A STUDY OF COLOUR USE ON ELECTRICAL DOMESTIC APPLIANCES

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ABSTRACT

A STUDY OF COLOUR USE ON ELECTRICAL DOMESTIC APPLIANCES

Colours have a crucial importance in human life. Humans use colours to give meaning to objects and to express their feelings, either visually either verbally. While colours and their associations may differ in different societies, their objectives in use are similar (like religious associations, status symbols, and to add aesthetic values, etc.). Whatever are the pleasures, styles or fashions of the time, the importance of colour's role in desirability of an object remains constant. Especially, in the post-Industrial Revolution era with the progression the field of communication, the cultural differences between societies decreased. Thus at the 20th Century with the international design movements colour became a common language in the field of design.

When first released the means of the electrical domestic appliances were helping house-works. But in the 20th century they changed identity and from bottom of the staircases and inside of cupboards, they took place on counter-tops and inside of the space lived-in. When this process is studied it is cleared out the role of colours on domestic appliances to gain their status. Considering too far apart and different from each other at first glance, colours and art, and house-works are parts of the same life; therefore their changes and progress' are contemporaneously similar with the changes at the social life.

In this work it is aimed to study the reasons of colour use in electrical domestic appliances, in historic, scientific and sociologic way. And by these means' it is reached to the conclusion that the characteristics of the colour schemes and the nature of the task are in accordance in electrical domestic appliances. According to this conclusion white has a sterile feeling and associated with hygiene, black and dark colours to the strength and elegance, pastel colours to cooperation an bright colours to be the focus of attention.

Keywords: Colours, Electrical Domestic Appliances, Colour Theory, Art and Design History of Twentieth Century, Development of Domestic Appliances

ÖZ

ELEKTRİKLİ EV EŞYALARINDA RENK KULLANIMININ İNCELENMESİ

Renklerin insan hayatında çok önemli bir yeri vardır. Nesneleri anlamlandırırken, duygularını sözel ya da görsel şekilde belirtirken insanlar renkleri kullanır. Renkler ve özdeşleştirildikleri anlamlar toplumdan topluma değişiklik göstermesine karşın kullanım amaçları benzerlikler göstermektedir. Dini özdeşleştirmeler, statü belirtgeleri, estetik değer katmak gibi. Dönemlerin beğenileri, tarzları ve modaları her ne kadar çok değişiyor olursa olsun, renklerin bir objenin tercih edilmesindeki önemi aynı kalmaktadır. Özellikle, Endüstri Devriminden sonra daha da gelişen iletişim araçlarının toplumlar arasındaki kültürel farkları giderek azaltmasıyla 20. yy.'da uluslararası sanat ve tasarım akımları tasarım alanında rengin ortak bir dil haline gelmesini sağlamıştır.

İlk çıktıklarında amaçları sadece ev işlerine yardımcı olamk olan elektrikli ev aletleri 20. yy içinde değim geçirerek kimlik değiştirmiş, 20. yy.'ın başlarında ancak merdiven altları ve dolap kapakları arkasında yer bulurken günümüzde tezgah üstünde ve mekan içinde evlerde kendilerine yer edinmişlerdir. Bu değişim süreci incelendiğinde renklerin ev aletlerinin bugünkü statülerini kazanmalarında büyük bir rolü olduğu farkedilmektedir. İlk bakışta bir birlerinden çok farklı ve kopuk gözüküyorlarsa da, renkler ve sanat, ve ev işleri aynı hayatın birer parçasıdır ve gelişmleri ve değişimleri sosyal hayatla paralellik gösterir.

Bu çalışmada günümüzde elektrikli ev aletlerindeki renk seçimlerinin nedenleri tarihi, bilimsel ve sosyolojik olarak incelenip açıklanması amaçlanmıştır. Bu incelemeler sayesinde ev aletlerinde kullanılan renklerle yapılacak olan işin doğasının birbirleriyle örtüştüğü gözlemlenmiştir. Varılan bu sonuçlara göre; steril görüntüsüyle beyaz özellikle hijyen amaçlı, koyu renkler dayanıklılık ve prestij amaçlı, pastel renkler uyumluluk amaçlı, canlı renkler ise dikkat çekme amaçlı kullanılmaktadır.

Anahtar Kelimeler: Renkler, Elektrikli Ev Aletleri, Renk Teorisi, 20. Yy. Sanat ve Tasarım Tarihi, Ev Eşyalarının Gelişimi

TABLE OF CONTENTS

LIST OF FIGURES…..……..viii

CHAPTER 1. INTRODUCTION…….…….1

1.1. Definition of Problem……..……..……2

1.2. Aims of Study.…….2

1.3. Methods of the Study…..……..2

CHAPTER 2. COLOUR USE IN DESIGN…….....10

2.1. Colour Theory: Basic Knowledge of Colour.....…….……11

2.1.1. Colour and Colour Wheel……11

2.1.2. Characteristics of Colours in Colour Wheel……..…..12

2.1.3. Colour Harmony……..15

2.2. Colour Spaces…….....17

2.3. Colour Matching Systems……...……19

2.4. Colour Forecasting……..20

CHAPTER 3. COLOUR AND SOCIETY…….……..…23

CHAPTER 4. COLOUR USE IN INDUSTRIAL DESIGN……..…….…..…..29

4.1. Visual Information & Personalizing……..30

4.2. Aesthetics and Ergonomics……..……..32

4.2.1. Colour Aesthetics…….……...33

4.2.2. Colour Ergonomics……..……33

CHAPTER 5. HISTORIC ASPECTS…….……36

5.1. Historic Progression of Colour Systems……..……..…....36

5.2. A Short Foreword on Housewares…….……43

5.3. Colour Preferences in Decades of 20th Century……...……..44

5.4. A Brief History of Development of Domestic Appliances……45

5.5. Colour Preferences in Decades And Art Movements and Its Influences on Household Appliances.....48
5.5.1. Dashy Hypocrisy, Late Victorian period.....48
5.5.2. An Epoch of Velvet and Silver; Art-Nouveau 1880s-1910s.....50
5.5.3. Summit of Abstraction, De Stijl.....51
5.5.4. Pioneer of Modernism, Bauhaus.....55
5.5.5. Golden Dreams of Black Night, Art-Deco 1920s-1930s.....57
5.5.6. Sign of Dynamism, Streamlining.....60
5.5.7. Under The Shadow of The War; Utilitarian Design.....63
5.5.8. When Every Body Went Modern, The Fifties.....64
5.5.8.1. Good Design.....64
5.5.8.2. Planned Obsolescence, Rıse of Consumerism.....66
5.5.9. In Quest of Freedom, The Sixties.....68
5.5.9.1. Pop Design.....69
5.5.9.2. Anti-Design.....70
5.5.9.3. Radical Design.....70
5.5.10. An Era of Social Conscious' Awakening, The Seventies.....71
5.5.11. Post Modernism, The Eighties.....71

CHAPTER 6. COLOUR PREFERENCES IN HOUSEWARES……..…….....73
6.1. White ……...……...…….……73
6.2. Metallic Grey ..……76
6.3. Dark Colours ……..……..78
6.4. Pastels……..……80
6.5. Bright Hues.....81

CHAPTER 7. CONCLUSION……...…….83

REFERENCES……..……..86

APPENDIX A. Glossary……..……...91

LIST OF FIGURES

Figure **Page**

Figure 1. Colour Interval……11
Figure 2. Itten's Colour Wheel……12
Figure 3. Light Colours……...13
Figure 4. Dark Colours……13
Figure 5. Vivid Colours……..……14
Figure 6. Dull Colours……14
Figure 7. Goethe' Colour Chart……..16
Figure 8. Illustration of Visible Colour Gamuts……..17
Figure 9.a. Subtractive Colours.....18
Figure 9.b. Additive Colours.....18
Figure 10. Osiris……..25
Figure 11. Christian Religious Men……25
Figure 12. Turkish Flag 27
Figure 13. Greek Flag.....27
Figure 14. Japanese Flag.....27
Figure 15. Refraction of Day Light in to Spectrum Through Prism……...36
Figure 16. Goethe's colour triangle.....38
Figure 17. Runge's colour sphere.....38
Figure 18. Rood……..……40
Figure 19. The colour tree of Munsell.....41
Figure 20. Plan of the colour tree of Munsell.....41
Figure 21. Colour and Shape Relation from Itten……...43
Figure 22. Cherub Sewing Machine.....49
Figure 23. Singer "New Family".....50
Figure 24. De Stijl Interior……..52
Figure 25. Peter Behrens design electric kettles for AEG.....53
Figure 26. Peter Behrens design electric table-fan for AEG.....53

Figure 27. An Early washing Machine……54
Figure 28. Hoover 700.....54
Figure 29. BVC Hand Operated Vacuum Cleaner.....55
Figure 30. Daisy Vacuum Cleaner.....55
Figure 31. Walter Gropius' Office.....56
Figure 32. GEC "Magnet" Electric Cooker.....57
Figure 33. Murphy Tea Service……...58
Figure 34. Geddes Cocktail Set……...59
Figure 35. Barbier Graphic design……..……59
Figure 36. Sears Roebuck Coldspot Refrigerator.....61
Figure 37. Coldspot Refrigerator 1940 Catalogue.....61
Figure 38. Dreyfuss, toaster…….……62
Figure 39. Dreyfuss design Hoover 150.....62
Figure 40. Hoover 150.....62
Figure 41. Braun Record player, Rams and Gugelot……...65
Figure 42. Kenwood Chef A701.....66
Figure 43. Sixtant Electric Shaver, Braun; Gugelot and Müller.....66
Figure 44. Hoover Constellation.....67
Figure 45. General Electric Cylindrical Vacuum Cleaner.....67
Figure 46. Multimix KM3 Food Processor, Braun, Müller.....68
Figure 47. White.....73
Figure 48. Grey.....76
Figure 49. Dark Colours.....78
Figure 50. Pastels.....80
Figure 51. Bright Colours.....81
Figure 52. Colour Spectrum.....104

CHAPTER 1

INTRODUCTION

The ability to think, design and create distinguished humankind from other animals. Being weaker and more fragile plus armed with no natural defence arms, first humans had to use their imagination to design and create furs, shelters, tools and weapons they lack in their nature to survive. Design is a concept as old as human race itself. The first designs made were to imitate nature itself. To imitate colours of nature was one of the first things humans did.

Colour is an important element in life of human kind. Being one of the first stimulants a new born responds, colour has always been a way to communication. First used as a means to survival, distinguishing dangerous plants and animals from harmless ones, colour then became a symbol of social status according to the colour of fur people wore. As soon as primitive human discovered earth pigments, colour got involved into daily life on the walls of caves or handles of tools they made as a means of self expression. In different cultures sprouted on different geographies, colours got different meanings, but they are used for the same reason: social communication.

In modern times the cultural boundaries between nations perceptibly disappeared. Colours never lost their local meanings on cultural habits, but in the field of design the colour choices unified to afford a universal language. Especially in the field of technological appliances design, it is seen that whatever the nationality of the designer or producer might be the colour scheme is almost always identifiable. Doubtlessly there are many scientific reasons influencing producers' or designers' approach to colours as well as the aesthetic concerns of consumers. Those reasons might be ergonomic reasons which have crucial importance in the field of electrical appliances or psychological reasons which direct one's attitude towards a colour, particularly towards an object in a specific colour unconsciously, or they might be cultural reasons like psychological ones which make some associations with certain colours, i.e. some colours are appropriate for particular tasks while the others are not.

1.1. Definition of Problem

Today it can be seen that those colour distinctions are quite sharp on the field of electrical domestic appliances. For example, “white goods” which are meant to be white or recently in metallic grey cannot to be found in some other colour as strong and vivid as white is. A while ago in our country, a producer of durable domestic appliances put on the market refrigerators in different primary or secondary bright colours, but those goods could not last on the market for a long time, and consequently none of the other producers went on to produce the same colours to stay in the market competition. Certainly that was an unusual essay which did not match the habits of the consumer, but considering there are a quite a mass of young population in Turkey with unorthodox tastes, what might be the reason for this defeat on the market? Why are some colours good for specific places in the house, while the others are not?

1.2. Aims of Study

In this thesis, it is aimed to study the reasons for this petrified colour habits in electrical domestic appliances under the light of colour science, cultural associations, and historic progression through the precedent century.

In this motive, an analysis of the use of colour focusing into the use of colour in designing domestic appliances from a general concept of design is made.

1.3. Method of Study

In first chapter as a common approach to the use of colour in design is studied in order to state phases of the use of colour during the design process, in a general understanding. As it is impossible to deal with colour without having any basic knowledge, an introduction to the subject of colour theory is studied.

At the first step of colour theory the definition of colour and colour wheel is made. The definition of colour is made as different wavelengths of light waves perceived by human eye. As designers and artists deal mostly with pigments rather than the wave lengths, the colour wheel is presented as the wheel of colour based on three primary colours, namely blue, red and yellow and their derivatives.

The following subtitle concerns the characteristics of the colours in the colour wheel. Colours with different characteristics are explained according to the three characteristics of colours; hue is the actual colour; shade the amount of black or white colour, and saturation, the chroma of colour. According to hue, colours may be warm if they are derivatives of red or cool if they are derivatives of blue. According to shade, the colours might be light colours if it contains white or if it contains black dark. According to saturation a colour can be vivid or dull if it has grey in it.

Once the characteristics of colours are presented, the harmonious use of colours is explained as arranging colours to make a pleasant whole. Harmonious relations of colours are described according to two different resources: Chijiiwa's colour Harmony and Itten's Art of colour. According to the first of these resources, colour harmonies are presented as; harmony of similar colours composed of adjacent colours, harmony of complementary colours composed of symmetrical colours on the wheel and harmony of contrasting colours composing of two colours having three hues between, and according to the last, colour dyads composed of two complementary hues also having symmetry on shades, triads composed of hues which form an isosceles triangle, tetrads composed of two complementaries and hexads composed of three complementaries on the colour wheel with twelve hues. Also in the same subtitle, German poet and philosopher Goethe's colour chart consisting of six colours is explained. According to Goethe the strength of colours in a colour scheme should be equal by their ratio of strength and area. As to Goethe's chart of colour strongest hue, yellow, is scored 9/9 and purple which is the weakest is scored 3/9.

The next subtitle is about the colour spaces in which a designer would work. Colour spaces are important in design, even though being an interval step for industrial designers in design process, in some design fields like graphic design or painting the product is obtained in those spaces. A numeric expression of colours according to the trichromatic nature of colours, principle colour spaces a designer would meet are RGB, CMY(K), and HSV. CMY(K) and HSV are subtractive colour spaces giving black when mixed. They both are spaces for pigments but while CMY(K) is used on offset printing, HSV is preferred by painters. RGB is an additive colour space which gives white by the mixture of colours. Its field of use includes any media concerned with light; TV monitors, motion pictures or computer monitors.

Today most of the designers work on the digital medium using RGB as colour systems or HSV with traditional systems. During the process of manufacturing,

however, those colours do not match the final products. That's why colour matching systems are used to unify the colour communication language between the designer and the producer. In this subtitle, colour matching systems are also presented.

So far, the use of colour during the design process is explained. On the other hand, choosing the right colours is as important as applying them in a correct way and in a correct medium. At the fourth subtitle of the first chapter, the process of colour forecasting, which determines the "colour fashion" for a season, is told. Whether they will be used in fashion design or product design, the colours used in a product is forecast at least 1.5 year before its season, considering what the mood and life style of the season would be. That's why at certain times some colours are "trendy" to wear or to use. The colour forecasting is a very important step in designing process as success of a design whether it is a very good design is measured by its success on the market, and colours affect people's decision to buy approximately 60 %.

In first chapter the process of the use of colour in design is studied. In the following chapters, this common approach will focused on the relation of colour with an object.

The second chapter is about the relations between colours and society. Whether it is noticed or not, today in our life there are still colour associations in use coming through ages carried with culture. If it is considered that colour is one of the first stimulants that a human reacts to this seems logical but what is interesting about the relations between colours and culture is that there are particular colour associations that remain the same wherever the culture is sprouted on. For example all over the world cultures the dichotomy of white and black, day and night and good and evil is corporated. Most of the associations of colours are made according to the religious associations and some colours are considered sacred. Even though the colours associated differ in all of the cultures, the cardinal points of compass are personified and their characters are associated with colour. The geologic aspects are important on colour choices of local cultures. Also the colour preferences of nations show its effects on national flags. However despite all these cultural differences today by the progression of technology, the sharp barriers between cultures began to disappear and especially on the field of design there is unity in colour language. Especially on the field of electrical appliance design, whatever be the nationality or culture of the producer, the colour schemes used remain constant.

After studying the use of colour in design process and colours relation with society, in the third chapter it is aimed to focus on the effects of colour on industrial design, particularly in the field of electrical domestic appliances. In the use of colour there are many aspects to be considered; differing from earlier mentioned aesthetic harmonious colour choices, or colour schemes reflecting the mood of the time, or else symbolic associations of colours visual information a colour scheme presents, or its functionality or individual choice of the consumer, i.e. personalizing of colours.

Visual information of a product is the first glance perception of the functioning of product by a user. On the field of domestic appliances, as the target mass of a product includes a very large range of people from different culture ranks, the visual information of a product must be clear and comprehensible, and colour is an important medium of visual information but as domestic appliances make part of "home" for people, considering visual information transmitted on a vast and common level would not be adequate. Their houses mean much more than a shelter to the human, since the first days of settlement they have personalized their "homes"; decorated it, put shrines in, or they have burned incenses as they do in their temples. During the post-war years, women needed to do their own house works and earlier designs of electrical domestic appliances were designed for being "functional". Colour is a stimulant that affects humans deeply; they create an emotional and social experience that would ease burden of household tasks. As individuals, people can be introvert or extrovert, romantic or serious; to personalize their domestic appliances within a large range of colours would increase the quality of time and task which they are working on.

Whether it seems that they cannot be brought together, aesthetics and ergonomics make up two of the tripods on which a good design rises. Aesthetic concerns about social experience of a product include how it looks, and what it makes people feel? Ergonomic concerns about the functioning of a product are whether it is comprehensible, or it works well? Colour has an important role for both. That's why, on the second subtitle of the chapter in which the effects of colour on an industrial product is studied, colour aesthetics and ergonomics are studied together.

Colour is the most important component of the visual aspect of aesthetics. It is directly related with the social experience thus the decision of buying or using a product. An unpleasant colour would obstruct the workability of a product, and this makes aesthetics related to the ergonomics.

Colour ergonomics makes a part of cognitive ergonomics, i.e. the mental process of a work. It aimed to get the best result of one's work by using the most appropriate colour. As it is easier to perceive compared to numeric or shape codes, colour provides shortening the time one spends on perceiving the functioning of a product, this is what relates ergonomics to visual information. Especially on domestic appliances as indicated before, the target mass is composed of many different people with different educational levels, so perceptive level, and colour codes are always reliable for anybody whatever its perceptive level may be. Besides, flawed use of colour would increase the user errors, which could be lethal on appliances working with electricity.

After studying more general data about colour and the use of colour in design, to be able to make accurate interpretations, the progression of explanations of colours, domestic appliances and colour preferences ought to be observed. Therefore, the fourth chapter is allocated to historical aspects of colours and domestic appliances.

To be able to understand the progression of the use of colour through time, first the progression of colour theories and explanations ought to be studied. From Aristotle to Itten, throughout history many philosophers, scientists and artists tried to understand the true nature of colour, and made their own interpretations on them. For example Aristotle thought that colours were the mixture of sufficient lightness and darkness. Leonardo considered white and black as colours just like red, yellow, green and blue, already renowned colours by philosophers. Also, his nature observations shed light on his predecessors. By his nature observations, he discovered perspective and its effect on colours and simultaneous contrast. Sir Isaac Newton observed colours in laboratory milieu and found out that white day light consisted of seven colours of spectrum while refracted from a prism. He took up colours as a matter of light as did Aristotle. French painter Blon reduced colours into their most primaries, and Harris developed from this eighteen hued colour wheel consisting of primaries red, yellow and blue, their compounds green, orange and purple and their mixtures, grading into shades and tints. The philosopher Goethe took up colour from the viewpoint of human eye. His observations were based on human perception and he explored simultaneous contrast, afterimage, colour of shadows and how colours can relate to emotional states. Contemporaneously, Runge made the first three dimensional colour sphere based on dodecahedron consisting of hues on equator. During following years Chevreul determined for the first time the principles of colour harmony, and Rood made researches on the field of optics which pointillists greatly inspired. However the most

accurate colour system had not been formed until Albert Munsell created his own colour notation system. Unlike the other three dimensional colour models, Munsell's colour model based on his observations about some colours are more saturate than others when pure, and instead of forcing colours into fit in a particular shape he created his colour model in the form of a tree, of which trunk consists of achromatics and branches from hues at different lengths depending on the chroma. This colour system was such an accurate system that it is still in use today. With the new century new expectations of people found its reflection on the theories of painters and teachers at Bauhaus Kandinsky and Itten, a spiritual approach to colours. They associated colours with movements and shapes and as did Goethe, they were concerned with the psychological effects of colours on people. Also, Itten suggested one of the most renowned colour wheel interpretations consisting of both three primaries, compounds and their mixture at the outermost wheel.

After studying the historic progression of colours on an intellectual platform, to provide an easy passage into the historic progression on the field of daily life, a short introduction about was made house-wares and colour tendencies throughout the last century.

In the third subtitle, the progression of domestic appliances is studied from the end of Victorian era till the 1950s, the age of consumerism. In this section, it is aimed to show how structure of society affected daily life and people's expectations and how domestic appliances were directly influenced by social changes. In this perspective, it is mentioned there how housewives stances changed by time towards house works through time, under the influence of social events like economic crises and wars, from despising doing house works into making some worshipping ritual of them.

After explaining the progression of domestic appliances, the next subtitle aims to observe the progression of colours according to changes in art movements and social life; meanwhile, making a synthesis of influences of colours and art movements on domestic appliances since late Victorian times through the decades of twentieth century. At first glance seemed like two different realms, art and house-works, when they are both observed contemporarily, being two extensions of the same social life it can be seen that they are not too much separated from each other on the time-line following Industrial Revolution. As long as domestic appliances involved in social life are concerned, they are influenced by the actual artistic taste. For example first domestic appliance presented in social life, the sewing machines are made by the taste of

Victorian time with veneered dashy ornaments to avoid the prejudices against working-class women. The following years, by the spreading of electricity among the upper class houses electric kettles are introduced on the tea tables. The electric kettles designed by Peter Behrens for AEG were made at a time between the passages from Art Nouveau's sinuous lines into the sharp geometrical abstraction of cubism; therefore there were different types of kettles designed for different tastes. In the 1930s, by the influence of modernism pioneered by Bauhaus, neutral and functional colours, by the influence of Art-Deco smooth finishings were introduced into the field of domestic appliances. These were the times of post war and great depression, women couldn't afford any further the servant aid and they needed to their own works. The Sear Coldspot refrigerator redesigned by Raymond Loewy conveyed those demands, even vacuum cleaners which were to be hidden from sight, with their streamlined casings or patterned dust bags were adapted to this tendency. Post-World War II era brought two different approaches into the design; one is with its pure functionalist approach of timeless concept of good design which is the sierra of the modern movement, the other is the consumerist approach involving planned obsolescence into design. In those years colours got introduced in domestic appliances to cheer up middle class women and manufacturers despaired by the war. Also in these years, modernist designers went on to maintain good design keeping on the rules of good design, embodying functionality and aesthetics in and with lead designers like Alfred Müller and Dieter Rams. The German electrical appliances manufacturer Braun became the best applier among them. The 1960s was greatly an anchor point on all aspects of life, the tendency towards freedom wiped clean the last traces of austerity and durableness of good design and everything became disposable yet cheery and colourful. With the economic recession of 1970s, more sober colours replaced the cheerful colours and a vague of responsibility towards nature grace of petrol crisis, and both designers and manufacturers worked on ergonomics and recyclable materials. By the 1980, the economy was recovered and the life style welcomed back the optimism of fifties and sixties but in a more responsible way. From then on the tendency of personalizing a product was in demand and ability to produce different parts in different colours by injection moulding of thermoplastics, rather than one piece increased the choices of colours for personalizing.

By the guidance of data studied in the previous chapter, the last chapter of thesis it is aimed to study the reasons of colour choices in domestic appliances in order of

mostly used colour schemes: White, Metallic Grey, Dark Colours, Pastels and Bright Colours. The conclusions about colours are as follows;

White is a colour which has dominance on most appliances. As a colour, white has a sterile feeling and associated with wetness; cleaning and freezing. Although there are a pile of appliances known as “white-goods”, for a long term white has been the preferable colour for kitchens. The first appearance of white on domestic appliances was with the 1935 Raymond Loewy design refrigerator. Afterwards electrical cookers and washing machines were put in the same category of hygiene and cleanness, and framed with white. Nowadays white is still preferable in kitchen appliances, but not in the strict way it used to be. Today, transparency and different hues are preferred to highlight functional parts of appliances.

Metallic grey is used on almost every appliance. Grey’s neutrality and cold appearance enhanced with the modern and machinelike associations of metallic shimmer makes an appliance appear technological and reliable. However it has a cold and formal appearance and this makes an appliance looking industrial rather than cosy and homely.

Dark colours, such as black and brown, are used mostly on appliances which are expected to be strong and reliable. As black has a stain covering quality, today most of the cookers and ovens are black. Before the invention of electricity, black and brown were the preferred colours for cookers and refrigerators. Electricity was lanced as “fuel of future”, and as long as design gained importance, cold and sterile white replaced black. It was the time of housewives.

The other field where black and dark colours are used is the condition which an appliance needs to look elegant, expensive and formal. Their places are mostly offices rather than homes.

Pastel shades of hues are adaptable and easy colours, that’s why we can see pastel tones almost on each appliance, but main field of use is on kitchen appliances, which are only a mean for the aim. Pastel colours are not eye catching and thus are suitable to be a part of a team work.

Contrarily, bright hues are eye catching. They grab all the attention and thus are suitable for purposes in which the appliance is the focus of the action, as in the case of vacuum cleaners.

CHAPTER 2

COLOUR USE IN DESIGN

What makes human-kind different from other animals is the intelligence and ability to create. Even before settlement, which is considered as an anchor point in human history, the vagabond humans created tools to help them for different purposes; to hunt, to shelter, to defence, to eat, etc… And from the first axe made of flint stone, by their instincts to personalize, colour became of impossible to renounce as an element of design with creativity.

Design has a very large field from two dimensions to four, and each branch of design differs from the other by their relations with colour. In artistic painting, the aesthetic value of colours is progressing, in graphic design functional use of colours is also as important as aesthetics. On three dimensional designs as architecture and industrial design functionality gain more importance and also have a task of accentuation of dimension and function. Zelanski and Fisher refer in their work Colour to the power of colour as the artist's tool by saying: "It affects our emotions beyond thought and can convey any mood, from delight to despair." (Fisher and Zelanski 1989, p. 9).

The "must considered" point of colour in design is that colour preferences have been a social aspect throughout time. The life style is an important aspect effecting colours. We can observe any sociologic changes in life style (psychological or economic) in colour choices as well as design. The other important aspect is cultural differentiations due to geography. On different geographies different cultures blossoms (as cultures of Mesopotamia and delta of Niles), and they get different meanings from the same colours. However the most varicosity on colour preferences was in the times when people cannot interact with one another at the other side of the world. As much as technology provides facility on interaction among people, their lifestyles and colour preferences become alike.

2.1. Colour Theory: Basic Knowledge of Colour

Being one of the first stimulants humans react to from the birth, colours are elements that cannot be given up in human life. It is not only an aesthetic concern but it is also a physiological concern and mostly a psychological need. That's why it is essential for a designer to understand colours and how to use them.

2.1.1. Colour and Colour Wheel

Colours let us perceive the world around us: the depth, length and any other visual data. According to "Petit Larousse", we can define colour as "the impression made on eye by the diverse radiations which form light". I.e., colour is light, or in a scientific manner, colours are different wavelengths at visible intervals of electro-magnetic waves. Light consists of the unison of those wave-lengths; the lack of them causes darkness. We can even tell that without colours we can see nothing, so vision is colour.

We can perceive the colours of objects by the wave lengths they reflect. If an object reflects the wave length of blue, we perceive it as blue, and so on. If an object reflects all of wave lengths at once, we perceive it white; if it absorbs all of the wave lengths we perceive it black.

Physically colours range in a linear way from purple to red as shown in Figure 1, but for artists and designers, colour theory is based on a colour wheel. Whelan defines colour wheel in his work Color Harmony 2 as "Constructed in an orderly progression the color wheel enables the user to visualize the sequence of colour balance and harmony." (Whelan 1994, p. 8).

Figure 1. Physically visible interval of colour lies between Ultra-Violet and Infra-Red
(Source: WEB_9 2005)

The wheel of colour consists of three primary colours and the secondary and tertiary colours formed by their mixing. The primary colours are like the molecules are to atoms, the colours that can not be formed by mixing of any other colours or cannot be reduced to some other form of colours, which are red, yellow and blue. Secondary colours are formed by mixtures of primary colours; green, orange and purple. Tertiary colours are formed by mixing one primary and one secondary colour. (Figure 2)

Figure 2. Colour wheel by Johannes Itten, indicating three primary colours and wheel
(Source: Fraser and Banks 2004, p. 44)

2.1.2. Characteristics of Colours in Colour Wheel

Every colour in the spectrum has three different characteristic; hue, shade and saturation. Hue is the actual colour, the way in which colours differ from one another. There are twelve hues in the colour wheel; red, orange, yellow-orange, yellow, yellow-green, green, blue-green, blue, blue-violet, violet, and red-violet. Shade is the amount of white or black mixed with the hue in the colour. Saturation is the vividness or intensity (Chijiiwa 1990, Callopy 2000).

Due to their different characteristics we can classify colours differently. For example referring to hue, there are warm colours and cool colours. Light and dark colours refer to the shade, and according to saturation we can classify them as vivid or dull (Chijiiwa 1990).

The first half of the colour wheel (red, yellow, orange, pink, and brown) are called warm colours. They remind us of heat. Warm colours are progressive and grab attention more than any other colours do. In a colour scheme they come forward. They are bright, splashy, appetizing and aggressive, and make the colour scheme look brash, cheerful, and exuberant (Chijiiwa 1990).

On the contrary cool colours (blue, green, violet and shades of grey) remind us of a winter scene, and have the opposite effects as warm colours. They are introvert and slow down body's metabolism. Although they have a soothing effect on people's feelings and they can be unbearably gloomy and oppressive (Chijiiwa 1990).

Light tints of colours look soft (Figure 3). Even light tints of warm colours have a fairy-tale-like quality. A colour scheme consisting of light colours isn't always preferable because of the lack of eye catching quality of it, but in a bright colour scheme it would stand out in its quiet way (Chijiiwa 1990).

Figure 3. Light tints of colours have a fairy tale quality

Dark shades of colours seem strong and solid (Figure 4). They make one feel both heavy and gloomy, both royal and dignified. In a graphic scheme they are mostly used for type and accent, or as a background to make serious theme. In furniture, black and dark colours look precious and expensive. Especially dark brown have a hand crafted look as in leather or carved furnishing (Chijiiwa 1990).

Figure 4. Dark shades of colours feel heavy and strong

The vivid colours (including black and white) have powerful personalities; they stand out in a colour scheme (Figure 5). For accent, they might be good but combination of more than two vivid colours would be disturbing; like the cacophony of many shouting voice or contradiction of two dominant characters. Eye tires quickly of vivid colour schemes (Chijiiwa 1990).

Figure 5. Vivid colours stand out in a colour scheme

Grey softens the character of colours and makes them blurry (Figure 6). Dull colours help to reduce tension and have a meditative mood, yet as they tend to be boring and insipid, they need at least one vivid colour to cheer them up (Chijiiwa 1990).

Figure 6. Dull colours reduce tension and tend to be boring.

Briefly, vivid colours are the basic hues on the colour wheel. Light colours are mixtures of the basic hues with white. They have a reduced intensity. Dull colours are mixtures of grey with hues and they tend to have a muddy appearance. Dark colours are mixtures of black and they are gloomy. Brightness is stimulating and darkness relaxing. Warm colours are exciting in nature and tend to be the figure as they are progressive, contrary cool colours are tranquilizing in nature and tend to be the background as they are receding. Yet a bright cool colour is more progressive than a dull warm colour.

> In conclusion, whether a colour is advancing or receding depends on hue (warm advances, cool recedes), brightness (high advances, low recedes) and saturation (deep advances, shallow recedes) (Sharpe 1975, p. 107).

2.1.3. Colour Harmony

Colours are different from each other, they have different characteristics; yet nothing is monochromatic in nature. Even in most shocking combinations, colours coexist in a harmonious way in the nature.

Colour harmony is the aesthetic arrangement of colours to create a pleasing whole. (Chijiiwa 1990) In a more scientific explanation, as Banks and Fraser indicate in their work, colour harmony "relates to the eye/brain's expectation of overall balance or neutrality" (Banks and Fraser 2004, p. 43).

Again Chiijiwa says in his work, "If the science of colour harmony is to know which colours to use, the art is to know what order to put the colours in and what proportions of each." (Chijiiwa 1990, p. 6). To know these relations is indispensable for a designer.

According to Chijiiwa, there are three kinds of relationship between colours to form different colour schemes; similar colours, complementary colours and contrasting colours. Similar hues are adjacent on the colour wheel, contrasting colours have three hues between them on the colour wheel, and complementary colours are the hues at the opposite sides of the wheel. The relationships between the hues on the wheel remain constant regardless of shade or saturation.

Johannes Itten describes in his work, "*Art of Color*", that colour combinations can be formed by two, three, four or six colours on the twelve-coloured wheel. Colour schemes made of two hues on the opposite sides of the wheel are complementary to each other and this scheme is called a dyad. In this kind of schemes, two chosen tones must be symmetrical also, i.e. if one hue is shaded its complementary hue should be lightened as well as the other is shaded.

If the position of the hues forming colour schemes makes an equilateral or isosceles triangle, this scheme forms a harmonious triad.

Two pairs of complementary hues form a tetrad in the colour wheel. Also, two adjacent colours and two opposing hues at the right and left of their complements form a tetrad in the form of a trapezoid.

A hexagon made of three complementary colours forms a harmonious hexad. Another way to make a hexad is to adjoin white and black to four pure colours (Itten 1978).

As it is mentioned above on the colour schemes explained by Itten, to make a harmonious scheme the visual strengths of colours must be equalized (lightness, saturation and hues). German philosopher Goethe makes a chart according to the visual strength of six colours, scaling them according to the amount of light they possess within. According to the chart shown in Figure 7, yellow is the strongest colour with a score of 9/9. The lowest score is 3/9 of violet, which means it is the least visible colour (Banks and Fraser 2004). Adjusting a colour scheme consisting of orange (8/9) and its contrasting colour blue (4/9) in this context would be possible with the use of blue two times larger then orange in the same scheme.

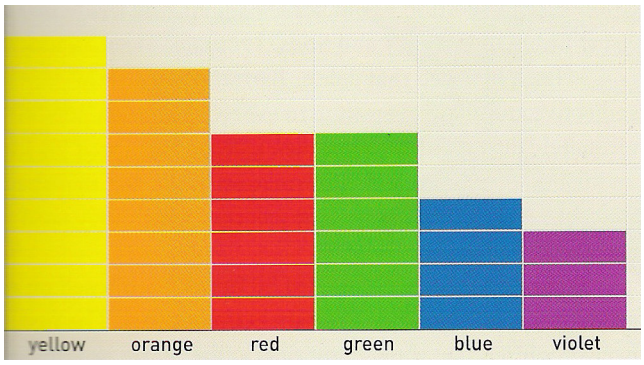

Figure 7. The colour scale of visual strength of colours proposed by Goethe (Source: Fraser and Banks 2004, p. 43)

There are also monochromatic harmonies based on different variations of lightness and saturation of one hue. If a monochromatic scheme of black is considered, it must be remembered that black has the lowest visibility, therefore the lowest score if it would be placed on Goethe's chart. In counterpart for its opposite, white is considered to have the highest visibility and score. I.e. in monochromatic schemes darker shades are to be preferred to provide equilibrium (Banks and Fraser 2004).

Other definitions frequently encountered are achromatic colours and process colours. Achromatic colours are black, white and shades of grey. Process colours are the four colours used in the four-colour printing process; yellow, cyan, magenta and black.

2.2. Colour Spaces

For a designer it is important to choose the right colour scheme for right purposes, but what is more important is to know how to express them. Whether the colours are precise in designers' imagination or on paper, they need a standard platform to communicate with the media they are using or the producer. Colour spaces are that common language which provides communication and continuity of the chosen colour. Fred Collopy indicates in his paper "Color, Form, and Motion" published in Leonardo in 2000 May, a colour space is defined by the way in which numeric parameters are designated and relate to one another. These numeric parameters are related to the assumption of trichromatic nature of colour.

Most common colour spaces are RGB (**R**ed-**G**reen-**B**lue), CMYK (**C**yan-**M**agenta-**Y**ellow-**K** for black) and HSV (Hue, Saturation, Value).

The colours displayed in a space are called a colour gamut (Figure 8). Rick Sutherland and Barb Karg defined the colour gamut in their work as;

> Colour gamut is a term that describes the range of colours that can be produced by any given process or device, such as computer monitors or proofing system (Karg and Sutherland 2003, p. 15).

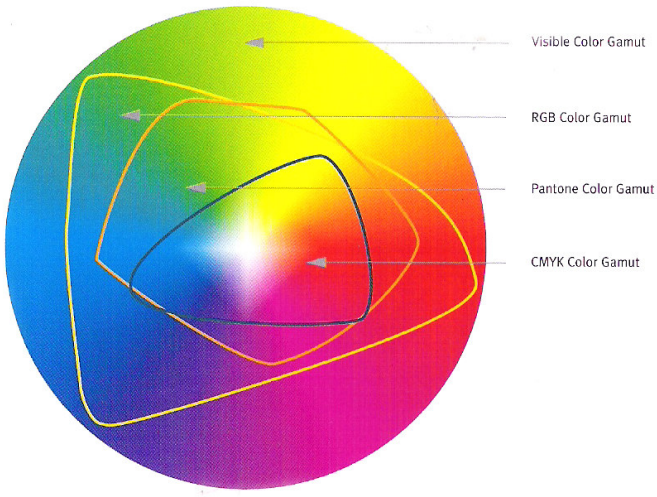

Figure 8. Representation of different colour spaces colour gamuts within the visible colour gamut. (Source: Karg and Sutherland 2003, p. 15)

RGB colour space describes additive colours. Mixture of these three colours (red, green, blue) gives us white light. So its field of use is on display devices where coloured light exists, such as computer monitors, TV screens and lighting effects. As it describes the colour of "lights", RGB colour space has a large colour gamut on the colour interval that human eye can perceive.

CMY(K) is the colour space of offset printing and those four colours together known as process colours. As it is a subtractive space, contrary of RGB space, the mixture of three colours (cyan, magenta, yellow)–beside black– gives black. CMY(K) colour space's colour gamut has a very restricted part in the range of perceived colours.

As shown in Figure 9 subtractive colours are secondary colours of additive colours, as additive colours are to subtractive colours.

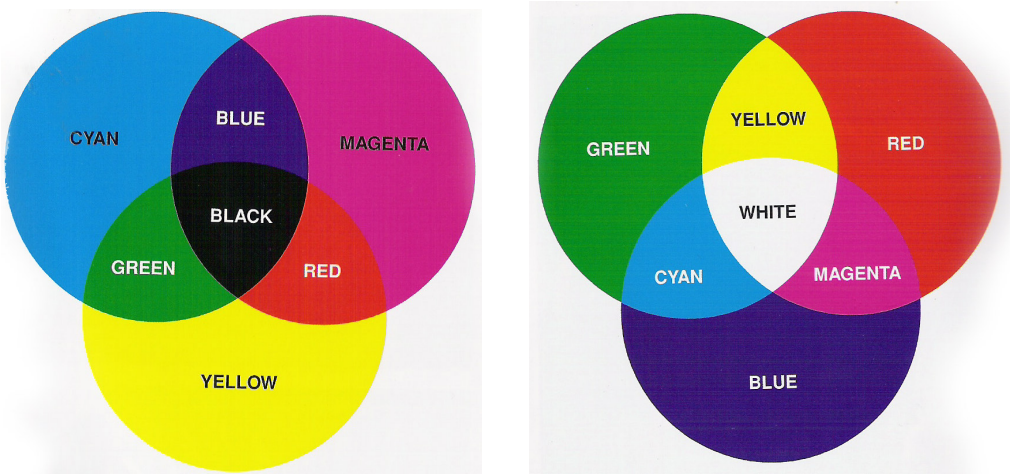

Figure 9. a. Subtractive Colours
b. Additive Colours
Subtractive colours are secondary colours of
additive colours, as additive colours are to subtractive colours
(Source: Karg and Sutherland 2003, pp. 84-85)

HSV is the colour space which is preferred mostly by artists as it is the most close to the visual perception of colours.

The colour spaces are very useful to define colours in one medium, but colours in different media are to appear far different from itself on the other media. For example, the colours on a graphic made on RGB mode would be very different from what it looks like on the monitor when printed out, (as printing process is on CMYK

colour space) some of the colours created in additive way (RGB) cannot be replicated by subtractive (CMYK) methods.

It is possible to convert images from RGB to CMYK on digital media as pixel based or vector based computer graphic software, but to assure the colours to remain constant when converted to the other medium, there are colour matching systems which are sets of colours to specify colours by numbers.

2.3. Colour Matching Systems

To convert an image from a medium into another, causes differentiation on the colours at the result. Also it is not always possible to get in subtractive methods all the colours that are composed by an additive method. In colour matching systems, despite CMYK models there is a single ink for each defined colour by a number. Those colours are called spot colours. Those are constant in all media and easier to find by their catalogues. The other advantage of spot colours on CMYK on single coloured schemes is that the cost of CMYK would be higher, on spot colour only the ink of desired colour is used, but on CMYK all of the 4 colours are used. And spot colours include the metallic colours and fluorescent colours which cannot be composed by a CMYK process.

Some of the most popular colour matching systems are Pantone Matching System, DIC Colour match, CIE, Trumatch and Focoltone.

Most renowned of those colour matching systems is Pantone Matching System with a very large colour library not only for printing but also for textiles and plastics.

The PANTONE formula guide consists of three guides and 1114 colours as coated, uncoated and matte shock as spot colours but also has PANTONE Process Colour System for CMYK printing and metallic with more than 3000 colours. The patented PANTONE Hexachrome Colour System enables a higher quality printing than CMYK is, and is made by six colours.

The PANTONE TEXTILE Colour System is useful in every field of design in which textiles are used; fashion, furnishings, interior design, etc… The system consists of two guides of 1932 colours in cotton or in paper. Pantone also has a biannual forecasting about clothing and industrial design, The PANTONE VIEW Colour Planner.

The PANTONE PLASTICS Colour System supplies to designers and producers with hundreds of colour choices; whether opaque or transparent (WEB_18 2006).

There are also other colour matching systems in addition to Pantone; DIC Colour Match is the match system produced by Japanese Dainippon Ink & Chemicals Inc.

2.4. Colour Forecasting

Each season colours used in design industry change, sometimes there is a radical or just a slight change. It is obvious that colour preferences are influenced by social and economic situations (Whelan 1994), but how does it happen the producers prepare their retail as if they are in accordance?

The reason for choosing the same colours all around the world in accordance is the colour forecastings indicating the colour trends made twice in a year, 22 months ahead from presenting products on the market by colour consulting authorities. Colour trends are no longer dependent on technical advances in pigment manufacturing as it used to be in former years. Even though it is a profit for designers to choose different colours, to predict the colour trends for different seasons became harder.

Even though colours consulting techniques depends on the nature of the field of design (the materials used, demands of clients etc…) the process of colour forecasting consists of three phases. During the first phase the international team consisting of many expert colourists, professionals on colour merchandising, advertising and marketing, professional designers of graphic design, fashion interior design and industrial design discuss seasonal colour philosophies matching the life style. After they agree on the concepts colour stories are made. The second phase is to prepare colour palettes with paper clippings, fabrics and yarns. Then, to afford stability on colours, the exact matches of colours on colour systems are found (mostly on Pantone Colour systems). The third phase is to prepare catalogues; theme names, appropriate images etc…, and publish them before the next retail season. Whelan says in his book "*Color Harmony 2*": "As consumers become comfortable with color in daily life, analysts look for newer and more exciting color combinations to stimulate their emotions and product needs. This is often interpreted as "something new" or "in style"" (Whelan 1994, p.123).

Colour forecastings are not only restricted to clothing. Those predictions are made for everything that is produced with colours. The categories of the predictions are generally, Interiors – which includes leather fashion, furnishings, paints, carpets and other decorations –, Graphics, Women's wear, Men's wear and Youth wear.

There are many organizations involved in forecasting of annual colour trends, such as "*Association for International Color Directions*" (**AICD**) and its marketing arm "*Color Marketing Group, Color Association of the United States*" (**CAUS**), Intercolor etc… (Whelan 1994).

Changing colour has an important effect on industry, whether the product is an industrial product or a fashion product and the applied design program should be watched carefully. Today the press has become a good means to follow its progress (Linton 1991).

Harold Linton explains in his 1991 book "Color Consulting" the way to work of Jean-Philippe Lenclos -the founder of "Atelier 3D Couleur", Paris- . Lenclos is an important colour consulter co-working with almost all design related disciplines like architecture, decoration, fashion, products and graphics, etc… When a manufacturer gives a target profile of a product to Atelier 3D Couleurs, they designate the colours which the sector would respond in recent years. Linton notes the importance of this work by saying: "In this sense, Lenclos and his associates have an active role in the creative industrial process, thereby contributing to the research, production, and the commercial success of the client companies." (Linton 1991, p.113). Working accurately on his field, Lenclos analyzes the international press, artistic events and professional exhibitions, collects different colour materials from the world and regularly updates those data. In his interview with Linton about colour consultants job he says;

> For an architectural or industrial product purpose, the study of color requires the consultant to perform incessant repetitions. It means recreating the life of an object no matter its scale. To create combinations of contrast in order to create visual and sensory emotions with color-with new objectives being provoked by communication needs: to give an impression of freshness, smell, warmth, exotism, comfort… (Linton 1991, p. 113)

According to Linton Lenclos is the first designer who treated colour as an independent element of design and gave colour an identity with daily life (Linton 1991).

The colour forecasts have an important role in the economy as economy depends on "buyability" (Whelan 1994). Psychologists think 6o % of the decision of buying

depends on colours (WEB_11 2004). Even without changing a product design, it is possible to renew it by changing its colour, so right colour forecasts helps producers to stay in the market without great expenses. Each year “Atelier 3D Couleur” analyses colour trends in European domestic appliances and develops colour cards for those products.

CHAPTER 3

COLOUR AND SOCIETY

As indicated in previous chapters, colour is one of the first stimulants humans respond to as newborns. As the colours are to be easily perceived and obtained, they have become a means to express one's self. First drawings on caves show us that primitive people were using pigments derived from earth: reds and yellow ochre obtained by the oxides or hydroxides of irons. In the famous cave of Lascaux even white colouring which is derived after multiple processes of bones was used (Banks and Fraser 2004).

Colour choices of different cultures differ according to the geographies they raised in. The natural impacts and resources greatly affect colour schemes and preferences used.

Colour of skin considered for ages as the perfection of a race for a long term while people were living separately from each other. Birren notes this aspect in his work "*Colour Symbolism*" by saying that "adoration of racial purity which was distinguished by colour purity. "Extreme whiteness of skin among northern people, extreme yellowness or goldness among Orientals, extreme blackness among negroes became the emblem of ideal racial type" (Birren 1988, p. 11). In the very same work, Birren also mentioned different racial colour associations in different cultures. For example, the Egyptian people recognized four races; Egyptians who are red, Asiatics who are yellow, Anatolians and Northern Mediterraneans which are white, and Nubians and Southern Africans which are black. Barren also mentioned a colour association made in a tale from "Arabian Nights", "The Tale of the Ensorcelled Prince" according to the religions: "The evil wife of the prince casts this spell upon the inhabitants of the Black islands and she transformed the citizens of different religions by her enchantments into fishes; the Moslems are the white, the Magians red, the Christians blue, Jews are yellow." (Birren 1988, p. 12).

Another important factor influencing colour symbolism is the association of a particular religion made with colour. The ancient Turkish people believed in Kök Tengri (Gök Tanrı in modern Turkish), the god dominating in sky. After the wisdom and holiness of Gök Tanrı, the wise wolf which helped the warriors named Kök Börü, the blue wolf. Also the legendary hero Oghuz Khan is said to be born with a sky blue face. Thus, his holiness and wisdom were accentuated (Ögel 2003). In ancient Egypt, the god Osiris is described with a green face as he is a god a part of whose is still dominating in the Niles, The Green River (Figure 10), and besides being the ancestor of all pharaohs, he was the god of fertility (Fagan 2003). For Buddhists, orange is the sacred colour, the colour worn By Buddha himself, and only priests can wear this colour. Orange has an association with divinity and humility of Buddha (Fraser and Banks 2004). In Islam, the colour green is considered sacred. The Garden of Eden is said to be in deepest shades of green, and only the innocents and true believers would reach it. Also the descendents of the prophet Mohammed can wear green turbans. As seen in most of the beliefs white is the colour of purity and innocence in Islam, that's why the pilgrims wear white "ihrams" on that Hajj pilgrimage (Birren 1988). It is said that Kabe was once white, darkened and became black with the sins of men. In Christianity, there is more colour symbolism than Islam has. For Christians, white is the sacred colour, symbolising purity and goodness, colour associated to Christ. Blue is the colour symbolising hope, divinity and piety, it is the colour associated to Mary. Red is the colour associated to martyrdom (Figure 11), and purple to self sacrifice; that's why high ranked Christian religious men wear red or purple in their cloths. Some of the Christian monks wear only the colour brown as it symbolises humility and modesty (Birren 1988).

Figure 10. Osiris, The God of Fertility and Rebirth his green face is a symbol of fertility.
(Source: Fagan 2001, p. 14)

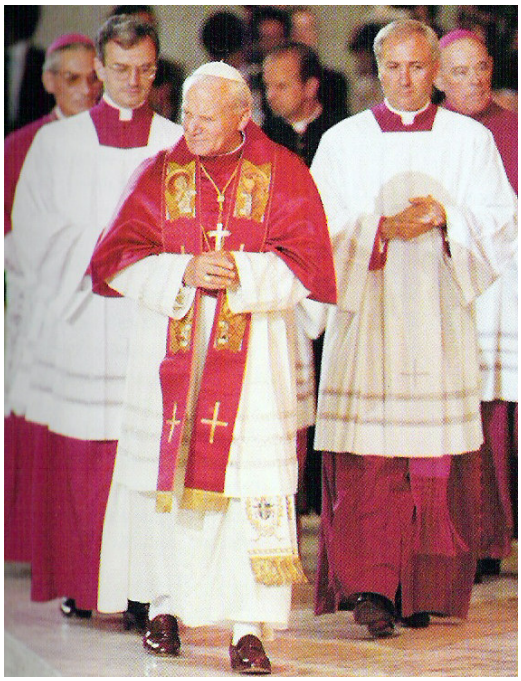

Figure 11. High ranked Christian religious men wear red as a symbol of martyrdom.
(Source: Banks and Fraser 2004, p. 14)

In almost all civilizations, a colour is associated to the cardinal points of the compass even though the civilizations are far apart from one another (Birren 1988). To associate colours to cardinal points is an ancient habit related to giving a mythological explanation to phenomena surrounding ancient people. It is the personification of cardinal directions and explaining those characters with the symbolic meanings of colours. For example, it is said in Chinese mythology, there are four kings dominating four directions, the guardian king of north, Mo-Li Shoo has a black face; the guardian king of south, Mo-Li Hung has a red face; the guardian king of west Mo-Li Hair has a white face and the guardian king of east Mo-Li Ch'ing has a red face (Birren 1988). Like the Old world, too many cultures in the New World have made an association of colours with cardinal points of the compass. Some principle Aztec gods is said to come from the cardinal points and those directions are described by the colour associations made to them. For example, Tlaloc (the storm god) resides in east, and brings prosperity with rain. That's why his colour is blue. Quetzalcoatl, the winged serpent, comes from west and brings spring and flowers, his colour are red. From north comes Mixcoatl bringing white and also Tezcatlipoca, the black panther a.k.a. the winter twin, and they

bring cold. Mictantecuhti, lord of the underworld, brings dry and hot air with him from south. His colour is yellow (WEB_29 2004). The Natives from Northern America, Cherokees associated cardinal points with following colours:

> Blue represented North which meant cold, defeat and trouble.
> White was South representing warmth, peace and happiness.
> Red was East, the color of the Sacred Fire, blood, and success.
> West was black the color meaning problems and death. (WEB_28 2004)

Generally, the hues which are hardest to produce locally are considered most precious and royal. For example, the colour violet was very hard to produce in Roman times and can be produced only by the secretion of a marine mollusque, Murex Brandaris (WEB_30 2006), thus it was the colour for royalty, and became en vogue at mid-nineteenth century and again became the symbol of royalty and aristocracy after Queen Victoria's choice of dress for her daughter's wedding (Dyorum 2006).

Local geological aspects are effective on colour choices in some regions. For example, some cities are united with the dominating colour, like Paris and grey of stone buildings, Siena and reddish brown of soil, Naples and yellow washed buildings. These colours are so closely associated to those cities that they are named after them. Also the place where the stone coming from Iran is presented and traded to the western society gave its name to the stone and colour to turquoise, the Turkish Stone.

The national flags are also examples of national colour choices, following examples are studied according to the examples of flags shown in Figure 12, 13 and 14. For Turkish people, red has always been a colour in demand. We can see red on the kilims, folkloric outfits, saddle ornaments, bride dresses, in odes and folkloric songs. It is obvious to see why colours of Turkish flag are red and white. The affection Turkish people have for red on their outfits, gave its name to a colour, Andrinople (Edirne) Red. The Greek people who have always been concerned with sea have deep like for blue, as can be seen in their flag, white and blue. In Japanese culture, red and white together are pronounced as one name, Kohaku, and means happiness for Japanese people. The Japanese called their land Nippon, The Land of Rising Sun, and the Japanese flag consists of a red sun rising in a white (angelic, holly) sky (Neumann 2004).

Figure 12. Turkish Flag

Figure 13. Greek Flag (Source: WEB_22 2006)

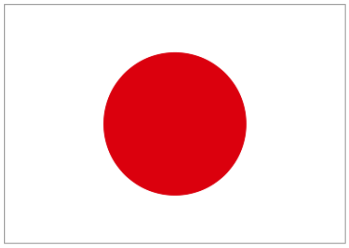

Figure 14. Japanese Flag

Adnan Tepecik notes in his work Graphical Arts the colour choices in national flags as;

> While people living around Equator use warm and bright colours on their flags and outfits, people living in cold climates prefer pastel shades, greys and cool colours on their outfits and flags (Tepecik 2002, p. 36).

Today at first glance it can be seen that colour preferences of people are not distinguished as they used to be before. Technology providing interaction among people, lifted out the sharp cultural boundaries between the societies even though they are far apart from one another. Since the beginning of the past century, life styles of people are to resemble with the progression in communication technologies, so are the colour preferences. Today, despite the cultural differences colour preferences are united. Especially, product and fashion design are affected greatly from western cultures, thus the colour symbolism of Hellenistic and Roman cultures on which the modern western society the flourished. The imposed effect of the western cultures dominated fashion design for a long term until recent years when ethnicism became en vogue, and to preserve and reflect the ethnical traces of a nation became the rising trend. Still, these rising trends show uniformity on colour choices in fashion all around the world. In the field of technological appliances however since International Style, the colour symbolism and choices of western culture became a common language accepted all around the world. For example, despite bad ominous association of white in Chinese culture, or Celtic association of green dress with fertility of a woman in British islands, and the affection and traditional red bride dress and veil of Turkish people, white gown and veil become the symbol of wedding everywhere in the world. By the turn of the new millennium, consciously or not people were looking for silverish colour as “the colour of the millennium”, consciously or unconsciously, to the association of space age

technology and the new millennium made early twentieth century. Since then besides white ones, metallic grey refrigerators have exhibited a rising demand graphic by the consumers in the field of domestic appliances.

CHAPTER 4

COLOUR IN INDUSTRIAL DESIGN

Even not considered among the primary stages of the design process, colour is an important element in design process. Luo says in his paper "Applying Colour Science in Colour Design";

> Colour has also been extensively used in the field of industrial design or product design. Although there are many factors in product design such as texture, style, forms and function, colour is one of the most important for attracting customers (Luo 2006).

Actually, an object's colour has a considerable impact on the appearance of a space as well as decoration and furnishings (Fraser and Banks 2004).

Many branches of sciences get involved in design criteria in the use of colour; psychology, aesthetics, ergonomics, marketing strategies, etc… When a colour scheme is to be chosen for a product, there are three aspects to be considered; psychological effects (symbolism and associations of colour), aesthetic effects (whether it is an attractive and effective design), and visual effects (eye catching colours and legible texts). Colour consultant Lenclos stated that the study of commercial colours would necessitate a vast understanding of the origins colours, i.e. the meaning of local colours and their effect on a commercial product (Linton 1991). Also, Leatrice Eiseman, the colour consultant of Pantone colour Institute, told Linton that her background on psychology has been useful in working with colours.

Briefly, for psychological effects we can say if a colour's associations relate to the product in a literal or abstract way, this is considered to be functional, for aesthetics we can say that harmonious colour combinations are considered pleasing to eye and that functional colour design influence perception of size and weight, and for visuality we can say some colours are advancing and some receding, and the appropriate use of those colours makes a product easier to use and understand.

With colour, it is possible to influence appearance and functionality of an object. Related to the function of an object or the local traditions, the use of colour makes an

object desirable, or not. Or misuse of colour combinations and proportions evoke decrease in the efficiency of performance even if the product is very well designed.

Still the knowledge of basic colour harmony, traditions or colour psychology alone isn't enough for an industrial designer. Even if a colour is functionally or culturally proper it doesn't make it suitable for the object, so the designer should consider the nature and texture of material the products. According to Eiseman, the following questions are important in colour choices.

> - What are the group, socioeconomic level, cultural background, and geographic location of your target market?
> - Do you have any preconceived notions about color?
> - Which colors, if any, have you used previously and were successful? Have any become classics or remained consistently strong sellers?
> - What fantasies, illusions, or ambiance is the product or setting to convey? (Linton 1991, p. 122)

According to her making generalities on colours must be avoided due to the very personal nature of colour perception (Linton 1991).

4.1. Visual Information & Personalizing

Colour is a medium of visual information of a product. In the domestic field of products visual information bears greater importance than it does with products for personal use. House works have definite tasks and definite tools to work with. Its focus group includes a group of people consisting of diverse cultures, ages, and genders with the same purpose (Erhan, 1978). Therefore, the visual information transmitted by the appliance should be clear and comprehensible. Images and typing are not always legible transmissions; they can mislead people of different cultures. Correct the use of colour would minimize the imprinting on product and eases work.

Still, the domestic appliances are not only common products that are used in common places. They get into peoples houses, in which people get out of the uniformity of their work life and only become themselves. People personalize the volume restricted by the walls to create a place in which they can shelter, be safe and be comforted; namely the home. Since the first human-beings settled in the caves, it has been seen that they personalized the volumes they lived in. Whether the cause is the aesthetical concerns or the need for belonging to somewhere, they decorated the walls with

drawings, inserted shrines to worship to their deities or sprits of their families, they kept the place clean and burned incenses when needed; the same comportments they do in their temples. So, being a part of this place, “home”, domestic appliances have to be a means of self expression as well as any other object in the house does.

In domestic appliances, personalizing tools is very restricted, since their priority is to be functional. More ever the sizes of appliances cause economical difficulties during mass production, so design of the tool is also formally restricted. The only way to make some difference which can be considered as personalizing before buying is to add colour to the tool.

Colours have an important role in personalizing the product. Products with the same design and diverse colours reach more users than the ones with uniformity in colour choices. During the second half of century, producers (ergo designers) oriented their products to the consumers demands. This orientation caused the need for diversity in products, because although there are focus groups that a product is aimed to, people in the focus group have different preferences and tastes. With the rising notion of liberty –denotational and economical liberty- at post war era people’s need to be “a” person led this diversity in production.

Besides being a trading strategy, science also showed that people are far more successful in their work with the tools with which they have an emotional and social experience. In this case, the social experience is provided by the colour diversity. As people have different character properties, the colours they feel comfortable with would change. While extrovert people feel comfortable with warm colours, introvert people would feel uncomfortable with the intrusion of these advancing colours in their sight and prefer cool colours. While romantic people prefer pastels with their dreamlike quality of sight, serious people prefer dark colours which have a more austere look (Sharpe 1975).

The nature of house work has never been pleasurable. It has always been a task to accomplish as fast and as good as possible with less tiring. The electrical domestic appliances ease quite a bit the housework. Still to deal with dust, dirt, heat and water remains a hard task. Experience of a person doing house-works which are not appealing, even with the aid of appliances whether they ease his work, would be negative. The time spent on doing the task would increase, and it would be a dolorous long time and the quality of the final result wouldn’t be as it is desired to be. Personalizing the appearance of tools increases the quality of time spent doing task, thus the quality of

work. In the study conducted by Ruth Mugge et al., it is stated that owners of personalized products become attached to them and care about handling them, i.e. personalized products have much longer lifetimes (Mugge, Schifferstein and Schoormans 2004).

4.2. Aesthetics and Ergonomics

People's expectations on design changed dramatically since the beginning of the last century. Besides function, they choose the products for the pleasure they can give. Today, a good design must appeal to the feelings as much as it does to the needs.

> More and more people buy objects for intellectual and spiritual nourishment. People do not buy my coffee makers, kettles and lemon squeezers because they need to make coffee, to boil water, or to squeeze lemons, but for other reasons.
> Alberto Alessi, Designer (WEB_31 2006)

Industrial product design rises on a tripod consisting of aesthetics, ergonomics and technology. Whether it seems like they seem sharply distinguished from each one another, the scientific experiments have proved the line between aesthetics and ergonomics is dissolving as aesthetic concerns are important too for an efficient work (WEB_31 2006).

The best designs are those in which all of these disciplines are equally considered. Yet there are some cases in which functionality or aesthetics must predominate as they can match in some cases. The most obvious example for the cases where aesthetics predominates is those fashionable stiletto shoes which have a very elegant and seductive look, but cause serious damage on feet and spinal posture on long term. This condition can be endured for a while for the sake of beauty, but where beauty cannot be mentioned is the case so that of safety. For example there are some restrictions on design criteria for certain products they can be introduced into the market. It is best to compromise aesthetics and ergonomics on the products which are not about safety or exception for beauty.

4.2.1. Colour Aesthetics

Aesthetics is the science of beauty, thus colour aesthetics is directly related to the social experience that a product can offer. As aesthetics is about all human senses, all of the five senses are considered as elements of aesthetics. Previously, the importance of visual importance has been indicated. Between the components of vision, colour is the most remarkable one (WEB_31 2006). The concord of colours, setting of colours and the equilibrium between colours are all subjects concerning colour aesthetics as they convince people if an object is aesthetically well designed or not. For example, contrast is a good way to set hierarchy as it focuses attention. Also, tension and balance are essential in aesthetics. Tension can be created by manipulating places of elements consisting of design, and creating balance by using elements of opposing quality. Rhythmic and flowing patterns, creating depth and adjusting scale, assuring interaction between elements, and unity are also among principles of an aesthetical design.

A product which is not in accordance with the aesthetic sense of a person would discord the harmony of the task between a human and a machine and this evokes undesirable consequences with the task. Thus, aesthetics is also closely related to the science of ergonomics.

4.2.2. Colour Ergonomics

Colour has importance in industrial design also from an ergonomic perspective. In his work “Ergonomi” Dr. B.A. SU indicates that functions and the structure a product of must be in cooperation with a human, he becomes a part of the system in a good designed product. Colour is a part of the design; therefore it is must be chosen in accordance to function of the product and to the place where the product is used in. However, choosing a colour according to the functions or places are is enough. Colours must be appealing to the users, and user must be comfortable with the chosen colours (Su 2001).

Colour ergonomics is a part of Cognitive Ergonomics. Cognitive Ergonomics is concerned with mental process of the work, as perception, reasoning and motor systems. Organizational Ergonomics deals with socio-technical systems, i.e. teamwork,

communication, crew resource management and work-design. Colour ergonomics is about using most appropriate colours to get best results from a person's work.

Use of colour is more difficult than use of neutrals, but correct application of colour "makes order out of chaos" (Birren 1961, pp. 250*)*, accentuates the important elements, and helps mental efforts.

Whether it seems so or not, use of colour is not only about aesthetical concerns. Colours do affect one's actions or reactions. Wood and Newborough have indicated in their paper, according to the design details for ECI, colour provides shorter search time than other modes of encoding information like shapes or numbers (Wood and Newborough 2003). Misuse of colours creates conditions that can cause fatigue, increase stress, decrease visual perception, damage eyesight, increase possible worker errors, and negatively affect orientation, and it would influence the of functionality of a product negatively. Although a trained colourist may distinguish up to 1.000.000 colours, too many colours on display increases search time (Wood and Newborough 2003). Even the best designed product would be useless with misdirection. The role that colour plays is to create accident-free, physically and visually sound interiors. Incorrect use of colours and patterns in interior and exterior environments can create visual impairments and cause serious accidents.

The theory of functional colour was developed in 1920's, and in this theory beauty and appearance are secondary to practical ones. According to the concept of functional colour, good vision and perception must be served rather than personal likes or dislikes. In conclusion it is a technical approach rather than artistic. Basic distinction between this approach and interior design is that personal preferences or emotional attitudes are denied for well-ordered scientific practice.

> Beauty in a decorative colour scheme has no criterion other than taste or opinion; functionalism in a colour scheme is entirely dependent upon tangible evidence (Birren 1961, p. 243).

Visibility of a colour has a great importance for functionality. As monotonous and dull colours fade away, too much vivid colours diffuse attention.

In light signals, bright lights are more visible than dim lights. The easiest light to recognize is red followed by green lights. They are followed by yellow and white; blue and purple are scattered by the atmosphere and grab almost no attention at all.

As for dimension, yellow and white coloured objects tend to be seen largest. Red and green follows them. Blue seems to appear smallest. The reason for this perception is the optics of the eye. For example, red focuses in a normal eye at a point behind the retina. To see it clearly, the lens of the eye becomes convex for pulling the colour nearer. Conversely blue is focused at a point in front of the retina, causing the lens to flatten out and push the colour back.

Yellow is also the colour with the highest visibility among the surface colours, but as such a bright colour in great mass would create a disturbing afterimage it is not convenient in great masses.

For industrial purposes colours which lack aggression and conceal dust and dirt, like soft and dull, greyish hues are appropriate. The primitive colours (red-blue-yellow) are eye catching and fatiguing, some bluish greens or peach colours would be more comfortable for the long time spending places. In casual places like washrooms, rest rooms and cafeterias light and clean hues are best.

Another field of functional use of colours is safety codes:

> A colour code for safety was developed in 1944 by the writer in the collaboration with du Pont. (…)
>
> Yellow is standard to mark strike-against, stumbling, or falling hazards. (…)
>
> Orange is standard for acute hazards likely to cut, crush, burn, or shock the worker. It is painted around the edges of cutting machines and rollers. (…)
>
> Green is standard to identify first aid equipment, cabinets for stretchers, gas masks, medicines, and the like.
>
> Red is reserved entirely and exclusively for the marking of fire protection devices. (…)
>
> Blue is standard as a caution signal. (…)
>
> White, grey, or black are standard for traffic control and good housekeeping.
>
> (Birren 1961; p. 253)

CHAPTER 5

HISTORIC ASPECTS

5.1. Historic Progression of Colour Systems

From the earliest times whether artists or philosophers or scientists, people sought to explain colours and colour mixings. For example, Zelanski and Fisher quoted from Aristotle explaining the similarity between colours as "the common origin of nearly all colours in blends of different strengths of sunlight and firelight, and of air and water." (Zelanski and Fisher 1989, p.46). Again in the same work, they mentioned the idea of Aristotle on variation among colours as mixing of colours with darkness or light (Zelanski and Fisher 1989).

As a scientist and an artist, also Leonardo da Vinci worked on his own colour theory in 17th century. Despite preceding consideration of early philosophers, Leonardo treated black and white as colours like red, yellow, blue and green. He observed nature quite carefully and he got as conclusions the effect of perspective on colours in which nearer colours seems brighter, the phenomenon known as simultaneous contrast, which is intensification of complementary hues when juxtaposed (Zelanski and Fisher 1989).

Contrary to nature observations of da Vinci, physician Sir Isaac Newton observed colours in terms of the physical properties of light. He demonstrated that white light is composed of seven colours of the spectrum and he made the first colour wheel composed of these colours (Figure 15).

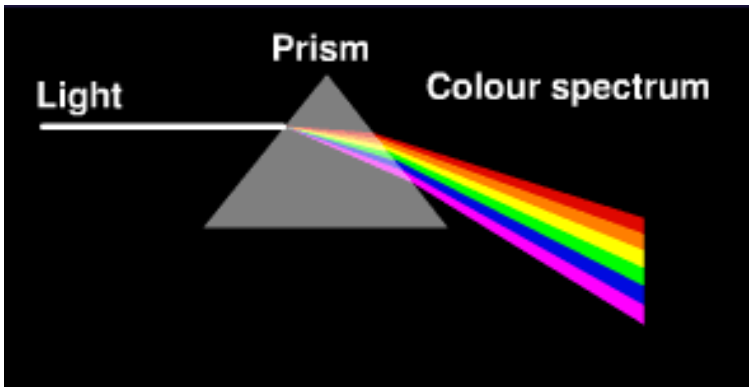

Figure 15. Newton observed that prism refracts white lights into colour spectrum (Source: WEB_32 2004)

After the discovery of a French painter, Blon, that all colours can be reduced to three primaries red, blue and yellow in 1731, Moses Harris developed the first model of pigments and published it in his work *The Natural System of Colours* in 1766. He stated three primaries as red, blue and yellow as did Blon, and from a mixture of them the secondaries or compounds green, orange and violet. Then, he made an eighteen-coloured colour wheel with the addition of mixtures of primaries and secondaries, and graded them into shades and tints (Zelanski and Fisher 1989).

Johann Wolfgang von Goethe in 1810 published his own colour theory in his work *Zur Farbenlehre*, the Colour Works. He disagreed with the conclusion Newton reached about the physical aspects of colours practically as well as philosophically; he concentrated on colour as a visual phenomenon happening in the human eye not in the laboratory. His observations were based on human perception and he explored simultaneous contrast, afterimage, colour of shadows and how colours can relate to emotional states. He worked on the ratios of strength of colours on which is still took as a reference while making harmonious combinations (Banks and Fraser 2004). His observations on colour of shadows impressed Impressionists and Post-Impressionists. His observation was, the colour of shadow is black or grey on white or darker colour of the surface only under the midday light. But on the other conditions the colour of shadow depends on the colour of light. He also suggested two colour models (Figure 16) (Zelanski and Fisher 1989, Banks and Fraser 2004).

> One was a circle with lines linking complementary hues superimposed on two triangles delineating primary and secondary triads. The second was a triangle with red blue and yellow at its outermost points and the secondaries green, orange, and purple in the middle. Dividing primaries and secondaries were further triangles denoting the less saturated, lower value tertiaries that would theoretically result from

mixing two secondaries with the adjacent primary (Zelanski and Fisher 1989, pp.49-51).

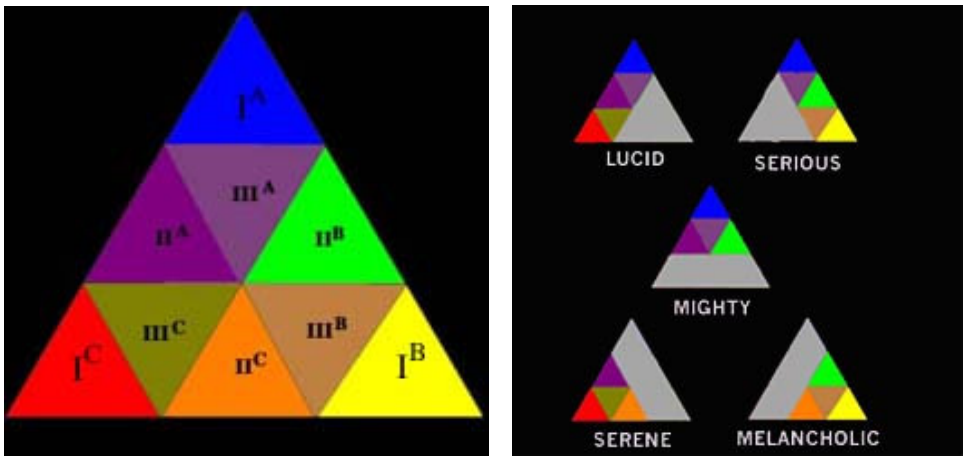

Figure 16. Goethe's colour triangle and colour relations with emotions (Source: WEB_23 2006)

In the same year with Goethe's Farbenlehre, a fellow citizen painter Philipp Otto Runge published *Die Farbenkugel*, the colour sphere he made in the first attempt of three dimensional model of a colour. This sphere consisted of twelve colours on equator graded toward white at the top and black at the bottom. His 3-dimensional model inspired Johann Itten's star shaped colour model (Figure 17) (Zelanski and Fisher 1989).

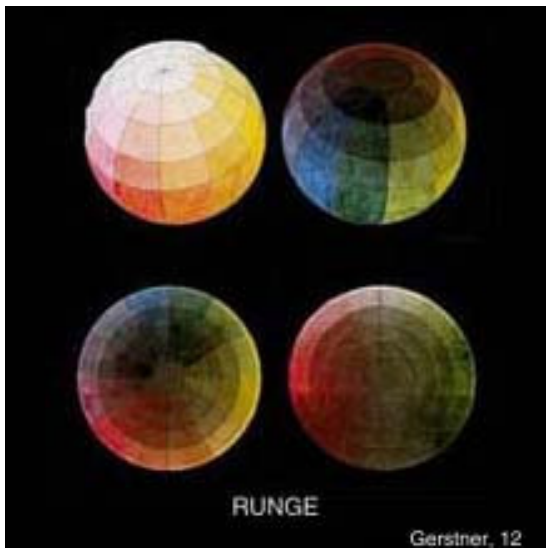

Figure 17. Runge's colour sphere had black and white on its poles and twelve hues on equator (Source: WEB_24 2006)

Michel Eugène Chevreul indicated in his work *"De la loi du contraste simultané des couleurs et de l'assortiment des object colorés*", The Principles of Harmony and Contrast of Colours (1839), the colour wheel but mostly the effects of colours on each other. He determined for the first time the principles of colour harmony (Zelanski and Fisher 1989). He indicated in his work that two adjacent colours would blend together and contrasting colours will make each other look brighter in large quantities (WEB_27 2006). In their work *Color* Zelanski and Fisher quoted from Chevreul; "the contrast of the most opposite colours is most agreeable…The complementary assortment is superior to every other" (Zelanski and Fisher 1989, p.52).

Ogden Rood performed extensive researches on field of colour optic. He states first time the three distinguishing characteristics of colours. "He identified the three major variables that determine the differences between colors as purity (saturation), luminosity (value) and hue." (Zelanski and Fisher p.52). By his experiments made with spinning disks he showed that pigment colours optically would behave as if they were lights, and from his experiments he made a circle of contrasting colours (Figure 18). As he worked on optics, he took red blue and green as primaries, and in his circle he arranged colours in such a way that the complement of each hue matched its negative afterimage.(Banks and Fraser 2004). His work on optics of colours influenced artists such as Georges Seurat, the pointillist who used afterimages of colours and Albert Munsell to develop his three dimensional colour model (Zelanski and Fisher 1989).

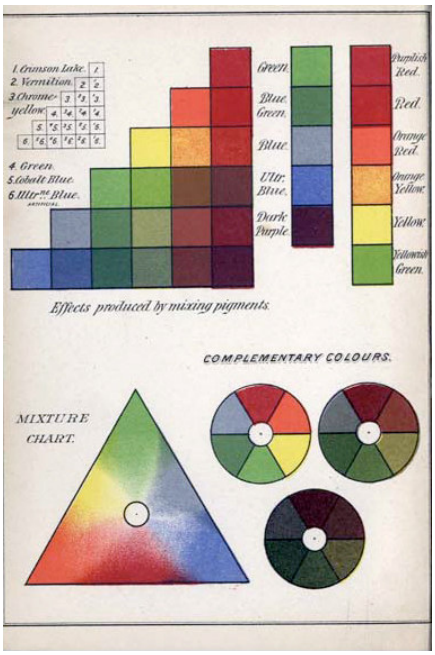

Figure 18. Rood performed extensive researches on field of colour optic. (Source: WEB_33 2006)

Whether the studies on colour showed great progression still a scientifically accurate colour system wasn't released until early years of the twentieth century. Albert Munsell created the most accurate colour model and published in his book Color Notation his system for colour notation, as easy as a school child can understand but as accurate as it is still used as the basis of pigment specifications around the world. What Munsell realized was when the spectrum was forced into a conventional shape as a sphere, the relations between colours corrupted. And he stated its cause as some colours are more saturated than the others when pure. So instead of the conventional sphere form he went on a three dimensional tree having hues on its branches of different lengths according to their purity (Banks and Fraser 2004). He described a colour on his tree in three dimensions: hue, value and chroma. The distinguishing property of Munsell's system is that his system was based on five primary colours instead of three (Zelanski and Fisher 1989, Banks and Fraser 2004). He took red, yellow, blue, green and purple as primaries and with their five intermediates placed them into his plan of tree, labelling them with the initials of hues. To afford a more accurate specification, he divided the wheel clockwise into 100 steps, having 10 steps per hue. The trunk of tree in the centre consisted of achromatics divided into ten steps, from 0 at the bottom (black) and 10 at the top (white). The achromatics are labelled by the initial for Neuters "N"

(Figure 19). As mentioned above, Munsell described his colours on three parameters and their notation is Hue Value / Chroma. E.g., a bright red would be stated as 5R 6/14. Here 5R states the hue branch, 6 states the branch's location is right on the middle of achromatic tree trunk and 14 is the length of the branch i.e. purity of the colour (Figure 20) (Banks and Fraser 2004).

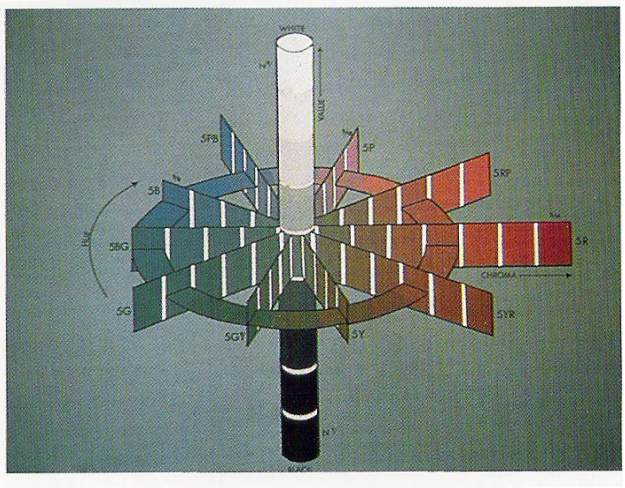

Figure 19. The colour tree of Munsell
(Source: Fraser and Banks 2004, p. 46)

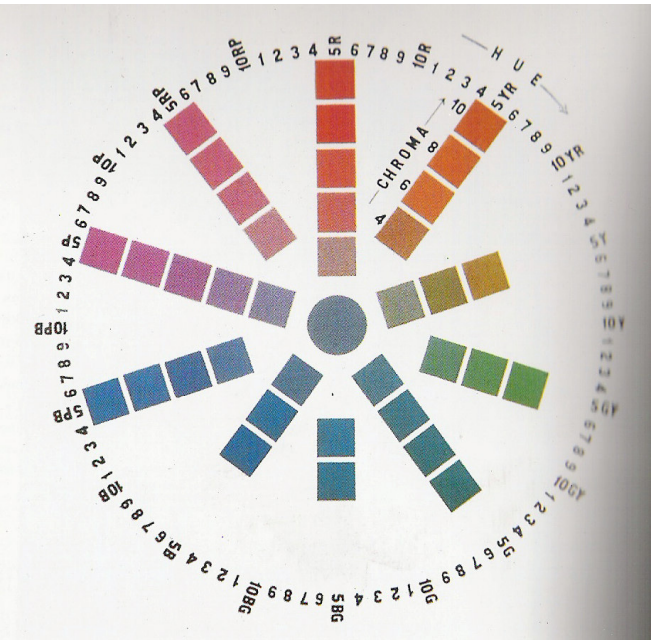

Figure 20. Plan of the colour tree of Munsell
(Source: Fraser and Banks 2004, p. 46)

Like most of the painters Kandinsky has his own colour postulations. According to him, colours have psychic effects as well as physical qualities. Barren quoted from him, “They produce a corresponding spiritual vibration that the elementary physical impression of importance.” (Birren 1978a, p.62). He thought there was a movement among primary colours. For example yellow has a spreading and approaching action while blue is retreating. He believed that different shapes gave different sensations to a colour; keen colours like yellow are best suited to sharp forms and soft colours like blue suited to round forms. His ideas about the colour of forms impressed Johann Itten’s theories (Birren 1978a).

Teaching *Vorkurs*, foundation courses on Bauhaus, Johannes Itten’s interest in colours was not only in scientific manner but also with a designer’s opinion. As did Kandinsky, he also believed the psychological and spiritual effects of colours have on people. He approached colour harmony in terms of balance and symmetry of forces, walking on the steps of Goethe. He believed that medium grey was the most equilibrated colour. He suggested two colour wheels; one a twelve pointed star based on three primaries, red, yellow, blue; having light tints towards the core and dark shades towards to edges of the star. The other was a colour wheel of three steps: inside three primaries, middle three secondaries and outermost twelve coloured wheel consisted of both primaries and secondaries and both of their combinations (Figure 2) (Banks and Fraser 2004). Itten also dealt with the relations of form and colours. He thought that in a harmonious work, expression of colours and shapes should be synchronized. He related three primary colours, red, yellow and blue with three primary geometrical shapes, square, triangle and circle. The secondary colours which were derived from pairs of primaries, orange, green and purple were related to the shapes derived from primaries, trapezoid for orange, arched triangle for green and ellipse for purple (Figure 21) (Itten 1973).

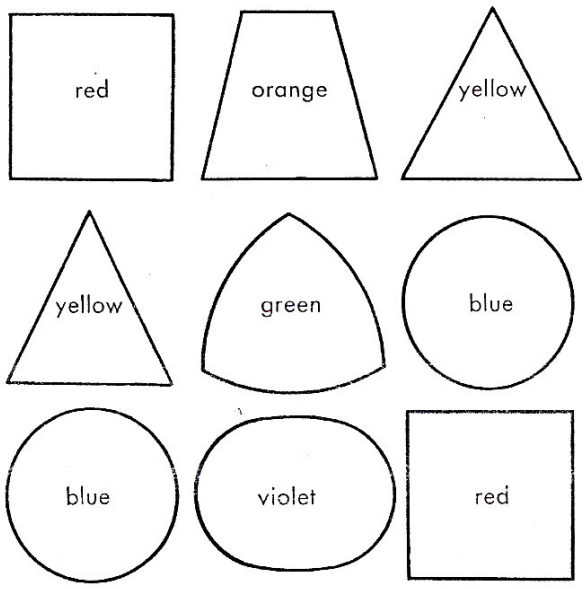

Figure 21. Johannes Itten's association of colours and geometric shapes.
(Source: Itten 1973, p. 121)

5.2. A Short Foreword on Housewares

Differentiation of home and office as a solution to industrial revolution charged house wives, who were already expected to do all house works, with a new task: house is the showcase of a woman. House wives who were accustomed to do their own work needed supplementary help to adapt to their new task. Increase of population in the middle-class, progress in technology and introduction of electricity in everyday life presented house wives who could not afford maids. In the beginning only the functionality of the house-wares were considered but as the technology improved the aesthetic concerns came out and house-wares became signs of social status. With the time passing by, they became a part of everyday life and moved on table tops from places they were hidden in.

5.3. Colour Preferences in Decades of 20th Century

The colour preferences of a period reflect the psychology, moral and materialistic situation of the people.

Social characteristics Victorian periods were to restrict individual feelings and expressions. In other words, "Characterized by a repression of man's natural drives and assumption of a façade of piety, purity, and morality, it was a time of hypocrisy." (Sharpe 1975). The houses, dress, maids, all were a sign of status and wealth, and everything looked clustered and dashy. The preferred colours of the period were gloomy colours like shades of brown, red, lavender and purple.

Sparkling times during the pre-WWI years were under the influence of rich colours of Imperial Russia, magenta, bright orange and violet. Yet, those colours remained on the rich and aristocratic people and couldn't reach to public.

Through out the years during the WWI, the gloom of war showed itself with colours like khakis, tans, and greyish and olive greens.

The 20s, id est. the post war period were under the dominance of psychological exhaust with beiges, greys, medium blues and combination of navy blues and white and browns, except for the introduction of red shoes.

The following decade of great depression -'29 '39- the preferred colours were the rich dark wines, chocolate browns, and bottle greens highlighted with white, colours which conveyed a feeling of security for restless people.

"In most countries, the years of WWII were drab and depressing, but there were some bursts of brightness especially toward the end of the conflict, and in the United States, where many areas of economy were extremely prosperous" (Sharpe 1975, pp. 116)

The colours of post-WWI period appeared again in the post-WWII period.

The 50s were the years of dominance of woman power and pastels.

In the 60s revolutions effects were reflected at the colour schemes too. The old guidelines for colour usage and colour harmony became obsolete overnight and a whole new generation of designers, artists and colourists grew up with either ignorance of colour harmony rules or total disregard of them.

The colour revolution reflected the falling of barriers in various other areas, the release of energy (colour is radiant energy, say some prophets), and the uninhibited

drive of an increasingly young population." The psychedelic movement was a response to the pressures of a leisure oriented society, and affected by the rising consciousness of youths.

> The psychedelic phenomenon is defined as the merging of all stimuli sound, touch, and smell; visual imagery and colour are its most significant features. The experience is said to be mind -and consciousness- expanding. (…) The psychedelic artists, followers and practitioners played a role in the raise of neon bright colours, new colour combinations, and heightened colour-form awareness, by heeding and giving expression to the cues of the revolution changes that were occurring worldwide during the 1960s (Sharpe 1975, p. 118).

The colour scheme of 70s was less strident than 60s, for no movement can remain forever. Yet the colour revolution of 60s left an inerasable mark on colour schemes after.

5.4. A Brief History of Development of Domestic Appliances

As one of many results of Industrial Revolution, differentiation of home and office loaded a new task on housewives. Before the house was both the place for living and working for men, and women were expected to serve their husband while they were doing their daily routine tasks. The rise of middle class enabled women to hire maids to do their house-works while they were helping their husbands, and with differentiation of home and office the women had nothing but to care about the appearance of their houses. In such an atmosphere, the first domestic appliances introduced in daily life were intended to be used only by house's maids. Then the servants were a sign of social status, having also domestic appliances that would ease servants' tasks reinforced the image of richness and importance of the masters and mistresses. As they were intended to be used by servants, the appearance of appliances was not important at all, they were utilitarian in look but efficient in function. Besides, the house-works were things that should be hidden from good society, yet houses should always be clean and tidy as if made by magic.

The first domestic appliance which took place in the living area was the sewing machine. It was already difficult to convince about sewing the contemporary women who used to believe in the nobility of idleness, was not a common work of low working

class women; the companies produced domestic sewing machines as a part of house decoration with ornaments and convenient materials.

Widespread of other house-wares required two stages of development. The first was the availability of electricity and the other was transition to mass production.

During the last decades of the 19th century, electricity got into the houses as an alternative to gas-lighting. Electricity demand for domestic use was a burden on electricity generating. That's why, its price was costly. Also, heating during the short and cool summer nights was affordable but it was highly costly during freezing and long winter nights, so domestic demands were little.

On the other hand, labour saving quality of house-wares causes a rapid growth in domestic consumption. By the beginning of World War I there were many appliances for the people who could afford to buy: Electric cookers, heaters, vacuum cleaners, kettles, toasters, washing machines, dish washers, mixers etc.

However, electricity was a luxury confined to rich people until the 1st WW. As the price of electricity fall the amount of sell of house-wares increased dramatically; between the 1st and 2nd World Wars the proportions soared from ten percents to ninety percents. Electricity and house-wares replaced servants for the middle-class women, and generally women spent less time on housework and more on house care after the houses were electrified.

Even though there were a great variety of appliances, it was not until 30s the design standards improved. Generally, old hand-operated or gas-operated machines were electrified by attaching an electric motor. During the early 30's electricity – consequently appliances got cheaper so efficiency and appearance of appliances drew the attention of manufacturers. Until then there were servants for the middle class women who could afford, and others bored their fate, but the economic crisis in 1929 was more effective on the financial budget of middle class than did World War I. Middle class women couldn't afford servants anymore. Even if they did, servants needed to look after their own family and working as a servant wasn't so advantageous at all. Those were the years of economic regression and wars. Both economic obligations and integrations to a new life style required some drop in their life standards as well as on the life styles.

Changes in social habits have gone hand in hand with design developments (Heskett 2003). For example, in architecture it shows it self as cancellation of the back doors, cutting a service window between the kitchen and dining room, addition of

storage and washing places in the kitchen. In product design, storage items and food trolleys were developed (Davidson 1982).

In 1930 there were great and impressive novelties on the field of transportation. Especially in U.S. there grew sympathy for aerodynamics and machine aesthetics. Housewives facing the harsh truth of house-works and ugliness of appliances welcomed aerodynamics in their homes with streamlined, white and clean casings of domestic appliances.

In these epochs, designers got involved in the design of appliances. Dreyfuss designed a vacuum cleaner for Hoover in 1935, encasing the motor in an elliptical housing set above a smoothly curved brush-casing. Raymond Loewy's design of a refrigerator for Sears Roebuck, Coldspot, with its clean and seamless finishing and its white pressed steel case it conveyed an image of hygiene and became a symbol of streamlining of the epoch.

During the 1950s, surviving victoriously the second of world wars, in the U.S.A. there emerged an immense potential of purchasing. Sarah O. Marberry quotes in her book from Life magazine of December 1959 that automated machines had "loosened a fresh windfall of inexpensive goods, many entirely new, to bring more comfort and enjoyment into daily life." (Marberry 1994, p. 1). Consumers encouraged the modernization and growth in every aspect of life. To convey the idea of modernity and progress, designers reflected the forms of latest fashion on living style; appliances designs referring to cars or aeroplanes (Forty 1989, Davidson 1982). The rocket became a popular symbol for progress. Consumers had sympathy for the space age technology and promises for future. Hoover's constellation Vacuum cleaner and General Electric's cylindrical vacuum cleaner reflected this sympathy for futurism. The rocket became a popular symbol for progress.

Besides colourful consumerism and craze of futurism, maybe most permanent of them all, Good Design approach of International Style was popular in post-war Europe with its discreet, smooth, grey, and white boxes, designed on proportional systems. The best applier of the good design was the German firm Braun with its main designers Hans Gugelot, Gerd Alfred Müller and Dieter Rams.

5.5. Colour Preferences in Decades and Art Movements and Its Influences on Household Appliances

5.5.1. Dashy Hypocrisy, Late Victorian Period

Before the Industrial Revolution, well designed and furnished houses were only meant for the rich aristocratic people who could afford them. Beauty in a house was very expensive, as every piece was hand-made and almost an art work.

The revolution emerged the middle class; common people (non-aristocratic and usually uneducated) with a considerable wealth to afford aristocratic life (Forty 1989). Thus design got involved in daily life.

The late nineteen century a.k.a. Victorian time was the time in which middle class became highly enriched and educated, so their demands were shifted to a more dignified and aristocrat-like life style, the house became a symbol of status for them. Those who could afford had maids to serve them, even a steward the richer ones, and every one could afford through mass production beautifully designed goods for a convenient price (Davidson 1982).

The demand for beauty of middle class brought aesthetic concerns in the field of design, and to be able to hold on to the market competition, manufacturers had to consider the artistic aspects of the mechanically mass produced product design (Forty 1989). On these designs there were influences from almost all past designs, Gothic, Classic as well Rococo. The mass production enabled reproduction of these arts easily. The nature got in rooms with all her details; animals, bird and floral patterns were en vogue.

By the mechanization in production, new techniques were introduced, like lamination and electroplating, which provided a great diversity in assortments to choose in an affordable price compared to hand craftiness of elderly times. The wall papers which were very fashionable at the time were easy to produce and afford to a convenient price however dense the patterns might be (Forty 1989).

The Victorian period's colour scheme consisted of dark and rich colours matching the sprit of the era; dark and gloomy. The houses, dresses, maids, all were a sign of prosperity and wealth, and everything looked clustered and dashy, so were the

colour combinations. Typical colour scheme of the period consisted of rich dark colours as ruby reds, forest greens, dark blues, browns, lavenders and purples.

Most common domestic appliances on the sight of the period were sewing machines. To avoid the existing prejudices against the associations of sewing machines with the working class women, the companies produced machines as they were appertaining to the respectable part of house furnishings, with ornaments and convenient materials (Figure 22). The colour preferred, were dark colours –to highlight its solidity and machine characteristics- or brass (Forty 1989).

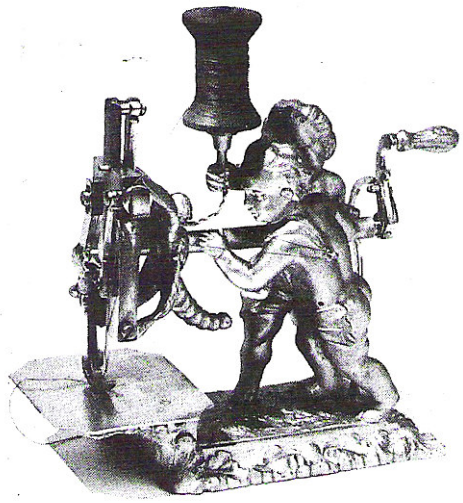

Figure 22. Cherub Sewing Machine 1858
(Source: Forty 1989, p. 98)

The first design made by Singer was a very efficient model which placed sewing action into a vertical axis, yet the appearance of the machine wasn't suitable neither for middle-class houses nor for middle-class women. The appearance improved by coating the machine in glossy metal with fancy floral stencil patterns. The machine was set on a wooden table top with metal lattice-work pedestals. Thus it became a part of the furniture of the daily life (Figure 23) (Forty 1989).

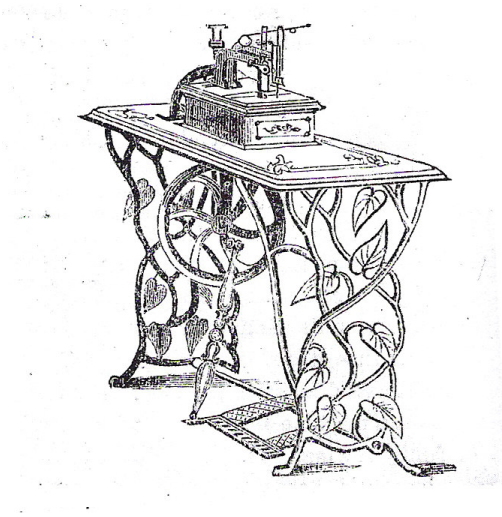

Figure 23. Singer “New Family”
(Source: Forty 1989, p. 98)

5.5.2. An Epoch of Velvet and Silver; Art-Nouveau 1880s-1910s

The first decade of the century brought hope of cheer and light besides the new century. The decade was excited with the first cars and first aeroplane flights. People wanted leave to behind the obscure and heavy colours of the Victorian era and soulless life imported by the Industrial Revolution. These wits mothered the first modern considered movement on art; Art-Nouveau.

The turn of the new century brought great expectations with it. The people were weary of the effects of quick industrialisation. Especially artists were uneasy with the mechanisation, and this had led to the movement of Arts and Crafts at late Victorian age, from which Art-Nouveau was highly influenced. The most distinguishing quality of Art Nouveau from Arts and Crafts was that Art Nouveau, with its elegant lines and fine materials, was meant for the wealthiest upper classes who could afford this fine craftsmanship (Fiell and Fiell 2001).

Art-Nouveau is considered as one of the first modern and international style of the 20th century on almost all forms of art and design (as architecture, furniture, pottery, jewellery and graphic design etc) and all around Europe. It got started in the early days of 1880s and lasted until the eve of WWI. It was a highly decorative movement inspired

by nature. The movement was a reaction against the "novelties" which followed Industrial Revolution; urban growth out of control, soulless forms of machines with its stylistic character, consciously over-exaggerated organic and ivy-like forms (Julier 2004).

Within the style there are two distinct looks; curved and whiplash-like look as with Gaudì, and austere and linear looks as in Mackintosh. In a more specific definition, characteristics of the movement are feminine lines; sinuous and curvy or vertical and high, stylised flowers and leaves. As materials and techniques, wood marquetry, iridescent stained-glass works, silver works and semi precious stones were in vogue (Hiesinger and Marcus 1993).

Art-Nouveau's most distinguishing character was the display of fine craftsmanship. Thus, it was not widely applied to industrial design as would in recently coming Bauhaus and Art-Deco style. Still, there are applications like the ones of Wiener Secession artists. Especially in the metal works of Josef Hoffman, commercial and less expensive materials incorporated a grid-like pattern.

Art Nouveau's characteristic colours were dark or natural colours reinforcing the idea of hand craftiness, as the distinguishing character of the movement was display of fine craftsmanship. Characteristic Art Nouveau colours were muted and sombre colours reinforcing the idea of handcrafted-ness and nature; mustard, sage green, olive green and brown combined with rich colours like lilac, purple, yellow, violet and peacock blue accents. Silver was among the favourite materials as it was convenient to hand-crafting and it was used common as accessories (Hiesinger and Marcus 1993). Also Austrian painter Gustave Klimt used gold and silver as highlights in his paintings.

5.5.3. Summit of Abstraction, De Stijl

Stylization of Art Nouveau turned to be abstraction, with hard and angular forms and dull and muddy colours of cubism during the years of WWI. The soft curvilinear lines hardened with the cold and wild realism of war.

The tendency towards abstraction started with cubism in art, reached its summit with Dutch design movement De Stijl founded in 1917 at Holland by a group of designers (architects and painters). They sought to embody art and the vision of a modern lifestyle by geometric abstraction. Everything was reduced on primaries, thus

they sought to reach universality. The colour scheme consisted of primary colours, blue, red, yellow, and formal compositions reduced on basic geometry, verticals and horizontals (Figure 24) (Heskett 2003, Fiell and Fiell 2001).

> "They sought to compose these conflicting elements of line, plane and colour into an image of equilibrium and proportion, as a symbol of the universal harmony of life. The equation of geometric forms with machine production, seen as a means of extending this harmony throughout the visible environment, lent a strong social-utopian emphasis to their theories." (Heskett 2003, p.96)

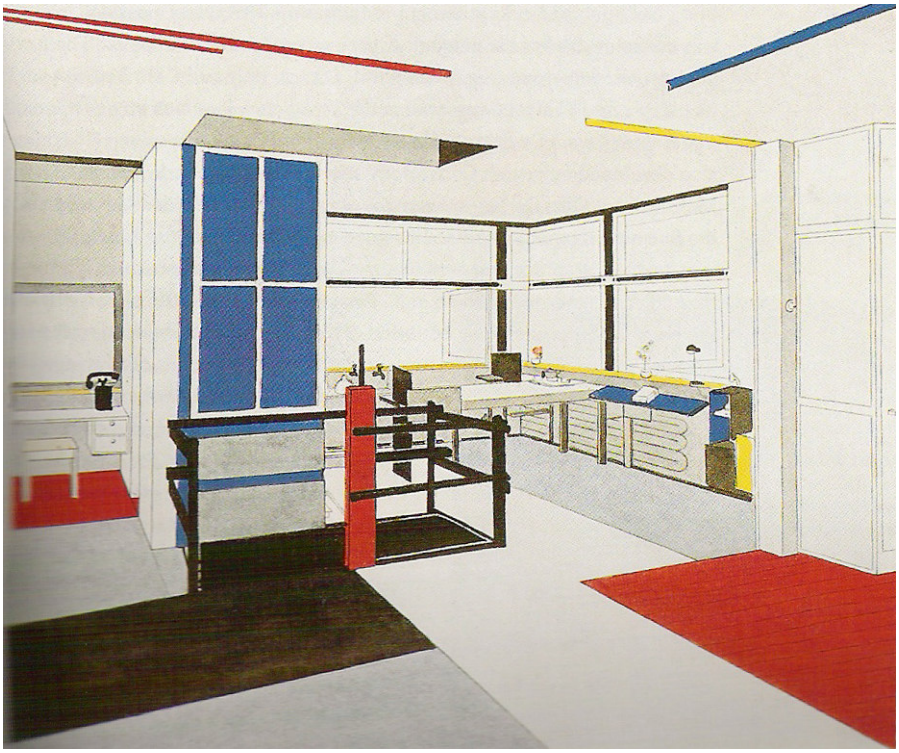

Figure 24. Rietweld-Schroeder House, Utrecht, Gerrit T. Rietveld 1927
(Source: Fiell and Fiell 2001, p. 57)

In the first decades of the 20th century, there were many domestic appliances and gadgets for those who could afford them. For upper class people the appliances preferable were the ones which they could use in living areas like electric kettles, electric radiators (Figure 25, 26).

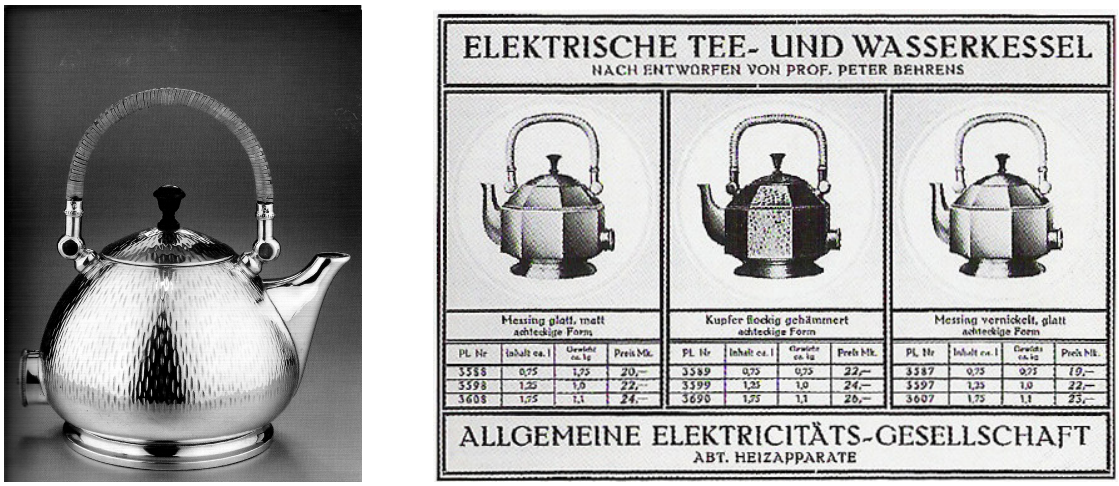

Figure 25. Peter Behrens design electric kettles for AEG, 1909
(Source: Fiell and Fiell 2001, p. 25)

Figure 26. Peter Behrens design electric table-fan for AEG, 1909
(Source: Heskett 2003)

The “back stage devices”, i.e. the labour saving machines spreaded among middle-class before than the upper class people which had already have maids doing these works. Most common labour saving machine among the middle class was washing machines as shown in Figure 27.

Figure 27. The Thor, The Hurley Machine Company washing machine, 1910
(Source: WEB_25 2006)

The vacuum cleaners were other preferred labour saving machines as it provided hygiene (Figure 28). The turn of the century brought a new sense of hygiene and health with it (Forty 1989).

Figure 28. Hoover 700, 1916
(Source: WEB_34 2005)

Before electricity spreaded around, hand-operated vacuum cleaners were available for those who could not get electricity (Figure 29, 30).

Figure 29. BVC Hand Operated Vacuum Cleaner, 1911

Figure 30. Daisy Vacuum Cleaner 1914

(Source: WEB_26 2006)

5.5.4. Pioneer of Modernism, Bauhaus

1920s was an important decade in modern design history. Bauhaus Design School founded in 1919 in Weimar by Walter Gropius, which became a symbol of modernism of twentieth century. Following years of the defeat of WWI, in Germany a desperation caused by economic, moral and human loss was dominated. The lack of material was a great problem and designers of the epoch tended to find some economic and aesthetic solution that people could afford, and be delighted with. The Design school Bauhaus founded by Gropius aimed to afford it by unifying all arts within (Hiesinger and Marcus 1993).

Bauhaus unified all kind of design, from graphics to architecture in the ability of their students. Thus, it provided a basis for a new profession in design; industrial design. The architects immersed through the walls into daily life and began to design house products and furniture. They aimed to integrate design theory –which included aesthetic concerns as well as practical- with industrial process.

The hard times following WW I brought financial and material inconvenience in every aspects of life as well it did on design. Design style of Bauhaus was “simplicity, multiplicity, economy –in space, time material and of course in money- and modernity” (Julier 2004).

Bauhaus style was distinguished with simple straight edged and smooth slim forms, without any excessive details. Shining steel with its modern, and hygienic look and was an important new material used by Bauhaus (Figure 31).

Although the colour scheme associated with Bauhaus is known to be the neutral and light colours which became the characteristic of modern movement, at the first years, by influence of Johannes Itten, the colour scheme consisted of darker colour inspired expressionists. Itten used to give importance to the contrasts between light and dark most of all. The colour scheme changed dramatically with the arrival of Theo van Doesburg as a guest tutor between 1921 and 23, and the colour schemes lightened and became neutral with the influence of De Stijl.

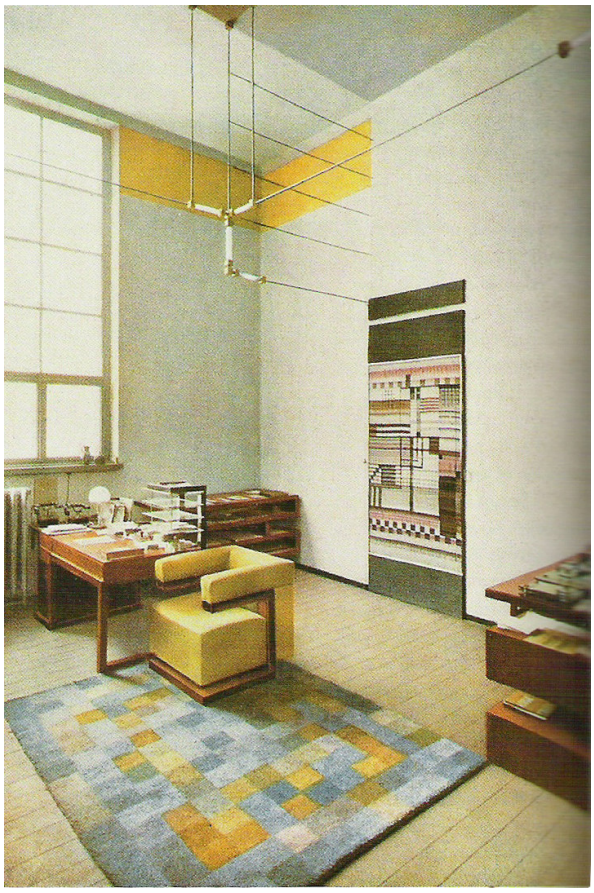

Figure 31. Walter Gropius’ Office, 1923 Bauhaus Design School in Weimar (Source: Fiell and Fiell 2001, p. 72)

Despite of drawn image of modernity, in domestic appliances, particularly there was no renovation at all in electrical appliances. The traditional mechanisms of existing machines were replaced by an electric motor like the example in Figure 32.

Figure 32. GEC "Magnet" Electric Cooker, "HO 920", 1927
(Source: WEB_26 2006)

5.5.5. Golden Dreams of Black Night, Art-Deco, 1920s-1930s

The decade of 1920s was under the sombre of WW I and the economic crisis. Those pressures made a reverse effect on people and their life-style. Thus, the decade mothered an important design movement, Art-Deco.

The social and economical situation of post WWI years gave birth to Art-Deco named after the shortening of "Éxposition Internationale des Art Décoratifs et Industriels Modèrnes" design exhibition which took place in Paris in 1925 which was a utopian decoration style. The years were the years of great Depression and emigrations towards the U.S.A. The voice of the time was jazz, and Art-Deco style decoration became the dreams of people coming true. Art-Deco emerged against the gloomy and troubled atmosphere of post WW I and Depression eras. It belongs to a romantic illusion of a world of luxury and decadence. In these years travel became popular,

especially great powers like England encouraged researches and assimilation of local folks in their colonies. Safaris, Egyptian and Indian culture were in vogue, so are animal skins, ivory, mother of pearl, tortoiseshell and Egyptian pyramids and sphinxes with the discovery of Tutankhamen's grave (Hiesinger and Marcus 1993, WEB_1 2005).

The motives used revived the strong ancient cultures as Romans, Egyptians and Aztecs. People sought to feel the glory and safety of being one of them. It is a fusion of history and modernity.

Art-deco is characterised by sleek geometric and angular shapes like zigzags of lightning and chevrons, stylised images of modern technology; aeroplanes, cars, skyscrapers or motives from nature; flowers, shells. One of the distinguished characteristic of the epoch was the dramatic contrasts; glossy polished wood and black lacquer mixed with satin or animal skins. As materials and techniques, industrial materials like chromes, plastics, glass, shiny fabrics like satin and mirrors were in vogue. The technique is mostly mass production but hand-made oeuvres of artists were welcomed too (Figure 33, 34, 35).

Figure 33. Silver Tea and Coffee Service, H.G. Murphy, 1934-39
(Source: WEB_1 2005)

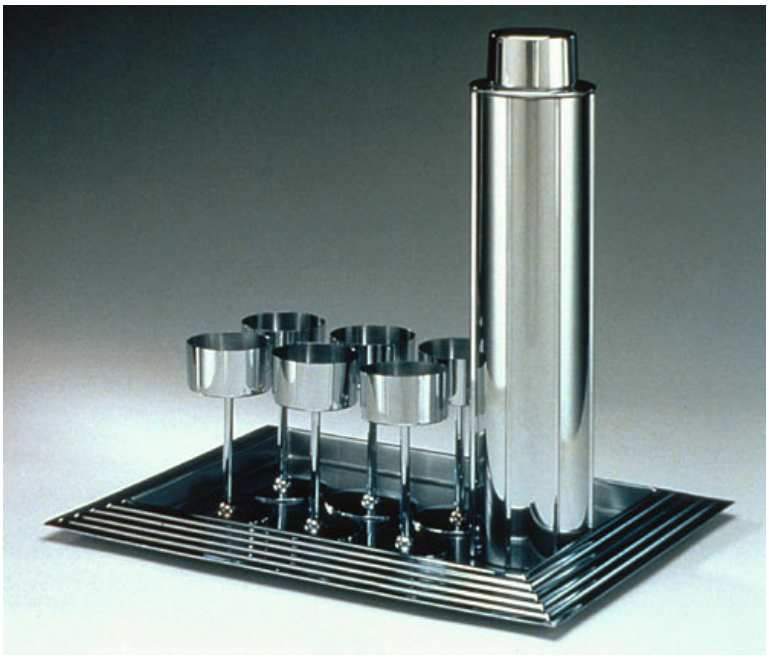

Figure 34. Manhattan Cocktail Set, chrome plated brass Norman Bell Geddes, 1937 (Source: WEB_35 2005)

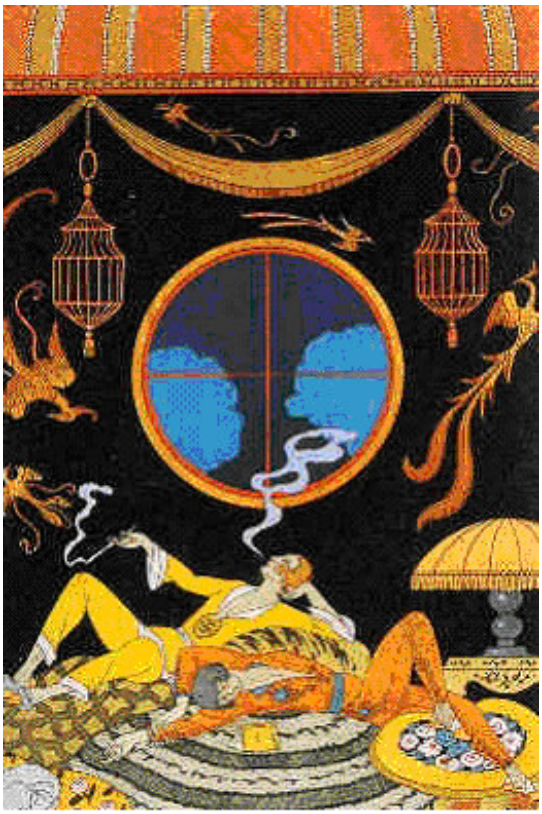

Figure 35. La Paresse, George Barbier, 1924
(Source: WEB_1 2005)

Black was the colour which left its mark on the epoch, and colour schemes were highly dramatic. Characteristic colours were bold colours as black, silver, chrome, yellow and red with cream, white, beige, green, oyster or eau-de nil accents.

5.5.6. Sign of Dynamism, Streamlining

While Art-Deco dominated decoration in Europe, a new idiom of design emerged in the USA incorporating colour scheme of modernity with understanding of Art Deco, Streamlining.

Novelties in the transportation area affected public taste greatly, and a sympathy for machine dynamism formed. The machine aesthetic was asked in every aspect of daily life. Aerodynamic involved in houses with streamlined casings of domestic appliances.

Emigration of Bauhaus designers from Nazi Germany to U.S. brought a colour scheme of modernism in household appliances. Despite their wit of timeless design and products, the modernist effects remained only on the surface. The planned obsolescence earlier applied on automobiles found its place on domestic appliances field, and even though the mechanism was working, people wanted to change their products looking inadequate with newer ones. By the encouragements of advertisements and designers, in the years of Great Depression the U.S. became the centre of streamlined good trade and design (Hiesinger and Marcus 1993).

Despite fruitless three decades about domestic appliance design, spreading of electricity encouraged manufacturers to consider design process about labour saving objects and gadgets too. In 1935 Raymond Loewy designed a new refrigerator for Sears Roebuck, Coldspot. With its clean and seamless finishing and its white pressed steel case, it conveyed an image of hygiene (Figure 36, 37).

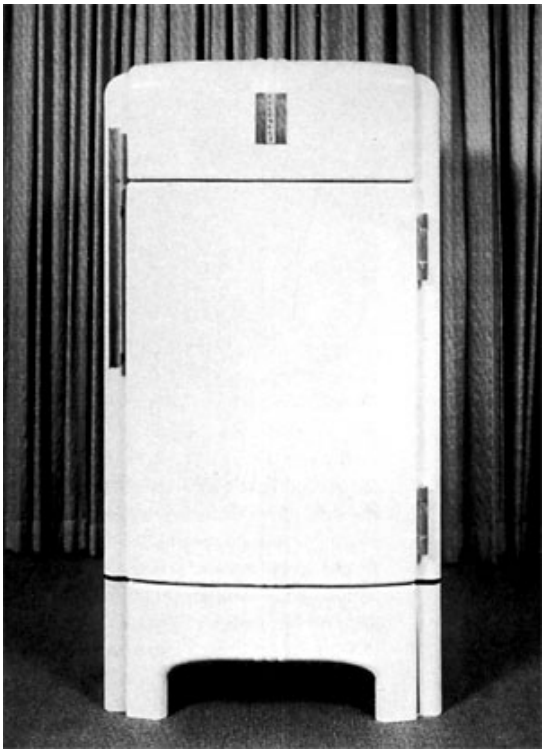

Figure 36. Sears Roebuck Coldspot Refrigerator Raymond Loewy 1935 (Source: WEB_13 2006)

Figure37. Coldspot Refrigerator 1940 Catalogue page 558 (Source: WEB_2 2006)

Loewy's design was advertised as "luxurious and convenient… new in design – modern – streamlined-arrestingly beautiful". Loewy's design increased sales of refrigerators.

Dark colours used in kitchens left its place to lighter colours with lighter materials as steel sheets.

During 1930s, existing Decorative Art-Deco style was accepted in household appliances (Figure 38, 39, 40).

Figure 38. Electric Toaster, chrome plated brass, glass and plastic Henry Dreyfuss, 1932
(Source: WEB_35 2005)

Figure 39. Hoover 150, 1936
Henry Dreyfuss,
(Source: WEB_34 2005)

Figure 40. Hotpoint 500, 1937
(Source: WEB_36 2005)

5.5.7. Under the Shadow of the War; Utilitarian Design

During the war period in every domain of daily life, even far from battle field, there were traces of war. To be able to supply the needs of military, there was a shortage of raw materials. All unnecessary ornaments and luxury were prohibited.

The effect of shortage showed its effect in field of colour and colouring too. Many industrial pigments were derived from metals which were necessary for use of military. Military colours got involved in civil life with women supporting morally their husbands, sons, brothers or just neighbours wearing or using the same colours as they did. The austere atmosphere created by the war and shortages recalled back the natural colour scheme of Arts & Crafts movement, consisting of natural colour of raw materials and natural dyes and socialist ideals in the field of design like Utilitarian Design.

The colour scheme dominating the period included faded and earthy colours under the influence of war.

1940s was a two staged decade, destruction of war and reconstruction at post-war years. People's mind was focused on surviving direct and side effects of a cruel war. During post war years designers found functionalism convenient for the needs of the century. Functionalism has described by Katryn B. Hiesinger in her essay "Design Since 1945" (1983) the idea as; 'that beauty in useful objects is defined by their utility and honesty to materials and structure.' (Dormer 1993, pp. 55). Functionalism had principles that excluded designers from design. It wasn't built on a theory of "Functionalism", but the theory had been evolved later to the style which was a reaction to the highly ornamented styles as Art-Nouveau and Art-Deco, and the utopia lifestyles they presented. It developed in a period constrained by the military effects of war and design technology, and designs were very similar to the military equipments with austere colours as black and white and earth tones, but also clear acrylic casings showing through, as Perspex. It wasn't obviously a colourful era (Hiesinger and Marcus 1993).

5.5.8. When Everybody Went Modern, the Fifties

1950s were the age of consumption. Modernism was the motto of the decade. Many artists and designers who had emigrated to U.S. and New York became the centre of art of the epoch. People rejected any thing that was related to wars, and it almost meant every thing. People's life style entirely changed; that was the rising time for kitsch and neon colours but also for the "good design", successor of modernism starting with Bauhaus. The economy surviving two world wars, severe economic depressions and also civil wars couldn't afford large houses and the big furniture decorating pre-war ones. Products were small, light and mobile, or contrarily stacking. First confection chains for middle class were founded. Houses were open planed, servants disappeared so housing surfaces contracted. New materials like plastics, PVC, Formica, melamine, fibreglass and aluminium got involved in daily life and with the craze of consumption they became en vogue. The colours representing the decade were bright colours, as red, lime green, yellow, black, bubblegum pink and pale blue. Yet, the concept of "functional colour" gained importance with the emerging of "Good Design".

5.5.8.1. Good Design

Good Design emerged in the period following World War II. It was the top point of modernism. Max Bill from the Ulm Hochschüle für Gestaltung stated that it; "Forms linked to the quality and function of the object, honest forms no inventions to increase sales" in 1950 (Julier 2004, Good Design p. 97).

Despite "Styling" (i.e. to apply ornaments on surface of the hard case of a product) in Good Design designer filters the exceeding features of the design to make it as useful as it can be with maximum performance and maximum user clarity. There was no application of superficial effects. Bauhaus art movement was the pioneer of the movement. Ergonomics got involved in design. Functionality in colour choices gained importance. Braun and Olivetti were considered the best firms applying good design.

Dieter Rams, the head designer of Braun summarized the good design in ten principles:

Good design is innovative.
Good design makes a product useful.
Good design is aesthetic.
Good design helps us to understand a product.
Good design is unobtrusive.
Good design is honest.
Good design is durable.
Good design is consequent to the last detail.
Good design is concerned with the environment.
Good design is as little design as possible.
Back to purity, back to simplicity. (WEB_7 2006)

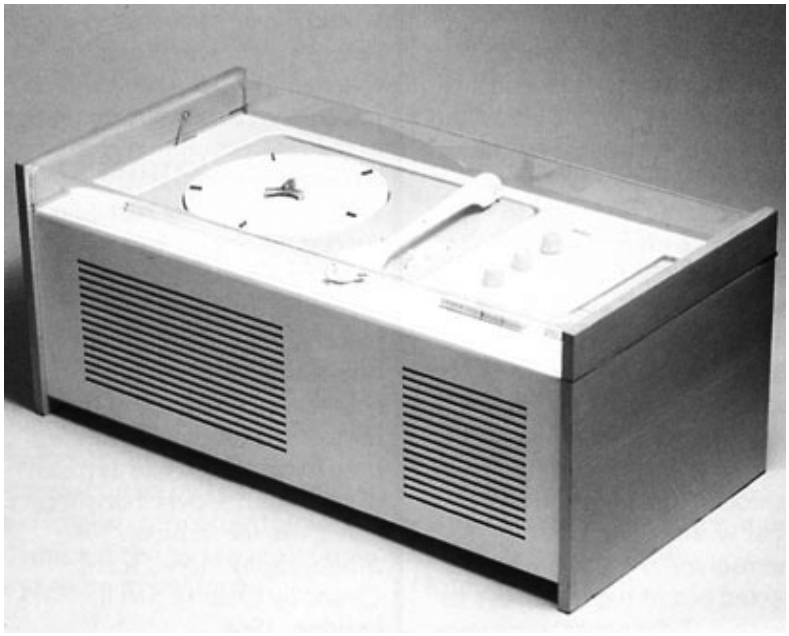

Figure 41. SK4 Record Player, Braun Dieter Rams and Hans Gugelot, 1956 (Source: WEB_7 2006)

The basic properties of the style were the under-furnished and austere spaces and plain bold primary colours. Modernists were fond of light, so glass was a popular material as well as mirrors, steels and plastics (Figure 41).

Due to its austere look, good design was judged as aesthetically unadventurous in time. The concept did not question the basic existence of the object and its symbolic value. Whether abused or not, good design remained as the "term of praise" about ergonomics and functionality of an object (Julier 2004, Hiesinger and Marcus 1993, WEB_15 2005).

5.5.8.2. Planned Obsolescence, Rise of Consumerism

Besides the timeless design wit of the good design, especially in the U.S., the triumphant of the war, people's the ability to buy increased, yet no one spent money on things they already had. To encourage people to consuming money, planned obsolescence applied on products (Hiesinger and Marcus 1993).

Planned obsolescence means that having restricted life in either technical or stylistic manner. Technical products are made in with purpose of an important unit with short life, and it is better to buy a new product then replacing the broken part. Stylistic obsolescence is making new designs in a short time according to the new aesthetic concerns changing with obliged fashion values. So people would desire to buy the newest and fashionable products, even if the older ones were still in good condition.

Best way to convey the stylistic obsolescence is to change the appearance of the product. Thermoplastics provided a wide range of colour and shape possibilities. In those years colourful products were introduced in daily life more than ever, like kitchen appliances in different colours (Hiesinger and Marcus 1993).

This vision of prosperity made the American way of life en vogue all around the world, and consumerism rose all around the world.

During 1950s, to convey the idea of modernity and progress, designers reflected the forms of latest fashion on living style; appliance designs referring to cars or aeroplanes. Modern movement's ascendancy was felt on the field of household appliance and gadgets as well (Figure 42, 43).

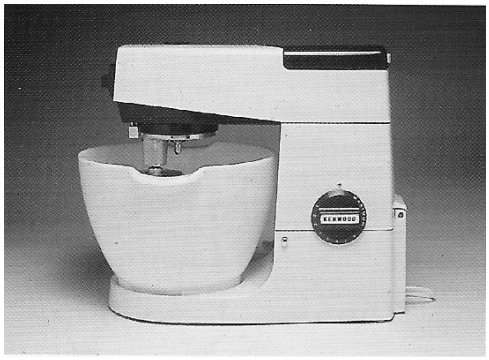

Figure 42. Kenwood Chef A701
Kenneth Grange, 1960
(Source: Forty 1989)

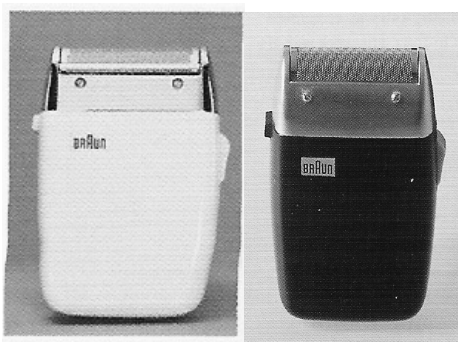

Figure 43. Sixtant Electric Shaver, Braun
H. Gugeulot and G. A. Müller
1962 (Source: Fiell & Fiell 2001)

1955 Constellation model of Hoover shown in Figure 44, with its futuristic lines and floating on a hovercraft-like air cushion reflect the epoch's taste for space age and futuristic technology (Figure 44, 45).

Figure 44. Hoover Constellation Vacuum Cleaner, 1955
(Source: Fiell & Fiell 2006, p. 256)

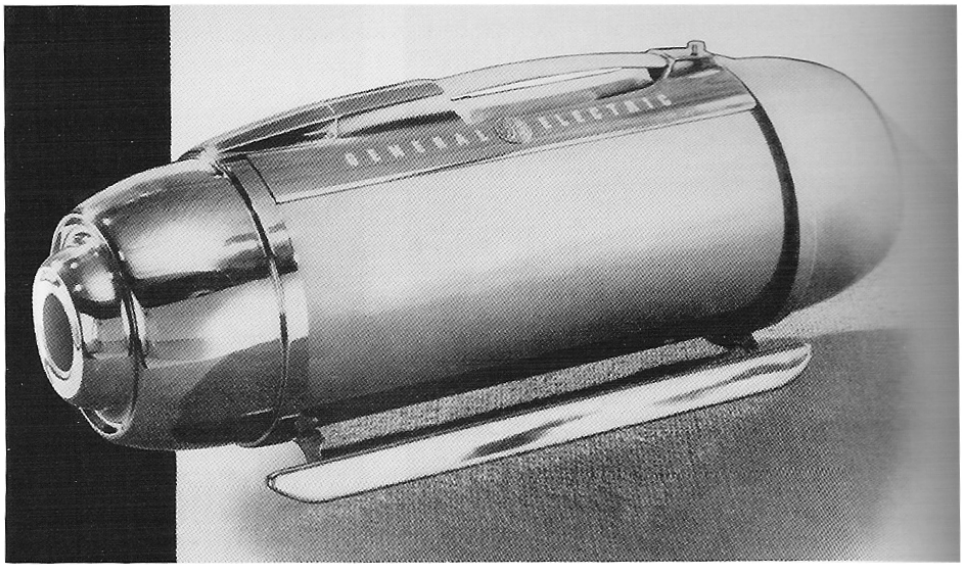

Figure 45. General Electric Cylindrical Vacuum Cleaner, Redesigned by Arthur BecVar,

1950 (Source: Fiell & Fiell 2006, p. 232)

The electrical manufacturer firm of Max Braun had a new approach to styling in domestic appliances. Main designers of the firm, Hans Gugelot and Dieter Rams developed a standard appearance. With discreet, smooth, grey, and white boxes, designed on proportional systems, Braun was considered best firm which applied aspects of good design (functional colour, ergonomics, functionality) in its products. The only splash of colour used in products was on switches and dials. Contrary to existing domestic appliances, the Braun appliances preserved the illusion that housework was a noble activity.

The best example for Braun Style was the Multimix KM3 Food Processor designed by Gerd Alfred Müller shown in Figure 46, in which the base and the power-head were gathered under a case, was is ornamented only by the coloured control knob and crisp lettering.

Figure 46. Multimix KM3 Food Processor, Braun; Gerd Alfred Müller, 1957
(Source: Fiell and Fiell 2001, p. 42)

5.5.9. İn Quest of Freedom, the Sixties

1960s witnessed many political, economic and social events; Vietnam War caused international anti-war revolts among people, youth questioned the limits of

freedom in society, rise of self consciousness and economic fluctuation. It was a decade of rebellion in each aspect of life. History took back its importance, hard lines of modernism left its place to art-nouveau inspired psychedelic styles or futuristic and space-age styles. It was the golden age of pop music and spiritualist, war opposing and love supporting hippies. Freedom was the spirit of the era, free life, free love, so as expected design was influenced by this thirst for freedom. Freedom found its expression with rejection of functionalism from the last decade and threw away products. The open planed spaces included in life in fifties but in sixties any restraining elements as walls and doors were out of fashion. Rooms separated by moveable screens and sliding doors were flowing freely into another. Vibrant colours and clashing colour schemes were en vogue as a revolt against the oppressive presence of an unfair war. Towards the end of the decade, designers were interested more in ergonomics and sustainability as a result of consciousness toward men and nature. Development of new materials enabled the production of short life-spanned, cheap to produce and consume-throw away products (Hiesinger and Marcus 1993).

5.5.9.1. Pop Design

Pop is an abbreviation that emerged in 1950s for popular referring to rising popular culture; i.e. the products of mass media, advertising, television, magazines, packaging and movies.

Pop design is a phenomenon emerged in 1960s following Pop-Art, using the images and elements of the popular culture, “low art aspects of contemporary life” in design (Julier 2004, Pop pp.168). The style in the early years of the decade, had influences of machine aesthetic of good design, yet its characteristics are bulbous surfaces and fluorescent, gaudy colours much like Art-Nouveau and Art-Deco. Besides, despite the modernism, pop design didn’t deny historicism. It was also inspired by futurism, surrealism, op-art, psychedelia, kitsch, eastern mysticism and space age.

Designers chose youth as the target mass, thus the designs were less serious than Good design of 1950s. As youth was the target mass, products should be cheap to buy, but also to produce. Products were mostly low quality. Disposability became a rising value as being anti-thesis of timeless and durable modern designs, and was encouraged

by made-of-paper objects. It had the traces of the economic and social freedom of the epoch, so designs were optimistic and expendable (Hiesinger and Marcus 1993).

Favourite material of the style was plastic. During the decade many new types of plastics and processes like injection moulding became available. Moreover, plastics were rather cheaper materials to use and to buy. Also they had a large colour scale and flexibility to shape that could match the epoch's soul (Hiesinger and Marcus 1993).

The colour scheme of pop-art was influenced by non-representational colour choices of fauvists. Yet unlike Fauvist colour scheme, the colours chosen didn't represent the inner sensations of the artists. They used artificial and commercial colours. So the colour scheme used on pop-design consisted of bright, artificial and mostly cheerful colours.

The effects of the political philosophy of the epoch showed itself in design as Anti-Design on late 1960s in Italy (Julier 2004).

5.5.9.2. Anti-Design

Anti design is a movement emerged in late 60s, against the rising consumerism of 1950s and 1960s. They thought design in recent years was a pawn of capitalism which creates false requirements for increasing sales not for enhancing domestic and environmental life quality (Hiesinger and Marcus 1993, Julier 2004).

A group of Italian designers and architects led by Ettore Sottsass redefined the new Italian design by invalidating existing lines of admired Italian design. They distorted forms, preferred shocking colours, made visual puns and deformed functionality of an object.

They preferred reusing existing forms for their own function rather than inventing new one.

5.5.9.3. Radical Design

Late 1960s and 1970s hosted another design style intended to break tenets of Good Design as did Anti-Design. Italian radical design groups examined the characteristics of the modern city, modern life and modern manner of consumerism. In Italy there was an interest in the idea of giving back to people the right to design for

themselves. The emphasis would be on user intervention, altering the object to serve consumer needs.(Julier 2004).

5.5.10. An Era of Social Conscious' Awakening, the Seventies

The decade of 1970 was a decade environmental consciousness and ergonomic concerns flourishing in late 60s, reached at its top point. The deterioration of environment became very important and designers of 1970s considered design as a part of ecological problems. The throw-away culture of 1960s changed radically, standards had shifted from quantitative to qualitative. The petrol crisis which occurred in the decade, also revealed the truth that fossil fuels were short in supply and should be used carefully like the derivatives. Plastics which were the favourite material of recent decades disfavoured for the reasons of the indestructible wastes and difficulties of finding raw materials (Hiesinger and Marcus 1993).

Economic recession brought back sober earth colours instead of clashing over dynamic colours of 60s, for the need of safety. Colours like avocado, burnt sienna, beiges were examples for the decade.

5.5.11. Post Modernism, the Eighties

At the end of the 70s, new theories about styling were emerging. The problem was designers had realized styling was to some extent an arbitrary activity. This was freeing up of attitudes within the fringes of the design had its effects in 1980s as Post-Modernism. Post modernism enabled designers to quote from past ecoles and civilizations (Hiesinger and Marcus, 1993).

> It legitimized kitsch in the very sense that the American Art Critic Clement Greenberg had defined and condemned it (in 'Avant Garde and Kitsch, 1939) – for borrowing superficially from devices developed by mature cultures, and putting them together in a meretricious fashion (Dormer 1993, p.87).

The politic and social life style of 1980s welcomed the style contrary to pre-war modernist designers.

1980s has a decade when the notion of "expression", "simile" and "metaphor" emerged in design.

> The idée fixe for the 1980s became a series of questions. 'Does this product express what it does?', 'Does it explore (as a sculpture might) the broader nuances of the use to which a product might be put?', 'Does it extend the imagination of the user?', 'Is it fun?', 'Does it put us in control over technology?' (Dormer 1993, p.88).

Product design tended towards idea of making products feel more personal. Products were designed to fit to users hand as if it was an extent, or a jewellery that user would wear. Making designs comfortable and safe became dominant factors of product design.

Greatest improvement in kitchen gadgets since post war years until the last two decades of century was the development of heat resistant materials; by the end of the 1980s electric kettles were made of polymers instead of metal electric kettles of 1950s.

CHAPTER 6

COLOUR PREFERENCES IN HOUSEWARES

Some colours are preferred consciously or unconsciously for certain domestic appliances. Unconscious colour preferences are made by the will of the designer, considering functional deeds and prevent misleading, like operating buttons and signal lamps. Conscious colour preferences depend on the will of customer, on her/his likes and dislikes and her/his needs, driven psychologically and/or aesthetical. Birren quoted from physician Felix Deutsch in his work Color and Human response about psychology, "These superficial associations lead to deeper lying memories, which explain the affective emphasis of the attitudes toward the colors." Also psychologists say a products colour effects customers' decision on buying it or drop it approximately 60%. (WEB_11 2004)

In this chapter, to analyze colour schemes used on domestic appliances is aimed according to psychological, aesthetic and physiologic concerns.

6.1. White

Figure 47. White

According to the science of optics, white consists of union of all colours, i.e. wave lengths, it is day light, and hence it is the most visible colour (Figure 47). As indicated in the first chapter, colour theory, the first half of the colour wheel consists of warm colours, the second half of cool colours. As does black, white has a contradiction in it as it is the union of all colours according to additive colours and lack of colour according to subtractive. It may represent the warmth of day light while representing the

cold ness of snow. This dichotomy gives white a neutral and monotonous character. As it has very little emotional appeal, it is a popular colour for finishing. (Birren 1978a) This neutrality gives white a clean and sterile feeling.

In the western culture which dominates the technology design, white is generally associated with good, purity, virginity and holiness. According to Aristotle white is related to the water and to the air, it is as pure as water and air. (Birren 1978b) White is also the colour of snow, thus cold. As dominating modern culture is based on Hellenistic and Latin cultures, snow and cold do not have an evil association as they do in Nordic or Far Oriental cultures, where snow and cold associated to white means death. On the contrary, Hellenistic and Latin cultures sprouted under the warm Mediterranean sun, associate white with sun light and good.

By the light of previous data, it is easy to understand why white is such a popular colour in domestic appliances. In a paper made in 1987 German design critic Katrin Pallowski discovered that; " (…) great majority of German consumers had clustered cosy homes except for their kitchens which tended towards being white streamlined and technical."(Dormer 1993, p. 177).

At first glance, gravity of use of the colour is in the field of "white goods" which are named after. Under the cover of white goods, there are ovens, washing machines, dishwashers, and refrigerators. The common factors of those goods are purity and water (besides oven).

As indicated above, white is related to sterility and purity. The fields in which human race needs mostly to have purity are coverings which protect its sensitive skin from side out effects, and food as he has a very sensitive digestion system unlike other animals. Lack of purity in these fields causes loss of health. He needs to stay clean to survive.

In the western culture, white is the symbol of water element. We can see the water element directly in dishwashers and washing machines. In refrigerators, element became the solid phase of water, ice. In the case of ovens, association of water with purity is considered. In all cultures, even in the ones which sprouted in drought climates, water is associated with cleaning. The aim of dishwashers and washing machines is to clean, while in refrigerators, it is to keep food clean; i.e. fresh and healthy. Ovens are the places in which the foods are prepared, so they have to be clean, too.

Still, appearing of white in domestic appliances only dates back to the 1930s, with encouraging the use of electricity and Streamlining.

At the end of the 19th century and the beginning of the 20th century, widespreaded fuel was coal or wood fire, whose smokes caused soot and most of the machines were hand operating. To prevent the corrosion of metals, the paint they used was dark coloured. As the social life of the epoch required a sharp distinction between maids and mistresses, the appearances of the domestic appliances was not important. As a matter of fact, domestic appliances were luxury, even though with the differentiation of office and house provided newly founded middle class women an ability to afford appliances, even the maids to operate them, whereas the low class women couldn't afford them. So the common colours of the appliances were the natural colour raw materials and black of the protective paint.

At the end of twenties, electricity was presented as the fuel of future. It has no odour; it has no soot and no colour. As the association of uncoloured elements like water and air with white; and being the counter choice for coal fire associated with black, electricity is associated with colour white. The most renowned example is the 1935 Sears Roebuck Coldspot Refrigerator designed by Raymond Loewy. Afterwards, electrical cookers and washing machines were put in the same category of hygiene and cleanness, and framed with white.

Besides, the differentiation of houses and offices loaded on the housewives of the epoch the task of keeping house clean and proper. Here are some quotations Adrian Forty sampled from the press of the epoch about the subject in his work Objects of Desire:

> "More womanly a woman is , the more she is sure to throw her personality over the home and transform it from a mere place of eating and sleeping.
> (…)
> A woman whose home does not bear to her this relation of nest to bird, calyx to flower, shell to mollusque, is in one or another imperfect condition."
> Cited from Women's Work and Women's Culture magazine published in 1869, 'The Final Cause of Woman 'an essay from F. Power Cobbe (Forty 1989, p.106).

> "Personality of a house should express your personality just as every gesture you make, or failed to make."
> Cited from 'The Personality of a House', a book written by Emily Post in 1930 (Forty 1989, p.106).

> "A man may buy and decorate a house; but it remains to woman to make a home of it for him. It is the personality of the mistress that the hose expresses. Men are forever guests in our homes, no matter how much happiness they may find there."

Cited from Elsie de Wolfe's book, 'The House in Good Taste' published in 1913 (Forty 1989, p.104).

To keep "the nest" clean and proper was almost impossible with white colour, which tends to get stained easily. Even, the wardrobe of the epoch consisted of rather dark colours instead of light colours, and patterned light colours instead of pure plain white.

By the end of the 20s, surviving a harsh World War, and (maybe more destructive to social status than war) an economic crisis, middle class housewives couldn't afford maids anymore and had to do their own houseworks. They entered into the kitchen, dirtied their cloths with dust, and faced the true nature of housework. Spending so much time and effort on the house loaded a more sacred meaning to house then aesthetic concerns. The existing domestic appliances replacing missing maids were insufficient to convey the feeling of hygiene and cleanness. In 1930s white casing of appliances were more appropriate to the "sacred" meaning of the houses which became housewives' "temple", the whiter they kept their clothes the better housewives they, were the cleaner they kept their kitchen, the better housewives they were. White in household provided this possibility on this challenge.

The other field of frequent use of white is in kitchen gadgets. Besides the association of cleanness, in kitchen gadgets, white's neutral character coexist in the kitchen, and legibility and visibility as background colour makes it convenient in kitchen gadgets. Especially with the design movement "good design" in the 1950s the best examples of use of white in food processors were made by German firm Braun.

Also, the neutral character of white makes easier adaptation of portable appliances like kettles or pots of coffee makers or irons to the environment.

6.2. Metallic Grey

Figure 48. Grey

Considering white is light and black is total absence of light, grey is lack of brilliance (Figure 48). Like all achromatics, it is a neutral colour. Its monotony makes it emotionally sterile. Its character is easily influenced by a dominant colour (Dale 1990b). The same shade of grey in a cool colour scheme looks cool, warm in a warm scheme.

Contrary to the extremes, black and white; grey, which is an interval of transition between them, neither is a mild colour, neither retreats nor intrudes. It has a connotation of common sense, calmness and maturity (Dale 1990b). Its austerity reminds of monotony and discipline. Birren describes grey with its positive and negative associations -which are equals- as a colour being irritatingly dull in its monotony and having associations with routine existence, but also ensures maturity and self control (Birren 1978b).

Its mildness and neutrality helps to reduce tension, Grey is a calm colour. It makes an important part of calm colour schemes, but this monotonous and impersonal calmness tends to make it a boring colour (Chijiiwa 1990).

Application of grey on products has been popular since 1950s, with the emerging of "good design". Its amicable and neutral character makes it suitable for coexistence. Russel Dale describes application of grey on products as; "Grey implies a durable and dependable product offering utilitarian good value and discreet sophistication. (…) its intrinsic neutrality offers design application using minimalist color." (Dale 1990b, p. 18).

Chrome plating was among the favourite finishing for domestic appliances as it was compatible with the concept of streamlining and reinforced the idea of space age (Fraser and Banks 2004).

Metallic shimmers and its application on diverse products became en vogue with the beginning of the new century. By the end of 1990s, silver was imposed as "the colour of Millennium", and became a symbol of modern age with preceding associations of metallic colour with space age.

Metallic grey is used on almost every appliance. Neutrality and cold appearance of grey enhanced with the modern and machinelike associations of metallic shimmer makes an appliance appear technological and reliable. It is applied on every surface of appliances in which white can be applied. Another important character of metallic surfaces is the adaptability to the ambience. Polished or matte, metal surfaces have the property of reflecting colour dominating the environment. Appliances with metallic

shimmers are chameleons among domestic appliances, which suit all kind of aesthetic and psychological expectations.

On the other hand, cold and formal appearance of both grey and metallic shimmer makes appliance looking industrial rather than cosy and homely. Usually combined with black, they transform kitchen gadgets into objects of prestige rather than ordinary objects.

6.3. Dark Colours

Figure 49. Dark Colours

Black is the darkness. It is the total absence of light. Optics defines colour vision as perceive the wave lengths reflected from a surface. If a surface reflects red light, the eye perceives this object to be red. As indicated above, white consists of union of all visible wavelengths i.e. white reflects all wave lengths and absorbs none. For black, being the opposite of white all the light is absorbed and none is reflected. It is lack of colour additively, but subtractively it is union of colours, and as white does it has contradictory characters in it.

In all cultures, from Hellenistic-based western culture to the Native Americans, black is generally associated with night, death and evil. For the human race which is weak, lacking night-vision and needing protection, night or black is associated with cold and unpredictable dangerous predators of night. They despised black and praised white. Russel Dale describes black in his Black and White Book as;

> Black and white are direct opposites. Black represents night and is the color of mourning. It is evocative of witches, covens, and magic. Black magic and supernatural forces have given black a sense of mystery. Fear of the night and claustrophobia in darkness can be associated with black. On the other hand, black is also epitomizes sophistication and has overtones of sexuality (Dale 1990b, p. 16).

As Dale states, besides associations with evil, black is the colour of sophistication. Throughout history, the scholars, Christian priests, Jewish rabbis and

Muslim imams have worn black robes. Black is also associated with ancient and mysterious lore. Today in comic books which actually carry deep allegories in, almost all mysterious characters are dressed in all black, which are on neither evil nor good side.

If there ever is anything that would be cloaked under the safety of black, besides lore, that would be stain. Being the mirror opposed of colour white, black is the colour of soil, soot and dirt. Unlike the fragile purity of white, black can tolerate stain. Maybe that is the reason for black to be among the preferred colours for sexual fetishism and sexual allure contrary to virginity symbol of white (Dale 1990b).

Black has also an association with power and strength. As a colour, black tends to be heavier and more solid than white (Birren 1978a, Chijiiwa 1990). Still, use of black shrinks appearance of an object, as all dark colours it can be used to reduce virtually the size of a place (Mahnke 1996).

The dichotomy of achromatics shows itself in the case of black with its relation of heat. Having a common association in almost all cultures to the night, black represents the unsafe cool breezes of night, chilling claustrophobic coldness of cellars; it is the colour of deepest shadows in which sun light could never reach. Moreover, it is the colour of charcoal or wood in the stove, it is the resource of heat. In western cultures, black also symbolises hell which is expected to be very hot.

Dark colours (Figure 49) are shades of hues made by adding black in them, or dark colours are hues which lack light in them. They carry the effect of black in them, they look strong but gloomy. Dark shades of hues are associated with royalty as they are costly to produce and tend to look expensive on furnishings (Chijiiwa 1990).

Dark colours, like black and brown are used mostly on appliances which are expected to be strong and reliable. Before the electricity, black and brown were the preferred colours for earliest cookers and refrigerators, as they were the colour of raw materials and kitchen and the other house tasks were considered things to be hidden from sight as indicated above. Electricity was lanced as “fuel of future”, and as design gained importance, cold and sterile white replaced black; it was the time of housewives.

Nowadays, black gained its place back in the kitchen of working class women, who have little time to convey the feeling of cleanness as women did in preceding decades. Also, the formal look of black makes them comfortable as they are used to live in such an environment.

The other field of use of black and dark colours is the condition that the appliance needs to look elegant, expensive and formal. Their places are mostly offices rather than homes.

6.4. Pastels

Figure 50. Pastels

Pastel colours (Figure 50) are lower percentage of the shades of actual hues (Dale 1990a). Pastel shades of all colours are soft and ethereal, even though they are shades of colours with strong character like orange and red or in depressive character as purple (Chijiiwa 1990).

In spite of masculine and dominant characters of bright hues, pastels have a feminine, romantic and calm character. That's why; they exist mostly in women's and infant fashion.

As they have a great amount of white in them, pastels make objects appear lighter and larger as does white. They are great for backgrounds. Like white, they also tend to look clean and pure, but unlike white they tend to look warm.

Russell Dale describes pastels as implying the gentle sides of nature, as new born babies and new born chicks, and says "In general, pastels are harmonious, restful and relaxing; they are easy on the eyes and allow the subject to filter through gently." (Dale 1990a).

The easy nature of pastels makes them suitable for tasks which needs cooperation as in the case of kitchen gadgets. As in the kitchen, every thing is a means to reach the final aim –which are ovens, or cookers- the preparatory tasks shouldn't advance and perturbate concentration.

In her book Color Harmony: Pastels, Martha Gill indicates the calming property of pastels and says: "Pastel palettes often embrace harmony and order, and impart a calming influence. Today holistic practices such as color therapy often use pastel color combinations to relax and bring harmony to the mid and sprit." (Gill 2000).

First appearance of pastels in domestic appliances was in 1950s when culture of consummation progressed as well as “Good Design”. The great amount of white used in pastels makes it also suitable for the association of whiteness and cleanness of electricity. The American firm Kelvinator offered a range of colours consisting of eight different pastel shades in its series FOODARAMA which would fit the decoration of a kitchen, in 1955 (Marcus 1998).

The development of heat resistant polymers, and separate moulding systems have enabled designers to respond to customers’ personal preferences since 1980s. Thus, instead of monochromatic solid pieces, different coloured parts can be used and this provides prevention of dull monotony and under-stimulating effects of the pastel coloured body. The most usual combination of colours in kitchen gadgets are the combinations of white and pastel coloured accents in knobs, operating button, and so on. The presence of pastel shades reinforces the perception of function without perturbating the routine in the kitchen and cheer up the austere and cold appearance of white without impeding the sense of cleanness it conveys.

As pastel shades are preferred mostly in indoor decoration, mobile gadgets with pastel shades are suitable in adaptation on the environment.

Today housewives prefer kitchen appliances with pastel shades rather than a cold looking colour scheme consisting of white and grey of modern design. Their feminine and amiable character suits better to their life style; a tender mother and wife, joyful but also skilled and smart in managing home.

6.5. Bright Hues

Figure 51. Bright Hues

Bright hues are the true chroma of colours (Figure 51). All the bright hues have powerful personality alone. When two or more bright colours are combined, the scheme becomes a cacophony of colours. Chijiiwa defined in his work Color Harmony this result as too many voices shouting at once.

Bright hues are over-stimulating and have an advancing character, i.e. they are eye catching and grab the attention and become the focus of attention. That's why bright colours are associated with youth. Uneasy character of bright colours' makes them unsuitable for coexistence on a task which needs concentration and cooperation.

In spite of feminine character of pastel colours associated with curvilinear lines, bright colours are masculine and the focus of attention character is generally associated with sharp edges and straight lines.

An important distinguishing peculiarity of bright colours from dark and pastel shades is that unlike them bright hues are pure colours and they do possess their own character without the influence of black or white imposing their own characters and making them similar to their own characters.

Bright colours are preferred mostly on vacuum cleaners, as they are the focus of the task which is aimed to. Besides, the task of vacuum cleaners is rather unpleasant compared to other domestic appliances, it is directly related to dirt and during the process the noise of cleaner is disturbing. Although bright colours tend to be fatiguing in the long term, they are suitable to cheer up this unpleasant process.

There are also some kitchen gadgets and appliances in bright colours as Kenwood's Disney Series. Those gadgets are directly aimed at young people who are not interested in kitchen work but want to cheer up boring mediocrity of kitchens. The target mass' of those products mass' is really restricted and their life on the market is generally too short.

CHAPTER 7

CONCLUSION

This study which is focused on the reasons of choices and use of colour in electrical domestic appliances aimed to answer the following question; “Why some colours are good for some appliances while others are not?”, and to display relation between colours and human.

In this work the general reasons leading the existing habits on choices of colours in domestic appliances are studied according to different aspects. In this motive colours are studied according to their importance in design, their effect on products, their symbolic associations in different cultures and the historic progression of colours being parallel to social events, in order to emphasize the relation between colour and human.

Briefly to remind, in the chapter, “Colour Use in Design” use of colour in field of design and designing process is studied in a general wit. In this motive the colour theory, colour models and spaces, and the process of colour forecasting are studied in order.

In the “Colour and Society”, the relations of colours and society are studied. In many different geographies, many different cultures were formed; therefore resulting from those differentiations there are different colour associations all over the world. Despite all these cultural differences, the motives of theses associations remained constant. Today by the progression of technology, there are much more interaction between peoples from different cultures and existing cultural barriers disappeared. Especially in the field of design, there formed a colour language which became common. In the field of designing electrical appliances, this colour language remains constant whatever the nationality or culture of the producer may be.

In the “Colour Use in Industrial Design” the use of colour in design is focused on industrial product design, especially on domestic appliances. In this chapter, the aspects to be considered in product design are studied. Those aspects are visual information admitted by the product, personalisation of the product, which makes the basic reason of colour applications, aesthetical concerns and ergonomic concerns.

In the next chapter, the “Historical Aspects”, after a more general approach to colour and use of colour in design, historic progressions of colours and domestic appliances with regard to social events are studied to be able to make accurate interpretations about the use of colour in electrical domestic appliances. Therefore the scientific and sociological data are to be gathered as a synthesis.

By the guidance of data studied in previous chapters, the last chapter of the thesis aims to study the reasons for colour choices in domestic appliances under the name of “Colour Choices in Electrical Domestic Appliances” in order of mostly used colour schemes: White, Metallic Grey, Dark Colours, Pastels and Bright Colours.

Today, the most significant impact over colour variations on domestic appliances is the nature of the task they will be used for. At that point, psychology and physical perception gets involved. Then the aesthetic concerns gain importance according to the personal choices based on likes and dislikes.

The conclusions about colours are;

1. Neutral colours like white and metallic grey have an ability to adapt to the ambiance they stand in. Thus, the combinations of white and metallic grey are preferred and applied almost on all appliances.
2. While association of purity and cold makes white a suitable colour for the appliances which are directly related to hygiene, the association of sophistication and (infernal) heat of black makes it convenient to use on prestige appliances and appliances involving heat like ovens and cookers.
3. Pastel colours are cooperative colours which don’t distract attention, still, they are cheerful. That’s why; they are mostly used on kitchen gadgets.
4. Bright colours have strong characters and the property of being the centre of attention. That’s why; they are frequently

used on vacuum cleaners and accentuate the function on domestic appliances.

Whether being a vast and mostly personal matter, still in colour choices made by designers and consumers, there is conscious or unconscious elimination of certain colours for certain tasks based on psychological, sociological and ergonomic aspects. A designer's duty is to observe and analyse whatever these reasons are rooted in, and to consider these significant aspects in the mental process of design to achieve the desired result from a product.

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APPENDIX A: GLOSSARY

Abstraction:

Abstraction is the process of ideas being distanced from objects. Abstraction uses a strategy of simplification of detail, wherein formerly concrete details are left ambiguous, vague, or undefined.

Achromatic:

Achromatic colours consist of black, white and shades of grey which is formed by adding white in black. Literally achromatic colours are "colours without colours". (Chijiiwa, Color Harmony) It derives from the Greek word for non-colour. In Johan Itten's Three Dimensional colour wheel, achromatics is located on the axis of the wheel.

Additive colours:

In the colour wheel red, blue and green defines a equilateral triangle, these are the primary colours of visible colour spectrum. They are about the light of the object it self not the lights reflected from the object. Combining of three primaries of additive colours gives white light. Secondary colours of additive primaries give subtractive colours primaries, cyan, magenta and yellow. The field of use of additive colours are media in which light is necessitate as TV and computer monitors, film making etc.
Additive colours describes RGB (red-Green-Blue) colour gamut on the visible spectrum of colours.

Aesthetics:

Aesthetic is a guiding principle in matters of artistic beauty and taste; an artistic sensibility towards an object.

Aesthetics is a term derived from the Greek word "aestesia"- the senses, and it concerns all of one's senses and responses –physical and emotional– to an object; it's about every thing about one's pleasures and displeasures.

Anti-Design:

Anti-design is an Italian design movement emerged on late 1960s against the rising consumerism of precedent decades. By the leadership of Ettore Sottsas a group of Italian designers questioned the validity of existing design criteria. They distorted forms, or reuse already existing forms for other purposes. With shocking colours and visual puns they deformed functionality of an object.

Some of the designers following the movement are; Ettore sottsas, De Pas, D'Urbino and Lomazzi, Gaetano pesce

Art-Deco:

Art deco was design tendency rather than a rather movement occurring popularly in 1920s and 1930s, the years of great depression. Takes its name from the fair, "*Exposition des Arts Decoratifs et Industrielle Paris*" at 1925. It is a utopian design style for people to feel the safety of ancient powerful civilisations using luxurious and costly materials. Despite of Art-Nouveau, Art deco welcomed previous artistic tastes and greatly influenced from antic cultures of Egypt, Rome and African tribes. The products aimed for public were made by materials as chromium, painted glass and bakelite, creating lavish effects by using low cost materials.

Art-Nouveau:

Art-Nouveau (French for New Art) is an international art movement occurring in a large interval according to the successor movements, between 1880s and 1910s. Different nations perceived and applied art- Nouveau on their own style. For Germans, it was Jugendstil, for Italians, Liberty; for Austrians Sezessionsstil, which differs from other wits with its ability to adapt on mass production; and for Spanish Arte Joven.

It is characterized by its highly decorative style and abstraction of natural forms. This tendency to abstraction and rejection of precedent movements makes Art-nouveau an early pioneer of modern art.

It had either very curvilinear or very rectile (but elegant anyways) shapes, and it made Art-Nouveau unsuitable for mass-production. This hand craftiness makes it a successor of Arts and crafts movement which address to people with high aesthetical and artistic expectations and a full pocket.

Most renown artists of Art-Nouveau are the Spanish architect Antoni Gaudì (La Chiesa di Sagrada Familia, Güell Park, la Pedrera, Casa Battlò), the French architect Hector Guimard (metro doors,...), the British architect Charles Rennie Mackintosh (Glasgow School of Art), the Austrian architect Joseph hoffman, the Austrian painter Gustave Klimt (the kiss), French glass and jewel designer Rene Lalique and Alfonse Mucha.

Art Nouveau's optimistic approach to life and high prices for handicraft ness, it cannot survive the World War I.

Arts and Crafts:

Arts and Crafts movement is a movement occurred in England led by John Ruski, William Morris and C.R. Ashbee. The very term originated with the exposition held on 1888 by Art Workers' Guild in London, its idea was to promote craftsmanship against the industrialisation of production. It was a movement advocating the belief that good art and design could reform the society, for many people Arts & Crafts movement

signified the rejection of industrialized production and distribution, and the embracing of traditional materials and methods.

Most renowned artists of the movement are: Charles Robert Ashbee, William Morris, John Ruskin, and Gordon Russel.

Bauhaus:

Bauhaus is the name of the design school merged in Weimar at 1919 by Walter Gropius, Staatliches Bauhaus Weimar which prepares the modernbase of design education. With its renowned teachers like Itten, Klee Kandinsky, Maholy-Gany all of the design students were educated in craft workshops. At the first years under the mystical approach of Itten, the way of Bauhaus contradicted with Gropius's ideal of uniting art and industry, with the arrival of Van Doesburg the effects of De Stijl introduced an the education is changed directly towards this way. After getting political disagreements with National Socialists, Bauhaus had to move to Dessau from Weimar and there Gropius designed the school building by Bauhaus style.

It is considered among the pioneers of the modern movement as it developed a design style incorporating newest construction materials of the time; concrete, glass and steel with an austere and unornamented look.

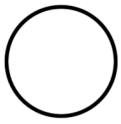
Blue:

Blue is one of the colours of spectrum, at the 450-500 nm wavelength interval.

Blue is one of the primary colours of colour wheel as indicated in the colour wheel of Itten. According to Goethe's chart of luminosity, its score is 4/9.

It makes a part of cool side of colour wheel; actually it is a "cold" colour. Its derivatives by adding "warm" yellow and by adding a little of "hot" red forms the cool colours.

According to Itten's associations of colours and forms, having relations to feeling of relaxation and smooth motions and spirits blue is associated with circle.



Birren defines blue in his work Colour psychology and Colour therapy as;

"Blue has qualities that are antithetical to red. It lowers blood pressure and pulse rate.

Under the influence of blue time is underestimated and weights are judged as being lighter. (…)

Because blue is a difficult colour to focus, it is objectionable as a light source and low in attention-value." (Birren 1961, pp. 260)

He mentioned about verbal associations of blue as;

"Blue has a meaning all its own as expressed in "feeling blue", or "blue music". The colour once referred to the insane, then to mental depression in general. There are

blue laws, blue gloom, and blue Monday, blue-bloods. Man yells blue murder and curses the air blue. Things happen in life once in a blue moon or suddenly like a bolt from the blue." (Birren 1961, pp.169)

He mentioned in the same work about the relation of Itten's relation of shapes and colours about blue as;

"Blue suggests the form of circle or sphere. It is cold, wet, transparent, and celestial. It is retiring in quality and creates a blurred image on the retina. Blue objects seen at a distance are never sharp to eye." (Birren 1961, pp. 171)

Deborah T. Sharpe explains a colour education process for blind children. In this process first the concepts that blind pupil can understand associated with colour;

"Blue is represented as the colour of dignity, poise, and reserve. It is associated with the U.S. flag, the policeman's and sailors uniforms, and the décor of restful rooms." (Sharpe pp. 91)

Chroma:

-Chromatic purity: freedom from dilution with white and hence vividness of hue.

-The attribute of a visual sensation which permits a judgement to be made of the amount of pure chromatic colour present, irrespective of the amount of achromatic colour.

-Synonyms**:** intensity (n), saturation (n), vividness (n)
(http://www.websters-online-dictionary.org/definition/chroma)

CMYK:

CMYK is a subtractive colour space used in the printing process. One starts with a white canvas, and uses ink to subtract colour from white to create an image. CMYK stores ink values for cyan, magenta, yellow and black.

Colour:

Colours are different light waves of different wavelength received by the cone sensory cells on retina of the human eye. An objects colour is perceived by the wavelengths it reflects. I.e., if an object reflects blue light eye perceive it as blue.

Colour Gamut:

The colours displayed in a space called a colour gamut, in an other saying the range of colours that can be produced by any given process or device is called a colour gamut.

Colour Ergonomics:

Colour Ergonomics is the science of using the most appropriate colour in a given circumstance which will best benefit those individuals working in that environment. It makes a part of cognitive ergonomics which is concerned with mental processes ('brain

work'), such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system.

Colour Forecasting:

Colour forecasting is to foretell the colour schemes of a season before a certain time regarding to the lifestyle of the time. In a team working on colour forecasting there are, sociologists, psychologists and people from design job as well as colourists.

Colour Matching System:

A colour matching system is a system made for preventing the loss of qualities of colour when converting a colour from a medium into the other, and to prevent confusing colours. This system is consisted of single inks for each defined colour by a number, called spot colours. Those colours are constant on all media and easier to find by their catalogues.

Colour Models:

A colour model is an abstract mathematical model describing the way colors can be represented as tuples of numbers, typically as three or four values or colour components.

Colour Spaces:

Colour space is a more specific term for a certain combination of a colour model plus a colour mapping function.

Contrasting Colours:

Contrasting colours have three colours between them on the colour wheel, like red and green, or red and blue.

Cool Colours:

Cool colours constitute from the hues on the half of the colour wheel which consisted of the blue and its mixtures. The colour range from green to violet makes these colours. It is a definition of a colour made referring to its hue, the actual colour. Cool colours slow down the metabolism of the body and have a calming effect. Some times cool colours may be look oppressive and gloomy. Cool colours are receding colours and according to Goethe's chart of colours these colours are among the weakest colours.

Dark Colours:

Dark colours are the mixtures of hues in the colour wheel with the black. Dark shades of colours seem strong and solid. They make feel both heavy and gloomy, both royal and dignified.

De Stijl:

It is a Dutch group of designers consisting of architects, product and graphic designers sharing the common objective of absolute abstraction, named after the magazine De Stijl (The Style). De Stijl magazine featured not only from Dutch avant-gardes, but also from constructivists, Dadaists and Italian Futurists. They sought the purification of art and design through the reducing forms and colours into their very primaries, thus adopting a universal design language of abstraction. Their philosophy was to bring harmony and enlightenment to humanity through the search for honesty and beauty. Chief Editor of magazine, Theo van Doesburg prompted the wit of de Stijl every where. Especially the seminars and courses made at Weimar influenced quite much the modernist wit of Bauhaus. De Stijl designs are characterized by the strong geometric forms and coloured blocks delineated space. Partitions are used instead of walls and minimum furnishings are used. Strong linearity produced dynamism, and the lack of ornaments created a sense of lightness ad freedom.

Most renowned de Stijl artists are; Theo van Doesburg, Piet Mondrian, Georges Vantongerloo, Gerrit Rietveld

DIC:

A colour matching system consisted of spot colour inks like Pantone, Trumatch, etc. abbreviation for Dinippon Ink & Chemicals.

Dull Colours:

A dull colour is the addition of grey to a colour, thus the personality of the colour is softened: if enough amount of grey is added, the result would be a muddy shade. Human beings instinctively prefer bright vivid colours; dull colours are annoyingly vague and diffuse, and create a blurry impression. However, dull colours help to reduce tension, and give colour schemes a meditative, dreamlike mood. Dull colours always run the risk of looking insipid.

Dyad-Complementary Colours:

A harmonious dyad composed of two diametrically opposed hues on the colour wheel and called to be complementary to each another. When working with harmonious dyads it must be remembered that colours must be symmetrical according to the centre of the colour sphere in which top pole indicates whiteness and bottom blackness.

Ergonomics:

Ergonomics is the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system. The profession applies theoretical principles, data and methods to design in order to optimise human well-being

and overall system performance. Derived from the Greek ergon (work) and nomos (laws) to denote the science of work, ergonomics is a systems-oriented discipline which now applies to all aspects of human activity.

Within the discipline there are three domains representing specific human attributes or characteristics of human interaction: Physical Ergonomics, Cognitive Ergonomics and Organisational Ergonomics.

Physical ergonomics is concerned with human's anatomical, anthropometric, physiological and biomechanical characteristics as they relate to physical activity. These activities includes, working postures, materials handling, repetitive movements, work-related musculoskeletal disorders, workplace layout, safety and health. Physical ergonomics is also concerned with how the physical environment around might affect one's performance. 'Physical' here means the kinds of things physicists know and love - heat, light, noise, dusts, chemicals, etc. Briefly, physical ergonomics is about understanding the harmful effects of the environment on people.

Cognitive ergonomics is concerned with mental processes the brain work, such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system. These processes include mental workload, decision-making, skilled performance, human-computer interaction, human reliability, work stress and training as these may relate to human-system design. Colour ergonomics makes a part of cognitive ergonomics as it is related to the perception and reaction towards an object.

Organisational ergonomics is concerned with the optimisation of sociotechnical systems like communication, crew resource management, work design, design of working times, teamwork, participatory design, community ergonomics, cooperative work, new work paradigms, organisational culture, virtual organisations, telework, and quality management, including their organisational structures, policies, and processes. Organisational ergonomics is about to organise people and the work to obtain the best result.

Good Design:

Good Design is a concept at the post second world war years at northern European countries, defining the carried on mentality of modern movement imposed by Bauhaus. The forms were linked to the function and in good design it is avoided from all of the excessive ornaments, opposing the former wit, Styling, which only consisted of application of superficial effects. One of the important difference of good design from its contemporaries is their wit of timeless design, to be able to use a product as long as it is possible without any deformations, or being stylistically worn-out. In product design, Braun and Olivetti are considered the most successful manufacturers integrating the principals of good design into the product design.

Green:

Green is one of the colours of spectrum, at the 520-565 nm wavelength intervals.

Green is one of the secondary colours, composed of mixture of blue and yellow, placed on the middle wheel on the colour wheel a of Itten. According to Goethe's chart of luminosity, its score is 5/9.

It makes a part of cool side of colour wheel; yet the warmth of yellow makes of it a more cheerful and lively colour than blue is. Still while greens having more tints of

blue looks cooler than do the greens in which yellow tints are dominating.

According to Itten's associations of colours and forms, as a mixture of the shapes having relations to feeling of relaxation and smooth motions and spirits of blue and sharp dynamism of yellow green is associated with arched triangle.

But Faber Birren makes the relation of colour and shape about green as;

"Green suggests the form of the hexagon or icosahedron. It is cool, fresh and soft. Because it is not sharply focused by eye, it does not lend it self to much angularity." (Birren; 1961, pp. 171) rather than the arched triangle of Itten.

Birren defines green in his work Colour psychology and Colour therapy as;

"Green is the colour of jealousy. "Greener" are in experienced workers, greenhorns are rustics from the country." (Birren 1961, pp.169)

Deborah T. Sharpe explains a colour education process for blind children. In this process first the concepts that blind pupil can understand associated with colour;

"Green is described as combination of the "gaiety of yellow and the dignity of blue, and also the predominant colour in nature, and is the colour of the forest and jungle. Because of its restful nature it is frequently used in decorating."" (Sharpe; pp. 91)

According to colour safety code developed in 1944 green is stated standard colour to identify first aid equipments, medicines and gas masks.

Hexad:

A harmonious hexad is composed of two symmetrical harmonious triads.

HSV:

HSV is a subtractive colour model describing pigments used in artistic purposes. Takes its name from the initials of "Hue-Saturation-Value" as abbreviation, defining colours numerically. Its primary colours are red blue and yellow. As does all the subtractive systems, the mixture of those three primaries gives black. One of the reasons that the HSV color model is so useful is that there is a substantial literature that uses these concepts— hue, tint, shade, and tone—to describe art history and technique.

Hue:

Hue is the actual colour situated on the colour wheel, the principal way in which one color is distinguished from another. According to their hues colours are separated into two categories; red and its derivatives forms warm half and blue and its derivatives form the cool half of the colour wheel.

Industrial Revolution:

The Industrial Revolution was a period of the 18th century marked by social and technological change in which manufacturing began to rely on steam power, fuelled primarily by coal, rather than on water or wind; and by a shift from artisans who made complete products to factories in which each worker completed a single stage in the manufacturing process. Improvements in transportation encouraged the rapid pace of change.

International Style:

International style is the term defining the aesthetic concerns of the modern movements from 1920s to the 1960s. But it is usually used for describing second phase of modernism following the times of Bauhaus' closure by Nazis. Its characteristics are anti-historicism, functionalism and use of new technology. Enthusiasm for international style peaked on the 1960s when the town centres are reshaped on architecture. Its clean streamlined wit and the ability to application on plastics made international style a most convenient style for domestic appliances.

Most renowned designers of the movements are, former Bauhaus teachers Ludwig Mies van der Rohe, Walter Gropius and Knoll, Dieter Rams Hans Gugelot.

Light Colours:

According to the shade of a colour, a colour might have light or dark characters. Light colours are the hues in which white is added. Light tints of colours tend to be soft and amiable. As long as the amount of white added in increased, the strength of hue decreases. The light tints of colours as powerful as red or orange tend to be soft as does light shades of blue. Light colours tend to look light in weight yet bigger in size. As they have a spreading quality on background they are convenient to use in decoration and graphic design as background colour.

Orange:

Orange is one of the colours of spectrum, at the 590-625 nm wavelength intervals.

Orange is one of the compound colours, composed of mixture of red and yellow, placed on the middle wheel on the colour wheel a of Itten. According to Goethe's chart of luminosity, its score is 8/9.

It makes a part of the warm side of colour wheel; it is neither a "hot" and aggressive like red, nor disturbingly bright like yellow. Orange is generally described as a cheerful and active colour.

According to Itten's associations of colours and forms, as a mixture of the shapes having relations to static materiality of red and sharp dynamism of yellow orange is associated with trapezoid.

However, the approach of Birren Differs from the colour and shape association of Johannes Itten;

"Orange suggests the form of the rectangle it is less earthly than red and more tinged with incandescence. Optically it produces a sharp image, is clearly focused by eye, and lends itself to fine angles and details." (Birren 1961, pp. 171)

Birren defines orange in his work Colour psychology and Colour therapy as;

"Orange partakes of the same qualities as red. It is not generally preferred in its pure form but highly pleasing in its tints (peach, salmon) and shades (brown). (…) The colour is mellow, less primitive than red, and it therefore has a more "liveable" charm. It has high appetite appeal and is quite suitable for food service." (Birren 1961, pp. 259)

The association of ripe fruits with orange makes it one of the most appetizing colours.

According to colour safety code developed in 1944 orange is stated standard colour to identify acute hazard likely to cut, crush, burn or shock.

Pantone:

A colour matching system consisted of spot colour inks like DIC, Trumatch. It is the most renowned in the field of colour presentations. Besides of spot colours it serves on the process of forecasting.

Planned Obsolescence:

Planned Obsolescence is a notion emerged in 1950s in USA and meant to produce products with a restricted life, either technically (an important part of the product becomes non functional in specified time) either stylistically (appearance of the design become unfashionable in a short term). It shortly became a strategy for large corporations.

Pop design:

Pop design is a popular style dominating the late fifties and sixties and took its name from the abbreviation of popular design referring to the outputs of popular culture and mass media, like advertisements, cinema and televisions. Supported and encouraged by the optimism and the feeling of freedom brought by the economic boom of 1960s. Despite of the formal and austere colour schemes and shapes of modern movement in pop-design everything was colourful and cheerful. Again, despite of the timeless approach to design of modern movement, pop design advocated the temporariness and throw away culture. Despite of the anti historicism of the modern movement, pop-art resurrected the bulbous and curvilinear shapes of art-nouveau and art-deco. In any way, pop design was a rebel against the cold severity and pressure of modern movement; it was the time for hippies and freedom. This optimism didn't last long, the Vietnam War, economic recession caused by the petrol crisis and awakening conscious towards the nature ended this atmosphere of optimism and freedom.

Post-Modernism:

Applied on almost all aspects of life like cultural and economic activities as did modernism, in fact post-modernism can be defined as a rejection of everything about modernism it is a counter movement to modernism with its vigorous austerity and spaces or products design too perfectly to use of people. By incorporating the highbrow and popular aspects, post modernism created its own language. Despite of anti-historistic approach of modernism, post-modernism recalled the samples of elements from different designs and eras, i.e. historicism and eclecticism. Not only rejecting whatever modernism hold dear, post modernism referred to the loss of faith towards modernism ad its belief on progress, reason and the power of human consciousness. Freud had already proven the weakness of conscious and role of subconscious over people. According to postmodernism there was a loss of faith in absolute truths people were constitute with a series of images symbols and metaphors driving them into a schizophrenic state manipulated by mass media. There was a considerable inward shifting on every aspects of life. Especially on architecture there was an obvious displeasure against the modernist architects which ended up into an empty wit of international style and adopted by either extreme right or extreme left, so there was a great shift in architecture from public designs like schools and hospitals into private buildings. This shift can be observed on every aspect of design, and related to this shift there as an obvious shift from production into consumption. Personalizing gained importance.

Renowned designers of the movements are; Aldo Rossi, Robert Venturi, Ettore Sottsass, Charles Jencks.

Primary Colours:

Primary colours are atoms of colours which cannot be reduced any further. According to the assumption of trichromatic nature of colours, each colour spaces consisted of three primary colours. On CMY(K) the primary colours are cyan, magenta and yellow; on HSV blue, red, yellow and on RGB red, green blue. Each colour can be composed of the mixing of these primaries.

Process Colours:

Process colours are the colours of four coloured inks used in the four-colour printing process in CMY(K) colour space; yellow, cyan, magenta and black.

Psychedelia:

Psychedelia is a style of music, visual art, fashion, and culture that is associated originally with the high 1960s, hippies, and the Haight-Ashbury neighbourhood of San Francisco, California. It generally began in 1966, but truly took off in 1967 with the Summer of Love. Its beginnings are associated with San Francisco but the style soon spread across the U.S.A, to Great Britain, and worldwide.

Psychedelia takes its name from psychedelic drugs, which helped give rise to the loud, swirling, pastel visual imagery and paisley designs. It was also influenced by Hindu, American Indian, and various Asian motifs, and extensive use of collage was a hallmark of the style.

Radical Design:

Radical design is a design style like anti-design aimed to break tendencies of good design, but having more violent expression of political ideologies. Its exponents were worked on projects which incorporated architecture, design and planning in motive to reshapes people's attitudes and environment. Their emphasis were on the on the user intervention altering the object to serve the consumers particular needs, and using visual codes undermining existing visual codes associated with western capitalism.

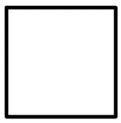
Red:

Red is one of the colours of spectrum, at the 625-740 nm wavelength interval, it is the border line for the bottom of the visible wavelengths. The wavelengths beneath red called Infra-Red, which transmits heat.

Red is one of the primary colours of colour wheel as indicated in the colour wheel of Itten. According to Goethe's chart of lumiosity, its score is 5/9.

It makes a part of warm side of colour wheel; actually it is a "hot" colour. Its derivatives are formed by adding "warm" yellow and by adding a little of "cold" blue forms the warm colours.

According to Itten's associations of colours and forms, having relations to the static immobility and materialism, red is associated with square.



Birren defines red in his work Colour psychology and Colour therapy as;

"Red is perhaps the most dominant and dynamic of colours. Its energy has strong influence on the growth of plants. It has been found to accelerate the development of certain lower animals, to increase hormonal and sexual activity, and to heal wounds.

In its action upon the human organism, red tends to distract the equilibrium of the body. (…) It will act to raise blood pressure and pulse rate but may be followed by a reversal of these effects after a period of time.

Psychologically, red is exciting and increases restlessness and nervous tension. (…) Under the influence of red, time is overestimated and weights seem heavier. (…)

Under practical situations, however, pure red can seldom be used; the full hue is too imperious and has too strong an after-image. Brilliant red has its value in commanding human attention, although a high frequency of colour blindness among men introduces limitations. Modified forms of red – rose, maroon, pink – are beautiful, and expressive universally appealing, and deeply emotional. (…). It helps to distract attention from within and to direct it outward." (Birren 1961, pp. 258)

Actually, red can symbolize many things both good and ill; blood, love, fire, energy, excitement, strength, danger, passion and aggression. I.e., red symbolizes strong emotions.

Deborah T. Sharpe explains a colour education process for blind children. In this process first the concepts that blind pupil can understand associated with colour;

"Red is the colour of love, passion and anger; it is hot, vivid and restless. Mention is made of its use in the American flag, as a "stop" traffic signal, and in valentines." (Sharpe; pp. 91)

Among pure colours red is the most appetizing, associated with red apples, sweet strawberries. In restaurants it is frequently used to make customers feel more hungry than they really are.

Verbal associations of red are indicated by Birren as;

"To him red is ardent and passionate colour, assigned to saints and sinners, patriots and anarchists, love and hatred, compassion and war. He paints the town red, sees red when angry. When his business is without profit he is in the red – indeed, his bookkeeper uses red ink to indicate the loss. Politicians draw red hearings across the line and shout of reds and radicals. There are red-letter days, redheads, redcaps, and vagrants without a red cent to their names" (Birren 1961, pp. 169)

According to colour safety code developed in 1944 green is stated standard colour to identify the marking of fire protection devices.

RGB:

RGB is an additive colour model, primaries consisting colours of light; red, green and blue, commonly referred to their initials as an abbreviation. The mixing of these three primaries gives white light. This model is used on media using light as the mediator on creating images lie monitors, photography and cinema.

Saturation:

Saturation describes how pure a particular hue is. It is also referred to as the intensity, s trength, or chroma of a color. Reducing the saturation of a particular hue, while maintaining its value, has the effect of adding white pigment, producing what artists call tints. According to the saturation we can classify colours in the colour wheel as vivid or dull.

Secondary-Compound Colours:

Secondary colours are the mixtures of primary colours, also called compound colours. On each colour space compounds differs as do in primaries. The compounds of the additive space RGB is Primaries to the subtractive CMY(K).

Shade-Value:

Value is the quality that differentiates a light color from a dark one. It is also referred to as lightness. A particular color moves toward black by a reduction in its value. Low-valued colors are less visible than ones with higher values. Decreasing value while leaving saturation alone has the effect of adding black pigment, producing

what are referred to as different shades. According to their shades or value, colours can be classified as light colours and dark colours.

Similar Hues:

Similar hues are the hues placed adjacent in colour wheel to each other. It is possible to make a harmonious colour scheme from similar hues.

Spectrum:

Light is made up of energy waves which are grouped together in what is called a spectrum. Colour spectrum is founded by the optical experiments of Sir Isaac Newton by refracting white day light through a prism. A colour spectrum consists of seven different colours; red, orange, yellow, green, blue, indigo and violet. The visible interval of light consisted of this colour spectrum.

color	wavelength interval	frequency interval
red	~ 625-740 nm	~ 480-405 THz
orange	~ 590-625 nm	~ 510-480 THz
yellow	~ 565-590 nm	~ 530-510 THz
green	~ 520-565 nm	~ 580-530 THz
cyan	~ 500-520 nm	~ 600-580 THz
blue	~ 450-500 nm	~ 670-600 THz
indigo	~ 430-450 nm	~ 700-670 THz
violet	~ 380-430 nm	~ 790-700 THz

Figure 52. Colour spectrum

Streamlining:

Streamlining is the term which determines surface effects which derived from water drop shape of aerodynamic machine aesthetics, and dominating in the thirties. The best applier of the Streamlining is Raymond Loewy and Henry Dreyfuss.

Subtractive Colours:

Objects create colour by subtracting or absorbing certain wavelengths of colour while reflecting other wavelengths back to the viewer. This phenomenon called a subtractive colour. The mixture of subtractive colours gives black. On the field of design subtractive colours are the pigment colours used either in artistic purposes either printing process.

Tertiary Colours:

Tertiary colours are formed by mixing one primary and one compound colour on the colour wheel. On Itten's colour wheel tertiary colours are placed at the outermost wheel.

Tetrad:

A harmonious tetrad is composed of two pairs of complementary hues in a rectangular form, or two adjacent and two opposing colours at the right and left of their complements in a trapezoid form.

Triad:

Colours forming an equilateral or isosceles triangle on the colour wheel called a harmonious triad.

Truematch:

A colour matching system consisted of spot colour inks like Pantone, DIC, etc.

Utilitarian design:

Design movement held on Britain during the years between 1941 and 1951 as a response to the demands of war economy. The style was mostly influenced from the rules of Arts & Crafts movement.

Victorian time:

The Victorian Era of Britain is considered the height of the industrial revolution in Britain and the apex of the British Empire. It is often defined as the years from 1837 to 1901 when Victoria I of the United Kingdom reigned.

The Victorian period is often regarded as one of many contradictions. There is a clash between the widespread cultivation of an outward appearance of dignity and restraint and the widespread presence of many arguably deplorable phenomena, including prostitution, child labour, and having an economy based to a large extent on what many would now see as the exploitation of colonies through imperialism and of the working classes. The term "Victorian" has acquired a range of connotations, including that of a particularly strict set of moral standards, often applied hypocritically.

Violet:

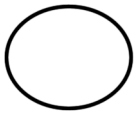
Violet is one of the colours of spectrum, at the 380-430 nm wavelength intervals. Violet is the top border of the visible wavelengths, the higher wave lengths are called ultra-violet.

Violet is one of the compound colours, composed of mixture of blue and red,

placed on the middle wheel on the colour wheel a of Itten. According to Goethe's chart of luminosity, its score is the weakest, 3/9.

It makes a part of cool side of colour wheel; yet the warmth of red makes of it a dreamlike and meditative colour.

According to Itten's associations of colours and forms, as a mixture of the shapes having relations to feeling of relaxation and smooth motions and spirits of blue and straight static materialism of red violet is associated with ellipse.



Chijiiwa defines violet in his work colour harmony, as;

"Purple is a sophisticated colour, long associated with royalty. We don't often see it I the nature, so we think of it as an "artificial" colour, and find it a bit hard to take. The lighter shades of purple have dominated women's fashions in recent years." (Chijiiwa 1990, pp. 16)

Birren notes the opposite effects of pries of violet as;

"Purple being a blend of red and blue, the two extremes of the spectrum, is more or less neutral biologically. It is not suitable for large areas because it disturbs the focus of the eye." (Birren 1961, pp. 260)

Vivid colours:

The colours may be classified according to their saturation as vivid or dull. Vivid colours are the hues with full chroma. The vivid colours (including black and white) have powerful personalities; they always stand out.

Warm colours:

According to their hues colours on the wheel can be classified as warm or cool colours. The first half of colour wheel, derivatives of red and yellow itself (red, yellow, orange, pink, and brown) are called warm colours. They are associated to heat. Warm colours are progressive and grab attention more than any other colours do. They are progressive, bright, splashy, appetizing and aggressive and make colour scheme look brash, cheerful, and exuberant.

Wheel of colour:

A color wheel composed of colours arranged in a circle referenced by their angles, for example, red at 0, yellow at 60 degrees, green at 120, blue at 240, and purple at 300. In a wellbalanced color wheel, complementary colors appear at 180 degrees opposite.

Yellow:

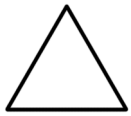
Yellow is one of the colours of spectrum, at the 565-590 nm wavelength

intervals.

Yellow is one of the primary colours of colour wheel as indicated in the colour wheel of Itten. According to Goethe's chart of luminosity, its score is the strongest 9/9.

It makes a part of warm side of colour wheel. Its derivatives of red make the warm half, and of blue make the cool half of colour wheel.

According to Itten's associations of colours and forms, having relations to thought, and sharp dynamism, yellow is associated with triangle.



Yellow has the highest visibility that's why it is the most tire some of the colours. Birren mentioned about this property of yellow as:

"A bright colour such as yellow would tire the eyes after prolonged concentration and would create a disturbing afterimage." (Birren 1961, pp. 244)

According to colour safety code developed in 1944 orange is stated standard colour to identify strike-against, stumbling, or falling hazards.