MODESTUM

The Use of Graphic Design in Interior Spaces with the Effect of Maths

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ABSTRACT

In this study, interior spaces in which graphic design is used and seen are classified and sampled based on the idea that indoor places may reflect the individual and/or the general population. Additionally, in this study graphic design analysis of indoor places (photographic, illustrative and typographic) is investigated and advices are given. The aim is to emphasize the importance of the role of graphic design applications, which have an expressionist composition, in the gaining of functional and visual comfort and perception of the unseen aspects of ordinary places. From the impression gained during research, it is seen that graphic design has an effective role on the specification and the identification of the items in the place. It is observed that by means of the different experience and approach of graphic designers, ordinary places transform into places which carry a message or touch on a criticism. Furthermore, it is discussed that the effect of an indoor place graphic is related to the relationship of that graphic with the place itself. Especially, it is mentioned that the architects or interior architects who design the place should be in a good relationship with the graphic designer. In conclusion a place, which is a product of architecture, carries an aestetical and conceptual message with the graphic design; this concept leads to the discipline that can be named as interior graphics or environmental graphic design.

Keywords: space usage in math education, interior space, graphic design, interior graphics, environmental graphics

INTRODUCTION

It is important what a person feels, sees in terms of a space to be lived and/or a space living in a set space. Therefore, we can say that the work or space, which is of a man-created and designed space, is a decisive phenomenon that shapes and directs human behaviour.

Today's product in all areas, called art and design, gained meaning and lived with its mission and usefulness in daily life for the pre-industrial revolutionary man. However, with the industrial revolution, the rapid development of science and technology and the new possibilities of rapid mechanization have begun to destroy tradition in the lives of societies and in the fields of art and design. Numerous design schools and art centres have started to be opened in scientific and artistic sense, and contemporary forms of expression have been made especially in the field of design. In the architecture of cities, a contemporary dimension in the field of interior design and graphic design has begun to be sought. Aesthetic concerns have begun to manifest themselves in mass communication, in particular by establishing a strong link between the graphic design phenomenon and the means of communication.

Nowadays, it is known that the disciplines of plastic arts are intertwined with each other in contemporary art and design understanding and practice. Therefore, many graphic designers / artists develop new methods and produce interdisciplinary works or creations not just on paper but also on any surface that they can apply using different materials. When we look at it from this point of view, the visual works created by the designers or artists on the spatial surfaces with all kinds of materials can be considered within the scope of interior graphic designs. Graphic Designer Jonathan Ellery's statement about 'what is graphic design for' is important in this context. "I do

Contribution of this paper to the literature

- It is observed that by means of the different experience and approach of graphic designers, ordinary places transform into places which carry a message or touch on a criticism.
- The architects or interior architects who design the place should be in a good relationship with the graphic designer.
- The photographic, typographic or illustrative composition or visual imagery should be used to enhance the space effect.

not know what graphic design means by definition anymore. The space that once sat in complete clarity was now so blurred by other disciplines that a whole new world emerged. This constant uncertainty age fits me perfectly" (Twemlow, 2008).

Like interior space design is for the evaluation and reconstruction of the volumetric gaps, the interior graphic design aims to provide a new form to the void and to form a shape on the surface. In this context, the graphic design phenomenon, which involves organizing texts and images in a creative process in two dimensions or three dimensions in a perceptible and visible plane to convey a message or to visualize a thought, plays an effective role in defining and functioning components and components of space. In these spatial graphic designs, which have a narrative composition aiming to make a thought or an emotion striking with out-shooting purpose, the perceptions resulting from the structure of the interior and resulting on the audience are transformed into a direct creation, so that the viewer becomes familiar and ordinary to look at the space with another eye and to perceive the invisible aspects of this space. We can say that the influence of an interior design depends on its relation to space. Interior graphic design works, which aim to make a thought or a feeling stunning, increases visual comfort of that space, confers identity and eliminate the ordinary style of the space for its users. In this case, the designer should examine, analyse and feel the space well and should evaluate the inner shell surfaces (walls, ceilings, floors, windows, doors, stairs, columns, etc.) correctly the creative process. It is one of the most defining features of interior space that it has a limited space that separates man at a certain scale from the space surrounds him. According to Şenyapılı (1996), determining the position of what they look and what they see and how they relate to each other, ensures the recognition of space. For example, the ceiling, the floor, the walls, and the objects in the room define the space of the room. The room is an interior space. For this reason, indoors is also called space (Şenyapılı, 1996). Thus, space as having properties of direction, shape, inner volume can be measured, and an object which can be thought as an element that can be fitted into place. The environment we live in, the interiors created by the people, can be classified according to their usage and needs.

When the literature was reviewed, it was explored that this study could lead many other studies that graphics designs are used in many space designs as it is being unique by showing that graphic design is necessary for architectural works as it has an important place in literature and it should be noted that all work depends on simple calculations as a results of mathematics education. Additionally, mathematics is used for both calculation of space, shapes and cost. Therefore, this study shows that mathematics is an important course to be taught during interior and graphic design courses.

SPACE USAGE IN MATHS EDUCATION

Space and interior design involves creation of shapes which have a very big pre-requisite in mathematics education and in many other fields. It is impossible to create a space if the correct measurements are not known so as to decide which shapes can fit in space for interior design. Mathematical basic skills are required for designers to be able to calculate simple arithmetic which can be used for not only for design but also for the calculation the cost of the design. For example, a landscape, tools, a galley, a directed graph should be calculated not only in design terms but also in cost terms. Thus, organising and then reorganising and classifying and then reclassifying the materials of the subject in the search for a material is a part of this necessity. Additionally, the emphasis of the construction of the metaphor of the landscape and its fields and the exploration of these spaces and its calculations depends on the education of mathematics (Hertling, 2009) since the interior is a constellation that is the expression of the social organization in which all the facilities required by the relations and artificial change and limitation imposed by the human in the natural environment for an aim. With this social organization, there is a defined gap that is shaped according to space, structure and character, and this defined gap creates differences by combining the user and various members. Hence, space which stands between the surroundings of the human being and the outside world, has a characteristic of forming the relationship with the outer world. However, interior spaces are limited by their location (Brooker & Stone, 2004). In other words, interior space is a closed volume with a certain concept, architectural form and mass. The interior becomes alive when a person starts using it. Therefore, interior space, which is a limitation and creation in the natural environment, gains meaning together with the user. As a result, interior space can be considered as an environment that reflects the human being itself.

Figure 1. Interior graphic design applications for the Arundel Mills Shopping Centre by Molly Miller Design (http://www.mollymillerdesign)

SOCIAL AND CULTURAL INTERIOR SPACES

Culture and knowledge are produced in society by bringing people together and socializing, and a space is needed for the production of this culture. These spaces, where a significant part of human life is spent, are living spaces that are integrated with social life, while being the centre of communication, entertainment, culture and art activities, and leisure time is also spent. In the past, the bazaars, hammams, taverns and coffee houses, which were known as socializing places, are now being replaced by cinemas and theatres, restaurants, art galleries, exhibition and fairgrounds, museums, entertainment and shopping centres and spa centres. These spaces have become places where physical and psychological comfort and visual aesthetics come to the forefront rather than their own special functions. The French sociologist Henri Lefebvre, in his book "The Production of Place," mentions space-society relations, suggesting that society produces space, as well as certain forms of sociality, identities and experiences (Lefebvre, 1974). Therefore, in these long-lived cultural and social spaces, new design concepts and spatial constructions are needed to emphasize the institutional and visual identity of the space, and to increase persistence and sustainability on minds.

Nowadays, shopping centres, which are considered as the places that best reflect the visual and popular culture, are designed to provide customers with a feeling of emotional, intellectual, artistic, etc. to increase the value of their goods and services and they are structured and constructed to meet the needs of their customers. In this situation shopping spaces are defined by graphic designs aiming at visibility in social spaces, further strengthening spatial influence and perception. For example, in this context, Molly Miller Design designed navigational and informative graphics for walls, ceilings and upholstery to create a dynamic and exciting shopping and entertainment venue. Nevertheless, these graphic designs, designed to increase the visibility and awareness of the entertainment centres in the shopping mall, are designed to bring the corporate identity, function and effect of the space to the forefront. The floor graphics that point to the bowling hall or the neon graphics that show where the tilt halls are visible in the room and provide a seamless rotation (see **Figure 1**).

The strategic planning that a graphic designer follows in the creative process should not only be limited to the function of the space but should provide more identity and driving force regardless of its usage purpose. Therefore, the designer must correctly recognize and reflect the qualities of the space before applying it in interior space.

Exhibitions and fairgrounds are confronted as places where cultural sharing and interaction are seen too much. They have a lot of visual equipment because they are places where there is a lot of content art / design or interaction / communication. Indoors graphic designers often encounter constraints and obstacles as a result of a need to be loyal when they have to work with such spaces. For example, fixed furniture, doors, stairs or the location, colour or form of the building elements cannot be changed. Therefore, the designer can choose to fully comply with all of these and make a context sensitive graphics design for the components of the space that the environment requires. Conversely, the designer can reject all these constraints and create a completely independent space / environment graphic design. According to Faulkner, the walls function is much more to divide the space than surrounding the space. They separate the actions in a room without obstructing traffic flow in the immediate vicinity or block the direct view (Kalinkara, 2006). They can also be used to create another space within the space. The walls that determine the shape and volume of the interior spaces are the surfaces on which the space graphic is most used. The designer can change the colour and texture of the wall surface, for example, it can be painted or covered with another material, or the existing wall surface can be designed. For example, we can mention that the constraints imposed by the components of the institutional identity designed by Pentagram Design for the London Design Festivals are completely ignored, if we examine its implementation internally. The composition, which started with

Figure 2. The interior design of the London Design Festival designed by Pentagram Independent Design Consultancy (Victoria & Albert Museum) (http://www.londondesignfestival.com)

the logo of the festival, we can talk about the dominance of the graphic design to entire space without knowing any obstacles (see **Figure 2**).

The museums are the places, which are in the service of the community and development, are sharing, exhibiting, informing and continuing and they are the places in which there are objects that have witnessed the people and the environment they live in and are open to public. They are also seen as educational institutions that provide active participation and permanent learning, which are important contributions to the formation of national values of countries with works of art exhibited by the past. Indoors graphic designs to be applied to the museums are important in providing visual comfort, besides increasing in-situ communication, giving a sense of depth to the space. Therefore, it is important for people to feel, see, to be able to live and / or to live in a place that is constructed in this way. We can say that the design of a human-designed and created structure or space is a decisive phenomenon that shapes and directs human behaviour. Designing and responding to aesthetic needs create the work of art, and it is created with talent (Sönmez, 2006). The artistic attitudes of the person designing the space also increase the value and / or visuality of the space. For example, the interior graphic designs that Erdoğan Ergun applied to the Near East University Car Museum in Nicosia. The designer applied graphic works on the wall surfaces with stencil technique (see **Figure 3**) to increase the visual effect and the effect of the museum space, which has about 2000-m2 area with 75 cars.

Figure 3. Interior graphic designs applied by Erdoğan Ergün to Near East University Car Museum, 2015

Art galleries are one of the most effective places among cultural spaces where plastic art works are exhibited and artistic activities are performed, painting, sculpture, ceramics, graphics and so on. The artistic attitudes that the artist reflects his personal art attitude and integrates with the space itself also increase the value of that space. A space / environment graphic can be applied to the space by the artist, for exhibition purposes, independently of his / her own purpose. According to Chin, the third basic architectural element of the interior is the ceiling. Ceilings have important visual roles in shaping the interior space although we cannot touch them like the space objects such as walls and flooring we are in constant contact with (Ching, 2014). The graphic designs to be applied to the ceiling surface can enable the user to perceive the space as a whole, enhance the influence of the space's elements, emphasize the dimensions and depth of the space and even outline it. Peter Kogler's exhibition in Istanbul Dirimart Gallery is a good example. The artist considered the walls, columns, ceilings and floor surfaces of the exhibition space as their design area and presented an approach with a series of recurring motifs with the idea of changing the perception of space-time concepts (see **Figure 4**).
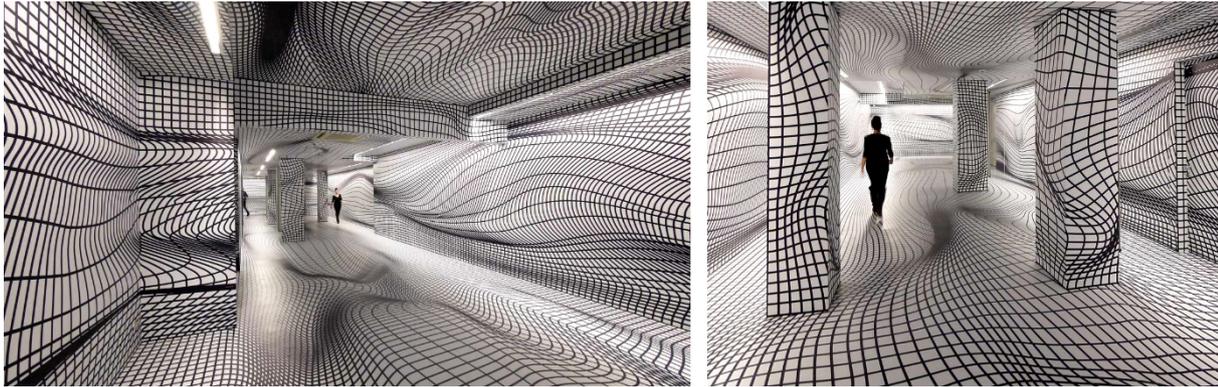
Figure 4. An image of Peter Kogler's 2011 Istanbul Dirimart Gallery exhibition venues (http://www.kogler.net)

LIVING AND WORKING INTERIOR SPACES

The private places have emerged from the need to control the area where people live. Therefore, these personalized spaces in which people can have a rest and / or stay alone can be called as interior spaces specially designed for a person and they are used by a small number of users compared to social spaces. According to Wells, personalization is a deliberate decoration and change for the user to reflect his identity (Kalyoncu, 2006). According to this; the space must be designed by the designer to address the physical and visual comfort of the space user. These are the best examples of such living spaces where individuality is on the foreground due to its bureaucratic structure. It is therefore necessary to recognize and apply the aesthetic, cultural and social structure of individual who uses the space, and to apply it in the best and the right way, while creating an interior space graphic with its own character in the houses with personalized spaces. For example, famous Italian architect Gio Ponti designed the villa of Anala and Armando Planchart, located in Venezuela, Caracas, in 1956. Since the homeowner, Anala Planchart, had a desire to live in a modern home, and Armando Planchart was a well-known business man in Venezuela, Ponti used modern, high-quality decorative furniture in interior design at that time and used his own artistic work on the surface of the space (www.dailyicon.net).

The offices, which are called workplaces, are places that long time and performance is spent, like personalized living spaces. Graphic designs to be applied to the surfaces of these spaces must be functional, informative or guiding in order to put corporate identity in the foreground, as well as to increase the working tempo and to provide visual comfort. For example; The AICT training office in Australia, which works for hundreds of students each year, has changed the environment around the room with its young, dynamic, fun and learning interior graphics designs designed by Enrico Bettesworth & Nik Gall (see **Figure 5**).

Figure 5. Interior graphic designs designed by Enrico Bettesworth & Nik Gall for the AICT office (https://www.behance.net)

INFORMATION PRODUCTION INTERIOR SPACES

We can refer to places of information production that are used for education, teaching or learning, which are indicative of countries' development levels in both art and science. In the indoor graphic designs in these spaces where information is produced, unlike many places, there are large wall surfaces, corridors, wide surface windows, classrooms and academic offices designed for better daylight. Hence, the fact that the components and elements of space are large in number and variety provides a great deal of convenience in the application of graphic design work.

The use of the right light to emphasize the general characteristics of the space and to enhance the spatial effect of colour will make the space more defined and meaningful. The interiors can be constructed in both natural and artificial ways of light. The use of natural light dates back to ancient times, and it contributes to the architectural structure in many functional and aesthetic ways. For example; the high ceilings and large windows of the Queens Metropolitan High School building in the United States help the daylight to enter the space directly, thus ensuring that the wall surfaces are brighter, more visible and more perceptible (see **Figure 6**). Graphic Designer Paula Scher has included the names of mappings and streets in the interior graphics she designed using this feature of architecture. These interior graphics have an educational implication in the sense of knowing the place, the city and the place where they live.

Figure 6. Interior graphic designs made by Paula Scher for Queens Metropolitan High School (https://www.creativereview.co.uk)

COMMERCIAL INTERIOR SPACES

These places are usually temporary due to their commercial structures and are designed to live up to their fashion length (Brooker, Stone 2010). Design concepts that change rapidly from day to day show themselves in such places too much. For example, the display or interior design of a store is constantly renewing itself and changing. In shops, which are commercial spaces, not only the brand identity but also the visual identity of the space is important issues. Therefore, interior graphic designs that emphasize the content, identity and meaning of the product or company increase both the visual value of the commercial space and the interest in the space.

The recreational and commercial accommodation hotels, in contrast to long-lived and personalized spaces, are living spaces for short-term purposes. The client is accommodated by paying a certain fee so the expectations in these venues in which there should be graphic designs to facilitate the retention, increase visual appeal and to inform about the touristic points of surroundings and to guide besides the spatial interior design for comfort, are very high. From this perspective, 'Ace Hotel' interior graphic designs support this discourse. Hotel managers have started a project called New York in black and white colours to design the interior surfaces of space. In this project, young New York-based graphic designers like Brian Procell, Faust Machine (Team Facelift), Mosco, Timothy Goodman, PegLeg, Pork, Pablo Powers, Jordan Seiler, Stephen Holding, Michael Anderson, Sean Vegezz of Tristan Eaton and Mint & Serf have taken place (http://www.iamfatterthanyou.com/2009/10/ace-hotel-new-york-x-mintserf-mirf/ last access date: 05.07.2017). In this project, most designers have considered the environmental and textural factors of the city in the design process of the interior graphics. For example; Timothy Goodman framed 99 different photos through the city and he realized his interior graphic design through it (see. **Figure 7**).

Figure 7. Timothy Goodman's interior graphic designs for Ace Hotel (http://tgoodman.com)

PUBLIC (COMMON USE) INTERIOR SPACES

According to Kanıpak; Open or closed spaces that are made by considering any individual's use without any discrimination in the society are called public spaces (http://v3.arkitera.com). Accordingly, public spaces can be defined as internal or external spaces oriented towards common use that directs it in social life. Therefore, we can also refer to public interiors as places where social identity is most intensely reflected. In this context, graphic works to be applied to public indoor surfaces are required to be in accordance with the cultural structure of the society and the moral norms. Therefore, the designer is faced with a number of restrictions such as the inability to perform unauthorized applications on personal interior surfaces in public spaces, the likelihood of the prevention of the visibility and visual communication on boards and panels or subjects like sexual content, drug addiction or the inducement of violence in public interior graphic designs cannot be touched.

The most used public interiors include hospitals, train stations, bus stations, airports, underground car parks, public toilets and metro lines. It is also necessary for graphic designers, illustrators or artists who produce in such interiors used by people having different socio-cultural backgrounds to realize creations that can be understood, sometimes amazed, entertained and sometimes be informed and directed by everyone who uses the space. Anamorphic practices are works that are perceived when viewed from an angle and whose shape is lost and cannot be perceived when the view angle is changed. It is related to the perspective and is created by including all the surfaces of the space with design. Anamorphic studies can only be perceived from a particular point of view, looking 'trapezoid', and the symbolic plaque can be placed on it at one time. When the interior graphic designs are viewed from a single point of view, these studies fall into two dimensions from three dimensions, which can be troublesome for the application and fun for the user. For example; Designer Panya Clark Espinal, Toronto Bayview has been influencing those who use the space with interesting and surprising forms that have benefited from the variability of perspective in the graphical work she performed inside the Sheppard Metro Station (see **Figure 8**).
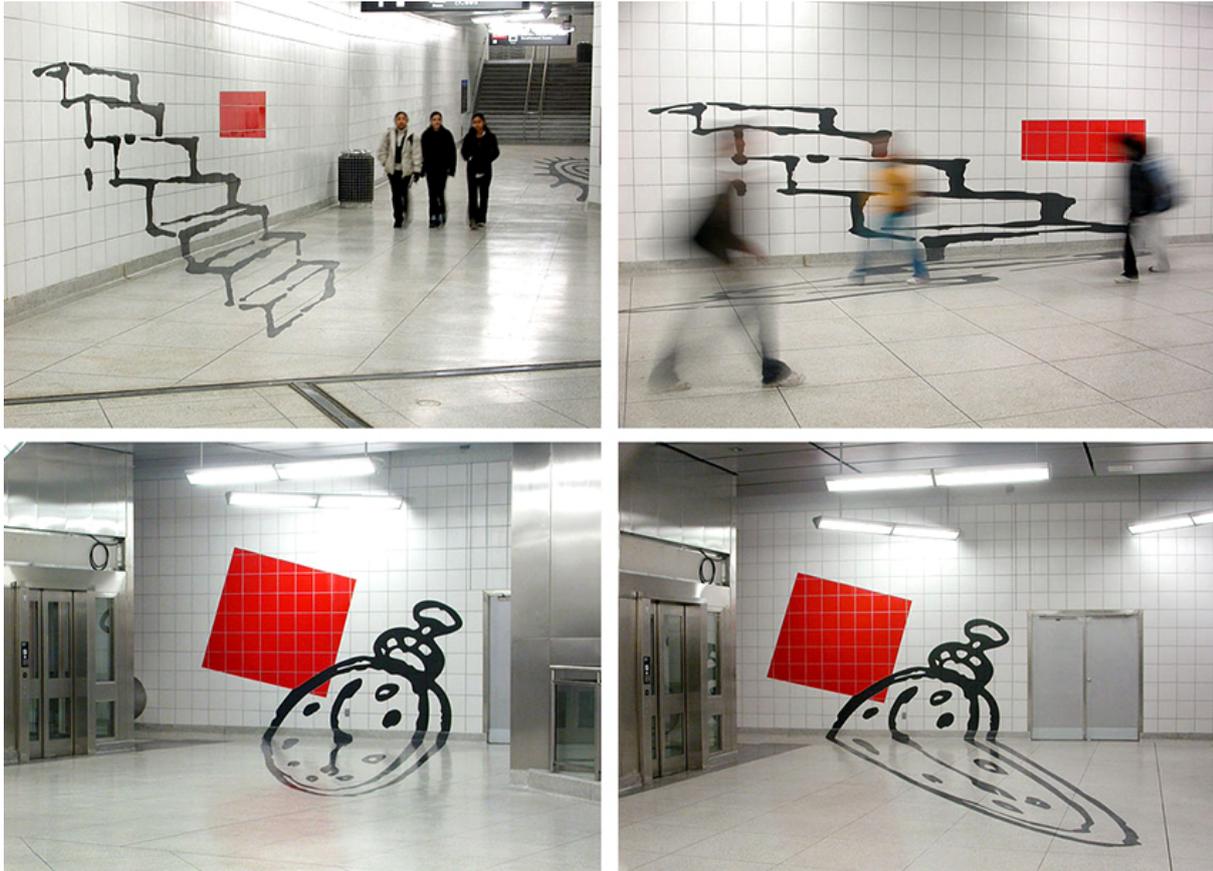
Figure 8. Panji Clark Espinal's interior graphic designs for Sheppard Metro Station (http://panya.ca)

The surface of an interior is often the first point of contact for the user of that space. A well-crafted surface or well-chosen material can give meaning to the interior space (Brooker, Stone, 2010). The first surface contacted by the user who steps into the space is the floor of the space. The floor surfaces can be covered with a wide variety of textural materials indoors. Graphic designs that can sometimes be used to guide the user in the space and sometimes to provide information can be applied on the existing surface of the floor or on the different materials to cover the floor in appropriate conditions. One of the best examples of public interior graphic designs is the work of German graphic designer Axel Peemöeller on the interior surfaces of the Eureka Tower Closed Car Park in Australia (see **Figure 9**). In this work, Peemöeller aims to make it possible for vehicle users who manoeuvre in tight spaces to perceive the guidance graphs from a distance.
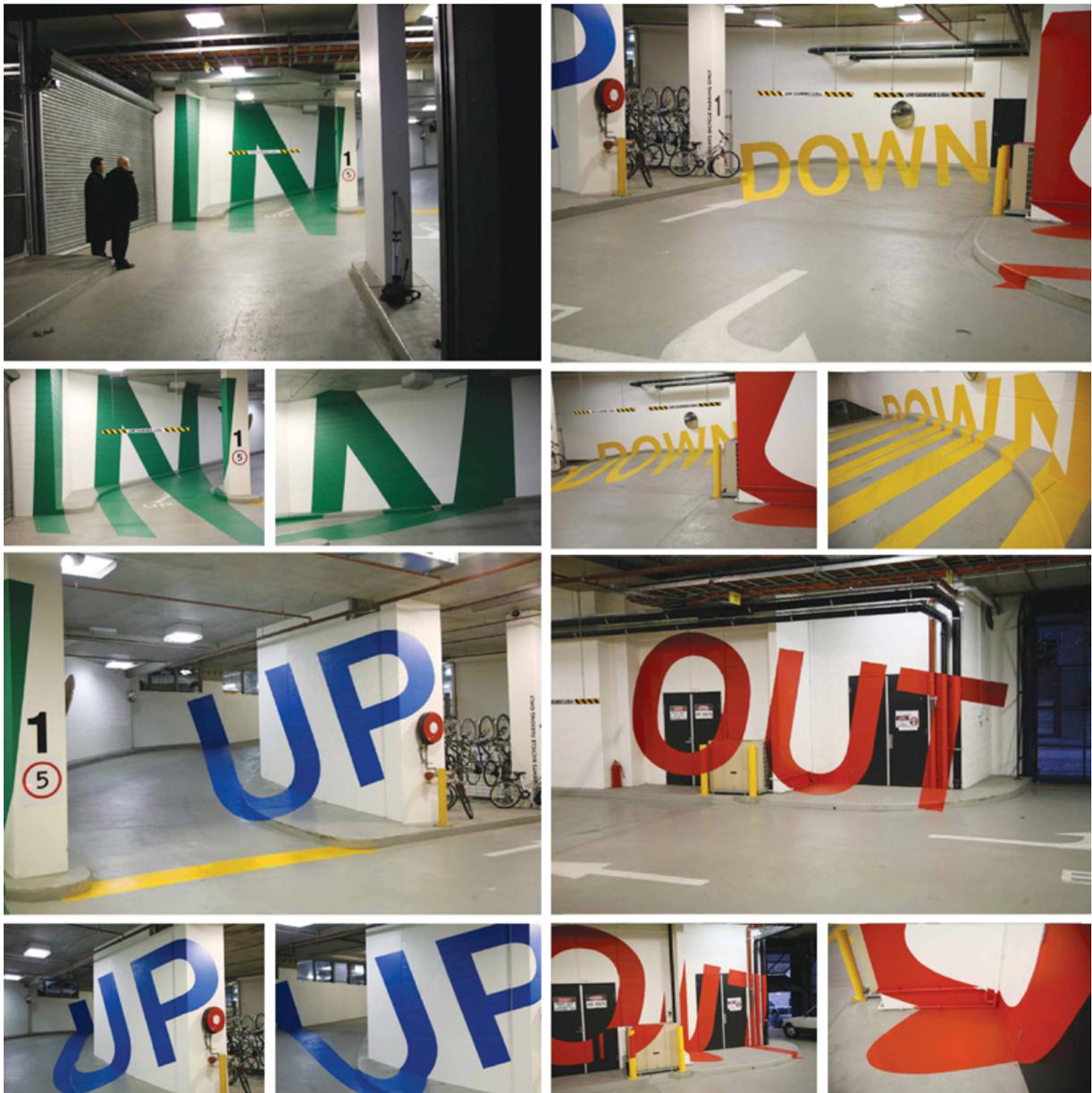
Figure 9. Indoor graphic design designed by Axel Peemöeller for the Eureka Tower car park (http://axelpeemoeller.com)

Hospitals are public interiors providing health services. When considering the patients using the space, it may be necessary that these spaces where special care and treatment are applied, physically differ from other spaces. For example, it does not have low ceilings, dark colours on the surfaces and not using the right light sources. These spaces are places where indoor orientation and information graphics especially for children's diseases are frequently seen and applied. For example; Raúl Martínez Vicente, Waterford Regional Hospital, aims to create an intimate, friendly environment in children's ward sections, not only by visual identity, but also by colours and forms, so as to make children in the hospital feel not frightened (see **Figure 10**).

Figure 10. Waterford County Hospital wall by Raúl Martínez Vicente Interior graphic designs applied to surfaces (http://www.publicart.ie)

CONCLUSION

Graphic design also varies according to the visual culture in which the collection is from the society or the time-dependent. These variations bring together the phenomenon we call trend or trend in graphic design. People living in society can evaluate and consume these trends with emotional accumulation, that is, their taste, culture, political approach or individual habits. Therefore, the designer may have to take into consideration the social and emotional qualities of the society and to produce the aesthetic values of the individuals living in the society. The designer can also determine or direct the social behaviours of the individual using the correct language of expression. Contemporary concerns may lead designers or artists to seek alternatives. These alternative approaches enable the use of different methods and production materials in addition to the conventional methods in the stage of application of indoor graphic designs to the surface of the spaces by the designer or the artist.

The vital activities of modern people are not only based on the images they see, but also on their ability to communicate graphically (Becer, 1999). Therefore, it should be emphasized that the photographic, typographic or illustrative composition or visual imagery to be used to enhance the space effect in interior graphic designs must be clearly understood for the use of space or for its users. Milton Glaser; "The goal of graphic design is to motivate people or inform them, and if the goal is to create a friendly social environment, it is much better" (Twemlow, 2008). Therefore, indoor graphic designs lacking aesthetic background, which are made out of its purpose, do not provide accurate visual communication and do not matter from a functional point of view.

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