As Juanita Dugdale (apud Berger, 2005) stated: “Visitors and occupants were having difficulty navigating spaces on their own; they needed visual prompts to find their way around”.

The growth of cities, the transformation of medium settlements in big cities, diminished considerably the direction sense, especially in cities which architecture is more or less similar in their different quarters, and where there are a lack obvious reference points. About this subject, Charles Higenhurst (1971, apud Berger, 2005) wrote: “today we are the strangers in our towns. We do not know and cannot see how things work. Our support systems... are remote. The information supplied in the environment is largely irrelevant to our immediate purposes or to an understanding of the world in which we live.”

These conditions aroused the requirement for the installation of a wide urban furniture ensemble, as well as signage systems that could give support and orientation to the city users, showing directions and identifying places. However, these elements are not always enough to achieve thoroughly this function.

Other contemporary cities, as Gallen Minah (2005: 401) explains, originate a great diversity and complexity in architecture that fights against visibility. Color bypasses its function as an element for definition and unification, and becomes a visual characteristic within the chaos and complexity of the visual field.

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Golledge (1999:1-7) focus on the process of drawing cognitive maps by the manipulation of selective information which, despite the existence of generalized information (maps, written descriptions, etc.), allows each person to
choose the references that will help in their route marking out. He also explains that the wayfinding process depends on legibility, the ease with which a path becomes known through a pattern of nominations (indications?). Moreover according to the same author: *For successful travel, it is necessary to be able to identify origin and destination, to determine turn angles, to identify segment lengths and directions of movement, to recognize on route and distant landmarks, and to embed the route to be taken in some larger reference frame.*

In his study of three American cities, Kevin Lynch (1960) seeks to point out directions through the streets network, that in new towns may be protruding elements, but which are not in most of the European cities. He also proposes orientation through specific buildings (the corner street shop or a striking building) which in big cities, where architecture tends to become uniform, does not provide great guidance data. On the other hand, these data could only be used by the quarter’s inhabitants, or usual visitors, as they will not be recognized by whom uses the route for the first time.

Per Mollerup (2005:17) refers buildings, in several cities, which are so characteristics that become real signaling milestones. However, not every cities has buildings such as the Eiffel Tower or the Centre Pompidou in Paris, the New York Empire State Building, the Sydney’s Opera House, or even the Guggenheim Museums, so they require other systems in order to facilitate the orientation of their visitors.

**CITY PLANNING**

*Cities have been considered in many different ways, in terms of town planning, architectural form, as commercial and social structures, as human organisms and circulation systems. Rarely have they been considered as colour compositions. But if we compare one with another – or different parts of one – this aspect becomes obvious* (Taverne and Wagenaar 1992:12). However, there are several urban plans that are concerned with the application of color in the city, and some of them even consider the use of color to indicate a path, or as a mean to solve the orientation problem. Although almost all are focused solely on architecture, not encompassing urban furniture.

**Picture Turin**

The first systematized chromatic plan was designed for the Italian city of Turin, between 1800 and 1850, and published by *Consigli degli Edili*. It was constituted by a color palette with twenty colors, which were considered
the most frequent in the city, with corresponding code numbers, and the main streets and squares, which had a uniform architecture, were colored in order to show the way to the city center – Piazza Castelo – with a chromatic sequence of eight different colors to the back streets. Although it was applied to the built environment, this chromatic plan demonstrated a concern with the orientation within the city and constituted an inspired source to the establishment of other cities chromatic plans.

On the beginning of 20th century, Bruno Taut was a precursor in establishing chromatic plans for new urban areas. He believed that every architecture should be chromatic, and that color should be employed to emphasize the city zones spatial dimension, avoiding monotony and, by the color luminosity and different colors effects, allowing the expansion or the understanding of some city areas and contributing for the happiness of its inhabitants. He studied the relations between colors and forms, and between colors and the incident light. For him the main color combinations commandment was the correspondence of color and architectonic elements, in order to conjugate space and harmony. However, despite the numerous applications of his concepts, Bruno Taut ideas have not made school

Picture Bruno Taut

In Barcelona, by the final of 20th century, were experienced an environment reorganization where color took an organized role from the beginning. In 1988, Barcelona municipality developed the Barcelona Color plan Project, in exchange with educational institutions and industry, integrating color schemes on a large scale (Taverne & Wagenaar 1992:92-95)

Moscow is a city that over time often changed its chromatic characteristics, and during the communist era there was no concern with chromatism and, therefore, the city became grey. Since the 20th century eighties, a new chromatic plan was scientifically projected and applied. The new Moscow color plan is based on a chromatic analysis of its
neighborhoods and sets of streets, taking in consideration the city history and the urban structure. The city was divided in three concentric zones: the central historical zone, the intermediate zone, a "shield" area, and the new residential, suburbs zone. For each zone a list of recommendations were established with a choice of colors corresponding to the building style palette, which may not correspond to its former color (Noury 2008:98-103).

When referring city planning, we must detach the work of Professor Jean-Philippe Lenclos, who created his own methodology for urban chromatic plans. It was in Japan, in 1961, that Lenclos started to shape his *Color Geography* when he compared the Japanese and French chromatic palettes. This comparison led him to the finding of specific local colors, and it is on the determination of these colors that is based the methodology developed since 1965, where he selects samples with twenty five buildings from the chosen zone, making a systematic collection of all the existent colors and material from the sample.

This methodology constitutes an inspiration source to other authors of urban chromatic plans, and Michael Lancaster, Tom Porter, Shingo Yoshida and Grete Smedal, among others, have applied methodologies similar to the Lenclos’ *Color Geography* when creating their own chromatic plans projects.

In her project for Longyearbyen, Greta Smedal intent to prove the color importance as an identification factor for the environment, and the chromatic plan was established from the observation of the natural environment colors and the characteristic regional light. The found colors were then tuned because, as Greta Smedal alleged: “the language of nature colors can’t be directly applied to environmental projects”. So the applied colors are a synthesis of the colors found in nature (Noury 2008:84)

Michael Lancaster created chromatic plans for different zones of England, like Ilfracombe in North Devon, the city of Norwich and the River Tames waterfront. The chromatic plan for Ilfracombe was based on a survey of environmental colors during the different seasons, and a study of the existing colors in the different parts of town.
On the River Tames project, Lancaster sought to reveal the importance of a policy for color coordination in harmonic compositions in order to prevent disturbances on color applications. With this purpose, were taken in consideration the extent and the differences of the various areas of London that the river crosses, being included indications for the color application on natural and artificial materials. This chromatic plan considers a palette of background colors corresponding to the natural environment, to which were added the building materials colors of the existent industrial complexes and another palette that made contrast with the background colors (Linton 1999:151-156)

The city of Norwich was chosen as a model for a study case of chromatic plans for European cities in reason of its size, its historical richness and its location in one of the regions with the highest tradition of using the color of the British Isles. In this project Michael Lancaster used the cooperation between all stakeholders, including population queries, in order to establish a strategy based on the Lenclos Color Geography and on the regional chromatic History, with the aim of achieving a visual coherence for the city and its surroundings.

Tom Porter, when creating chromatic plans, considered color as an adaptable language for a defined context. In his work of reconstituting Oslo palette, he recorded systematically the existent colors and consulted the the Harald Sohlberg painter's work with the intention of evaluating the traditional colors. This palette, with two hundred and twenty five tones, constituted a color guide for Oslo architects.

Porter also created the chromatic plan for the city of Newhall in Essex (1995-2000), where he recorded the land and flora existing colors, as well as the specific colors of the nearby villages and farms. This palette was reviewed in 2004, becoming more focused on the building materials colors and on the mosses that coated the walls (Noury 2008:114-116).

In Tokyo, in 1994, Shingo Yoshida researched the built environment colors in order to understand color distribution and create a chromatic plan that is the result of a harmonic and subdued blend of this colors. After this first chromatic plan, others were designed to different city zones with the aim of assuring a visual harmony (Linton 1999:146-150)

Al these referred urban chromatic plans consider color applied exclusively to architecture, whilst color in urban furniture and signage is only contemplated very punctually. Nevertheless, the urban environmental chromatism consists not only on its buildings, as José Aguiar (2002:316) states: "A chromatic study cannot be restricted to the facades of buildings, although these are the most visible elements. There are many other factors that will condition
the urban image and, together, create a site specific color”.

There are orientation systems, independent from architecture, which are applied in a punctual way. Friedman and Thompson (1976:34) point out an experiment in Boston, where the rout around several monuments were marked by red lines – *The Boston Freedom Trail* – converting the confusion of this streets city in a pleasant experience. The same authors also mention an intervention from the painter Gene Davies, who decorated the path to the *Philadelphia Museum of Art* with his characteristics colored stripes that acted as a focal point for the museum facade.

A more structured project, planned to ameliorate the orientation within cities, was the *Sentieri Urbani* designed by Gabriele Adriani. In this project the pedestrian walkways were redesigned and transformed with ornamental drawings, different for each city zone, seeking to inform the users about the zone identity, tradition, history, culture and commercial activity, without neglecting the technical aspects of ergonomics and road security. This project, however, didn’t include a color application.

On the Japanese city Shiogama, the revitalization program combined signage with a chromatic identification system by means of two fundamental elements: color and local characteristic forms. As the city was associated to salt refinement, the chosen form was the salt crystal while color was divided in two components: a background component harmonized with the built environment, and another component linked to primary colors and remembering the city nautical connections. This second component was applied mainly in signage. This system, that was designed by *Maahiko Kimura, gk Graphics*, was first implanted on the port terminal buildings, and then extended to other city zones because it was flexible enough to be adaptable to great variety of architectonic styles. (Wildbur et al 2001:26).

In Philadelphia was developed a signage system for pedestrians that includes public illumination, pavements and urban furniture. In this project, from Joel Katz – *Katz Wheeler Design*, the area was divided in five districts, inspired from the William Penn division where the main streets were boundaries. The signage, which is inscribed in big circles with maps, combines symbols with the codified color of each district (Wildbur et al 2001:28).

A good example of signage, where color contributes to the identification of city zones, is the project designed by *Rudi Baur* for the city of Lyon (France). In this project a three color palette shows the river direction with a blue color, while green points to the park and grey identifies other directions. This signage is completed with another one that shows the points of interest to visit in the different neighborhoods, but without color as an identity value (Mollerup 2005:305).
Considering the several chromatic plans, being them architectural or for signage and urban furniture, only very few apply color as a mean to increase visibility, orientation and identification, despite the fact that color is a must appropriate tool to achieve these purposes.

**CHROMATIC PLANNING EXISTENT METHODOLOGIES**

The concern to establish a coherent urban image through color studies and chromatic plans is relatively recent, despite some pioneer cases, and led to the conception of chromatic planning methodologies, gathering the necessary steps for the selection of a color palette that would constitute the urban image. Urban plans that are concerned with color application to cities, generally employ methodologies directly related with the cities different characteristics and are mainly focused in architecture.

On recovery or restoration of historic cities, the chromatic plans are usually based on file collections that tell the architectonic and chromatic history of the zone or city researched, and on samples of the buildings coatings extracts, which allow the determination of each building colors during their life time. Examples of this methodology application are the well-known chromatic plans of *Turin* and *Barcelona*.

Concerning *Turin*, we may consider three chronologic chromatic plans. The first one was a 19th century pioneering plan where the colors along the streets and places were chosen in order to show the ways to the city center – *Piazza Castelo*. This plan was reviewed and developed, between 1978 and 2983, by *Giovanni Brino* who created a data...
base defining the main chromatic typologies that should be applied to the Turin neoclassic zone. The limitations of Brino plan led to the necessity of a third chromatic plan – Progetto-Colore de Torino – developed by Germano Tagliaschi and Ricardo Zanetta on the end of 20th century eighties. These chromatic plans were very important because, despite considering only architecture, they showed for the establishment of urban chromatic plans that were also concerned with the orientation within the city. The chromatic plan for Barcelona, which was conceived and applied by 1992, is important because it is a model for the historic cities recuperation.

A precursor methodology, was the Coloroid System created in Budapest by Antal Nemcsics, in 1962. This system theoretical foundation was based on psychophysiological connotations and historical research of the preferential relations between human beings and color, and the system color parameters were hue, saturation and brightness, numerically indexed in a tridimensional atlas of 1647 color samples. This system was an innovation to the color research in Architecture, because it is a subjective evaluation of chromatic plans, by means of objective factors determination.

The chromatic planning methodologies meant to be applied to new cities or zones, which are yet to be build, cannot use historic file collections except for the mention of the region traditional colors. Also, they only use the colors of the natural environment, and not the surveys of building existing colors.
*Color Geography* is a modern and very complete color methodology designed and developed, since 1965, by Jean-Philippe Lenclos expressly to establish urban chromatic plans. It is focused on the search and definition of specific local colors, the *environmental color* that may include the survey of the chromatic palette both of the existent materials and local vegetation, in order to create harmonic, or similar, sets which will allow the chromatic plans preparation, considering color as an adaptive language to a defined context.

As Lenclos (1995:86) says: “The color analysis of a site may involve various types of architectural ensembles, on the scale of a country, a region, a city, a city neighborhood, a village, or a dispersed settlement”, and “these studies can be undertaken following orders when they are intended for application on construction or rehabilitation programs, or when creating swatches for new industrial products for the buildings. Otherwise, they are the result of our own research on the ‘Color Geography’... “

The methodology application starts by the selection of a street, or a collection of representative buildings, that will allow one or more chromatic records of twenty study cases. Whenever it is possible this analysis obeys the buildings
numeric order, reproducing faithfully the landscape, and is developed in two phases: on the first one, on the ground, it is made the analysis of the site; and on the second phase we make the visual synthesis of ground chromatic records.

Lenclos applies his methodology in two different ways. Whenever the methodology is intent to be applied to Architectonic groups that are yet to be built, the research is based on the local environment color, making a survey of the chromatic palette of flora and existing materials to create a set that harmonize or integrate its environment. In contrary, on chromatic plans for industrial sites, Lenclos uses colors that stand out from the surrounding environment, creating real architectural sculptures.

As it was stated before, the methodology developed by Jean-Philippe Lenclos was an inspiration source to other colorists. One of them, Michael Lancaster calls his chromatic plans methodology – Strategy – because, as he says, the proceeding of chromatic planning evolves a great number of people and it must be, simultaneously, sufficiently prescriptive to attain the objectives, and sufficiently flexible for adapting to changes on use, occupation, structure of the buildings, fashion and taste. As he says: “A colour strategy implies not only a plan but also the establishment of procedures — working methods that are both practical and economically viable. Above all it depends upon the prediction and communication of an acceptable vision of the future” (Lancaster 1996:88).

The methodology applied by Greta Smedal to her chromatic plan for Longyearbyen is similar to the one applied by Michael Lancaster and contemplates the following steps: record of the existing colors, analysis of possibilities and ambits, development of a global chromatic concept, presentation to the client or public, detailed description of the color plan, implementation. In this project, the existing colors were observed under light variations, throughout the day and year, and the environmental colors were recorded along the different climatic seasons. All the colors were recorded using the NCS – Natural Color System.

NEW CHROMATIC METHODOLOGY FOR URBAN PLANNING

This methodology arises from a PhD research which defined the need to create a new methodology for urban furniture color planning, which will make possible to create color plans for urban environments, allowing urban
furniture to stand out from its background, contributing for their better legibility, and transforming them in identification elements that will improve the orientation within the cities. The development and implementation of this new methodology will allow the determination, with a higher scientific approach and rigor, of the color planning to be applied to urban furniture in each district or urban area, of a city. The present research project is focused in Portuguese cities, with different characteristics, applying the methodology in development, and establishing as result color plans that can be applied whenever there is a need to design urban furniture chromatic plans.

The new methodology applies to the study cases an extensive direct observation, with the use of mechanical devices, including photographic mapping of both urban furniture and signage, in order to evaluate their visibility and legibility, as well as their color applications.
For each urban area, and to facilitate the study, shall be defined a sample area, including the main streets and places and, also, some secondary ones, with the intention of encompassing the most representative zones, those with specific characteristics. Along the chosen area, an exhaustive record of all the environmental colors is made, including material samples not only from the buildings, but also from pavements, vegetation and any additional elements present with a relative permanence in the urban environment – the non-permanent colors – that must be taken into account for the spatial chromatic readings, which are then classified using the Natural Colour System (NCS), that was chosen because of it allows the easy identification of every color, even when they are located out of reach, and without needing additional equipment. It must be underlined that the recorded colors are perceived colors, not always coincident with the inherent colors (the real colors belonging to pigments and materials) and that the perceived colors may, also, be a partitive synthesis, particularly in the case of vegetation and tiles coated walls.

Among the environmental colors we must take in account the percentage in which the sky color will interfere on the urban area color and, also perceptive factors related with color interactions, as well as the geographic and atmospheric conditions and the chromatic variations along the different climatic seasons. With this purpose, the palette is tested along the seasons’ changes to judge the chromatic alterations aroused from the different colors of the vegetation as well as day light variations, sky colors according to weather changes to evaluate the chromatic plan pertinence.

These collections are completed by photographs of the environment elements and panoramic views from the different blocks, using urban plans, architectural elevations and sections of the selected paths as well, which act as elements of the environment color components. All these records are methodically indexed in forms and maps, previously designed and tested, which allows the creation of a data base guided by scientific rigor, in order to determine a chromatic palette for each quarter, or urban area and, consequently, to establish a coherent chromatic plan that may be applied to urban furniture.
In order to guarantee the scientific rigor on each quarter chromatic plan determination, we consider the dominant colors, proportionally represented, choosing colors to the urban furniture which may establish an adequate chromatic and luminosity contrast with the dominant colors and, also, respect the traditions, culture, identity and history of the quarter. These contrasts must be observed under the possible local illumination variations, in order to be sure that they accomplish efficiently their functions.

The urban furniture chromatic plan, which will be different for every quarter, must stand out from the environment, contributing for a better legibility and identification of these elements and, in the same way, will become a city’s area identification element which may be used in different supports and, this way, facilitate the orientation and wayfinding within the city.

**CONCLUSIONS**

With this project we aim to define and underline the importance of color application to urban furniture, taking in consideration that a pertinent chromatic plan can contribute for a better visualization and, consequently, turn urban furniture into an ergonomic factor, contributing for a better utilization of its elements and, simultaneously, ameliorating the orientation within the city and identifying its different zones. We expect that this methodology, which establishes the importance of a pertinent and structured color application to urban furniture, will contribute to the enlargement of the urban chromatic plans perspective, allowing them to become more holistic and comprehensive.

This project empirical phase will focus in some case studies, where we want to implement the use of color plans to urban furniture as a strategy to achieve a better and inclusive design project, ameliorating this equipment visibility and use, contributing to city quarters identification and users’ orientation.

In addition to the inclusion of all the environmental colors, being them from architecture, vegetation, skies and all other elements that constitute urban spaces this methodology takes in account perceptive factors related with color
interactions, as well as the geographic and atmospheric conditions. In consequence, the urban chromatic plans will gain a higher scientific approach and rigor.

We also aim to establish a color plan which may contribute to differentiate each city quarter, respecting the local history and symbolism, and achieving a good contrast with the environment.

Being a research project there is a need to evaluate the established color plans. As evaluation methodology we will constitute some focus groups composed by city inhabitants of different ages and gender, experts on color application, municipality technicians, such as architects, urban planners, equipment designers, landscape architects, managers, engineers, etc.

The focus groups will interact with an indoor and an outdoor presentation. The first evaluation will consist on an indoor presentation of the guidelines for the chromatic plans elaboration, and the focus groups will discuss and evaluate the pertinence of the urban furniture colors choice. In the outdoor presentation the focus groups will be confronted with these color applications in predetermined city areas. Their feedback, their contribution, will be incorporated in the color plans model. We expect they’ll recognize the importance of taking in account urban furniture chromatic programs in urban color plans, as a way of inclusive design implementation and city zones differentiation.

REFERENCES


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