Chapter 8 Colour not by chance. Culture of Vision for a conscious chromatic project

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Abstract

In the current civilization of the image, the chromatic component constitutes an indispensable and winning language (to be addressed systematically) in any type of performance and/or communication: an aspect that is often not addressed sufficiently in the basic training of many professions. How much then does the visual aspect (even chromatic) count in the success and work of an architect or a designer or a designer in general, in any field? Awareness of vision and perception are a precious component to improve performances, and multicultural exchanges. Chromatic Culture can be confirmed as an authentic project dimension in the analysis and intervention on architecture and city, territory and landscape, as well as in the definition, conservation and enhancement of Cultural Heritage, without forgetting the design product, graphics, digital, cinema and more. Therefore, we will provide a specific overview on the Culture of Vision (in particular chromatic) between specific theories and practices (from Goethe onwards), tradition and innovation, with thematic examples, to better understand (but also to apply and verify, in the analysis and in the project) the founding role of cultural matrices with findings in Divisionism and in the Bauhaus, up to now). Among the most important objectives, the control of communication and of the "chromatic image", in all the aforementioned areas, should be emphasized, without forgetting the structures and processes of formal languages and visual characters, with relative meanings. The challenge is then to demonstrate (paraphrasing Arnheim) that "chromatic thinking", based on the Culture of Vision and on Comparative Color Theories, is confirmed as a fundamental methodological approach, in analysis and design. From theories to praxis, therefore, to "draw color" in a cultured and conscious way, and to educate oneself to it without interruption, in the time of history and in the space of cultural territories.

Keywords:

History, Colour theories and models, Art, Architecture, Design, Communication, Semiotics of vision, Colour as a sign.

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1. Introduction

The course is configured as a great "challenge": that of demonstrating (also in the application parts) how the chromatic culture (and the thought related to it) are fundamental for any type of action, in the field of color analysis and design. So even the most applicative experiences cannot be separated from this method approach: the same technical physics or all the palettes (that we apply to create products in any type of project) are born from a millennia-long experience.

In the first module the approach to comparative chromatic theories will be exemplified and facilitated by the illustration of Itten's theory, with the example of its chromatic model, with the parameters that generate it and the consequent color contrasts, to be applied in the analysis and in the project. A brief comparative description of some models selected to demonstrate the complexity of color theories in history and chromatic culture will follow. This first part will be accompanied and verified through particularly significant application examples: from art (including street art) to architecture, design and so on, trying to propose a critical selection that fits the needs and curricula of the students of the course.

2. An infinite journey with the "Ray of Iris". History and theories in Chromatic Culture

Tracing "the ray of Iris", that is the coloured thread reconnecting the path of knowledge and "chromatic way of thinking" in history and in the cultural territories, is never easy: for a series of reasons and situations such as vastness, depth and articulation of the phenomena in which (with various titles) it is involved, as the main subject, or as an instrumental element. And the procedure appears even more complex if rules and principles have to be derived from such knowledges for the analysis and the chromatic project.

2.1 The "chromatic way of thinking" in history, culture, theories

The beginning of this narration can therefore only be entrusted to the wonderful images that Owen Jones, Philipp Hackert, Jacobs Hittorff have handed down to us from history. Owen Jones (London, February 15th, 1809 - London, April 19th, 1874) was an English architect, draftsman and writer; he decided to move to Europe in 1832 (France, Italy, Greece, Spain), Egypt and the Middle East. In Greece, Jones met the German architect Gottfried Semper, known for his studies about the polychromy of ancient Greek architecture. Jones stood out with his works in Paris at the Sèvres Museum and in Egypt (Cairo). In his book *Grammar of Ornament* (1856) he

described the peculiar elements of his style, characterized by a synthesis between Western and Arab culture, by the common denominator of geometry, by the hope for the introduction of machines for production, by the overcoming of eclecticism and of revivalism, by abstraction in ornament, by plane modeling, by chromolithography, by the theory of color of the chemist George Field. In the propositions about colour, starting from n. 14 and in particular in n. 17, Owen Jones cites the *Field's chromatic equivalents*, while in 1851 he used the chemist's theories about the harmony of colours of the decoration of Crystal Palace in London. In the book there also is a history of decoration in the various eras and civilizations, from the Egyptian to the Elizabethan one, from the Chinese to the Italian one. Jones's ideal path starts from Egyptian ornamentation, where the imitation of floral forms is dictated by symbolic and religious needs (for example the Lotus represents the emblem of the solar cult), through the *"Mimesis of the natural element as an initial impulse for a vast repertoire of forms, developed on the basis of abstraction procedures combining geometry, rhythm, symbols and metaphors in a path of distancing from nature"* (Riegl, 1963).

2.1.1 Colour, History and Culture: Egyptian decoration

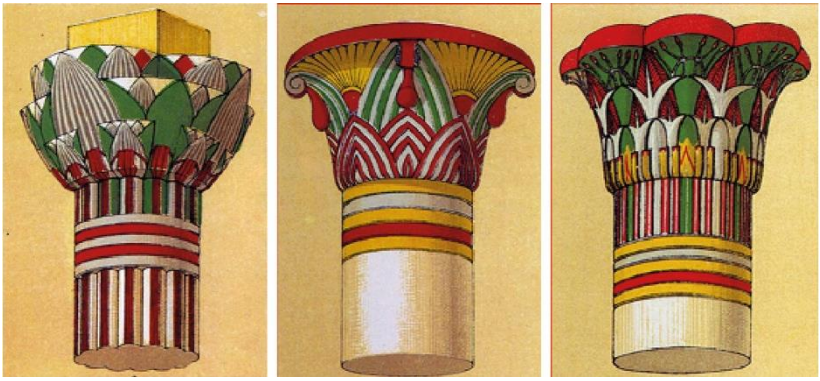


Figure 1. Three capitals, examples of sculpted architectural ornamentation (Ferrari, 1925).

Figure 2. Examples of painted architectural ornamentation (Ferrari, 1925).

The Egyptian ornament has an infinite variety of capitals, albeit in the context of the two main types prevalently: lotiform and bell-shaped. Figure 1 represents borders on the walls of a grave in Benihassan (Jones, 1986, Plate VIII). Red, blue and yellow are the basis of the Egyptian palette, with white and black for the outlines; green, especially used for strips and parts of the flower, is often replaced with blue. In these borders we can see a simple alignment of flowers and buds, with no connection between them. The front lotus flower with a rosette is alternated with a flower silhouette, drawn as a bell. In the upper band, a simple combination of lotus leaves, whose shape is similar to a shovel; in the center, the lotus flower silhouette is drawn according to the most common type, with pointed leaves and the lateral ones tilted outwards.

2.1.2 Colour, History and Culture: the Greek temples

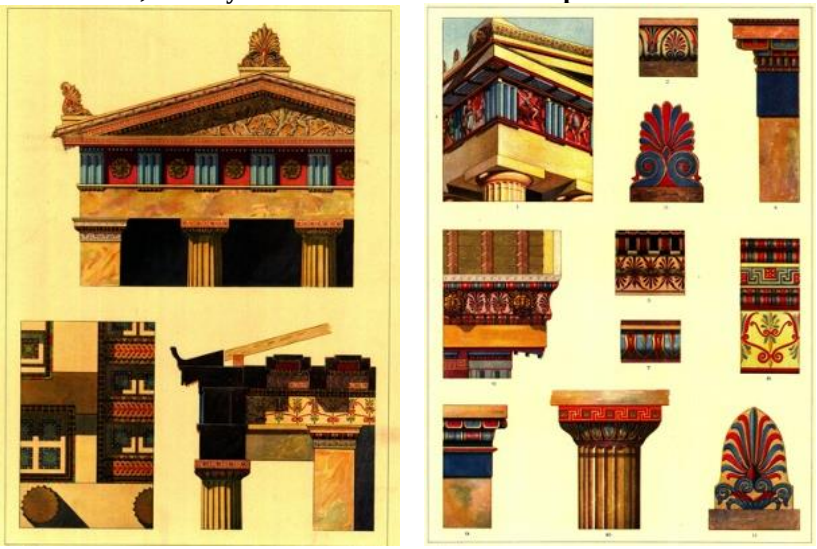


Figure 3. On the left: Reconstruction of a Doric temple; on the right: 1,2,3,4 Details of polychrome decoration of the Parthenon, Athens; 5 Terracotta from Selinunte; 6,8 Trabeation and frame of the Temple of the Acropolis in Selinunte; 7 Shell of the Temple of Theseus in Athens; 9 Capital of Ante from the temple of Temi in Rhamnus; 10 Type of Doric capital; 11 Antefix of Figalia (Ferrari, 1925).

Figure 4. On the left: Jakob Ignaz Hittorff, the temple of Empedocles (temple B) in Selinunte, pencil and coloured watercolour (s.d.) (Hittorff, 1987). On the right: Philipp Hackert, drawing of the Temple of Segesta, 1777, (Knight, 1986).

2.1.3 Egyptian and Greek temples as an emblematic image of the Culture of Colour

In his *Journey to Italy*, on April 20th 1787, Goethe wrote in Segesta, together with strong notes of landscape colour: «Myriads of butterflies flutter around the flowering cardoons...» concluding that «the traveller leaves after having paid great attention to the monument and the colours of the temple, but little to the theatre and the city» (*Journey to Italy*, 2004, pp. 275-276). Ten years before Goethe, Richard Payne Knight spent three months in Sicily with Philipp Hackert - a favorite painter of the Bourbon Court since 1768 – linked to Goethe (who, among other things, acquired part of his 'Sicilian' drawings) during his years in Neaples. Particularly significant is his pencil watercolour drawing of the temple of Segesta (fig. 4 on the right), an example of his *Prospectmalerei*, among the realistic views of classical places (Krönig, 1987). In 1851 the Franco-German architect Jakob Ignaz Hittorff, whose work is known in Sicily, published his *Architecture polichrôme chez les Grecs*, 'forcing' his uncertain results to prove his theory of a complex polychromy in Greek temples. It is a foundational phase, from 'coloured' sculpture to 'coloured' architecture, which in extreme synthesis establishes the cultural relationship from Quatremère to Hittorff. But already in December 1823, Hittorff, after the Palermo stop of his trip to Italy (when with Samuel Angel he saw the 'coloured' metopes recently discovered in Selinunte in the collection of the University (fig. 4 on the left)), wrote the 'polychromy letter-manifesto' to Baron Gérard da Agrigento, about the 'coloured' works of the architects from Agrigento, published in *Annali dell'Instituto di Corrispondenza Archeologica* from 1830 (II, 1830, 263-284), and a preliminary version of the famous *Restitution du Temple d'Empedocle à Sélinonte ou l'Architecture polychrome chez les Grecs* from 1851 in the title of which (*De l'Architecture polychromme chez les Grecs, ou restitutition complète du temple d'Empédocles dans l'Acropolis de Sélinunte*).

On July 24th 1824, *Jakob* presented at the *Académie* some drawings of ancient temples and monuments in Sicily (in *Hittorff* 1987, 336-340) describing the coloured stuccos found among the ruins of the temples of Selinunte and Agrigento, as proof of the practice adopted by the ancients to colour their sculptures and their buildings, together with the proofs of the monuments of Athens, Aegina and Figalia, with the colours of the architecture of ancient Sicily seen and restored by Hittorff in all their splendor: «...the most beautiful red, blue, green and the color of gold ... almost exclusively used by Sicilians…». After the studies by the English James Stewart and Nicholas Revett in their crucial expedition in 1750-55,

there were several archaeologists who set out in the second half of the Eighteenth century to discover the monuments of ancient Greece: starting from the Parthenon, it can be theorized that the colouring of the external surfaces should also be extended to the structures placed above the trabeation and especially in the tympanum. Meanwhile, in 1787 in Andreas Reims' study about the origin of the ancient arts of drawing (whose apogee was identified in the "*polychromenmalerei*"), the concept of "polychromy" was coined, destined to meet considerable success in the subsequent debate, also in relation to ancient architecture and sculpture, partly thanks to the theoretical systematization by Antoine Ch. Quatrèmere de Quincy (Netti, 2019). As Hittorff clearly said in his fundamental treatise about polychrome architecture (1830) among the Greeks: "we wanted to make people appreciate the considerable resources that Herculaneum and Pompeii can offer for the collection of the necessary materials for the restitution of the entire system of the monumental architecture of the Greeks; once we are sure of this filiation, all we have to do is to go back little by little to the source of the motifs guiding the artists of the Greek colonies to rediscover their matrices and the typology of the monuments of the Motherland". In addition, in Pompeii there was the possibility of comparison the chromatic examples from ancient sources and from Vitruvius' treatise, especially with the evidence of archaeological comparison. A fortuitous event had been the discovery (not far from Pansa's house) of a shop of a colour seller, with many material finds.
This essay of mine - programmatically - intends to assume, as the "strong root" of the Culture of Colour, the "chromatic images" linked to this historical moment and its protagonists.

2.2 Interdiscipline, multidiscipline, transdiscipline of colour

In the phenomenology of the image, chromatic processes are born and live between visible and invisible, perception and cognition, material and immaterial: in architecture, city landscape, but also Industrial Design project, including product, graphics and more. Up to eco-sustainable, and beyond.
But, even in more recent times, the "ray of Iris" continues its journey: from History and Theories it is possible to keep on reasoning in order to arrive - through knowledge - at the "rules", criteria and methods for analysis and project. If we refer to the first half of the Twentieth century, we can take as an example three foundational experiences in the "chromatic way of thinking" between perception and cognition, visible and invisible, material and immaterial: Bruno Taut, De Stijl, Le Corbusier, up to the present day

with Steven Holl, Sauerbruch, Hutton and others, in a review of images collected by Alessandro Pisani in his degree thesis (Pisani, 2010).

2.2.1 Art and architecture between social commitment and experimentation

Bruno Taut (plate 2)

Bruno Taut's architectural activity developed in a period in which the theme of colour applied to buildings was the subject of numerous debates, including the social ones. This component (also economic, among other things) represented the means to stimulate perception, emotions and imagination and if applied to architecture it arise a profound power, capable of awakening interactive reactions. On September 18th 1919, the "Appeal to coloured architecture" was published by the magazine *Die Bawelt*, supported not only by young architects, linked to figures as Taut and Gropius, but also by leading exponents of the artistic field such as Peter Behrens, Hans Pöelzig, Adolf Behne and Bruno Möhring. The sensitivity towards coloured architecture also got to Bruno from his studies on colour at the beginning of his career, in particular from the desire to restore the polychrome aspect of the cities like the Medieval ones. The trips to Kowno (Russia) and Constantinople (1916 - 1917) had been decisive too, places with different culture but united by an intense use of colour in architecture. Finally, it is possible to observe how in the Siedlungs made in the same period, we can find the same ranges used by Taut in his pictorial compositions.

De Stijl: the neoplasticism by Gerrit Thomas Rietveld and Teo Van Doesburg (plate 3)

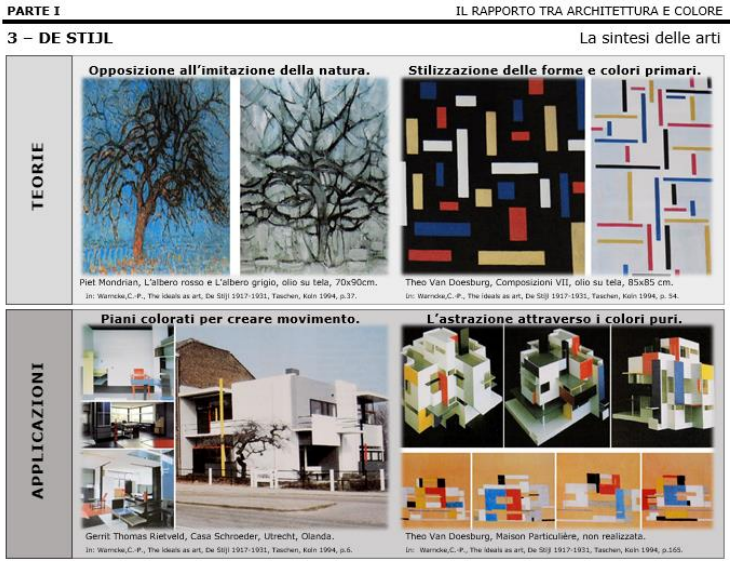
In the same period, from Bauhaus to Constructivism, up to Neoplasticism - passing through De Stijl - Piet Mondrian, Theo van Doesburg, Bart van der Leck, Gerrit Rietveld, Georges Vantongerloo and Vilmos Huszár formulated their individual opinions about colour. Rietveld conceived colour in an ancillary (almost supportive) terms in any composition, but with an essential function in individual perception, reinforced by a captative role, especially of the primaries. And it is exactly him who created the Schroeder house in Utrecht in 1924, an authentic architectural emblem of the movement: here, the decomposition of space into levels is underlined by the use of pure and saturated primary colours on the same surfaces. Rietveld created a perfect synthesis of the theories of movement with a game of rectangles and "pure" tones, where the furnishing objects and the architectural structure embrace the same constructive principles. The house

develops on two levels, based on four fundamental elements, borrowed from theories derived from the Bauhaus: "pure" primary elements determining the shape and the structure of the house; Flat gray or white elements aiming at defining the relationship between inside and outside; Linear, vertical and horizontal elements - architraves, pillars, drainpipes - yellow, red and blue combined with white, gray and black; Functional elements - windows, doors, railings, external staircase and skylight - in black and white. Conversely, Huszár and Van Doesburg adhered to Wilhelm Ostwald's theories. Van Doesburg created the *Color Construction* in 1922: it is a work of which Zevi wrote: "The wall partitions are no longer silent, they have no weight, they can be broken up into smaller rectangles chromatically distinguished by the basic colours". These are the results of a rigorous formal and functional research that Van Doesburg conducted with colleagues such as Cor van Eesteren and of which we can recall what he had written in 1923: "we examined the laws of colour in space and duration, and we found that the balanced relationships of these two elements ultimately lead to an expressive plasticity".

Le Corbusier (plate 1)
By Le Corbusier, the "chromatic way fo thinking" is an universal element: "Here is a fundamental truth: man needs colours. Colour is the immediate, spontaneous expression of life" (Tentori, De Simone, 1988, p. 211). In his conception of colour we can substantially identify three periods: the one between 1905 and 1932 in which, after his initial studies, we perceive the clear influence of "purist" theories (with Amedée Ozenfant), of the trips to Southern Europe, in which colour has a natural connotation, a memory of the Mediterranean; the one following the first draft of the *Claviers Salubra* (1931), conceived as a harmonic series organized with a "scientific method", like the keys of a piano (Colli, 1981, pp. 8-12). It is a phase that reached up to the end of the Second World War, in which new concepts took over allowing colour to take on an autonomous value; the one following 1951, where the influence of the trips to India can be found in his architecture with a consequent use of colour as "form and light".


PARTE I
IL RAPPORTO TRA ARCHITETTURA E COLORE
1 - LE CORBUSIER
La sperimentazione cromatica
TEORIE
Colore per definire lo spazio.
Colori necessari per operare.
Charles E. Jeanneret, La bouteille de vin orange, olio su tela, 60x73cm.
In: Museo Corner Venezia, Le Corbusier pittore e scultore, Mondadori, Milano 1998, p. 59.
Le Corbusier, Mascherine e campioni di colore della collezione Salubra.
In: Colli, L. M., Le Corbusier e il colore: i Claviers Salubra, in Storia dell'arte, n. 43, La Nuova Italia, Firenze 1981, p. 29.
APPLICAZIONI
La luce rivela il colore.
Percezione attraverso il supporto materico.
Le Corbusier, Notre-Dame du Haut, Ronchamp, Francia.
In: Brooks, A., Le Corbusier 1887-1965, Electa, Milano 1987, p. 130.
Le Corbusier, Convento de La Tourette, Lione, Francia.
In: Brooks, A., Le Corbusier 1887-1965, Electa, Milano 1987, p. 141.


PARTE I
IL RAPPORTO TRA ARCHITETTURA E COLORE
2 – BRUNO TAUT
Il colore consapevole
TEORIE
Un approccio istintivo ed espressionista.
Capace di creare un'identità, a bassi costi.
Bruno Taut, Città giardino, Falkenberg, Germania.
In: Nerdinger W., Bruno Taut: 1882-1938, Electa, Milano 2000, p.281.
Bruno Taut, Città di Magdeburgo, Germania.
In: Nerdinger W., Bruno Taut: 1882-1938, Electa, Milano 2000, p. 341.
APPLICAZIONI
All'esterno in rapporto con l'ambiente.
All'interno in rapporto con l'uomo.
Bruno Taut, Casa Taut, Dahlewitz, Germania.
In: Nerdinger W., Bruno Taut: 1882-1938, Electa, Milano 2000, p. 365.
Bruno Taut, Casa Taut, Dahlewitz, Germania.
In: Nerdinger W., Bruno Taut: 1882-1938, Electa, Milano 2000, p. 367.



2.2.2 Material and immaterial: light and illusory "chromatic pixels"

Steven Holl (plate 4)

The examples bring us back to the gistest actuality. He was defined as a poet of architecture, in Steven Hall's works it is possible to find the concepts of space, time, movement, but also of sensations, light, transparency, matter, images (including geometric ones), shadows and colours. This inspired vision confronts modern architecture, based on technology, represented by contrasting the uniqueness of a place with the ever growing trend towards globalization. The basis from which this conception of architecture arose also matured from phenomenology, particularly from Merleau-Ponty's way of thinking. From this point of view, it is no longer just the mind that is the centre of perception in the architectural field, but the body which (active from the point of view of knowledge and physical experience) becomes the most effective means to reach the perception of space in all its dimensions, material and not (Mari, 2002).

Sauerbruch & Hutton (plate 5)

The coloured textures by Sauerbruch and Hutton seem to be created using pixels placed in and on the architectures, to arrive to a polychrome as a distinctive sign dialogueing with the colour in the surrounding context.

PARTE I IL RAPPORTO TRA ARCHITETTURA E COLORE

4 – STEVEN HOLL Il colore nel progetto

TEORIE

Progettazione del colore come idea base.

Steven Holl, Disegno assonometrico Simmons Hall, Cambridge, Usa.
In: Frampton, K., Steven Holl Architetto, Mondadori Electa S.p.a., Milano 2002, p.116.

Luce e colore modificano la percezione.

Steven Holl, Uffici per la D.E. Shaw & Company, New York, Usa.
In: Frampton, K., Steven Holl Architetto, Mondadori Electa S.p.a., Milano 2002, p.24.

APPLICAZIONI

La luce si manifesta attraverso i materiali.

Steven Holl, Università di New York, New York, Usa.
In: Frampton, K., Steven Holl Architetto, Mondadori Electa S.p.a., Milano 2002, p. 83.

Il colore si manifesta attraverso la luce.

Steven Holl, Cappella di Sant'Ignazio, Seattle, Usa.
In: Frampton, K., Steven Holl Architetto, Mondadori Electa S.p.a., Milano 2002, p.35.

PARTE I IL RAPPORTO TRA ARCHITETTURA E COLORE

5 – SAUERBRUCH & HUTTON La policromia come segno distintivo

TEORIE

Un approccio basato sull'esperienza visiva.

M. Sauerbruch, L. Hutton, Photonic centre, Berlino, Germania.
In: Sauerbruch, M., Hutton, L., Sauerbruch & Hutton. Archive, Lars Mueller Publishers, Baden 2006, p.p. 122-125.

Cromatismo determinato dal contesto.

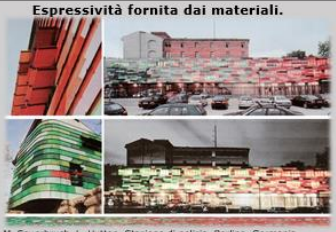
M. Sauerbruch, L. Hutton, Sedus Warehouse, Dogern, Germania
In: Sauerbruch, M., Hutton, L., Sauerbruch & Hutton. Archive, Lars Mueller Publishers, Baden 2006, p.p. 176-178.

APPLICAZIONI

Architetture pensate per distinguersi.

M. Sauerbruch, L. Hutton, Experimental Factory, Magdeburgo, Germania.
In: Sauerbruch, M., Hutton, L., Sauerbruch & Hutton. Archive, Lars Mueller Publishers, Baden 2006, p.p. 166-169.

Espressività fornita dai materiali.



M. Sauerbruch, L. Hutton, Stazione di polizia, Berlino, Germania.
In: Sauerbruch, M., Hutton, L., Sauerbruch & Hutton. Archive, Lars Mueller Publishers, Baden 2006, p.p. 241-245.

2.2.3 Ethics and sustainability in the chromatic project

Els Colors kindergarten (plate 1B)

In the recent field of sustainable technologies, the colour project sees the use of high-performance transparent materials to achieve greater psychophysical well-being: this is what happens in the Els Colors kindergarten in Barcelona. By using laminated glass with coloured film inside (or also Agbar tower).

Water Cube (plate 7)

The new architectures live of new tones linked to the innovative eco-sustainable technological culture. Water Cube stadium, for example, has become an icon of this way of designing and building, while respecting the environment.

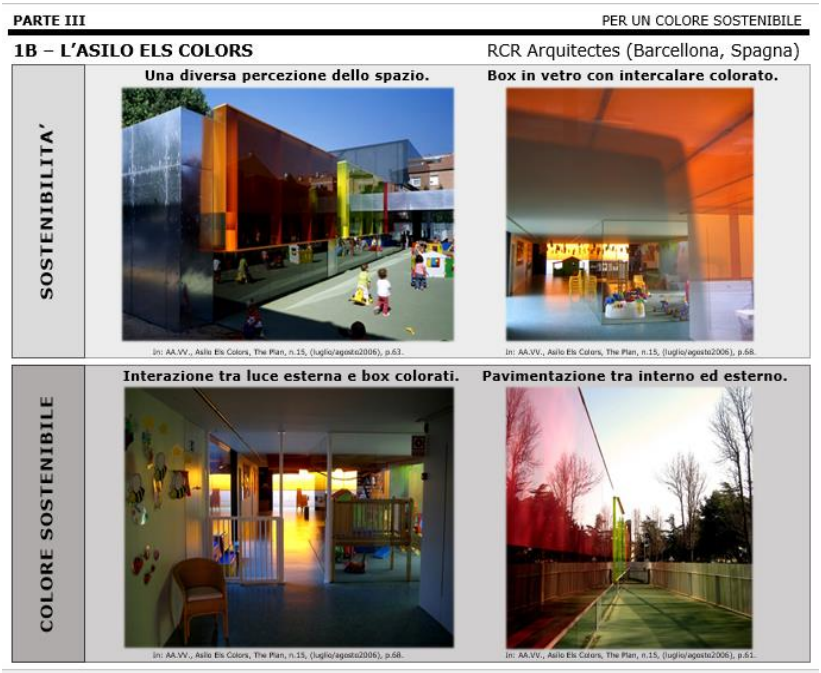


Figure 5. Tables taken from the graduation thesis by Alessandro Pisani (Pisani, 2010).

2.2.4 Andy Warhol and references to the theories of colour

During the years of study at the Carnegy Intistute of Technology in Pittsburg, Warhol came into contact with the studies and the researches by eminent scholars and theorists of colour. He was certainly fascinated, so much so that he cited them in his diaries, by Goethe's "spectrum and color wheel" model, by Kandinskj, by Otto Runge's model. But the psychological aspect linked to the colour that Andy Warhol sources for the creation of his works often refers to the psychological test developed by Luscher: 1 portrait of the writer made by Andy Warhol in 1982.

Figure 6. Andy Warhol, Goethe, 1982, print on canvas. This work is inspired by Tischbein's painting, the most famous depiction of the poet: "Goethe in the Roman countryside".

3. Colour at the roots of visual language, from tradition to contemporary

The communicative and cognitive process of Man can be in part assimilated to the continuous flow of stimulus that - through the sense organs and therefore also the physiological apparatus of vision - reach the brain, allowing the construction of images and information, through a perceptual/ interpretative process in continuous transformation. Within these dynamics, colour plays a continuous, constant, widespread and articulated role. In the

infinite ways in which it is declined in our life, we can recall a couple of cases: nature and religion.
In the succession of the seasons, for example, nature speaks about its mutations through colour, just as the patternings of animals declare their type of life: exhibition and appeal, defense and aggression, mimicry and survival.
On the other hand, in the field of faith, each religion thrives on its own codifications and symbolisms, to spread, share and confirm its own creed.
The universe collecting and uniting all the aspects we have mentioned is communication: and in each of them, colour lives and plays its role as a sign, symbol, complex and complete language.
The main methods of the education to the vision mentioned in this essay include the research experiences by Wassily Kandinsky, Johannes Itten, László Moholy-Nagy and Paul Klee at the Bauhaus in Weimar; by György Kepes at the New Bauhaus in Chicago; by Josef Albers at Yale University School of Design; by Max Bill at the Hochschule für Gestaltung in Ulm; by Bruno Munari at the Carpenter Centre in Cambridge; by Lois Swirnoff at the Department of Art, Design and History in Los Angeles.

3.1 The communication process and its rules. Color as a sign

Since it is necessary, here, to adopt a great simplification, we can affirm that the great tendency is to divide the modes of communication into three large groups: verbal, paraverbal and non-verbal. In the verbal, the logical and analogical content prevails, in which the content is important, the type of language adopted and the strengths chosen in the speech. In the second type, the mode of transmission of the message prevails: that is, of the content: therefore the mode and the "register", the level of communication, including the tone of the voice and pauses, or other elements of completion, is important. Finally, in the third case, body language, facial expression, postures and gestures, clothing are used. Mimicry, body movements, physical relationship with the interlocutor or audience are used. In reality, there are infinite ways of communicating: even silence is a form of communication. In particular, in this case, we will privilege all the visual modes in the Culture of Vision, the domain of choice for the birth and origin of color, its uses, its relationship with communication. But the fundamental aspect (together with all the technical-scientific and psychological aspects, of which color is an active subject and a passive object) is what we can define "Chromatic Culture", including the particular phenomena of Semiotics of vision and the related rhetoric of vision. Systems, modes, elements and relationships, inherent to these latter

expressive manifestations, are not yet fully clarified, dealt with specialist, controlled in the various processes of analysis and chromatic project, in the various areas and with the related purposes. Among the many creative, persuasive, functional uses, remember for example those for safety and wayfindng. And again, just think of the yellow, red, orange areas that Covid-19 has introduced us to.

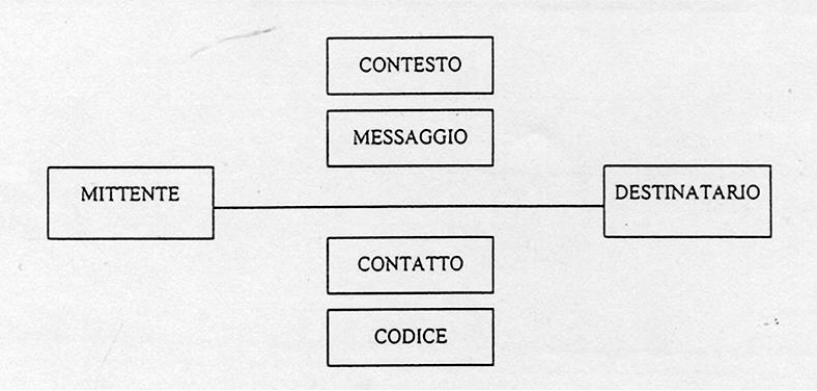


Figure 7. Roman Jakobson's communication model (Caprettini, 1992, p. 24).

Figure 5 therefore distinguishes various constitutive elements:
1) The SENDER: the person responsible of initiating the communication, producing (encoding) and transmitting the message, directing it towards the consignee.
2) The CONSIGNEE: the person to whom the message is addressed and who must receive and interpret it (decoding).
3) The MESSAGE: information composed by SIGNS and SENSES structured according to particular rules of one or more codes and transmitted through a certain means or channel.
4) The CODE: set made up by conventional rules socially recognized, which allows the production and interpretation of a message by ensuring it a consistent structure: an elementary example is given by conventions in religious services or (more simply) by the Highway Code.
Each language (for example Italian or English) is a code with the help of which whoever produces or receives a message can attribute a meaning to it, appropriately combining the signals and their senses (or contact). But there are also visual codes, as shown in the illustration in fig. 9, Mona Lisa,

with the various transformations of meaning, induced by the different formal languages, in different representative styles.
5) The CHANNEL: means, instrument, physical apparatus used to activate and maintain communication, to transmit and receive the message;
6) The CONTEXT: the complexity of the conditions in which the communication takes place, and more precisely the situation, known or assumed, which unites sender and consignee even partially. It includes the "objects" to which the message refers and attributes a meaning, that is to say its *referents.*
To each of these constitutive factors, which still remain interdependent from each other, corresponds one of the following 4 functions:
1) Emotional: the importance assumed by the *sender* in the message and by the attitude of the subject towards what it is being expressed (such as "emoticons" in SMS).
2) Conative, or "force function": it occurs when there is the sender's intention to change or to directly involve the *consegnee*'s behavior, stimulating the response. It is therefore the fundamental function.
3) Poetics (stylistic), it could precisely be referred to as self-reflective: with it we intend to strengthen the expressiveness of the *message* which first presents itself and its internal configuration, focusing on factors of coherence. It is the main of the poetic, and more generally *rhetorical*, message.
4) Metalinguistics: it takes place when the message talks about itself, in particular when it describes or specifies the *code* involved in the communication; or when it indicates, by its own means, how it works.
A possible definition of communication could be the following one: the set of "signs" that are exchanged between two people to:

- Inform - be informed.
- Influence the interlocutor's attitudes and decision-making orientations and vice versa: therefore persuade.
- Process or develop the analysis of a situation in logical terms.
- Explain, define, modify the quality of the relationship with others, to also promote greater participation.
- Involve/interact.
- Entertain, interest, educate.

Communication must be: Quick, Direct, Effective. This also applies to Visual Communication, even when it uses colour, which indeed helps in all these functions. In the field of sales, this is summarized with the "example of the 5S: " Stop, Show, Seduce, Satisfy, Sell".

In psycho-sensory performance, there are 4 different levels of visual attention: perceive, see, look, observe, linked to two basic factors: the attention of the perceiver, and the duration of the optical stimulus.
Documenting, studying, reflecting are essential moments of an indispensable practice for an effective Visual Communication, in analysis and in project.

3.2 Colour in the classification of the sign

But, if everything is communication, how is the message "real" in this process? How do we transmit ideas, thoughts, feelings, sensations that we cannot convey except through the senses? How can we make them "real and sensitive"? Through the "sign": an entity formed by two parts: "meaning" and "signifier". The meaning is the content of the message, that is the insensitive (immaterial) part that cannot be communicated through the senses) that is transmitted and conveyed by a sensitive and "material" part; the signifier is the sensitive (material) part.
The signifier can be understood as the bearer of a message: if the communicator does not give it a value (i.e. a meaning), money (i.e. the signifier) is useless: it cannot be exchanged, and therefore has no reason to exist. The coin will have a function only if we give it a value (that is a meaning), which expresses something (agreed between the issuer and the receiver, therefore decodable) in our case :<< $ 1 >> (fig. 8).

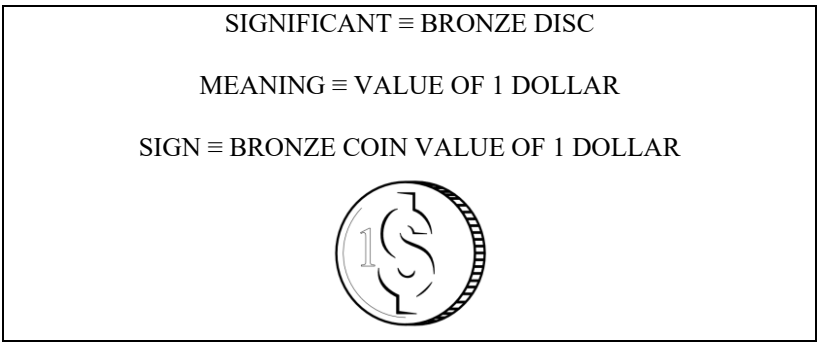


Figure 8. An example of classification of the sign.

Starting from the sign, through a long and sometimes complex cultural and / or "popular" path, we arrive at the "symbol"; think, for example, of some highly significant forms.

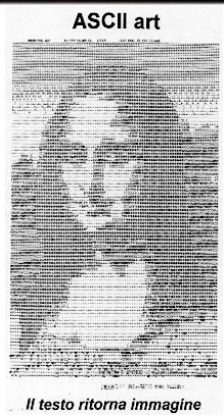


Figure 9. The meaning that can be attributed to a work also varies - metalinguistically - depending on the codes and the formal language expressing it.

3.2.1 Classification of the sign

One of the areas of greatest interest in the study of signs is their classification. Several criteria can be used, and in fact the existing types are varied: the signs are distinguished, according to their origin, in natural (smoke is the sign of fire) and artificial (the red blade raised at the top is a sign of the order of stop) according to the connection that the signifier has with the meaning, in signs proper (without diagnostic and prognostic value) and symptoms (the red spots on the face are a symptom of measles) etc ... in the same way the distinction between sign and symbol , where the symbol is

an arbitrary signifier, closely linked to the deepest collective unconscious, which contains in itself a part of meaning: black is a symbol of mourning because, in a period of mourning, the soul is gloomy. Naturally, however, the whole series of distinctions that the classification of signs entails is a complicated and extremely fluctuating question.
Another useful distinction is that between signs of different extension. A single word is a sign, but a sentence is also a sign of a more complex structure, and an extended text (for example an entire literary work) will be a macrosign of even more complicated organization. The same gradation can be had with other semiotic domains: the gesture of an arm in a work by Titian can be a simple sign, the person of which the arm is a part can be a more complex sign, and the whole representation is a further RED sign. For each of these levels it is possible to identify a differentiation of meanings and codes (ie two different iconic languages) for the same object and the task of the study of the sign is to discover how these levels of meaning are compatible with each other.
Here some synthetic examples of lexical conventions:
Signify: act of meaning;
Figuration: act of meaning through means of figures;
Sememe: the smallest semic unit provided of a meaning;
Phoneme: the smallest semic unit provided of a phonic sense;
Grapheme: the smallest semic unit provided of a graphic sense (distinctive of a graphic system);
Iconema: the smallest semic unit provided of an iconic sense (linked to the figures);
Morpheme: the smallest semic unit provided of a formal sense (minimal linguistic unit, bearer of meaning, which cannot be further subdivided without altering its meaning);
Chroneme: the smallest semic unit characterized by colour.

SEGNI NATURALI (1° categoria)
Indipendenti da volontà di comunicare
Sono caratterizzati da:

Vicinanza naturale.	INDICI
Implicazione logica (inferenza) derivata dall'osservazione di leggi e processi della natura, e quindi, non razionali e controllabili.	SINTOMI TRACCE

SEGNI NON NATURALI O DI EQUIVALENZA (2° categoria)
Nascono dall'intenzione di comunicar

Possono dare informazioni, prescrizioni, divieti

	LETTERE, PAROLE, NUMERI,INSEGNE, LINGUAGGI VERBALI, SEGNALI STRADALI, TELEGRAFICI, MARCHI,ETICHETTE, EMBLEMI,BANDIERINE

SEGNI ANALOGICI O ICONICI (3° categoria)
Dati da similitudine formale e/o rapporto culturale e sociale
Presuppongono un'attribuzione di valore soggettivo e/o collettivo, e quindi un'interpretazione critica

ICONA	DIAGRAMMA	Formule logiche, matematiche, chimiche, disegno,pittogrammi
	IMMAGINE	
	METAFORA	
SIMBOLO	NATURALE	
	ANTROPOLOGICO	
	OGGETTO-SIMBOLO	

Figure 10. Classification of the sign: the example of the mimosa.

In the different meaning that a sign can assume (if read as belonging to the three different categories now illustrated) we can take the example of the mimosa. As a natural sign of the first category, the mimosa can indicate the blossoming of nature in spring, but it happens automatically, without anyone intending to communicate this message. As a second category sign, on the other hand, we can assume the reproduction of the same flower, placed on the label of a mimosa perfume: in this case its image is equivalent to the content expressed, therefore in the presence of a desire to communicate, but without adding any additional messages or meanings. The mimosa branch exchanged during the International Women Day, on the other hand, has a strong symbolic and celebratory value, and therefore must be taken as a third category sign, as an analogical or iconic sign (fig. 10). And, in the three different communicative functions performed by the same element (mimosa), colour (yellow in this case) takes on three different roles, according to a differentiated "chromatic image".
This is where Semiotics and Semiology come in.
A definition of Semiotics: "it is the science having as its object the comparative study of signs, of the structure and functioning of all the processes in which the same signs are involved". Two orientations relating to semiotic analysis (that is signs) are recognizable, closely linked to each other:
1. Semiotics as a classification of signs;
2. Semiotics as an investigation of communicative processes.

The object of this discipline is, in fact, both the identification of systems, composed by units (SIGNS) and relationships within them, and collaterally the explanation of the concrete processes or uses (Acts of Communication) in which the signs find their expressions, also practical (Caprettini, 1997).
A definition of /Semantics/ "Science of meanings".
Codes can be:

1. Syntactic (based on the formal/structural relationships of each sign with the other);
2. Semantic (based on signs/universe relationships of meanings);
3. Pragmatic (based on the relationships between signs and subjects who use them).

As an example of a rhetorical icon, we refer to the sculpture Estasi di Santa Teresa, by Bernini (fig. 49).

3.3 Colour to convince: Liberty and Futurist graphics

Figure 11. Left: Alphonse Mucha, *Rêverie*, 1898; right: Alphonse Mucha, Cover of *L'illustré Soleil du Dimanche*, 1897.

To talk about the history of the Italian manifesto we have to make a leap in time, moving to Paris. It was in fact in the French capital that the artist Jules Chéret sensed the potential of a new printing technique, lithography: it was the year 1860. Invented in the late eighteenth century in Bohemia by Alois Senefelder, this technique soon proved to be the most important invention in the field, second only to Gutenberg's hope. Despite being less

revolutionary than the movable type press, stone lithography was equally innovative: for the first time, artists could work with traditional techniques, obtaining prints of such perfection in details and shades, that they could compete with the original painting. In just a few years, Chéret's lithographic press at the Imprimerie Chaix managed to produce multi-colored images or "chromolithographies", using different stone matrices, one for each color. This process made it possible to print works with large colored areas, thus paving the way for the creation of the advertising poster. Chéret's posters had the same impact in Paris as cinema in the 1930s and television in the 1950 s. try to imagine the scene: one fine day, on the gray walls of a metropolis illuminated in the dim light of gas lamps and suffocated by the smoke of coal stoves, large brightly colored posters appear, a carousel of danseuses between feathers and rhinestones, Folies Bergéres and Mulin Rouge . It was a shock: the city had turned into an outdoor art gallery. "

Figure 12. Alphonse Mucha, Package for Lefévre-Utile Gaufrettes Pralinées 1900-02, mixed technique.

«The poster created by Mucha to advertise *Flirt cookies* uses the tripartite composition. The name of the biscuits appears at the bottom of the illustration and that of the company at the top. In the center, two young people from high society, dressed to go to the theater, are standing next to

each other. He looks at her while she, modestly, looks down. Mucha adds flowers and leaves to decorate an image behind them».
«On the cover of *L'illustré Soleil du Dimanche* the usual female figure appears in the typical Mucha style: her head is surrounded by a wreath of flowers and long hair floating in the wind, recalling Botticelli's Birth of Venus (1478) (1445-1510). The lithography superimposes a natural world of trees, flowers and butterflies on the city in the background. The image is the embodiment of relaxation".

Figure 13. Left: Alphonse Mucha, *Poster of Cassan Files*, 1897; in the centre: Jan Misset, *Droste chocolate box*, 1904; right: Alphonse Mucha, *Bleu Deschamps*, 1897.

«In 1897 the French typography Cassan Files commissioned Mucha from the poster. The company had existed for 25 years; to symbolize its activity and promote its name, the artist inserted the printing press, some prints and an allegorical male figure into the illustration. The man turns the wheel of the press and simultaneously leans forward to listen to a young woman sitting in the foreground. Half-naked and with long tousled blond copper hair, the woman gives a timeless dimension to the image. The prints that fall from her knees are variations of her portrait. With skilful use of color, Mucha creates a rich motif. »
«Bleu Deschamps, 1897 makes extensive use of blue, which is not often seen in Mucha's posters. The product was a laundry additive. Mucha

represents a girl in a simple white dress, standing in front of a tub, who lifts a sheet and looks with satisfaction at the result obtained with Blue Deschamps**».**

Figure 14. Left: Leonetto Cappiello, *Original manifesto Cachou Lajaunie*, 1949 (www.affice-passion.com); right: Marcello Dudovich, 1918, G. Ricordi, Milano, 1878-1962 (www.teladoiofirenze.it).

"The art of the future will be powerfully advertising"! So wrote Fortunato Depero in the 1931 manifesto Futurism and advertising art (see the exhibition From the futurist dream to the advertising sign, at the Lucca center Contemporary, curated by Maurizio scudiero and Maurizio Vanni).With San Pellegrino products, the Strega liqueur, the tamarind Erba, the Unica chocolate, and above all the Campari drinks, without forgetting the editorial collaborations, such as for the Illustrated Magazine del Popolo d'Italia and American periodicals Vogue and Vanity Fair.

Figure 15. Left: Lorenzo Ottaviani, *Travel Italia. L'età dell'oro del manifesto turistico*; right: Lorenzo Ottaviani, *Le Lac Majeur*, 1925 ca, Mario Borgoni, 64x101,5 cm, lithography, ENIT, FS, Richter & C., Napoli.

Figure 16. Fortunato Depero, *Squisito al selz 1926*, collage on cardboard, 71x96,5, Milano, Galleria Arte Centro. Contrast of pure colours and Goethe's harmonic diametrical oppositions: green/red, yellow/purple.

Figure 17. Left: Fortunato Depero, *Grandi marche 1934-1935*, tempera on paper, 63x48 cm, Valenza, private collection; right: Fortunato Depero, *mandorlato Vido 1924*, litografia a colori, 140x100 cm, New York, Massimo&Sonia Cirulli archivio.

Figure 18. Left: Fortunato Depero, *Pellicani 1924-1932*, inlay of coloured fabrics, 173x130 cm, Trento, private collection; right: Fortunato Depero, *Fonografo giocondo*, advertising sketch 1924-1925, collage, 54x43 cm, Genoa, private collection.

Figure 19. Fortunato Depero, *Venus Pencils*, 1929, collage on cardboard, 42x61 cm, Milano, Galleria Arte Centro.

Figure 20. Among the most important contemporary graphic designers, Glaser became famous for the *I Love New York* logo (1976) and his poster of Bob Dylan (1966), a pop icon of the "youth of the 60s", the Hippies of America, chracterized by very colourful images - and with outlines often deformed almost to the point of abstraction.

4. The future from history: comparative and applied chromatic theories, from analysis to design

For the analysis and/or the colour project, the current situation seems to confirm two trends, not always easily reconcilable: the first one aimed at deepening more specialized and selective disciplinary methodologies; the second one aimed at integrating, comparing and synthesizing different but complementary method approaches. A concept now seems to be widely shared: from theoretical contributions to individual applications one cannot (must not) speak of "colour" in generalist and superficial terms.

4.1 A "comparative mosaic" from 'Policroma'. Protagonists and roles of colour theories: scientific-disciplinary, symbolic-artistic, technical-applicative and other purposes and aspects. Goethe, Runge, Itten, and more...

From this point of view, for example on a scientific-speculative level, it is clear that we can no longer talk (as it unfortunately still happens) about "Theory of colour" or "Model of colour" as if it was an entity or an amorphous reality, "neutral" and undifferentiated, deprived of a specific placement in highly specialized cultures. In this sense, a methodological premise must be reiterated: the concept of "Colour Theory" (when not better specified) appears meaningless, since it is widely established by now that there are multiple compared and comparable theories, pertinent to different disciplinary approaches, diversified, well characterized and identifiable through specific and univocal parameters and criteria (Marotta, 1999): it is therefore sufficient to - consciously - direct knowledge, planning and operations to a selectively critical and warned way. In 1899, for example, a "simple" manual about mural painting like the one by Ronchetti, cited theories like those by Rood, about variation of colours according to light (Ronchetti, 1947). The usefulness of history and knowledge for the analysis and project of colour.

4.1.1 'Policroma', the icon of a method. Compared theories and their models

The synoptic framework of the models is the visualization (icon) of a systematic comparison by themes it is confirmed as a precious methodological instrument, to clarify the phenomena relating to the Chromatic Culture: the possibility of hypothesizing, clarifying, but also rediscovering relationships and contacts between Authors of the various

theories, to highlight similarities and differences in their respective outcomes.
But it also allows academic from various disciplines to observe and monitor the developments of various studies and research over time, to discover their reciprocal intersections and influences, as well as to be a privileged workshop for establishing and comparing (integrating) specific disciplinary dictionaries, which certainly cannot be declined in improper or unconscious terms and meanings.
This instrument assumes therefore a strong and effective practical value for the possibility to communicate with a direct and correct way the fundamental data of these theories, togheter with the various Authors, but also the applications of these theories for example (with the respective methods and criteria, rules and parameters), both at a project level and analytical investigations - in any field. But the highest goal - for everyone - is to educate to a "chromatic way of thinking" and to a Culture of color.

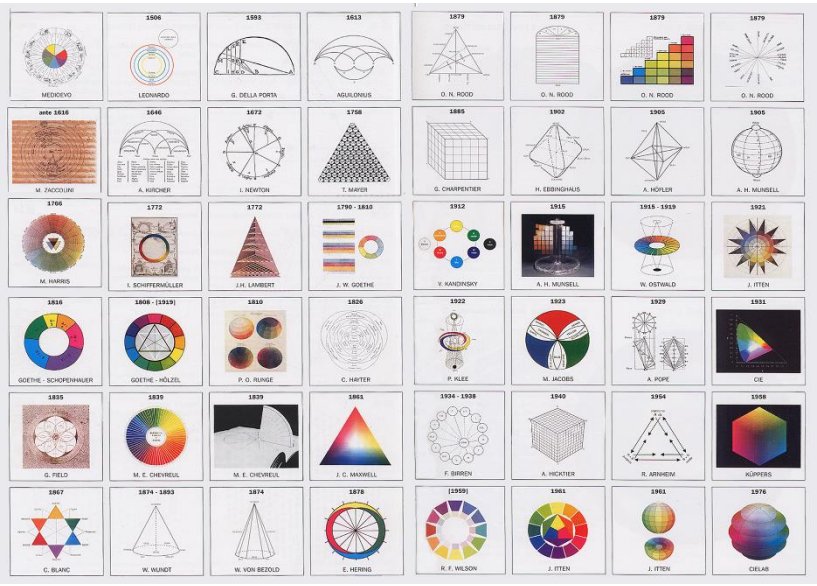
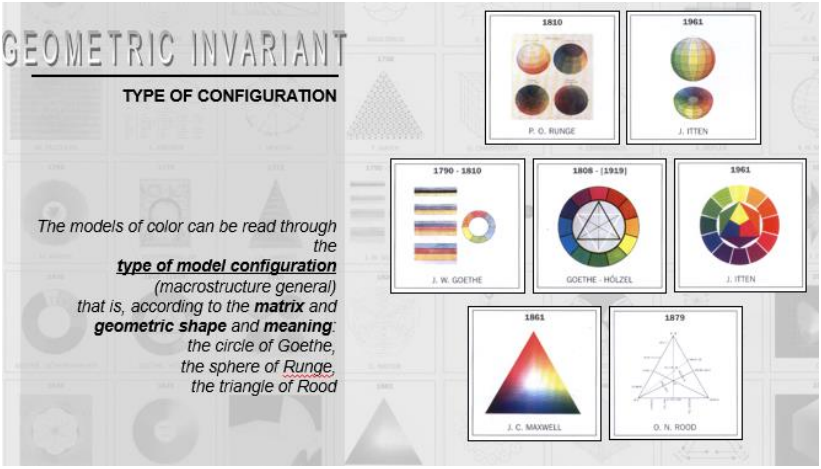


Figure 21. Icon of a methos: the comparative Frameworks of colour models (Marotta, 1999, pp. 54-55).

4.1.2 Significance and representation in the models

In the past, to represent, display and symbolize their theories, models of color have formed an indispensable tool for intellectual development, testing and use of critique design, continuing even today to form a body (chronologically and/or theme reconstructed in congruent and comparable terms) crucial for a conscious and specializing approach in culture of the color.

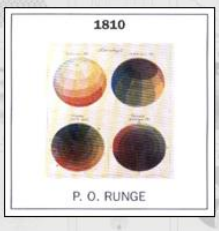
The models of color can be: charts that represent algebraically determined functions (for example, a wavelength that generates a color, in its tone). Colour schemes designed to express the symbolic meanings of color, assuming the shapes of the models themselves connotations and denotations signifiers very important are the geometric invariants, with his parameters of reading: in addition to the chronological reading, models of color can be read and classified according to invariant, which constitute at the same time interpretive key and generating principle. To explain the close relationship that exists between a theory of color and its pattern, it seems useful to recognize in the first instance, the geometrical invariants of the latter not only as such, but also as a symbolic representation and signification of more detailed and extensive content, or of specific phenomena. Among the invariant first, most characteristic, it is possible to recognize the following: 1 type of configuration ; 2 value of focus ; 3 presence of axes and diameter s ; 4 relationship between shape and parameters ; 5 topological aspects.

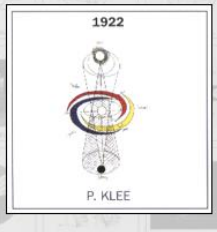


GEOMETRIC INVARIANT

CENTRALITY VALUE

The models of color can be read in accordance with the ***value of centrality****: often* ***the center of the model coincides with the "color center" - the most significant - in the color system****; is what happens to the gray middle of the sphere of Runge (which he considered universally balanced and harmonious, not only in the religious sense, but also on the physiological / perceptual, as the cause of maximum satisfaction of the eye*

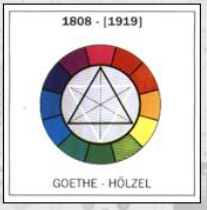


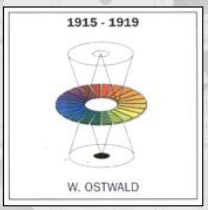


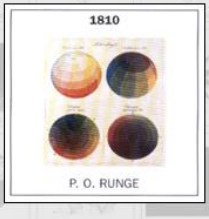
GEOMETRIC INVARIANT

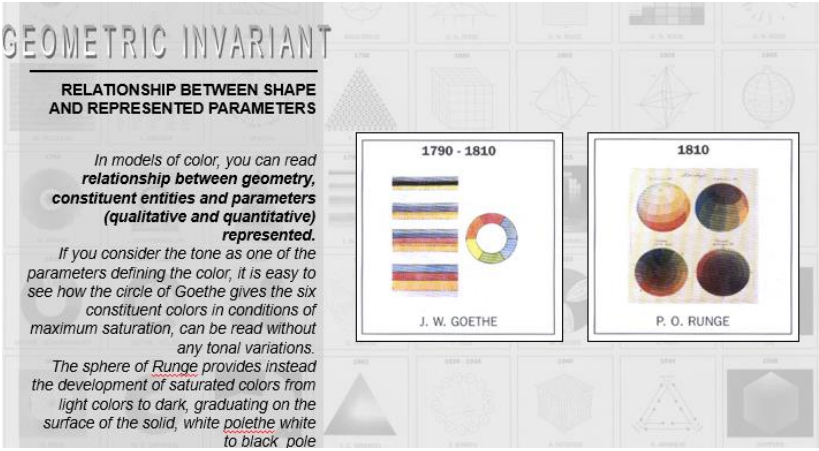
PRESENCE OF AXES AND DIAMETER

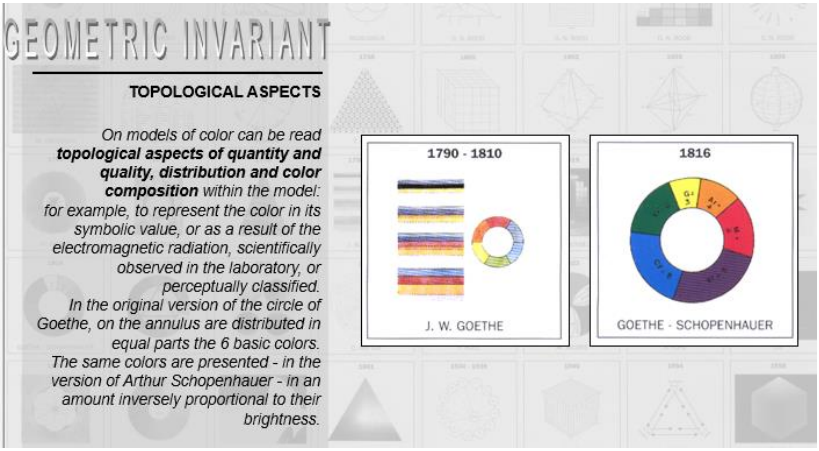
The models of color can be read according to the presence of ***axes and diameters****: they represent* ***the opposition and theoretical biases or visual / symbolic*** *(up-down, left-right, light and dark, light-darkness, life and death). diametrical opposition harmonics of Goethe, the black-white axis of the sphere of Runge or double cone of Ostwald)*








GEOMETRIC INVARIANT
RELATIONSHIP BETWEEN SHAPE AND REPRESENTED PARAMETERS
In models of color, you can read relationship between geometry, constituent entities and parameters (qualitative and quantitative) represented.
If you consider the tone as one of the parameters defining the color, it is easy to see how the circle of Goethe gives the six constituent colors in conditions of maximum saturation, can be read without any tonal variations.
The sphere of Runge provides instead the development of saturated colors from light colors to dark, graduating on the surface of the solid, white polethe white to black pole
1790 - 1810
J. W. GOETHE
1810
P. O. RUNGE


GEOMETRIC INVARIANT
TOPOLOGICAL ASPECTS
On models of color can be read topological aspects of quantity and quality, distribution and color composition within the model: for example, to represent the color in its symbolic value, or as a result of the electromagnetic radiation, scientifically observed in the laboratory, or perceptually classified.
In the original version of the circle of Goethe, on the annulus are distributed in equal parts the 6 basic colors.
The same colors are presented - in the version of Arthur Schopenhauer - in an amount inversely proportional to their brightness.
1790 - 1810
J. W. GOETHE
1816
GOETHE - SCHOPENHAUER

4.1.3 Johann Wolfgang Von Goethe

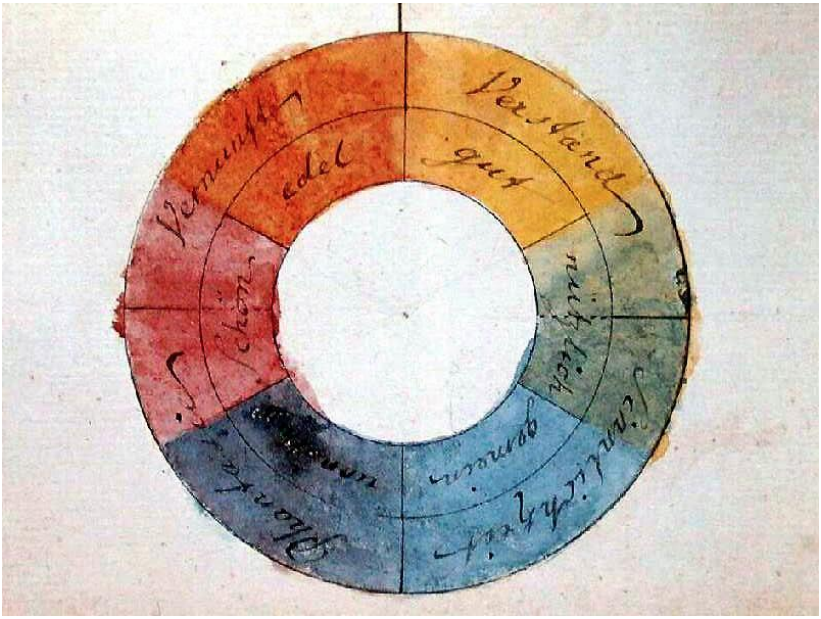


Figure 22. Goethe's chromatic circle, 1810.

Johann Wolfgang Von Goethe (Francoforte sul Meno 1749 Weimar 1832).
1749 - He was born in a wealthy and cultured family and spent his childhood in a stimulating environment, where especially his mother, an educated and lively woman, creates his training sentimental and poetic. He prefers Sheakespeare and Paracelsus (Philipp von Bombast Theophrast Hoenheim)
He studied the occult sciences, alchemy, astrology, in opposition to the bourgeois values of his original environment.
1772 - He graduated in law in Strasbourg, is dedicated to the history of collecting color studies of other intellectuals.
1774 - He wrote "The Sorrows of Young Werther", a book that gives him instant success and fame throughout all Europe.
1786 - He start the trip to Italy, "The Grand Tour" almost obligatory for every young aristocrat. In the two-year journey visit many cities in the north and settled in Rome. During this time he creates many drawings, which underline its propensity towards the study of nature and its colors.

1794 - Along with Schiller, he wrote “The Correspondence”. Later, after the death of his friend he publics “Elective Affinities” with which he approached the world of images and process color.
1798 - Returned to Weimar, he worked on the theory of colors, which will make a great contribution, from the scientific point of view, to the culture of his time.
1808 - Publish Farbenlehre (Color Theory). He believes that the color and its manifestations are nothing but human experience: the place in which they are perceived is not space, but the human organ of perception.
1832 - He died in Weimar.

COLOR AS THE INNER EXPERIENCE

The colors do not belong to nature but to the mind.
The strong criticism that Goethe moves towards the Newtonian theory of the dependence of colors from light resides in this fundamental concept that "the place where we capture the luminous phenomena in their form and coloristic is not space, but the tool devised specifically for perceive: the eye. "

The ***Farbenlehre*** Goethe address in their entirety the controversy related to color appearance under physiological (and pathological), physics, chemistry and history, but also recognizing the relationship with philosophy, mathematics, natural history and sound theory, and identifying the and sensitive and moral action and the aesthetic of color that goes with it according to its symbolic values and the effects it produces on the mood.

Based on these considerations, the perception of color is an **inner experience:**
a color knowledge.

THE THEORY OF GOETHE: CHARACTERS ESSENTIAL

"Goethe gives a great contribution to the culture of his time, not only from a literary point of view but also scientific. Although covering so amateur natural phenomena, he provides valuable tools to modern science. Fascinated by the phenomena of attraction, affinity, dislikes and mixtures, (...), gets closer and closer to the world of images and processes of color, light and color phenomena, already in the middle of the sixteenth-century culture. "1

[1] Anna Marotta, *Policroma. Dalle teorie comparate al progetto del colore*, Celid, Torino 1999, p.102.

THE EXPERIENCE AND THE TOTALITY

ANTI NEWTON THEORY

THE "ROMANTIC NATURE"

POLARIZATION

SENSITIVE AND MORAL ACTION OF COLOUR

NATURE OF COLOR

FROM THE AGE OF ENLIGHTENMENT TO ROMANCE AGE

....

THE CRITIQUE TO THE NEWTON'S THEORY

The cultural theoretical system Farbenlehre (color theory) marks a moment in the development of Enlightenment thought to the Romantic: the rationalization and quantification of the natural phenomenon of light and color to their consideration subjective and artistic eminently ..

Ilsaac Newton (1642 - 1727) in his corpuscular theory, says:

- all colors are contained in white light
- the white light, is constituted by bundles of rays of atoms that can be separated.

Goethe disagreed because:

- the light is just the means to study the colors
- the scientific method does not take into account the emotional dimension
- the colors are not studied in their natural environment

SUBJECTIVITY

Goethe conceives of "seeing" as a subjective action in a specific context, not absolute, undifferentiated, but in perspective: it depends, that is, by the terms of the beholder, and environmental conditions. He defines the "vision" as the retina being at the same time in different and opposite conditions of light and darkness. Each of these two states tends to totality, psycho-physical balance. The color, therefore, does not belong to the eyes but to the mind. The perception and vision become total act, participatory, creative and poetic

For Goethe, the colors do not belong to nature, but to the mind, for this reason they are a **subjective experience**.

Goethe considered the color as a **subjective phenomenon** that depends on several parameters:

- **amount of light in the place where the colored object is**
- **amount of colored light on the object**
- **psychophysical state observer**
- **visual organ dysfunction**

TOTALITY

1.

2.

Every single color stimulates the eye, through a specific feeling, the aspiration to **universality**. To capture this totality, to satisfy himself, the eye look next to each colorful space, a space in which to produce the colorless color that is invoked (simultaneous contrast).
The full range of colors is represented, symbolized by two triangles which capture the spectral colors (Fig. 1).

These six shares given by leaders of the pair of the triangles, were doubled by Hölzel who added a pictorial value intermediate between a primary and a secondary, and between a secondary and a primary, modifying the circle of Goethe, composed of six colors, with a color circle in twelve colors (Fig. 2).

POLARIZATION

*The colors are not in the light, but **are created from time to time by a dynamic interaction between light (white) and dark (black),** due to the presence of a turbid medium.*

+	-
YELLOW	BLUE
ACTION	DEPRIVATION
LIGHT	SHADOW
LIGHT	DARK
POWER	WEAKNESS
HOT	COLD
DISTANCE	PROXIMITY
REJECT	ATTRACT
AFFINITY WITH ACID	AFFINITY WITH ALKALI

PRIMARY AND SECONDARY IMAGE

Primary image

All events that are raised in the eye, such as to confirm the actual existence of an external object.
Are those pictures that you have, without any mediation, from our view.

Secondary image

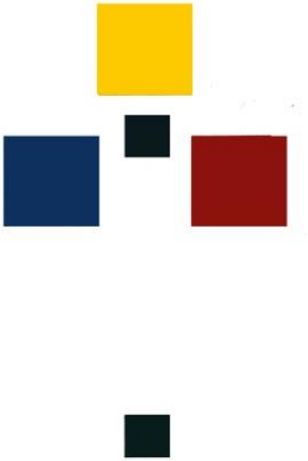
Are derived from primary and remain in the eye when the subject is no longer genuinely and effectively present.

SECONDARY IMAGE

Group I: perceptual or retinal

Successive images: derived from a indirect vision relation
Post pictures: remain imprinted on the retina even for a few seconds to stop the stimulus
Contrasts of simultaneity: observing a color, it is its complement, because the retina invites the opposition to produce a whole
Contrasts later: are a special case; use the same principle of post-images: when it is the cessation of vision of one color, it emerges the complementary

NEXT CONTRAST



COLOR THEORY

PRIMARY AND SECONDARY IMAGES

Primary images

All events that are raised in the eye, such as to confirm the actual existence of an external object are those pictures that you have, without any mediation, from our view.

Secondary images

Are derived from primary and remain in the eye when the subject is no longer genuinely and effectively present.

SECONDARY IMAGES

group II

Reflections or double images: the eye perceives through the action of some means (images reflected in the mirrors, glass, crystal, reflective surfaces)

NATURE OF COLOR

Physiological colors

"Noi li abbiamo chiamati fisiologici, poiché appartengono all'occhio sano e poiché li consideriamo come le necessarie condizioni del vedere, al cui vivente interagire accennano in sé stessi e verso l'esterno".

J. W. Goethe *La Teoria dei Colori*

Physical colors

"We define physical colors those colors for the birth of which are necessary material means of a certain kind which, however, does not in itself have any color and can be clear or turbid or translucent or fully opaque" "[...] are produced in the our eye through external causes, or, if they are in some way already given out by us, are reflected in it. "

J. W. Goethe *La Teoria dei Colori*

Chemical colors

"We call those colors so we cause of certain bodies, which keep for a time more or less short, which grow on them in intensity, that they subtract or that we can transmit to other bodies and to which then attach a certain immanent property ".

J. W. Goethe *La Teoria dei Colori*

PHYSIOLOGICAL COLOUR

*"1. The [physiological] colors, since they belong wholly or in large part to the subject and the eye, **constitute the foundation of the whole theory**. They are defined as physiological belong to the eye healthy and because they are considered as the necessary condition of seeing. **They can therefore also be called irreducibly subjective and are fleeting because they disappear quickly."*** [1]

[1] Johann Wolfgang Goethe, *La teoria dei colori, Lineamenti di una teoria dei colori – Parte didattica*, (a cura di Renato Troncon), Il saggiatore, Milano 1981, p. 21.

LIGHT AND DARKNESS

COLORED SHADOWS

SIMULTANEOUS CONTRAST

NEXT CONTRAST

DOUBLE CONTRAST

OPTICS MIX

LIGHT AND DARKNESS

The concept of light is white, black of darkness forming a register value in itself.
Their relationship is a straight line, a gray scale according to the law of arithmetic plus and minus.

They can add or subtract to the colors, but do not combine.

The birth of a color requires **light and darkness**, light and dark, or light and no light.

Virtually ***any color value can be brought to one of the extremes, that is, to disappear in the white and black.***

COLORED SHADOWS

The colored shadows presupposes two conditions:
a colored light that illuminates somehow the white surface
an auxiliary white light, which illuminates in a certain degree the shadow.

A well lit object produces two shadows:

- one produced by a white light, lit by a colorful light source, has the same font color
- one produced by a colored light source is illuminated by white light and appears of the complementary color to light colored

COLOR THEORY

SIMULTANEOUS CONTRAST

Optical effect of contemporary visual stimulus.

The adjacent colors influence in such a way that the color with chromatic strength weak is covered with a shimmer of color opposite to that near

Michel Eugene Chevreul (1786-1889) *fformulated the law of simultaneous contrast.*
"In the case in which the eyes see two colors contiguous they will appear as much as possible is different, both in the optical composition both in tone"

*The figure shows the simultaneous contrast with **grey** on a **colored background***

We observe the stripes of grey with the same clarity on a violet-red and a green-yellow

While violet stripes on the bottom are covered with a shimmering green-yellow

At the bottom of the green-yellow strips are covered with a shimmering violet-red

Even the central point on which we fix our gaze is the same grey, but the white looks darker

COLOR THEORY

SIMULTANEOUS CONTRAST

*Simultaneous contrast with **green-yellow** and **violet-red on overseas-blue and orange***

Fixing our gaze on the central black axis

The green on blue is more clear with a tendency to yellow

The azure violet is clear and tends to red

The green on orange looks darker and approaches an average value

The violet on orange background appears darker and tends to blue

Each color has something of the opposite color of the background on which it is

COLOR THEORY

NEXT CONTRAST

Optical effect which persists for a few seconds after the cessation of the visual stimulus.

*The **complementary color** to the color previously set by the eye, **is presented subsequently**.*

We hold the gaze for a few moments on the center paneL Let us fix gaze at the small grey dot for a while.

Now we look at the gray spot on the white surface: the opposite spectrum will appear.

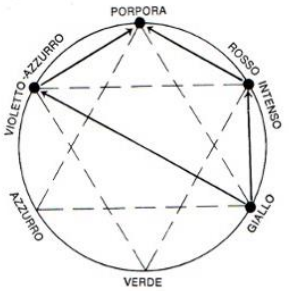
Now we look at the grey spot on the surface of deep red, the opposite colors will blend with the colors of the background

The color opposite to the color previously set, produced by the eye, is always present subsequently

COLOR THEORY

NEXT CONTRAST ON THE COLORS CIRCLE

The results can be checked schematically in the color circle.
If a yellow surface is fixed, its physiological opposite color is violet-blue.
Moves his eyes from yellow to deep red.
The violet blue spreads on the surface of deep red, thus producing a purple sparkle.



COLOR THEORY

DOUBLE CONTRAST

The double contrast **is obtained from both the simultaneous contrast, that from the next one**.
It happens when, simultaneously and successively, **we obtain the complementary colors of the two colors observed**.

Let us fix the point in the surface orange and then we turn our gaze on the grey spot in the white field

The orange is reversed in pale blue and the white square turns into a red-orange

Eye and brain produce two inverse values, Ithough only one color value is fixed

This double contrast is explained by the simultaneous contrast as a square white on orange always appears more bluish.

COLOR THEORY

OPTICAL MIX

Phenomenon related to the next contrast. When the next image to the visual stimulus appears on a colored background, the complementary color blends with the color of the background. It can also be produced by different particles of different colors, perceived at the same time: confetti, powders.

The orange and blue are distinguishable from each other at about 2 mt. away,

The color effect has a feeling of rosa in the fragmented surface (*von Bezold) . The* effect occurs only if the spots have the same brightness and extent similar, and if they are observed at suitable distances.

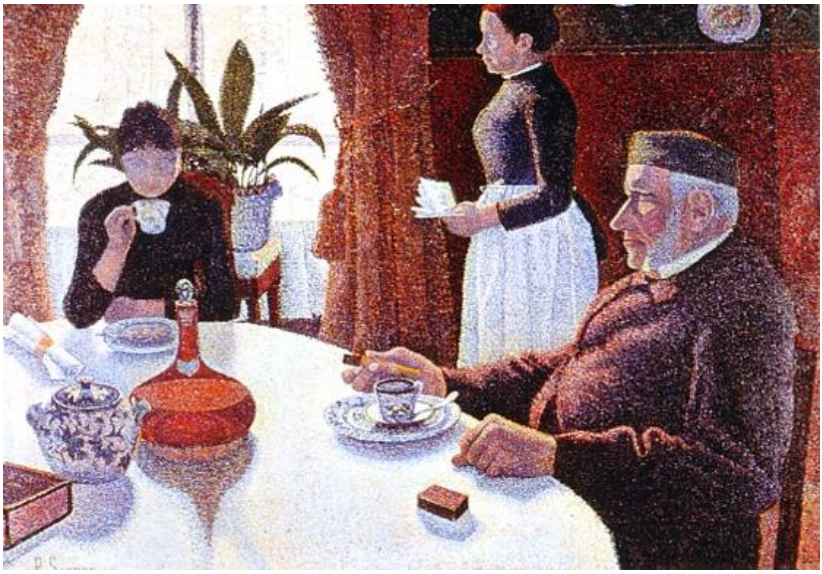


Figure 23. Paul Signac, La salle à manger, 1886-1887 (from optical mix to the "divided color").

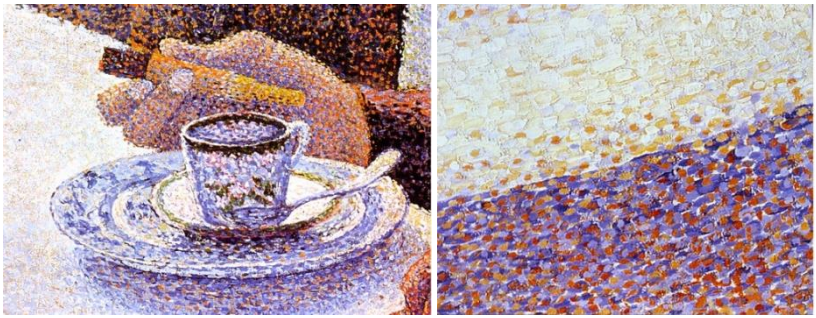


Figure 24. Paul Signac, La salle à manger, 1886-1887 (detail).

COLOR THEORY

FISICAL COLORS (OPTICAL)

"Those colors for which birth certain material means are necessary. They do not have any color by themselves and can be transparent or turbid or translucent or, finally, completely opaque. This type of colors of are therefore produced in our eye by external causes, or, if they are in some way already given out by us, they are reflected in the eye itself"

Dioptric of 1st category (refracted)

If they born with turbid and translucent media: opaline, fog, smoke, smoked glass

Dioptric of 2nd category (refracted)

If its production medium is transparent. Example: "the observed objects by medium of more or less density do not appear at the place where, according to the laws of perspective, should be"

Catoptric (reflected or mirrored)

They are obtained by mirroring, but also through "continuation" (emanation) of energy. Examples: mother-of-pearl, which "reflect" different colors, especially the purple and green; the plumage of birds

«Parottici» colors (for "touch")

Are obtained when the light "touches" the margin of a body (light effect "around" the bodies, "from" and "towards" them). These colors are considered "temporaries", coming from optical phenomena.

«Epottici» colors (superficial)

They can also be considered as temporaries, but in certain circumstances, they are fixed in such a way that persist even after the cessation of the conditions (physical or chemical) that produced them, transforming them from physical colors into chemical ones.

COLOR THEORY

CHEMICAL COLORS

"We call those colors so we cause of certain bodies, which keep for a time more or less short, which grow on them in intensity, that they subtract or that we can transmit to other bodies and to which then attach a certain property immanent ".

REAL MIX

The painting is based on a mixture of colored corpuscles.

The close connection takes place through the mixture through juice (oils, resins), with fine colored powder.

The colors mixed together retain their character, as they are the colors next to each other, you no longer feel the totality and harmony

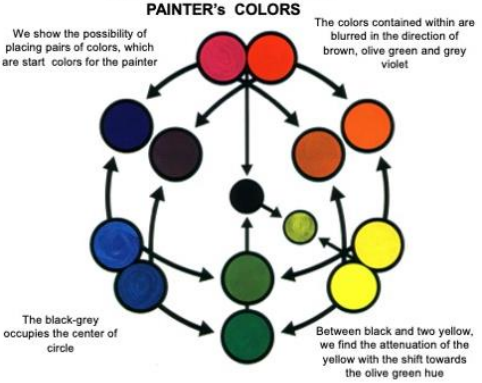
COLOR THEORY

CHEMICAL COLORS

"We call those colors so we cause of certain bodies, which keep for a time more or less short, which grow on them in intensity, that they subtract or that we can transmit to other bodies and to which then attach a certain property immanent".

For example: black for combustion, white for oxidation, metals brought to incandescence, lead with acetic acid that turns into white lead

REAL MIX
COLOR CIRCLE CONSISTS OF PAINTER's COLORS



COLOR THEORY

CHEMICAL COLOR

"We call those colors so we cause of certain bodies, which keep for a time more or less short, which grow on them in intensity, that they subtract or that we can transmit to other bodies and to which then attach a certain property immanent".

For example: black for combustion, white for oxidation, metals brought to incandescence, lead with acetic acid that turns into white lead

ILLUSORY MIX
To get the mix you do not need the juices that combine the colored powders.
A yellow powder, very fine, together with a blue, is perceived with the naked eye as a green powder.
In this way, far from strips: yellow and blue give rise to a green surface

COLOR MODEL

THE CIRCLE

The form is a significant element, and for Goethe, in particular, the shape of the circle is reduced to that of the womb, (as well as the shape of its talisman initiatory Ordo Illuminatorum) and consequently to the symbolic meaning related to it:
feelings of peace and security
genesis of inner peace
The layout of the circle allows you to easily identify the primary and secondary colors and contrasts fundamental and is also the one that best represents the intensification of laws and the laws of opposition.

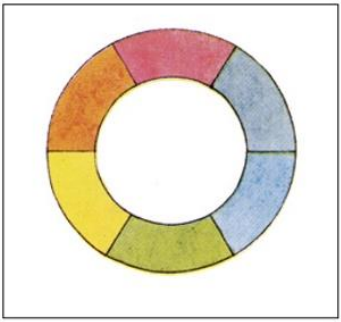
ABARIS, the initiatory name of Goethe, belonging to the Ordo Illuminatorum; mostly appeared inside a circle, symbolizing the womb. The name was well depicted in a state of bliss, which also conveyed to him that wore.
This would result in the circular shape of the Goethe's color model.

COLOR MODEL

THE COLOR CIRCLE IN SIX COLORS

The six colors of the spectrum identified by Goethe are arranged in a circle:
Purple
Violet – blue
cyan
green
yellow
Red - Orange

Each has its complement in a diametrically opposite position:
ellow and blue, red and green, orange and violet



Johann Wolfgang Goethe
Color circle , 1799

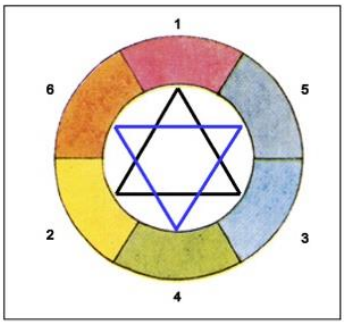
COLOR MODEL

THE COLOR CIRCLE IN SIX COLORS

Goethe's color circle
has two triangles.

The first, with the top up, on whose vertices are **the primary colors** (basic):
1 *PURPLE*
2 *YELLOW*
3 *CYAN*

The second, with the top down, on whose vertices are **the secondary colors**:
4 *GREEN*
5 *PURPLE - BLUE*
6 *RED - ORANGE*



Johann Wolfgang Goethe
Color circle 1799

COLOR MODEL

THE COLOR CIRCLE IN TWELVE COLORS

Adolf Hölzel (1853-1934)

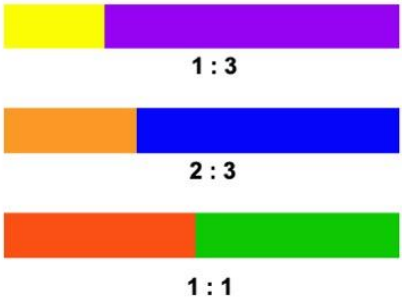
Hölzel, widening the circle of Goethe, divided into six parts making it a color circle in twelve colors.
The painter has turned Goethe's color circle within a circle of twelve compartments, with colors with the characters from the painter and complementary pairs. Attaches the utmost importance to the dynamic interaction of colors.

Adolf Hölzel
Color circle 1919

CONTRAST

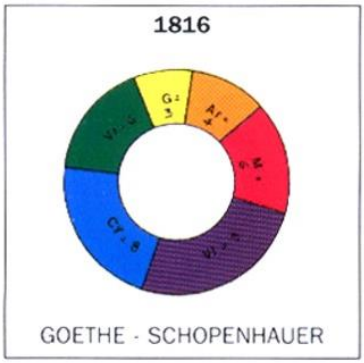
CONTRASTI DI QUANTITÀ

Goethe has established ***a numerical scale of bright values*** *.*
The reciprocal values of brightness would be:
Yellow: 9; orange: 8; red: 6; purple: 3; Blue: 4; Green: 6
While the brightness values, to obtain the balance between the complementary pairs, are:
yellow: purple = 9, and 3 = ratio of 3 to 1 = 3/4: 1/4
orange: blue = 8:04 = ratio of 2 to 1 = 2/3: 1/3
red: green = 6 and 6 = ratio of 1 to 1 = 1/2: 1/2



CONTRAST

QUANTITY CONTRAST ON COLOR CIRCLE



CONTRAST

CHARACTERISTIC COLORFUL : SCHEMATIC REPRESENTATION OF ENERGY EFFECT

The energetic effect *arises from the prevalence of active side, that can be reached with yellow, red-yellow and purple that should be kept on the active side.*

In the area right we see the prevalence of colors from purple to yellow

The area on the left has a minimal amount of color, determined from light blue, which is cool, and the secondary colors violet-blue and green.

CONTRAST

CHARACTERISTIC COLORFUL: SCHEMATIC REPRESENTATION OF MILD EFFECT

The mild effect *arises from the prevalence of passive side, that you get with the blue, violet, purple and held towards the passive side. As can be seen in the schematic representation in side, the considerable amount which gives rise to* ***the mild effect*** *requires a counterweight minimum by the three warm colors.*

In the right Goethe indicates a minimal amount of bright red and yellow.

In the left we see a prevalence of mainly cool colors including purple and green

CHROMATIC HARMONY

HARMONY LAW

The harmony law is manifested in the eye need to play the colors of the color circle, always.
The pairs of complementary colors define an **objective harmony law**, the harmony independent dictated by subjective taste.

The central core of the theory Goethian lies in the fact that the chromatic circle is active when it is considered as a whole as "each color stimulates the eye, by means of a specific sensation, the ambition universality".
The fundamental law of color harmony is achieved then,, in the visual system which relies, to a color, its opposite physiological appearing in the color circle on the extreme of each diameter.

The **yellow** refers to the value generated by red and blue: that is **violet**.

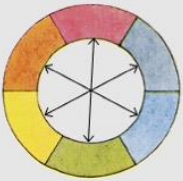
The **blue** refers to the value generated from yellow and red: that is **orange**.

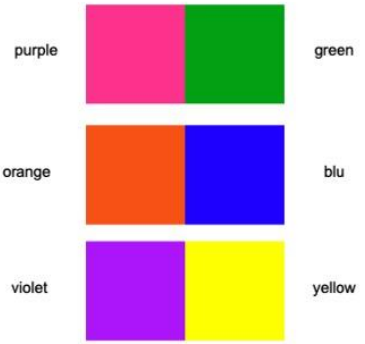
The **purple** refers to the value generated by yellow and blue: that is **green**.

CHROMATIC HARMONY

HARMONIC COMPOSITIONS or DIAMETRICAL

The pairs of complementary colors define an objective harmony law independent by the subjective taste harmony.





4.1.4 Legacy from Goethe

Figure 25. J. M. W. Turner, *Light and color (Goethe's theory) - The morning after the deluge - Moses writes the Book of Genesis*, oil on canvas, 1843 (The Tate Gallery, London).

Figure 26. Interiors for the English upper class on the late Nineteenth century: John Soane for Hobbs House

The colors determine the overall character of the painting. There is the whole circle of the colors, but does not appear in the original order.

In "The Portrait of Dorian Gray" by Oscar Wilde, Lord Henry made Dorian read a mysterious book with a yellow cover, one of the symbolic colours of aestheticism. In fact, in the Nineteenth century, yellow became a very fashionable color thanks to the invention of new coloring systems less toxic than the previous compositions. Although it was initially used for the upper classes, it soon spread to the Middleclass homes as well.

Among all the yellows used, the most sought after (and also expensive) was the Goethian "Turner Yellow", or "Patent Yellow", for its exaggerated brilliance and vivacity never seen before. The English painter often proposed this color in his paintings, which he used in a refined way to turn on the light of his landscapes, as he had seen it was used in the great Italian paintings. «Everything is yellow - a critic observed -, only yellow, a yellow contrasting violently with blue».

Characteristic of these houses is the particular use of color, which far exceeds the previous tradition for the abundance and the audacity of

combinations: much of the richness of these effects was obtained with wallpapers and fabrics, thanks to the use of elaborated coloured prints and extraordinary weaving techniques.
The liveliness and freshness of the colours applied during the late Nineteenth century was partly due to the invention of aniline, a new colouring. The aesthetic consequence of this technological advance was the creation of some very bright yellows, vivid blues and acid greens of such chemical intensity never seen before. Earthy reds or very dark browns were also used, but they were enlightened with gold or very bright yellows. First of all they were used in fabrics and wallpapers, but the new colours could also be incorporated into varnishes.
The architects of the Aesthetic movement had a certain predilection for the use the "Greeneryallery", a slightly modified olive green with shades of yellow, for the wooden panels, and an antique pink or hyacinth for the walls, even if they preferred brighter and lighter colours for the rooms used during the day.

Figure 27. Pierre Auguste Renoir, *La Parisienne* (1874), oil on canvas, 160x106 cm (National Museum of Walls, Cardiff, photo Mik Fear). Passing through the sieve of coeval theories, there is a link in the transmission of color knowledge. In the 70s of the nineteenth century: Claude Monet (with other Impressionists) expatriates in England during the war of Prussia. In London knows the work of Joseph Mallord Turner (known follower and supporter of the Goethe's theories).

4.1.5 Goethe's theories in Turin through Chevreul and Arnaudon

Figure 28. Pietro Fenoglio, Villino Scott, Turin (Decortes, 2006).

Figure 29. Scenes from the movie *The Importance of Being Earnest*, 2002.

In the movie *The Importance of Being Earnest* Clothes, accessories, jewels, living rooms, furnishings, sumptuously laid tables, flowers, gardens: the camera plays for time slowly, almost smugness, over everything, to show the apparent beauty and perfection of a world actually deeply cynical and cruel. Martin Scorsese told how the Italian cinema by the "masters" was the point of reference in his reconstruction of the era in which the film is set. The director's personal tribute to Italy was completed by involving two illustrious names in the project: Dante Ferretti at the sets and Gabriella Pescucci at the costumes.

4.1.6 Philipp Otto Runge

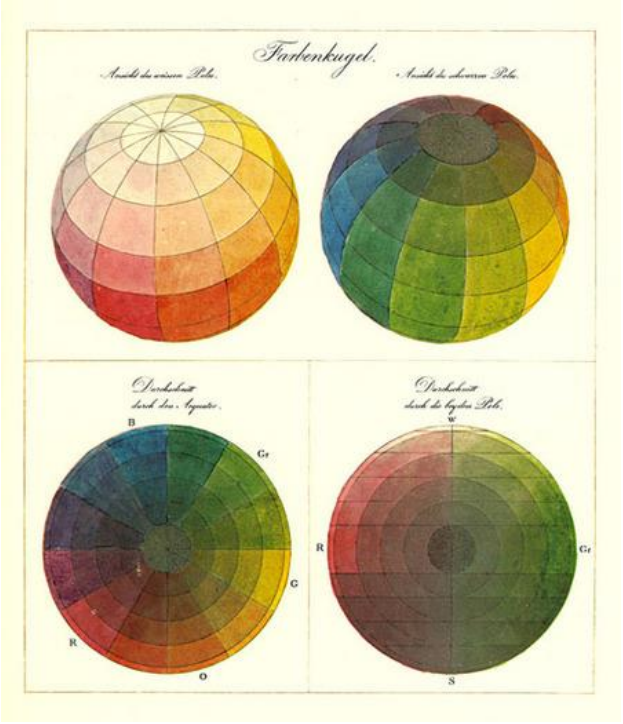


Figure 30. Runge's colour sphere, 1810.

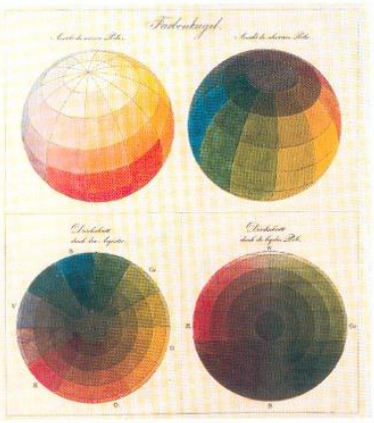
Philipp Otto Runge (Wolgast 1777 – Amburgo 1810)
1777 - born in Walgast, in Pomerania
1788 - began to devote his time to *the silhouette* (portraits of family members or popular scenes).
1810 - his book is published (The color sphere, namely the construction of the mutual relation of all mixtures of color and their complete affinity) where he conceived a spherical color model originated from an intense debate with Goethe.
According to his theory, the colors can be organized shaping themselves into a spherical shape, divided into meridians and parallels, in similarity with the globe.

COLOR MODEL

1810, COLOR SPHERE

According to his theory, the colors can be accommodated shaping itself into a spherical shape, divided into meridians and parallels.

The resulting model, published in 1810, is the first project of three-dimensional sphere of colors, and is based on the same color system of Goethe: the basic colors are presented with different degrees of saturation, from the equator to the center of the globe.



COLOR MODEL

FEATURES OF RUNGE (ITTEN) SPHERE

The sphere color is a three-dimensional model on which it is possible to ideally place every hue of the color of the universe.

- ***The pure colors (saturated) are placed on the equatorial***
- ***The compounds of the same tone are located on horizontal sections***
- ***The tonal gradation (from light to dark and vice versa) are placed along the vertical sections, namely along the segments.***

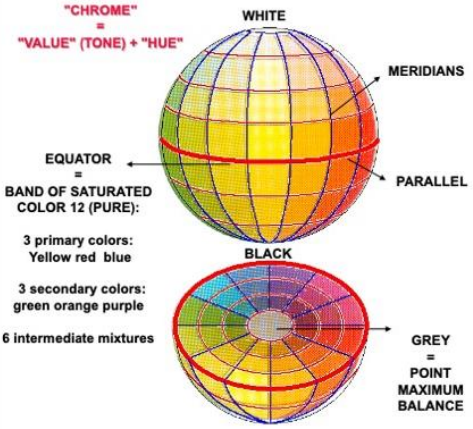


Figure 31. Philipp Otto Runge, Allegory of the morning, 1808. The work is a precise application of color theory, by the same author published in 1810 and displayed in Farbenkugel (The sphere of color).

4.1.7 Johannes Itten

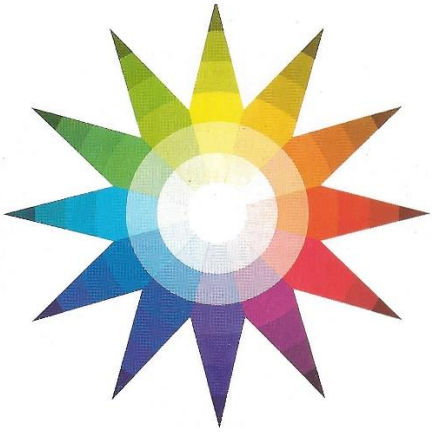
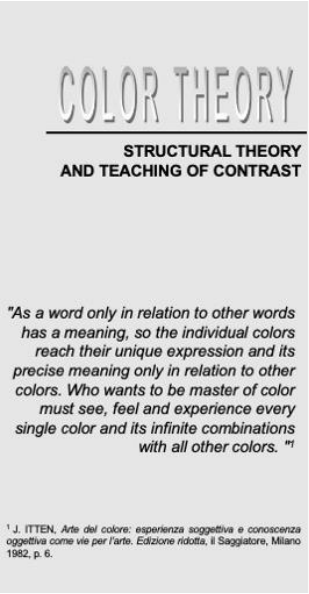


Figure 32. Itten's colours star, 1921.

Johannes Itten (Südern-Linden 1888 – Zurigo 1967)
1888 - in Südern-Linden, Switzerland
1908 - graduated as a primary school teacher and began teaching
1909 - began to devote himself to painting, influenced by the vision of the Cubists and members of the Blaue Reiter, and went to Geneva
1913 - he went to Stuttgart, he became a pupil of Adolf Hölzel, which significantly affects his quality
1916 - He held his first solo exhibition at Der Sturm gallery in Berlin. He moved as a teacher in an art school in Vienna, where he is fascinated by the cultural circles in which religious and mystical themes. At this time he met Alma Mahler, widow of the composer Gustav Mahler and the Gropius' wife
1919 - Gropius invited him to teach at the Bauhaus in Weimar: teacher Itten proves particularly fond, shall act as the "master of the form" in almost all laboratories and called major artists such as Klee and Schlemmer.



The structural theory of colors,
underlying the teaching of Itten at the Bauhaus ,its studied the laws of color effects , as they appear to the vision .
In particular it is used for the study of pictorial composition through the analysis of works of art of the past.

To Johannes Itten the basis of his " form of teaching " at the Bauhaus is a general " teaching contrasts ": big-small , long - short, wide - narrow , thick -thin , black-white , very - little, right - wrong , pointed - flat , horizontal - vertical , high-low , smooth - rough, hard - soft , calm - agitated , light - heavy, transparent - opaque, Fluid -solid , sweet - sour, strong - weak , loud -quiet , and then the **seven color contrasts**.

As he wrote :
"Light and shadow , studies of materials and grits , the theory of form and color, rhythm and forms of expression are discussed and presented in their contrast effects ."

Consequneziale the theory of contrasts will be studies of **chromatic chords** or **harmonies** .

COLOR MODEL

1961, THE COLOR CIRCLE

It 'a harmonious color circle divided into twelve parts.
You have the primary from the central equilateral triangle into three parts. In the circle in which is entered the triangle will develop a hexagon, getting three more triangles in which we will place the compounds obtained by the primary colors. On the circle shows a ring divided into twelve equal sectors, which are the primary and secondary interspersed by tertiary.
The disc chromatic harmonic to 12 parts, made starting from the 3 primary colors, is used by Itten to derive the various types of combinations or "chords": those bichromatic those quadricromatici.

COLOR MODEL

1921, THE COLOR STAR

The star of Itten's color has seven luminous shades and twelve tones. The Star is nothing other than the development on the plane of the sphere: here finds the placement of the same colors, but arranged so that **the center there is the white color, while gradually you are going to the outside the colors are in two tone light, the range of pure colors, two other areas in dark tones, and finally at the top of the fields, black.**

COLOR MODEL

1961, COLOR SPHERE

The three-dimensional model is modeled on the color system of Runge. Each point on the sphere can be easily determined by means of meridians and parallels, in relation to the pole white, black pole and the equatorial zone (pure colors).
Equator a color reaches its maximum purity, going to the white color becomes lighter in brighter tones, darkening toward the pole in black tones shady.
At the heart of the system lies the medium grey.

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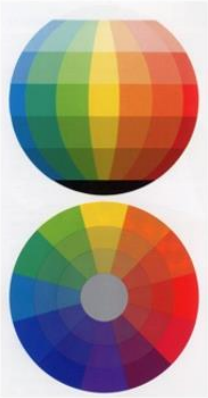


CONTRAST

THE SEVEN COLOUR CONTRASTS

According to Itten relations between colors are based on the infinite possible combinations of the three measurable elements: hue, brightness and saturation.
Each report is born or is enhanced by means of a comparison, or than a contrast.
It speaks of contrasts when the juxtaposition of two or more colors can detect differences or intervals sensitive. So in the language of color is not possible to speak of a color only in relation to its wavelength, but only a color determined by the context.

Studying the characters and the most characteristic color effects, and comparing them, it establishes the contrasts or differences or intervals obvious. If these differences are absolute contrast of opposites or contrast polarity

Itten has defined 7 distinct types of contrast:

PURE COLOR CONTRAST
LIGHT-DARK CONTRAST
COLD-HOT CONTRAST
COMPLEMENTARY CONTRAST
SIMULTANEITY CONTRAST
QUALITY CONTRAST
QUANTITIES CONTRAST

CONTRAST

PURE COLOR CONTRAST

It is the result by the combination of any color to the highest degree of saturation. The combination of yellow, red and blue representing the highest degree of tension between pure colors.
. To create this you need at least three colors contrast sharply distinguished: the result is always an effect boisterous, energetic and decisive set to lose proportionally strong as they used the colors move away from the three primaries.
So the orange, green and purple have a less pronounced then yellow, red and blue.

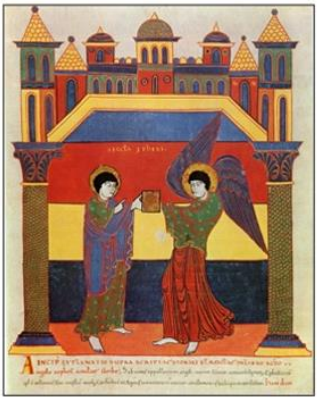
The combination of yellow, red and blue representing the highest degree of tension between pure colors.

If you separate the colors with white or black lines take on a greater prominence: any color acquires a real value.

CONTRAST

PURE COLOR CONTRAST

The three primary color: yellow, red, blue, to have greater prominence are arranged in five horizontal stripes.
Yellow has a preponderance to allude to the supernatural value of the message delivered by the angel (the yellow represents intellect, knowledge, wisdom, light, inspiration).



XI secolo, Dall'Apocallisse di San Sever, *La chiesa di Efeso*, Parigi, Bibliothèque Nationale.

CONTRAST

PURE COLOR CONTRAST

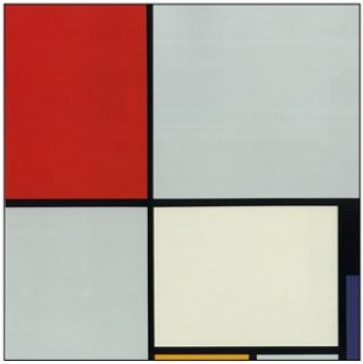
Use of gold, orange, red, blue, green, white, grey.
Yellow expresses the empyrean, then condenses into a darker orange to make the power of the angelic hosts. On the heavenly world dominated by the red. The earthly world is grey. To the right and left stands the red two religious buildings, where people can come into contact with the divine.

XV secolo, Enguerrand Charonton, *Incoronazione della Vergine*, Certosa di Villeneuve-lès-Avignon.

CONTRAST

PURE COLOR CONTRAST

In this composition, Mondrian, dividing up the surface of the painting with broad black lines, achieved great stability and has achieved absolute evidence.
The shapes and colors have no intention expressive psychological or spiritual-symbolic.
His taste for the clear composition led him to a naked realism of shapes and colors.



1872-1944, Piet Mondrian, *Composizione 1928*, Collezione Martin Stam, Amsterdam.

CONTRAST

LIGHT-DARK CONTRAST

Light and dark. Light and dark. Black and white
It 'a polar contrast. Occurs comparing colors with different brightness. The strong contrast of light and dark is between yellow and purple are opposites on the color circle for brightness. The higher the affinity of brightness (or darkness) of color, and less marked the contrast of light and dark.

In painting black and white represent the extreme point of contrast of light and shade, but between them develops the range of greys and colors. There is only one black and one white overall, but at least there is an enormous range of degrees of light and shade of grey. The grey can be a mixture of black and white and from any pair of complementary

Continuous series of 12 grey gradation from black to white. It is important that tonal gradations are equidistant.

CONTRAST

LIGHT-DARK CONTRAST : quantitative contrasts in black, white and grey

Once assimilated the tonal relationships of white, grey, black it is possible to realize proportional quantities contrasts.

Strip in three shades (grey, white, black) with strong proportional contrasts.

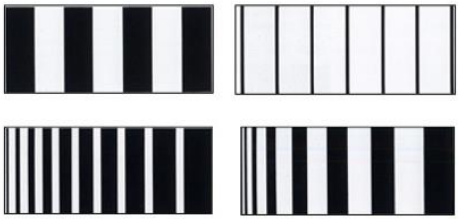
Strip in three tones. The group has much influence on the effectiveness of proportional contrast. Both the positive and the negative form are progressive.

The positive form is progressive, the negative one is constant.

The positive form is narrow, the negative form is wide: the proportional contrast is effective.

CONTRAST

LIGHT-DARK CONTRAST: QUANTITIES CONTRASTS IN BLACK AND WHITE



You can then study the contrasts proportional or quantitative, always referring to the light and dark, such as big-small, long-short, wide-narrow, thick-thin

CONTRAST

LIGHT-DARK CONTRAST

Through the different use of the hatch, the master has created some extremely fine tonal gradations. Faust to the pursuit of knowledge itself as a thinker unfulfilled. His search for the deeper reasons for life is expressed by the spatial depth between its image and the bright appearance of the window.

Rembrandt, *Faust*, acquaforte.

CONTRAST

LIGHT-DARK CONTRAST

The figure is made based on a dialectic contours of bright and dark and is plastically molded to work of subtle gradations of light and shade. The way to portray the black bow and merge it with the shadows of the dress reveals a perfect mastery.

Georges Seurat,
Il fiocco, disegno.

CONTRAST

LIGHT-DARK CONTRAST: COLOR LIGHT-DARK HARMONY

The figure represents the harmony in four: black white, grey and a color. Each color has a different brightness.

The figure represents the harmony black, grey and two colors. The black and blue in the center, yellow and grey at the ends have almost the same degree of brightness, so the accord is divided into two different tonal values.

The figure shows the harmony of black and three colors. The red and green have the same brightness as well as yellow and white, so you have two groups alternating tone.

The figure represents a six-color harmony: of black, white, plus four colors, characterized by a strong proportional contrast.

CONTRAST

LIGHT-DARK CONTRAST: COLOR LIGHT-DARK HARMONY

The painting is built on two tonal gradations. The first consists of the bright areas of lemons and oranges, of the clear part of the basket, rose and cup. Instead the fruit and basket shadows, the metal saucer, the cup and and the rose shadows are relate to the dark shade of the table and background.

Francisco Zurbarán, *Natura morta*, Firenze, collezione Contini-Bonacossi.

CONTRAST

LIGHT-DARK CONTRAST

The helmet is painted in golden tones yellow-orange light and warm and looks hard, sharp. The plume is rather soft, in two semi-tones, bright red and dark red. The face is a wonderful mix of light and dark, hot and cold. Important for the volumetric effect of the head is a small spot of light on the shoulder. In this painting, the contrast of light and shade is a medium amount of eloquence.

Rembrandt, *L'uomo dall'elmo dorato*, Berlino, Kaiser-Friedrich-Museum.

CONTRASTI

LIGHT-DARK CONTRAST

The abstract character of the painting is accentuated by the contrast between the black and the white light. The reality of the fireplace and the guitar is a distant allusion. On the darker shades dominant stand out with strong contrast of light and shade areas lighter. The red-brown of the fund is made heavier by black areas, and the brown component is enhanced by the blue with the same degree of tonal colors.

1915, Pablo Picasso, *La chitarra sul caminetto*, proprietà privata.

CONTRAST

HOT-COLD CONTRAST

It has as poles of cold and hot respectively blue-green and orange-red that maintain a fixed value, while the values scaled between them take on a value of cold or hot only in relation with the tones colder or warmer.

HOT COLORS	COLD COLORS
Yellow	Yellow-green
Yellow-orange	Green
Orange	Green-blu
Red-orange	Blu
Red	Blu-violet
Red-violet	Violet

CONTRAST

HOT-COLD CONTRAST

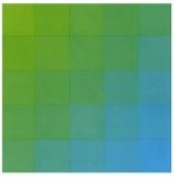
It has as poles of cold and hot respectively blue-green and orange-red that maintain a fixed value, while the values scaled between them take on a value of cold or hot only in relation with the tones colder or warmer.

In the two figures we have an identical tone-off, purple.

It gives rise to an impression of cold, since the contiguous colors are warmer.

It gives rise to an impression of hot, since the contiguous colors are colder.

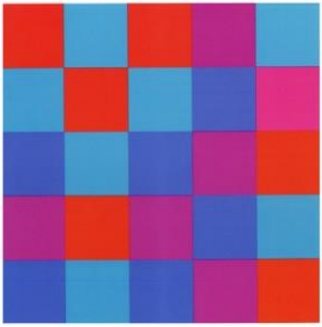
The figure represents a series of modulations in the red-orange.



The figure represents a series of modulations in the green-blue.

CONTRAST

HOT-COLD CONTRAST



In this composition checkerboard with alternating colors, the strength of the colors is enhanced by the contrast of cold-hot.

CONTRAST

HOT-COLD CONTRAST

The blue robe of Mary stands on a red background that makes it a cold light and radiant. The glacial blue and red create a contrast of cold-warm. The changing light of the sky is constantly changing its angle of incidence and colors when purchasing a different glow at any time of day.

XII secolo, Vetrata della Cattedrale di Chartres, *La Madonna col Bambino.*

CONTRAST

HOT-COLD CONTRAST

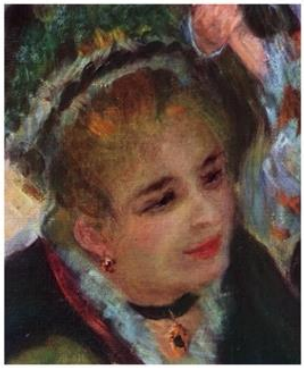
Grünewald decided to use the hot-cold contrast to represent by color the angel's concert. There are three clearly distinct tonal plans. The first is made clear by the angel who stands before, the second from the middle group of angels in red-orange, the third of the angels green, purple and blue background.

Matthias Grünewald, *Angeli musicanti*, Detail of Concerto angelico dall'altare di Isenheim, Colmar, Museum Unterlinden.

CONTRAST

HOT-COLD CONTRAST

The girl's face is rendered with modulations of tones ranging from yellow and pink to light violet, merging into each other. Each hardness of outline disappeared, softened by delicate tonal passages. Although the shapes remain almost erased from the floating light are very noticeable. The colors of the painting seem to arise from reflections, in their delicate shades appear as elusive and unreal. This is precisely due to the modulation of hot and cold colors.



1876, Auguste Renoir, detail of de *Le Moulin de la Galette*, Parigi, Musèe Jeu de Paume.

CONTRAST

HOT-COLD CONTRAST

The Impressionists noticed that the blue-cold, clear sky and the atmosphere everywhere assuming the character of a colored shadow, came into contrast with the warm tones of sunlight. Here is the hot-cold contrast orange-blue-purple. The chromatic modulations purple-blue, blue-green, yellow-green, in contrast with orange, create an unreal harmony that transfigures the scene.

Claude Monet, *Il Parlamento di Londra nella nebbia*, Parigi, Musèe Jeu de Paume.

CONTRAST

HOT-COLD CONTRAST

Cézanne has used all the colors of the color circle. However, he ended up building a perfect harmony based on two complementary pairs: red-green and orange-blue. The red-green theme is suggested by the dark form sandwiched between the clear jagged edges of the tablecloth. The four main colors are distributed throughout the painting in spots very variously modulated. These modulations of cold- hot operate the magical transformation of the world of objects which the painter consciously aimed.

Paul Cézanne, *Natura morta con mele e arance*, Parigi, Musée Jeu de Paume.

CONTRAST

COMPLEMENTARY CONTRAST

They are complementary two colors whose pigments mixed together give a neutral grey.

The complementary on the color circle, are diametrically ***opposed****, then there is only one complementary of each color.*

As opposed to, the complementary color reference each either and mutually juxtaposed reach their maximum brightness level, mixed vanish in the grey.

The combination result of yellow, red and blue is the grey, even the combination of two complementary is the grey.

Red: green = red: yellow and blue

red-green

Blue : orange= blue: yellow and red

orange-blue

Yellow : violet= yellow : red and blue

violet-yellow

CONTRAST

COMPLEMENTARY CONTRAST

The figures represented graphically the gradual addition of a complementary color data. In the middle of each strip is a grey tone.

The complementary pairs include always the three primary colors: yellow, red and blue.

CONTRAST

COMPLEMENTARY CONTRAST

Jan van Eyck begins his color play from the red of Mary's mantle and the green of the cloth that covers the kneeler. The red is repeated in the wing of the angel, the hem of the blue-green cloth, the cap of the figurine on the terrace and in the background architecture. The color of the interior of the building is a mixture of red and green. The green of the cloth is transformed in the blue of the angel dress and the figurine on the terrace. The same color become clear in the river, in the background mountains and sky shades..

Jan van Eyck, *Madonna del cancelliere Rolin*, Parigi, Louvre.

CONTRAST

COMPLEMENTARY CONTRAST

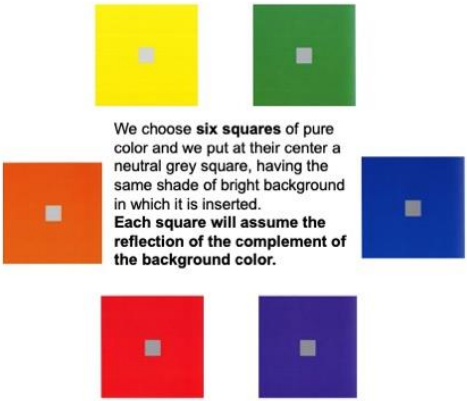
The color structure of the scene is unusual. The male group is solved on two pairs of complementary colors: orange-brown-blue and red-purple-green. The yellow-grey opaque mantle of Solomon is in contrast with the lilac dress of the queen, with the same degree of tonal colors. The yellow-grey reflects the Salomon diffidence and his confidence is manifested by cold blue stripe of the garment. The Lilac Queen expresses her noble soul.

Piero della Francesca, *Salomone riceve la regina di Saba*, dal ciclo di affreschi di San Francesco in Arezzo.

CONTRAST

SIMULTANEITY CONTRAST

*It is the phenomenon by which **our eye, subjected to a given color, it requires at the same time the complementary,** and not receiving it, he represent it by itself.*
This phenomenon proves that the chromatic harmony is essential to respect the law of complementary. The color simultaneously produced exists only in the color perception of the observer, and not in external reality.
The simultaneity effects result more serious as the longer it lasts the observation of the dominant color, and more if this is bright.



CONTRAST

SIMULTANEITY CONTRAST

In the figure we have two blacks squares on violet background, the simultaneous effect of black is green.

In the figure we have two blacks and two yellow squares on a violet background. The black does not change simultaneously, due to the presence of yellow, complementary of violet. But despite being the same black of the figure on the left, it is different.

CONTRAST

SIMULTANEITY CONTRAST

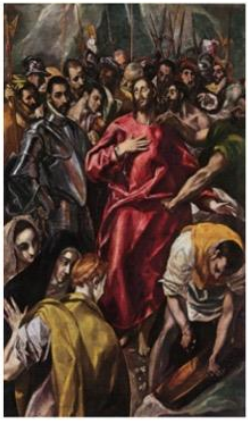
The figure shows that the primary yellow and red on blue are static, without changing simultaneously.

If you change the background color, from blue to blue-green, the effect immediately place, as the yellow and red on blue-green are excited simultaneously.

CONTRAST

SIMULTANEITY CONTRAST

El Greco has created a contrast between the greatness of Christ's regal in a purple robe, and the vulgar mass of soldiers. Christ is attacked by soldiers in green-black. Beside him is a knight locked in an impenetrable armor grey-blue, reflecting the color of the purple robe of Christ and mix it with blue-grey in a dramatic blue-purple. The purple, yellow-green, yellow-grey and grey-blue are set off each other in a simultaneous contrast incisive and inharmonious, which expresses the desperation due to the fact that the colors are not exactly complementary.

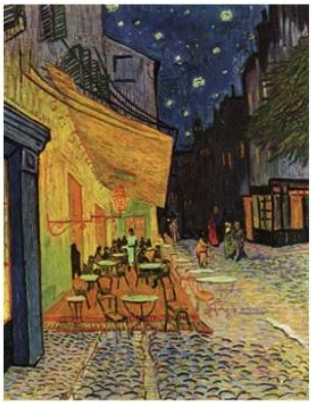


El Greco, *La spoliazione di Cristo*, Monaco, Pinacoteca.

CONTRAST

SIMULTANEITY CONTRAST

The terrace, bathed in the warm light, is yellow-orange and its light color contrasts with the dark houses and the blue-purple night sky. The dominant yellow with the orange terrace creates a simultaneous contrast with the blue-purple sky. The yellow-green of the walls and the dark green of the tree, contrasting with the red lines and spots, produce the simultaneous contrasts.



Vincent van Gogh, *Il caffè notturno*, Otterloo, Rijksmuseum Kröller-Müller.

CONTRAST

QUALITY CONTRAST

*For **color quality** refers to the **purity degree or the saturation of the colors**. The contrast of quality is therefore the **contrast between the intense bright colors and the other dull, dim**. Lightened or darkened, pure colors lose some of their brightness. When a combination is required contrast of quality, you should mix any bright tone with their dull tone.*

.

The colors can be changed or cut according to four different processes and react to the obfuscation process in a different way:

1.
we can cut a pure color with white to make it colder.
2.
you can cut a pure color with black to make it less bright.
3.
you can cut a saturated color with black and white, that is the grey. Doing so can achieve tones equal, greater or lesser brightness, but increasingly blurred compared to the starting color.
4.
it is possible to obfuscate a pure color by mixing it with its complement. So adding yellow to purple tones are obtained intermediate between light yellow and dark violet.

CONTRAST

QUALITY CONTRAST

We lay at the center of a chessboard a bright color and the neutral grey at the corners with the same brightness of the central pure color. We combine pure color with grey to give 4 intermediate progressively blurred tones. It shows the contrast sensitivity of quality in its chromatic modulations.

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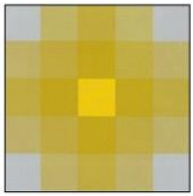
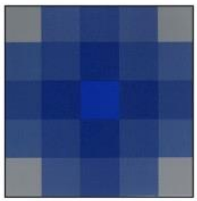
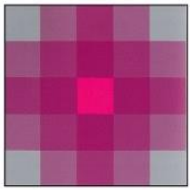






CONTRAST

QUALITY CONTRAST

The color range of Georges de La Tour is distinctly subjective. He used only the red, black and white, chiaroscuro contrasts and quality, building his paintings of light and shadows, shades of bright and dull. Taking advantage of the quality contrast attributes to the bright red a sense of serenity and warmth.

Georges de La Tour, *Il Neonato*, Musée de Rennes.

JOHANNES ITTEN

CONTRAST

QUALITY CONTRAST

Here there are two types of contrast: the first is to chiaroscuro tones, white-blue pink and orange, the second is the quality between red and dark blue. The background of the painting is a shadow blue-black night in which pure colors shimmer here and there, in the form of red fish, darting out from darkness to light.

Paul Klee, L'incantesimo dei pesci, Philadelphia, Museum of Art.

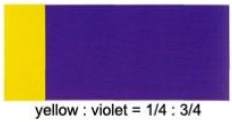
CONTRAST

QUANTITY CONTRAST

*Arises from the **mutual quantitative ratio of two or more colors.***
Two factors, closely related between them, determine the effect of a color: its intensity and size of the colored field. Each color has a different intensity or brightness.
The relations of quantity are determined on a scale of numerical values of the brightness defined by Goethe.
If the colors are not used to their maximum brightness level, also changing the proportions between them to establish harmony.

According to the numerical scale Goethe the reciprocal values of brightness are the following:
yellow: 9
orange: 8
red: 6
purple: 3
blue: 4
green: 6

orange : blue = 1/3 : 2/3



yellow : violet = 1/4 : 3/4

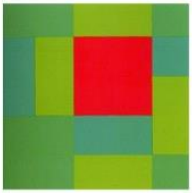
We must translate the brightness values in harmonic values by reversing the amount of numerical relationships. The relationships of quantities for the complementary ones are shown at left.

red:green = 1/2 : 1/2

CONTRASTI

CONTRASTO DI QUANTITÀ

L'azzurro è così scarsamente rappresentato da risultare appena percepibile. L'azzurro appare molto vivace ed intenso.



In questo esempio il rosso è in forte minoranza. Il rosso, presente in piccola quantità, risulta essere molto vivace ed intenso.

A fianco sono illustrati alcuni effetti dovuti a un accentuato contrasto quantitativo.

CONTRAST

QUANTITY CONTRAST

The colors are used to describe objects, it lacks any expressive function. The small orange-red stain on the sleeve and the neck of the farmer who plows is in contrast with the tones amount of blue-green, green and brown of the whole painting. The painting is essentially composed of red-orange, blue-green and their compounds

.

Pieter Bruegel il Vecchio, *Paesaggio con la caduta di Icaro*, Bruxelles, Musées Royaux des Beaux Arts.

COLOR HARMONY

REALITY AND COLOR EFFECT

*Itten defines the **chromatic reality** as the pigment, the coloring matter CIE determined and analyzed from the point of view of physical chemistry, which assumes its content and meaning by human perception through the retina and the brain. The eye and the mind can achieve an accurate color perception only for comparison or contrast. The value of a color can then be assessed only in relation with the so-called negative colors such as black, white, gray, or other colors. **The color evaluation, in contrast to reality physico-chemical color constitutes reality psycho-physics of color or color effect.***

Physical reality and chromatic effect are identified only in
COLOR HARMONY

In other cases
the reality of the color changes
producing other effects.
When reality and chromatic effect are not the same, we have a
disharmonious impression,
dynamic expression, unrealistic and unstable.

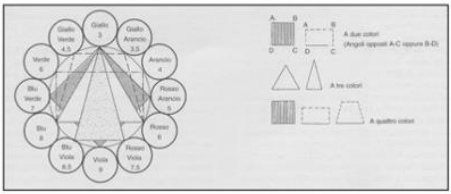
The Itten study is oriented
to **harmony of colors**,
that "means to make a judgment on the effect of two or more colors.

COLOR HARMONY

HARMONY COLOR

Two or more colors are harmonious if their combination gives a neutral grey: so the human eye is satisfied or find their own balance if **the physiological law of complementary colors** is respected (complementary colors are the sum of which gives the neutral grey).

For a harmonic color composition are **essential quantitative relationships** between colors, already established by Goethe, according to the degree of brightness:
yellow: red: blue = 3:6:8.



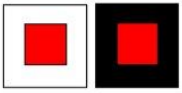
In 1961, Itten, studyng **the color circle (**a scheme of harmonious color wheel to 12 parts made starting from the three primary colors)**,** identifies several types of combinations or harmonies from those in two-color to the four colors ones.
Harmonics are all pairs of complementary colors, and all harmonies with three components in the color circle. These ones, can be mutually connected by an isosceles or equilateral triangle, a square or a rectangle. You can draw the graphics patterns of connection in the color circle starting from any primary color.

COLOR HARMONY

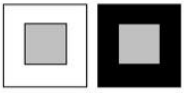
EXPRESSIVE AND DISHARMONIOUS COLORS

All combinations of colors that mixed do not yield the grey color are ***expressive or disharmonious.***

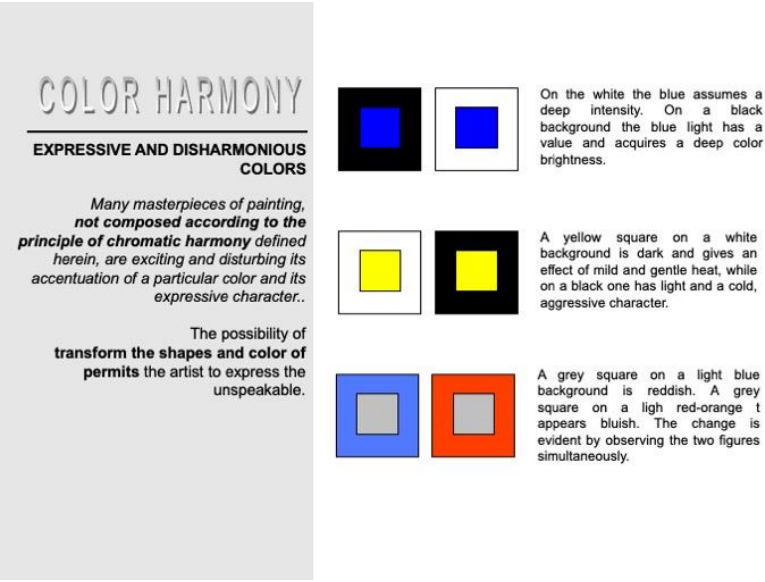
A white square on a black background appears larger than an identical black square on a white background. White is radiant and expands the limits of the square, while the black contract those.



A red square on a white background is dark and the brightness is limited. In contrast to the black, the red shines like radiating heat.



A square light grey on a white background appears dark, while on a black background is clear.



4.1.8 Legacy from Mondrian to Itten

Figure 33. Mondrian and YSL set realized by Alvufashionstyle (https://www.alvufashionstyle.com/2015/07/31/mondrian-ysl-arte-moda-michele-vignali/).


POLITECNICO DI TORINO FACOLTA' DI ARCHITETTURA 2 Tresca Rassel
PERCEZIONE E COMUNICAZIONE VISIVA WA081 A.A. 2003/2004 Prof.ssa A. MAROTTA Arch. V. TREVES
LASCIA PARLARE IL COLORE
TRE PROFESSORI SUL TRENO
TRE STUDENTI SUL TRENO
Rosso Arancio: Passionale, vitale, sensuale
Blu: Malinconico, tranquillo, solitario
Verde: Giovane, fresco, speranzoso
Rosso Viola: Arrabbiato, intrigante, sensuale
Blu Viola: Freddo,riflessivo,introverso, triste
Giallo: Solare, luminoso, geloso

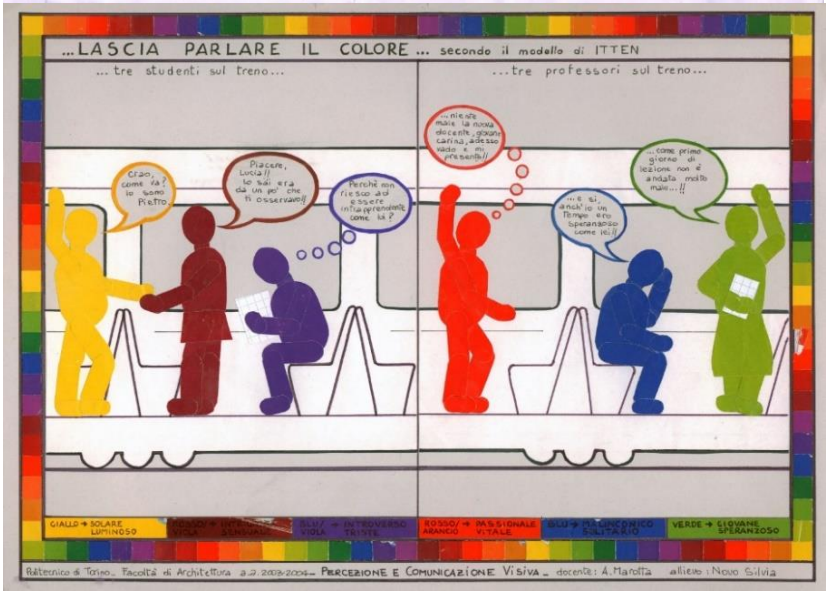

...LASCIA PARLARE IL COLORE ... secondo il modello di ITTEN
... tre studenti sul treno...
...tre professori sul treno...
Ciao, come va? io sono Pietro
Piacere, Luca!! lo sai era da un po' che ti osservavo!!
Perchè non rieco ad essere infrapprendente come te?
...mi sto mare la nuova docente, giovane carina, adesso vado a mi presento!!
...si si, anch'io un tempo ero speranzoso come lei!!
...come prima giorno di lezione non è andata molto male...!!
GIALLO → SOLARE LUMINOSO
ROSSO/VIOLA → SENSUALE
BLU/VIOLA → INTROVERSO TRISTE
ROSSO/ARANCIO → PASSIONALE VITALE
BLU → MALINCONICO SOLITARIO
VERDE → GIOVANE SPERANZOSO
Politecnico di Torino - Facoltà di Architettura a.a. 2003-2004 - PERCEZIONE E COMUNICAZIONE VISIVA - docente: A.Marotta allievo: Novo Silvia

Figure 34. Itten's theories applied by selecting opposite colour triplets on his colour disc. The two colour triads were selected by applying an isosceles triangle (see p. 83)

4.1.9 Josef Albers

Josef Albers (Bottrop 1888 - New Haven 1976), one of the first students of the Bauhaus who was awarded with the title of Meister, that is master, for presenting his theory based on his experiments in which he favors the use of paper materials (from coloured ones to newspaper clippings) with the aim of applying formal changes that may affect the behavior of the material. Within his poetics on colour, the phenomena related to optical illusions and the interaction of colour are highlighted. Among the numerous theoretical-scientific laws there is the one by Weber-Fechner, related to the differential thresholds, according to which during a sensorial perceptive experience (and therefore also visual) it is possible to verify - also quantitatively - the relationship between the real intensity of a physical stimulus and the subjective sensation induced by it.

Albers compares the behavior of colour to the one of the musical notes. The word synaesthesia, one of the rhetorical figures of the literature, can be interpreted in the field of the study of colour and related phenomena as a "consent" (or simultaneous perception of two different perceptual expressions), resulting from the stimulation of a single sensory organ. The phenomenon can involve all the five senses at the same time or only part of them. The "audition colorée" is particularly common, with which stimulus are simultaneously perceived with the form of images and visual structures.

Albers' theory proposes the perception of colour by the human eye with a location "above or below" another, resulting in a different "illusion of space" which confirms the sensation of progress towards the observer or of retreat from it. Furthermore, the theorist also expresses an apparent "volumetry in two dimensions", measuring with extreme precision the distances and the visual relationships between flat areas of tonal colors. The relationship between the chromatic ranges within the constant pattern of the square that he identifies, with different entities of extension, density, absorption and radiance. There is an interaction of the colours in the squares that are balanced or combined two by two, to support or contrast all the remaining ones: the same colour, placed on different backgrounds or adjoinings, can appear different, while in the same way - with the same artifice - different colours can seem absolutely identical (Marotta, 2010).

4.2 Phenomenology of the image and Gestalt

The phenomenology of the image contributes to the knowledge of the fundamental issues relating to the nature of images, within today's visual culture based on the pre-eminence of the image over the word and on the perceptive and aesthetic value of images, also and not only dependent on language, for the construction of knowledge, in order to integrate teaching knowledge, theoretical skills and practical procedures useful to the students for their procedures.

Contextually to the linguistic and philosophical definition of the terms phenomenon and phenomenology, it would be essential to frame the nature and the reality of images by addressing the study that emerged in the contemporary debate to offer an essential overview of the main descriptions and conceptions of the image developed by the Western way of thinking. From the distinction between artistic value and historical-cultural relevance on one hand and autonomy of the image on the other hand.

If the complexity of a visual perception (especially chromatic) is not easily describable and even less catalogable, we can here identify, in short but exhaustive terms, at least three ways in "perceptual colour":

1. Phenomenological: colour "as it appears" and as it is perceptually perceived.
2. Neurophysiological: through the knowledge of the vision receptor apparatus and its functioning.
3. Psychophysical: the production of neuronal stimulus by means and instruments and their measurement are correlated to a physiological reaction. Through the physical measurement of the emitted and perceived radiations (also in combination) which are connected to the psychological response, we arrive at the "advanced psychophysics". In these advanced colorimetric approaches, the "physical" measures are crossed and screened in a "transdisciplinary" way with psychological outcomes and aspects, towards more complex considerations.

Regarding the visual perception, according to various "schools of way of thinking" we can briefly summarize three of the main theories here:

a. Constructivist or empiricist theory (Helmholtz, Gregory): the visual perception as a construction of the image takes place from time to time by dynamic comparison between the sensory information provided by the eye and the images previously perceived in the past and stored in memory.
b. Ecological theory (Gibson): the perception of objects cannot be considered separately from the underlying structure on which they are inserted or projected.

c. Gestalt or configured form theory (Koffka, Wertheimer, Kohler, Arnheim, Musatti, Marcolli and others): the mind projects outward, through the senses, innate forms and categories adapted to the surrounding world. In the latter case, perception derives from the organization of sensations, rather than from their association by summation: the whole is not a simple sum of the parts.

The relationship between figure and background plays an important role in the development of perceptual phenomena. In this conception, memory and experience play a fundamental role. In the final perceptual outcome, there is often an interrelation between the laws of the Gestalt, rather than the prevalence of just one of them.

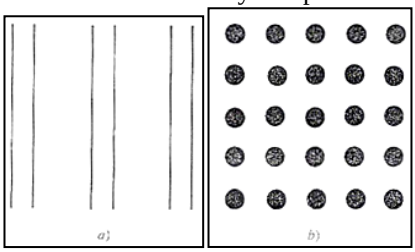
4.3 The role and the "optical weight" of colour in the Gestalt configuration of the form and in the hierarchies of the visual field: from Kandinsky, Itten, Klee, Albers, up to contemporaneity (Zeky, Maffei, Marcolli)

Gestalt psychology (Gestalt means form, scheme, representation), also called Psychology of form, is a psychological current concerning perception and experience that was born and developed at the beginning of the Twentieth century in Germany (between the 1910s and the 1930s), to then continue its course in the USA, where its main exponents had moved during the period of Nazi persecutions.

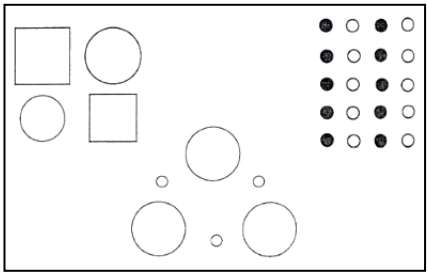
One of the essential postulates of the Gestalt is that according to which each area of the visual field is not perceived in isolation but in relation to other parts, so as to constitute units of greater perceptual importance, according to particular conditions of stimulation: it follows that everything is something more then the sum of the parts. Furthermore, the field can be segmented into areas that take on the role of figures, with an object nature, and into areas that take on a background role, of a less concrete or evident character. Regarding the modalities of these relations, it is necessary to refer to the studies conducted in this regard by Gestalt psychologists and in particular to the studies by M. Wertheimer, K. Koffka and W. Kohler. Wertheimer has identified a series of rules or laws about how to group the elements of the field into larger structures, that is into configurations. Thought and perception always concern organized wholes. The conditions by which the elements of the field unify and organize into perceptual units are determined by their relationship with the context, whose role is decisive in the recognition of figures and in the attribution of meaning. The visual field is assimilated - in analogy with what happens in physical science, and particularly in dynamics - to a field of forces. Six different laws of form or

configuration can be identified: closeness, similarity, closure, continuity of direction, significance and experience.

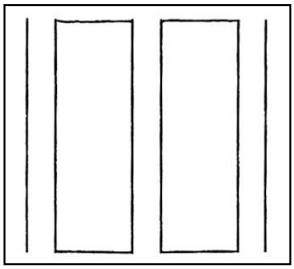
The closeness law
The grouping, or unification, occurs in relation to the proximity of the elements, which condition tend to visually compact in this.



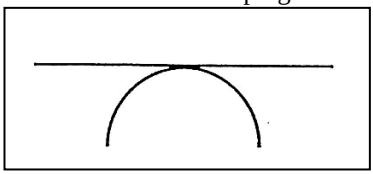
Law of similarity
For this reason they perceptually group, making the configuration stable and compact. Similarity can occur based on shape, colour or size.



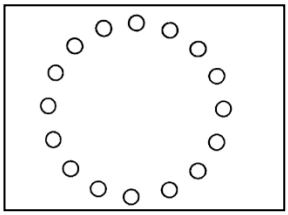
Law of closure
Assigning a meaning regardless of whether it is known or not. The perceptive role of the contour is decisive in this regard.



Law of continuity of direction
Those forms remain with their integrity and simplicity, with their set of coherent lines and natural directions developing with a continuum.

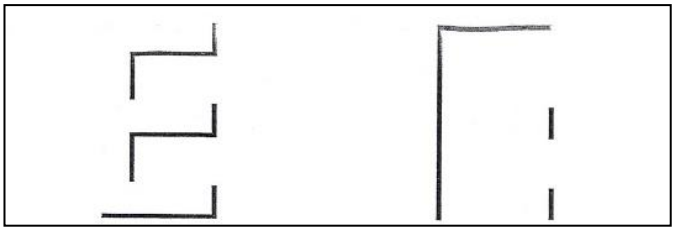


Law of significance
Parts of the field are linked together in order to produce weighty and meaningful forms, organizing the configuration in compliance with the simplest solution and with internal coherence. The tendency towards the perception of harmonious and balanced structures ensures a more immediate recognition of meaning.

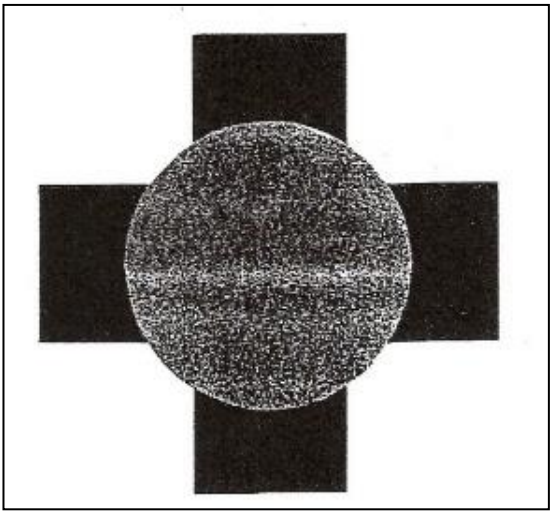


Law of experience
The psychology of form recognizes the importance of experience both in the biogenetic sense (in correspondence to the environmental conditions) and in the sense of individual experience. Experience is therefore decisive in the perceptual organization, soliciting the completion of the missing parts

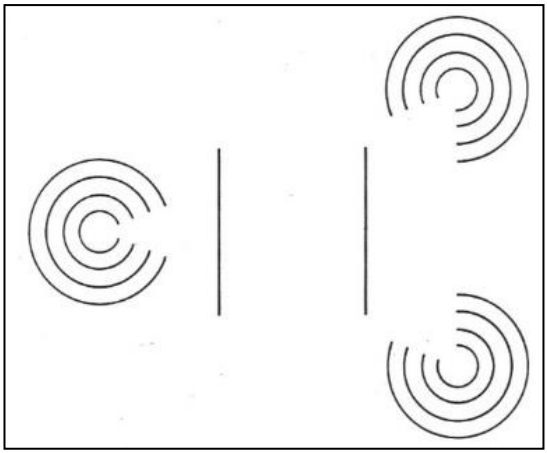
in the visual field and facilitating the recognition of data already sedimented in the memory, in certain spatial conditions.



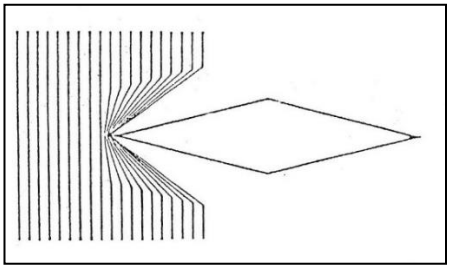
"Amodal" completion of the cross, actually non-existent, behind the circular shape.



"Amodal" completion in the non-gradient margins, producing Ponzo's illusion (according to Farné, 1968).



Causal Interaction: the striped structure appears physically deformed by the tip of the lozenge.



Optical weight between chromatisms and configurative geometries.

1. The weight also depends on the spatial depth: the greater it is the depth reached by an area of the visual field, the greater it is its weight (the reasons are not entirely known). See *Dejeuner sur l'herbe*.
2. The weigth depends on the location of the object with respect to its "visual pattern", and in particular with respect to the centre.
3. The weight of a visual element increases in proportion to its distance from the pattern's centre of equilibrium.

4. The weight is also proportional to the intrinsic being of the represented object (Ethel Puffer): that is by its symbolic and significant qualities, by its level of graphic definition and pleasantness, by its smallness, etc...
5. The weight is influenced by the isolation of the object, which is enhanced if it is isolated.
6. Weight is also influenced by shape: a regular configuration (as simple geometric shapes) makes it appears heavier. See the example on Kandinsky, or the fortifications.
7. The weight depends on the compactness of a graphic sign or shape, that is on the degree of concentration of a visual mass around its centre, hence the value of the textures.
8. Weight is influenced by knowledge that is by the experience of the beholder.

So far the characteristics are taken from Arnheim, but we can still add:

1. Weight is influenced by contrast: positive/negative, etc.
2. Direction.
3. The visual balance, as we have already said, depends on: point of application (of the pattern), value (that is weight) and direction.
4. The direction of the visual force depends on various factors, including the weight exerted by the elements of the visual field.
5. For the balance of the composition, the direction of the force must be compensated.

Figure 35. Piero della Francesca, *Pala di Brera*, or *Pala Montefeltro* (*Sacra Conversazione con la Madonna, col Bambino, sei santi, quattro angeli e il donatore Federico da Montefeltro*), tempera and oil on panel (251x173 cm), about 1472, Pinacoteca di Brera, Milan. The composition is also the result of a refined chromatic balance and optical weights.

Figure 36. Nino Di Salvatore [1], *Spazio gestaltico curvo.16,* 1989, acrylic on canvas, diameter 150 cm.

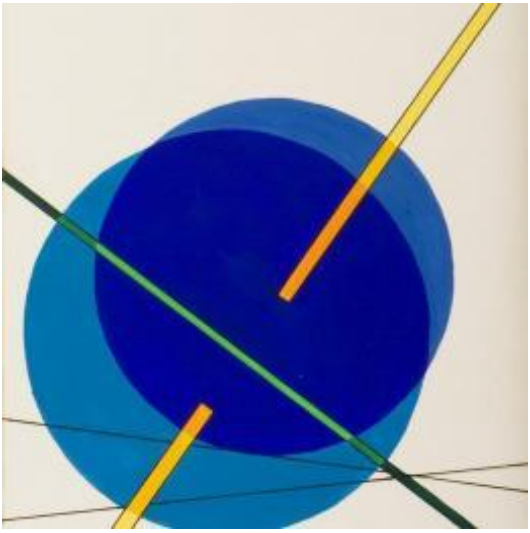


Figure 37. Luigi Veronesi [2], Tempera on cardboard, 1990, 18x24 cm, (signed and dated on the bottom right, with an authentication by the artist on a picture dated 1992).

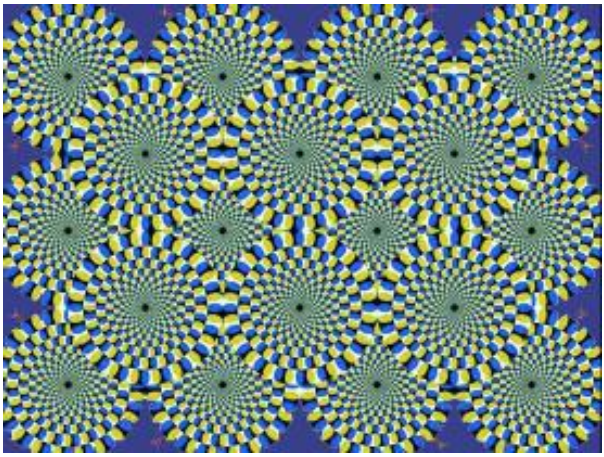


Figure 38. Akiyoshi Kitaoka [3], an optical illusion in Rotating Snakes. Tones in the phenomenology of the image.

4.4 From theories to practice: Shiro Kuramata's cultured and conscious example in design

The first, true, great figure of Japanese designer was Shiro Kuramata: in 1965 he opened the Kuramata Design Office and was the first to carry out a professional activity not linked to a company, conducting research into new formal languages. Following his own poetics, he nevertheless opened up to the exchange of ideas with some Italian designers such as Ettore Sottsass Junior and Andrea Branzi, joining the group of Memphis designers. The realization of the self-produced pieces was entrusted to craftsmen and technicians of the highest level, whose work allowed to give a very high quality to his ideas, as in the case of the *Miss Blanche* chair, 1988 (in which the design stopped the Chinese artificial roses in space) or the installation of the light for *Spiral*. Kuramata also designed the first stores for Issey Miyake, an other key figure in defining the soul of modern Japan. In fact, in Kuramata's poetic way of thinking, materials and techniques are pretexts to suggest shadows, lights, shades, transparencies and never objects, physical presences that impose themselves on space. In fact, the shock caused by this new languages was so strong that it arouse reactions often more instinctive than meditated.

However, the experiences of Alchimia and Memphis, observed with greater detachment, have not only surprised the categories of taste and style, but have had a much more profound impact on the productive and cultural

structure of the project. Researches that appeared frivolous and limited to chromatic or decorative aspects have instead concretely modified entire industrial sectors, supporting innovation, both technical and formal, in the field of coloured laminates, recomposed woods, glass and lighting. The apparent disharmony of forms, on the contrary, concealed an intimate adhesion to an unstable present and places Italian reflection at the centre of the culture of design. If the academy was unable to keep up, to update, the pages of prestigious magazines and new schools elaborated proposals and reflections.

A constellation of young foreigners, above all, found their centre of gravity in the ateliers in Milan: for the first time since the end of the Second World War, Italy discovered itself international, able to attract talents and export ideas. Shiro Kuramata was certainly not the first, and will not be the last, of the young foreign designers fascinated by the new season of the Italian design. Kuramata was perhaps the best example of a new cultural condition; he is Japanese, but "not at all Zen". Close to the Memphis group, Kuramata elaborated a poetic and swirling language, light and hard, transparent and solid, neutral and coloured. Kuramata worked with materials of his contemporary and moved in spaces without place, to extract unstable, precarious, temporary balances. His objects were ambiguous and elusive, yet they fixed with pinpoint precision the sense of a contemporary that just needed to be recognized: "the biggest problem is gravity, we have to try to think about how to remove it. My strongest desire is to feel free from gravity, free from all bonds. I want to float".

4.4.1 General review of theories and criteria

"For a designer, a good project is a generous and pertinent response to all the possibilities offered to him, and the quality of the result lies in the close and authentic correspondence between form and meaning".

The contrast between pure colours detected by Itten is evident in this piece of furniture designed by Shiro Kuramata.

Kuramata's objects have been designed to amaze, to give sensations by going beyond the systematic search for function. In all this, there is a study for precise details reflecting the minuteness of the daily life of the Japanese world, of a culture rooted in time that places its origins in the social phenomenon of the Sixteenth century, when the bourgeoisie rebelled against the imposing Samurai caste, the period of the beginning of a new culture made up by small but significant details. The quality of this designer's designs is found in the chosen shapes and colours, thanks to which they become the protagonists of the scene, enhancing full and empty spaces,

colours and transparencies that arise sensations to the touch and sight in the subjects. In the Japanese culture there is a singular relationship between the senses unknown to the Western one, particularly relating to the relationship between sound-colour and colour-sound, according to which when you look at a colour you can hear a sound, and this is the philosophy put into light by Kuramata. In fact, "the designer's work can be described as the use of the resources of a particular language made understandable through the non-verbal equivalents of intention, style, sense and structure, but there also are other levels of experience more related to the function that must be received immediately.
"A truly brilliant work is deeply rooted in its time, it includes awareness, dreams and aspirations, as well as specific resources and technologies: work of this kind respects the past and concretely creates the future" (Potter, p. 35). Kuramata's work and poetics can be observed through different points of view, such as colour, form-matter, transparency-gravity and light.

4.4.2 Colour

The use of colour is one of the main means through which a designer expresses himself. Shiro Kuramata made a particular use of colour in his creations, playing with it according to the different circumstances, starting from the use of a primary colour up to its complete "dematerialization", thus making possible to create different shades and multiple reflections. The most used colours are black, white and red-orange, probably chosen by the designer with the aim of creating possible strong contrasts thanks to the combination of them, especially in the mixture of transparent methacrylate and steel elements.
In Kuramata's designs and realizations it is possible to highlight a relationship with Itten's way of thinking regarding the choice of shapes and colours present in his theory. In fact, he developed a theory about colour, taking up Goëthe's and Runge's way of thinking, within which he identified seven contrasts of colour: pure colours contrast, chiaroscuro contrast, cold-warm contrast, complementary colours contrast, simultaneity contrast, quality contrast and quantity contrast.
The first contrast, relating to the use of pure colours at the highest level of saturation, combined with each other, can be particularly observe in *Homage to Mondrian* (fig. 42), a dresser with different red, blue and yellow geometric elements. The second contrast, chiaroscuro, is present in many of his creations, bringing the contrast to a maximum exasperation through the use of full and dark colours combined with transparent and light elements.

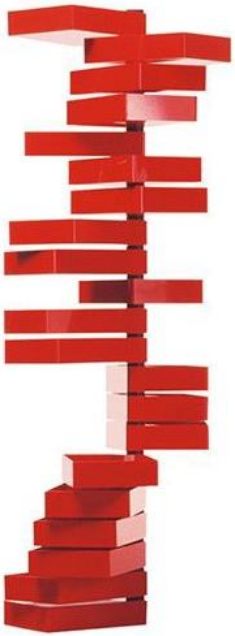


Figure 39. *Revolving Cabinet*

Among the different examples there are the *Side1/Side2* dresser (fig. 43) with its white drawers and black outer casing, the *Glass Table*, small table with black steel supports and glass top, and the *Pyramid* dresser (fig. 46), with its black drawers in strong contrast with the transparent outer casing.
The third contrast regards the cold-warm given by the combination of cold or warm colours. This type of contrast can be seen in the work *Cabinet de Curiosité* (fig. 45), composed by acrylic elements with green-blue and red-fuchsia shades. The fourth contrast identified by Itten is the contrast of the complementaries, originating from the combination of those colours whose pigments mixed together give a neutral gray and are diametrically opposite in the chromatic circle. It can be seen in one of his most famous works, *Miss Blanche*, a chair in acrylic material with elements (paper flowers) in red and green, exactly two complementary colours. The simultaneity contrast is the phenomenon whereby our eye, subjected to a certain colour, simultaneously demands its complement, and by not receiving it, our eye will represent it by itself. This type of contrast can be observe in some works by the Japanese designer such as *Revolving Cabinet* (fig. 39), a piece

of furniture made up of drawers in glossy red methacrylate, and *Sedia Seduta* (fig. 44), a chair made up by two elements rispectively yellow and black.
By quality contrast we mean the one between intense, bright colours, and other pale and dim colours and can be observe in some objects by Kuramata such as the *Sofa with Arms*, between the shine of the steel and the opacity of the leather or fabric seat. The seventh contrast identified by Itten is the quantity contrast, which arises from the reciprocal quantitative relationship of two or more colours. The effect of a colour is determined by two factors, its intensity and the size of the coloured field; each colour has different intensity or brightness. Goethe established a numerical scale based on the reciprocal brightness values. It is necessary to translate the brightness values into harmonic values of quantity, by inverting the numerical ratios. The contrast is based on the combination of high brightness colours with a low quantity value, and low brightness colours with high quantity values.
Among the works by the Japanese designer, those in which it is most evident are *Homage to Joseph Hoffman, Volume 2* and *Sedia Seduta*. In the first work it can be observe how the surface occupied by the dark colour of the fabric is considerably higher than the one of the bright light of the bulbs. In the second, the yellow seatback and seat are in smaller quantities than the rest of the black armchair.

4.4.3 Form and matter

The game of reflections and shades of Kuramata's objects are forged by a wise choice of shapes and materials. In the wide range of creations the use of acrylic materials is predominant, the result of experimentations with this extremely innovative material for the time. Methacrylate is used by experimenting with it in solid, liquid and gaseous state. Thanks to the research and the combination of this material it has been possible to create objects composed by different coloured layers giving rise to multiple internal reflections, as in *Vaso monofiore*. In addition to acrylic, glass was also often used, an ancient material but re-proposed in a modern key thanks to the use of new techniques for assembling the elements (such as photosensitive glue) that made it possible and created particular pieces of furniture that had never been made before. Among these there is the *Glass* product line, in which we can find various seats, tables, small tables and shelves. The experimentation of these new techniques and new materials led to the production of singular objects characterized by pure and geometric shapes contrasted with rounded shapes, sturdy and solid elements contrasted with perforated elements, such as the *Sing Sing Sing* chair and the *How*

High the Moon armchair. The aim was to create contrasts between full and empty, heavy and light, sensations due to the choice of shape, colour and material. In addition to this, Kuramata offered to its target objects that change their appearance as the position of some elements changes. A significant example is the *Revolving Cabinet*, a dresser composed by rectangular-shaped methacrylate drawers rotating around a central pivot thus making it possible to assume different positions.

4.4.4 Transparency and gravity

Figure 40: Shiro Kuramata, *Miss Blanche*, in http://www.moma.org/collection. Two of Kuramata's most important themes, the search for transparency and the absence of gravity, characterize this famous work.

Another important aspect of Kuramata's design work is the continuous search for the absence of gravity, the evanescence that can be found in the combination of plastic materials and glass. Among his many design objects, some are the exemplification of the combination of solids and voids made possible thanks to the use of transparent acrylics making up the outer shell or some parts of the product. There are numerous examples, including the *Pyramid* dresser and the *Miss Blanche* chair: some of these objects seem to be suspended in the void, in a particular state of weightlessness, while others seem to witness an "arrested" time limit thanks to which they retain their integrity, like the *Glass Table*.

The "dematerialization" is a theme that returns several times in Shiro Kuramata's poetics, the *Glass* line is the demonstration of the complete absence of colour characterizing his unique furniture, which retain their soul in spite of everything and are appreciated for their essentiality. The reduction to this substantial state is found not only in the absence of colour but also in the absence or reduction of the volumes of the objects. Numerous projects feature essential lines and points designed with the aim of giving them an identity, all the superfluous has been removed. This is found in the multiple steel seats, which have simple metal elements that have the function of a skeleton in which one or two cushions are placed to guarantee the seat. Some objects that can be mentioned are the *Sofa with Arms* and the *Apple Honey* chair.

4.4.5 Light

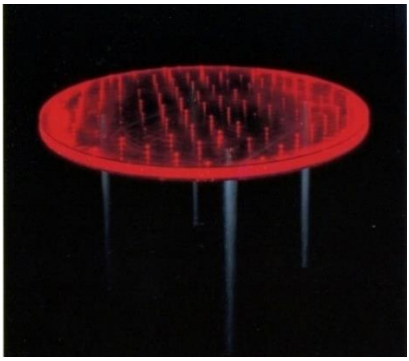


Figure 41. Shiro Kuramata, *Blues in the Night*, in Kuramata, 1988, p. 126. In *Blues in the Night* artificial light plays an important role by changing the color of the support surface.

Shiro Kuramata has also been particularly interested in the study of the light during his career as a designer. Among his creations, many are distinguished by the reflections given by the combination of glossy, transparent and different coloured acrylic materials, but also by real lighting systems modifying the physical state of the object in some cases. Among these there is the *Blues in the Night* small table, which takes on a red colour when the internal LEDs are switched on and the *Floor Lamps* which feature a long tube with a circular section, inside which flows a tangle of luminous threads. There is also the luminous version of the *Revolving Cabinet*, the *Illuminated Revolving Cabinet*, a dresser made entirely by transparent

methacrylate and illuminated by the central pivot from which the artificial light is diffused illuminating the rectangular drawers (www.treccani.it)

4.5 From theory to design works: six examples of application

The following overview of examples shows in detail the complex relationship in Shiro Kuramata's production with his matrices of colour culture.

4.5.1 Homage to Mondrian, 1983

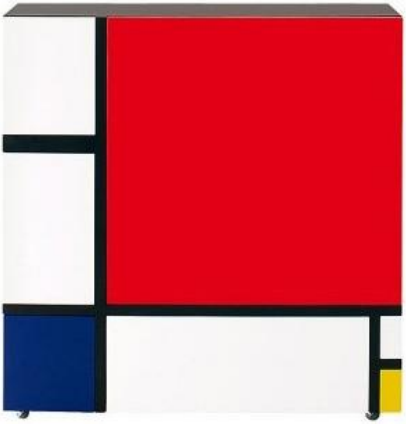


Figure 42. Shiro Kuramata, *Homage to Mondrian*, 1983, in http://www.schoener-wohnen.de/designer- lexikon/130330-homage-to-mondrian.html. This unique dresser is a tribute by the Japanese designer to the Dutch painter.

Complementary-harmonies colours

According to Goethe's theory, the pairs of complementary colours define an objective law of harmony, independent by the harmony dictated by a subjective taste. In *Homage to Mondrian* the primary colours (blue, yellow and red) were used, and it is possible to identify among them chromatic harmonies through the compositions of character. These consist in colour combinations identified in the circle through circle cords. Of the four compositions described by Goethe it is possible to identify three of them: yellow-clear blue, red-yellow and red-clear blue (where clear blue means blue).

Pure colours

The contrast of pure colours consists in the combination of any colour at the highest saturation point, it is the simplest to achieve. At least three distinct colours are required to create this type of contrast. The juxtaposition of yellow, red and blue represents the greatest degree of tension between pure colours. If we separate the colours with white or black lines, they acquire a greater prominence: thus, each colour acquires a concrete value. In Kuramata's work analyzed here, there is precisely the juxtaposition of yellow, red and blue, separated by black lines and white squares, and they take on a greater contrast. In Mondrian's composition a great stability is achieved by dividing the pictorial surface with large black lines. Shapes and colours have no expressive psychological or spiritual-symbolic intent. His taste for clear composition led him to a realism of shapes and colours.

Warm and cold colours

Colours take on a cold and warm value only in relation to warmer or colder tones. The Impressionists realized that the transparent cold clear blue of the sky and the atmosphere contrasted with the warm shades of the sunlight, taking on a character of a coloured shadow everywhere. In the work in question, there is a contrast between a cold colour (blue) and two warm ones (yellow and red).

Spatiality of colours

Colours, and even shapes, have expressive values with a sensitive and conceptual nature. The association of colours and shapes means that there is a parallelism between them. The square, for example, is a symbol of materiality, heaviness and closure. Each shape made up of a clear pattern of horizontals and verticals falls within the expressive sphere of the square. In this regard, these elements can be found in Kuramata's work due to the presence of horizontal and vertical elements.

The square corresponds to red, the symbolic color of matter; the strength and opacity of the red participate in the stillness and heaviness of the square. Furthermore, it is possible to say that the squares present in the work, especially the red one, contribute to produce the effect of the two-dimensionality of the object, to the point of making it seems devoid of depth. The spatial effect of a colour depends on several factors; in a colour there are forces producing effects of depth, and they show in form of chiaroscuro, warm-cold, quality or quantity contrasts. Diagonals and intersections can furthermore create the spatial effect.

In Mondrian's painting that Kuramata took up to pay homage to the Dutch painter, there are a not intersected blue and a yellow shapes on a white

background; blue gives the impression of breaking through the pictorial surface on white (creating an effect of depth), while yellow has little important.
A white square on a black background appears larger than an identical black square on a white background. White is radiating and expands the limits of the square, while black shrinks them. A red square on a white background turns out to be dark and its brightness is delimited. On the contrary, on black one, red shines as if radiating heat. On white background, blue takes on a deep intensity. On a black one, blue has a clear value and acquires a deep luminosity as a colour. These effects, that can be identified from the analysis of Itten's theory, can be found in Mondrian's works and consequently also in Kuramata's homage to the Dutch painter.

Colour - not colour
In *Homage to Mondrian* there are also black and white, which, according to Runge, must be considered separately as non-colours interacting with the actual colours and mixtures. By Runge there are only three colours in nature: yellow, red and blue. which can be identified in the work in question.

Light
The colours used by Kuramata in the object are not transparent.

Colour-background relationship
One of the features of this Kuramata's dresser is the two-dimensional impression that is produced especially in relation to the background. In fact, the completely white background in the picture tends to accentuate this impression of absence of depth of the work. Albers also proposes the perception of colour through the human eye with a position "above or below" another, which entails a different "illusion of space", confirming the sensation of progress towards the observer or of the retreat from the observer. The colours used (yellow, red and blue) produce a different degree of "illusion of space", meaning that the blue colour tends to give spatial depth, while the red and yellow ones tend to flatten the composition.
It is recalled that Mondrian created works in his research towards abstractionism in which colours and shapes do not have to produce any three-dimensional effect. It is therefore clear that our analyzes contrast in part with the Dutch painter's way of thinking, according to different theories of colour instead.

Dutch Neoplasticism
This Kuramata's dresser is a tribute to Piet Mondrian and for this reason reproduces the main characters of the Dutch painter's works. The latter was

among the founders of Neoplasticism, an artistic movement arose in Holland in the second decade of the Twentieth century. The word was coined by Mondrian to define the doctrine at the basis of his painting and theorized the exclusive use of the right angle and the three primary colours, as in the abstraction of all shapes and colours (that is in straight lines and primary colours), he aimed to find a new form of plastic expression, not subjective but valid for everyone. In Kuramata's work there precisely are the three primary colours (yellow, red and blue), lines and right angles, that are the founding elements of Neoplasticism and therefore of Mondrian's painting.

4.5.2 Side1/Side2, 1970

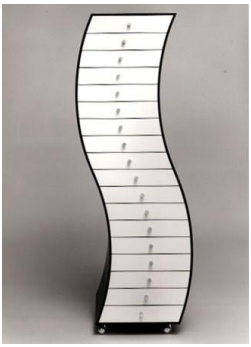


Figure 43. Shiro Kuramata, *Side1/Side2*, in http://www.archiexpo.it/prod/cappellini/cassettiere-design-6547-3447.html

In this work by the Japanese designer it is possible to detect the contrast of pure colours. The dresser is characterized by black and white, achromatic colours according to Goethe's definition.

Chiaroscuro

Analyzing this work by Shiro Kuramata, according to Itten's theories about colour, it is possible to detect the chiaroscuro contrast among the seven he identified. The colours used by the designer for this piece of furniture are black and white, as it can be seen in the figure, which represent the extreme point of chiaroscuro contrast for Itten. According to Itten, between these two extremes there is an extraordinary range of chiaroscuro degrees of gray; some of them can also be identified in this object, through the shadows it casts on the background and which are created by the succession of concave and convex surfaces characterizing it.

Colour - not colour
As already written, in *Side 1/Side 2* there are only black and white colours which are actually "non-colours" according to Runge, and are characterized by being non-transparent or corporeal.

Color-background relationship
This Shiro Kuramata's dresser is characterized by the use of opaque coloured materials (white on the front and black on the sides). The perception of the furniture within an environment is greatly influenced based on the colour of the background; in fact, at the presence of a light colour, the dresser would tend to blend in with the background. On the contrary, the presence of a dark colour would highlight the object due to the contrast that will be created with the white of the dresser. These considerations are valid if you look at the object in front, while if you look at it from the perspective, other contrasts would be created between the colours of the dresser and the object.

4.5.3 Sedia seduta, 1984

Figure 44. Shiro Kuramata, *Sedia Seduta*, in http://www.icollector.com/Shiro-Kuramata-Sedia-Seduta-Ishimaru-Co_i6242065. The name chosen by Kuramata for this object well describes the concept underlying its base: a chair "sitting" on an armchair.

In this chair by Shiro Kuramata yellow and black were used. The first one is part of the six colours of the spectrum identified by Goethe and is one of the three primary (fundamental) colours together with cyan and magenta (a variety of purple).

Chiaroscuro
As in Side 1/Side 2, in *Sedia Seduta* it is possible to identify first of all the chiaroscuro contrast again. The two colours used, yellow and black, have different degrees of brightness: in fact, yellow has a high degree of brightness, while black has the lowest brightness value: the combination of colours with different degrees of brightness generates the chiaroscuro contrast.

Quality contrast
Another one of Itten's contrasts that can be observed in this work by Kuramata is the quality contrast. Chromatic quality is the degree of purity of colours, where purity means their degree of saturation. Quality contrast is the contrast between intense, bright colours and other pale, dim ones. In *Sedia Seduta* the contrast originates between yellow (bright and intense colour) and black (dim colour).

Spatiality of colours
The object in question is characterized, as already written, by a two-toned also characterizing it from the point of view of its shape and its solidity. The (bright) yellow colour has been used by Kuramata in the backseat and in the seat, which consist of a thin layer of material. The brightness of the colour helps to accentuate the sense of lightness of this element. The two parts just mentioned (yellow back and seat) are installed in a black parallelepiped. The use of this colour (pale and dim) accentuates the heaviness and solidity of the base part of *Sedia Seduta*.

Color - not color/light
In addition to yellow, black was used in the work in question, which is considered a non-color by the German theorist. In this case, yellow is not transparent as well as black, which Runge considered a corporeal colour, that is devoid of transparency. In *Sedia Seduta* Kuramata used yellow, which for Runge is one of the three existing colours together with red and clear blue.

Color-background relationship
In the seat by the Japanese designer, colours are also used to differentiate the two elements composing it: yellow for the thinner elements, while black for the massive base on which the first ones lay. As for Albers' theory, it can be observe that the two colours used appear on two different levels. In particular, yellow appears to approach the observer (sensation of advancement), while black appears to move away (sensation of retreat).

4.5.4 Cabinet de curiosité, 1989

Figure 45. Shiro Kuramata, C*abinet de Curiosité*, in http://www.phillipsdepury.com/auctions/lot-detail.aspx?sn=NY050310&search=&p=&order=&lotnum=12.

Cabinet de curiosité, transparent acrylic shelf with coloured modules alternated in the vertical elements. If it is observed from different angles, the effect of the colours changes due to an overlapping effect.

Warm colours and cold colours
This design object created by Shiro Kuramata is made up of a set of different vertical and horizontal elements in transparent and coloured acrylic. In particular, it is possible to highlight an alternation of cold (green and clear blue) and warm (red and magenta) coloured modules in the components, thus creating a warm-cold contrast. In addition, warm and cold depend on the combination of different colours: in certain segments,

magenta may arise an impression of cold if the adjacent colours are warm, otherwise warm if the neighboring colours are cold.

Pure colours

By observing the shelf it is possible to identify a contrast of pure colours, as the coloured acrylic elements with a greater degree of saturation are combined in certain points. In fact, there are two types of combinations: red with green and magenta with blue.

Degree of colour saturation

The alternating warm and cold colours in modules of different sizes can cause different sensations based on the clarity of each single element: the parts with a higher saturation level give an idea of a certain solidity, unlike those with a lower level which almost seem to be crossed inside by a liquid. Thanks to these characteristics, the shelf can exemplify two of the seven contrasts by Goethe's theory of colour: the contrast of quality and quantity. In this case, the design object does not have its own well-defined totality and integrity, it can appear as a dematerialized geometric shape to an individual's sight. Harmony can be created by the balanced ensemble of the different alternating elements in different colours.

Complementary colours and harmonies

The shelf is characterized by the set of Goethe's main "expressions" such as yellow, blue, red and green, a term by which he defined colours. The first three in particular are the three pure colours placed at the vertexes of Goethe's chromatic circle, while the green turns out to be a real mixing colour between yellow and blue. This last colour creates a harmonic, that is a diametrical composition when it is combined with magenta.

Light

The shelf features the only three existing colours according to Runge, namely yellow, red and clear blue, interspersed with other defined mixing colours, such as green and magenta, created by the transition from one pure colour to another. These are in particular transparent colours, which, according to Runge's way of thinking, are most affected by the effect of light that creates greater energy on them and from which it is reflected in a more relevant way. In addition, the light (both natural and artificial) involves the creation of different coloured shadows in the surrounding environment, giving origin to a special effect makimg the design object even more unique.

Spatiality of colours

The perception of the colours characterizing the artifact conceived by Kuramata varies according to Albers' theory. In fact, the segments with warm colours at a high saturation level seem to advance compared to those with a lower level and compared to the cold ones, thus giving a feeling of lift. These can be considered as different chromatic ranges that balance and contrast each other in the vertical elements of the shelf, thus giving an effect of instability. Moreover, the perception of *Cabinet de Curiosité* within the space can also vary depending on the environment in which is placed: if the background is white, the colours of the transparent acrylic material appear as they are, and they may appear different only in the case of a front view, as the colours of the four support elements are added two by two by varying the perception of the colour of the segments (which added together can appear different from reality). The same phenomenon of distortion can also occur in the case of an environment characterized by a coloured background, as the transparent acrylic material makes it possible to mix the colours of the object with the ones of the background.

4.5.5 Pyramid, 1968

Figure 46. Shiro Kuramata, *Pyramid*, in http://www.bonluxat.com/a/Shiro_Kuramata_Pyramid.html

Pyramid. Dresser in transparent and black acrylic with a particular pyramidal shape, defined by the shape of the individual drawers composing it, placed in ascendancy.

Pure colour

The black colour represents the extreme chiaroscuro point of the vertex of Itten's chromatic star model. A phenomenon of proportional contrast may occur in the event in which the black drawers are left open in a disorderly manner, giving an effect of imbalance to the viewer who will be able to distinguish the pyramid shape to a lesser extent.

Colour and non-colour

The *Pyramid* dresser is characterized by the black colour of the drawers enclosed in a transparent casing. According to Runge's theory, black is one of those colours to be considered separately as "non-color", like white, in this case brought to the minimum level of saturation. In fact, the total transparency represents the total dematerialization of the external cladding.

Gestalt laws

The design object arises a never unitary perception of form at the sight of the observer. In fact, *Pyramid* is characterized by a unique structure in transparent acrylic, in which the black drawers of decreasing shape are placed from top to bottom, spaced from each other by a few cm. The singular pyramidal shape can be perceived when there is the "total" closure of the individual elements defining its shape, thanks to the Gestalt law of closure, according to which the visual system associates the character of objectivity with the closed form, assigning it meaning independently of whether it is known or not. The recognition of the geometric shape can also take place thanks to the experience law, according to which experience is decisive in the perceptual organization under certain spatial conditions, as completions the missing parts are solicited in the visual field and the recognition of data already settled in memory is facilitated.

Degree of colour saturation

Pyramid is a dresser characterized by the presence of two non-colours: black and white. The first is at the maximum level of saturation, it constitutes the central body of the transparent casing that emerges in a particular way, which can be considered as white in the state of minimum saturation.

Spatiality of colours
The perception within an environment of Kuramata's dresser, entirely made with opaque black elements and a transparent colored casing, may vary according to the colour of the background. In fact, the pyramidal geometric shape is enhanced at the presence of an environment characterized by a clear and pure colour (white, yellow, red, green), while on the contrary with a dark background (black, dark gray or blue) it is possible to have a minor perception of this singular form.

4.5.6 Laputa Bed, 1991

Figura 47: Shiro Kuramata, *Laputa bed*, in http://www.designboom.com/portrait/kuramata/laputa.html Laputa bed. Singular queen size steel bed, with modules coloured in clear blue and fuchsia that alternate creating a destabilizing effect.

Warm colours and cold colours
The bed is characterized by a steel structure in two contrasting colours: magenta and clear blue-blue. The first is a warm colour, a colour giving the eye an ideal satisfaction and making the design object even more welcoming. The second, on the other hand, is a cold colour, it clearly detaches from the first, causing a possible cold reaction (also given by the used material, polished steel). This singular object can attract the

observer's attention at the sight thanks to the alternation of the two colours characterizing the structure of this piece of furniture, which creates an effect of disorder involving and destabilized perception by the subject who is observing it, due to the continuous alternation of clear blue and magenta between the two headboards and the bed supports.

Complementary colours and harmonies
Laputa Bed is characterized by two colours among the main ones identified by Goethe, magenta and blue, which constitute two of the vertexes of the triangle of primary colours inscribed in the chromatic circle. In particular, a chromatic intensification effect can be created, as the clear blue intensifies into the magenta if the turbidity is attenuated.

Spatiality of colours
The colour of the space in which the bed designed by Kuramata is placed can influence the perception by the observer. In fact, if the background is a warm colour such as red-orange and magentas, the parts of the steel structure of the bed that can emerge in a particular way are those in blue; vice versa, if the background is characterized by cold colours, the opposite phenomenon can occur. If, on the other hand, the background is white then the two previously mentioned colours are in balance and at the same time in clear contrast. In the latter case, it is the silk textile complement that can be "uniformed" and it can emerge in a small way from the background, thanks to the white colour with a texture reminiscent of the star piece terrace created by the designer.

5. Colour as language, sign and symbol: significant semiotic and signify semiotic

The partial conclusions we have reached in the previous chapters direct us to some considerations, if not confirmations. In the case of Kuramata, for example, we have had precise results with respect to the laws, criteria and parameters derived from the theories he privileged, freely applied, therefore within the absence of uncritical automatisms. On the contrary, we have observed how the applications of these laws from the emerged theories, have been enriched by crossing with other aspects.
The same can be said above all for some themes in the field of Liberty and Futurist graphics that we have proposed: in this case too, we have been able to find correspondences, without rigid and sterile automatisms: therefore, chromatic theories can be considered (if we do not want to strictly apply all their decrees) as a direction and orientation, both in the application for

analysis and design, as well as to broaden, deepen and articulate our knowledge (our reflections) on chromatic culture.
Now, considering the breadth and numerousness of the comparative theories in the synoptic table of figure 20, we can ask other questions, such as: "is it possible for theories to find proofs of the way of thinking and the visual mode that can be derived from the theories of colour, even in other historical periods than those we have examined so far?". The answer is positive, if we cross (for example) the "chromatic way of thinking" (and the related practice) to the artistic theories in Italy, from Renaissance to Mannerism.
But to those questions, we can add an even more complex one: "it is possible to use colour within Significant and/or Signified Semiotics (as we have indicated in the Classification of the Sign, on p. 21) precisely to confirm its symbolic and significant function?

5.1 An effective link in the art of persuasion: rhetoric and "chromatic image" in the Semiotics of Vision

To confirm this, in the Sixteenth century for example, the Counter-Reformation set the goal - in the Jesuit "rhetorical way" - of also visually regulating art and architecture, according to strategies planned and inspired by figures such as Ignazio di Loyola (with the Jesuit Society), to oppose the French Reform. The precise attention paid by religious institutions to architecture and art was complemented by a similar attention paid - by contemporary leading figures - to colour and its theories: among many, Jesuit theorists of colour emerged, such as Athanasius Kircher and François d'Aguilon. Among the protagonists of the Council of Trent (and therefore later), the Culture of Vision - in the treatises following the Council of Trent - confirmed the importance of colours. In his treatise Gabriele Paleotti (1522-1597) (Paleotti, 1582) defined painting, "as a popular book, capable of any material, be it sky or earth, animals or plants, or human actions of whatever kind, which requires that the painter […], at least mediocre or not lack of competence at all". While chap. XII prescribed to avoid "profane images [...] with large masses of gold [...]" while "natural, figured and vividly coloured things [...] give us the true news (scientific, NDR) without which we are in difficulties and darkness of various things". While in the *De pictura sacra* (1624) Federico Borromeo (1564-1631), Carlo's cousin, theologian and very young cardinal, prominent figure, lover of science, admirer of Galileo, spoke explicitly about colour in chap. XI: "The painter needs piety above all: "Colours are almost words that, perceived with the eyes, penetrate the soul no less than the voices perceived by the ears [...], so

that even the vulgar and the ignorant multitude understand the language of painting, and with no less effectiveness than prudent men […]". Federico insited: "the pale colours and these pale marbles do not disdain the laws of decoration, they need even more": therefore a precise rule of the expressive codes of the Seventeenth century. The recommendation in the use of non-bright colours and reliable settings were consistent with the ideological environment in which Carraccio, Caravaggio, Veronese (and others) will have to - unwillingly - move. Without forgetting the perspective and spatial hierarchies as peremptories of the visual narrative, the close relationship between the prescriptions from the Council of Trento and the dramatic shots is confirmed, especially with the "night" lighting to enhance the "ray illuminating existence" with the true Roman Faith.
Another significant example is the contribution by François Aguilón, known

Figure 48. Pieter Paul Rubens (1577-1640), *Juno places Argus's eyes on the peacock's tail, at the presence of Iris*. Cologne, Wallraf Richartz Museum, 1611, oil on canvas (2,5x3 m). The "ray of Iris" as the significant language of chromatic Culture in Time (Iris, the mythical figure, Taumante and Elettra's daughter, the personification of the rainbow, messenger of the gods, especially Zeus and Hera).

for his book about optics (Aguilón et al., 1613): in *Argos' death* (fig. 48) Rubens punctually applied the principles that the treatise set out in the three types of mixtures of colours: the *compositio realis*, where colours are produced by the mixture of materials; the *compositio intentionalis*, where colours are combined within a transparent medium; the *compositio notionalis*, in which, as Kemp recalled: "Colour spots, so small as to escape the sight, converging as sensory impressions of the eye, so that for each combination of colours a uniform original colour is received". Pratically, the principle of optical mixing, later confirmed by authors such as on Bezold (Marotta, 1999).

But the same image confirms another fundamental fact: through visual metaphors (peacocks, Juno's diadem, Argos' eyes and his severed head, Iris' rainbow) the Chromatic Culture represents and communicates itself. The painting, commissioned by Jacob de Bie, but later sold to Giovanni Battista and Stefano Balbi, left for England in 1806 and it is now in Cologne. It has been recently restored for an exhibition dedicated to the years the painter spent in Genoa, it represents the moment in which Juno places Argos' eyes on the peacock's tail. The goddes prepares to place the shepherd's hundred eyes on the feathers of the peacock, her sacred animal, sorry for the death Mercury had inflicted on Argos. Juno had entrusted to the shepherd the custody of Io (a young priestess whom Jupiter transformed into a heifer to hide the adultery from his wife), since his eyes, which are placed only on the head, in accordance with Ovid's tradition, never closed all together and therefore he always remained vigilant.

The decapitated body derives its posture from a drawing with Tizio by Michelangelo, and its livid appearance is highlighted by the comparison with the colour of the puttos' complexion, on the right in the picture. The group with Juno and Iris, on the other hand, takes up a composition by Mantegna, *Giuditta e Oloferne* (Jaffè, 1989; Boccardo, 2004; Hofstede, 2004, pp. 106-107; http://www.istitutograf.org/recensions_genova_rubens.htm).

As a final example - in relation to what has just been exposed - we cite Giovanni Battista Salvi (Sassoferrato), who used the changing colours deriving from phenomena actually observed in nature, (and at the time used for their aesthetic values, regardless of the naturalistic characters, and widely recommended to give grace to chromatic harmonies) by applying them mostly to "figures of lightness". Like the "shiny garments" of the nymphs or the angels with reflective "not otherwise than the bow of Iris" dresses; the same chromatic solutions were combined with figures such as Salome or Mary Magdalene. Such colour solutions are not recommended

for the Virgin or for other highly respected figures according to him, confirming an ancient rule in use: in analogy with symbolic purposes, less so with the science of nature. Between the Sixteenth and the Seventeenth century, therefore, it is confirmed how history and theory of colour contributed to build the one of cultural way of thinking.

5.1.1 The Culture of Vision in the theology of the Jesuit Society. Communication and persuasion of the theories by Sant'Ignazio di Loyola. The Jesuit "theatre"

The composition should be read as the focal point of a complex whole, made up of the entire space of the chapel, where the baroque genius makes manifest the concept of the "beautiful assembled", that is the thematic and visual unity between architecture, sculpture, painting and decoration. Bernini took up the theological meaning due to the suggestions of the Venetian nobleman: the dedication to the reformer saint of the Carmelite Order is associated with the celebration of the Corner family with the seven cardinals (including Federico and Doge Giovanni who are buried there, the latters long dead). They are depicted here as living, in conversation with each other and facing from choirs and boxes, beyond which it is possible to see majestic architectures in an illusory perspective, converging towards the altar of the chapel. The illusionistic game between real and unreal involves all categories: place, space, human time and divine time.

While recalling Bernini's consummate experience as a set designer and author of theatrical machines, it is good to underline that the spectacular nature of Bernini's highly cultivated art is not a mere "artifice", adapting perfectly to the religious content in that need for persuasion - conformed to the meaning - that the theatre of the Jesuits expressed by a linguistic system that indiscriminately blends all artistic techniques in an integral and total vision of art. In this work from his maturity, Gian Lorenzo Bernini managed to effectively achieve one of the basic objectives of his research: to implement, through the integration of the arts, a new lyrical synthesis between vision and emotions. Man overcomes his human limitations, only by voluntarily opening to God.

Figure 49. Bernini, Estasi di Santa Teresa, 1647-51, Rome, Santa Maria della Vittoria.

5.2 From the Counter-Reformation to the *Nouvelle Rhétorique*: from the relationship between signifier and signified, to the relationship between expression level and content level

In the relationship between the signified and the signifier, what can the role of colour as language and "chromatic image" be? To move towards a semiotic translation of the role of colour as a "chromatic image", some preliminary concepts are indispensable.

We have observed how (paragraphs 3.2 and 3.2.1) the image (including colour) is included by many Authors in the third category in the classification of the sign: the one of analogical or iconic signs: therefore, among the most complex, versatile and full of meanings. In reality, with regard to visual (and chromatic) communication, it is hardly necessary to reiterate how what appears to be a mere "natural" perception, derived from immediate reactions of our sensory apparatus, is actually "the most theoretical of the senses" (Napolitano Valditara, 1994) to be considered, if not precisely as an "exact science", certainly through "logical" and clear disciplinary rules.

But, as in all types of communication, an indispensable aspect is constituted by signification: therefore, together with the control of scientific and technical approaches, also the one of the means of expression or content (cultural, artistic, emotional), appears fundamental, linear with what is proposed (for example) by figures such as Algirdas Julien Greimas, by the Groupe μ from Liège and by the school of the *Nouvelle Rhétorique*, or by Hjelmslev and Perelman (Greimas, 2002; Hjelmslev, 1999; Perelman, Olbrechts-Tyteca, 1958). By Louis Hjelmslev in fact, the distinction between signified and signifier is broadened and articulated: the signified (insensitive) becomes the "content level", while the signifier (sensitive and therefore communicable) becomes the "expression level". Both "levels" are structured and organized no longer through "simple" sign units, but through whole semiotics (we assume here the term "semiotics" with the meaning by De Saussure, as a "science of signs", which tends to an overall and general analysis of the mechanisms underlying knowledge, communication, languages and all human activities understood as languages. Examples of semiotics: mythology, flowers, others.

Hjelmslev again called "connotative semiotics" those whose expression level is a semiotic, and instead called "metasemiotics" those in which the content level is a semiotic, in analogy - it seems - with the term "metalanguage", when it contains in itself a part of the message content. But how is a transfer of this (even rhetorical) approach possible into the language of vision? The *Trattato del segno visivo* (Migliore, 2007) laid the

foundations to propose some instances, also in relationship between Semiotics and Representation.
It is born from rhetorical needs essentially used by the corporate, in marketing and advertising sectors, the treaty (Migliore, 2007) can be considered a useful premise - theoretical and applicative - on the strategies of visual argumentation, towards the construction of an interpretative model which, far from considering rhetoric as an ornament of discourse, is confirmed as being of fundamental importance to enhance reasons and arguments, support ideas and structure them, especially in a systematic process.
The *team*, (with Francis Edeline, Philippe Minguet,) devoted to interdisciplinary research, crossing semiotics with the theory of linguistic and visual communication [4]. In particular, Jean-Marie Klinkenberg, aware of the need (but also of the criticality) in governing such a broad and complex process, specified: "the evolution of graphic material follows the same paths as language, that is: equipartition of information; strengthening of redundancy; coding of first level units and formation of closed repertoires; assembly rules for the second level" (Migliore, 2007, p. 209). In the same book, Klinkenberg re-proposed some interesting and more than acceptable positions to problematize and systematize some aspects in the structure of visual rhetoric; for example with the role of geometric constructions (Migliore, 2007, p. 209). In our opinion, this part could be completed with configurative geometries (Gestalt) or according to an approach including other types of geometric conception too (up to the golden section), as claimed by Charles Bouleau (Bouleau, 1988). Less effective and convincing - also because it is not entirely clear - is the approach of this "School" to the theme of colour.

5.2.1 Colour as a visual and philosophical metaphor in Diogo de Carvalho's *Tratado*

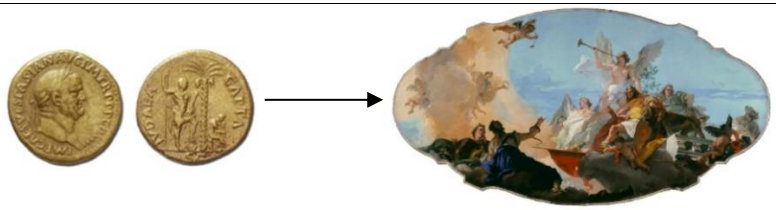
Deep analogies on the same themes and meanings (addressed through mythology as a semiotic signifier) are clearly found in the author of an important treatise about colour from 1787, the Portuguese Diogo de Carvalho, who anticipated the contribution to chromatic way of thinking (explained in his issues), to science and to the production of knowledge on this topic. Among his references, Aristotle stands out in the index - who, moreover, he criticized because "he affirmed that colours were properties or qualities of the bodies and that they existed in them without dependence on the light. He had not proved at all his opinion; nor he could do it, being it contrary to all experiences". In the path affecting us, de Carvalho met

Humboldt, already Friedrich von Schiller's friend, but above all Goethe, a key figure in Diogo's experience towards the Culture of Colour, which he faced and lived at 360 degrees (Marotta, 2020). Certainly, one can agree on the "romantic" character of their - shared - approachs to life and to the knowledge of time. Diogo programmatically linked the literary sphere to the chromatic culture, also expressed through strongly and programmatically chromatic visual metaphors. This is what happened when he convicingly stated: "The most famous poets will all fall, in the admirable and beautiful phenomenon of the celestial arc, in their metric compositions". Omero attributed to it the colour of gold: [p. 148] Ιριν δ᾽οτρυνε χρυσοπτερον αγγελεουσαν ", (*Iliad*, lib. XI, 185). Probably, also for their characteristics of iridescent polychromy, Diogo maintained that "The neck of the dove and the tail of the peacock are beautiful objects, which must be sung even by the best poets". Lucretius depicted them as follows: "*Pluma Columbarum quo pacto in Sole videtur: Quae sita cervices circum, collum que coronat* (Lib. II. De Rer. Nat) [p. 149] (XXII. §. 49)". Keeping on, Diogo recalled other chromatic examples, between Vision and Literature: "Tasso, perhaps imitating this beautiful original (by Lucretius NdA), depicted the same phenomena of colours, in the feathers of the dove and the peacock (*Gerusalemme Liberata*, Cant. XV .5. [p. 149])". And Virgilio mentioned the peacock in his *Metamorfosi* too, according to De Carvalho: "offers you a thousand colours in his verses of the Aeneid", as a metaphor for vision. Let's not forget that, on the same theme, Pieter Paul Rubens realized one of the most important and significant paintings from Virgil's *Metamorfosi*, representing the peacock with its tail as a metaphor for vision, specifically the chromatic one; not surprisingly, the painter had already collaborated for a long time with François d'Aguilòn for the illustrations of *Opticorum libri sex*. Again regarding the observation about colour in nature - between science, art and poetry - Diogo also referred to Milton (Book VII, *Lost Paradise*), who exalted all the plants which (leaving the hand of the Creator) decorate the Earth (naked before the Creation) in the prevailing and pleasant Colour of Green.

5.2.2 Colour in Significant Semiotics (ALPHA Group)

Actualizing the discourse anticipated by De Carvalho and other treatise writers, it may be legitimate to ask a question here: "how can colour be significant through the concept of chromatic image?". But what definition of image can we assume for our communication purposes? According to many scholars (Floch, Groupe μ, Arnheim, Damish), it can be understood as a complex of significant elements, that is as a text. It can express complex

conceptual models, even in purely visual terms. Therefore, if we come back - albeit in non-rigorous terms - to the classification of the sign in the Semiotic of Vision, within this we can resume the category of analogical or iconic signs (that is those given by formal similarity and/or cultural and social relationship), also deep in the visual, perceptive, chromatic ways.

<table>
<tr><td rowspan="5">They presuppose the attribution of a subjective and/or collective value and therefore a critical interpretation</td><td rowspan="3">ICON</td><td>IMAGE</td><td></td></tr>
<tr><td>DIAGRAM</td><td>Logical, mathematical, chemical formulas, drawing</td></tr>
<tr><td>METAPHOR</td><td></td></tr>
<tr><td rowspan="3">SYMBOL</td><td colspan="2">NATURAL</td></tr>
<tr><td colspan="2">ANTHROPOLOGICAL</td></tr>
<tr><td colspan="2">OBJECT-SYMBOL</td></tr>
<tr><td colspan="4">Definition of image and classification of sign:
CONTENT LEVEL AND EXPRESSION LEVEL</td></tr>
<tr><td colspan="4">  </td></tr>
<tr><td colspan="2">sign as</td><td colspan="2">to the sign as</td></tr>
<tr><td colspan="2">SIGNIFIER + SIGNIFICANCE</td><td colspan="2">EXPRESSION LEVEL + CONTENT LEVEL (with ‘dedicated’ semiotics)</td></tr>
</table>

By Groupe μ and Louis Hjelmslev,
the distinction is:

Content level
= significance =
Ideas awakend by a sign

Expression level
= signifier =
Material manifestatione of a sign

We can therefore define:

- ***connotative semiotics*** those whose expression level is a semiotic
- ***metasemiotics*** those in which the content level is a semiotic

Assuming the Mythology as semiotic signifier then, an answer to the question posed previously can be expressed through the image of Botticelli's Venus: since she hides her sexuality with her long hair, alluded (through a rhetorical preterition) by the shape of the hair itself, in a way that seems ambiguous.
Everything leads back to the principle that the nakedness of Venus is not only an exaltation of classical beauty, but also an affirmation of pure beauty, of the simplicity of soul. Among the hidden meanings of Venus there is also the correspondence between the pagan myth of the birth of the water goddess and the baptism. The life given by the Zephyrs and the clothing offered by Ora are nothing but personifications of the principles of physicality and spirituality, poles at the centre of which Venus stands as a symbol of balance. In the union of opposites represented by the Goddess, we recall the essential principle of complementarity, in life and in love, of physical experience and spiritual ascent, here identifiable with the elevation of the intellect to the knowledge of the true, of the good, of the just. Venus is placed at the centre of the scene, and represents the sacred and human principle of divine and earthly love, of the purity of the soul, of rebirth.
To her right the group formed by Zephyr and Clori. Zephyr is the image of the fecundating wind "bearer of life", from which life originates; Clori represents the physicality of the loving act.

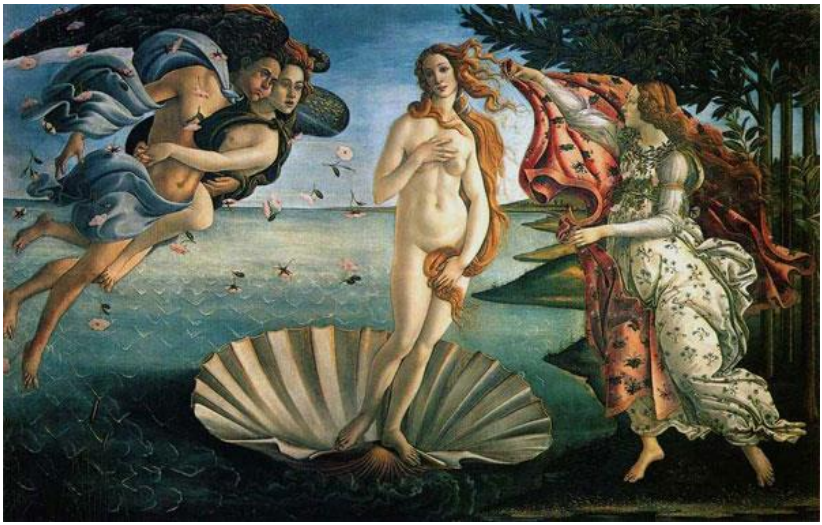


Figure 50. Sandro Botticelli, *La nascita di Venere*, 1482-85, Florence, Museo degli Uffizi (http://www.uffizi.org/it/opere/nascita-di-venere-di-botticelli/).

5.2.3 Color and geometry in connotative semiotics: the example in Islamic architecture

Following example (Lo Turco e Marchis, in Marotta et al., 2017)) is a first application of this approach to architecture: so the geometric matrix of Islamic patterns takes on different values depending on the relations between colors that make up the tesseras; the geometrical-structural level of the doors is investigated through the verbal oppositions identified in the text on the content plane and on the expression plane.

6) Once the base module is completed, the pattern is derived from the next and subsequent repetition to cover any type of surface, creating complex geometric structures and highlighting a great variety of new shapes. There are also other methods to generate geometric patterns such as the use of isometric triangular grids, or squared and hexagonal ones on which the patterns have been drawn.

On the left, some geometric constructions to obtain complex decorations. On the right, elementary geometric matrices and subsequent composite derivations: the khatem as sememe.

Starting from the basic star (the khatem or the Prophet's ring) we can describe all the shape developments resulting from the nature of the star's

rotation on its center. The big stars are formed by a rose composed by petals regularly arranged around a center, externally bounded by a polygonal line called the belt; outside this belt, the star joins a composition of simpler motifs, structured to form a set that can be repeated for symmetry.

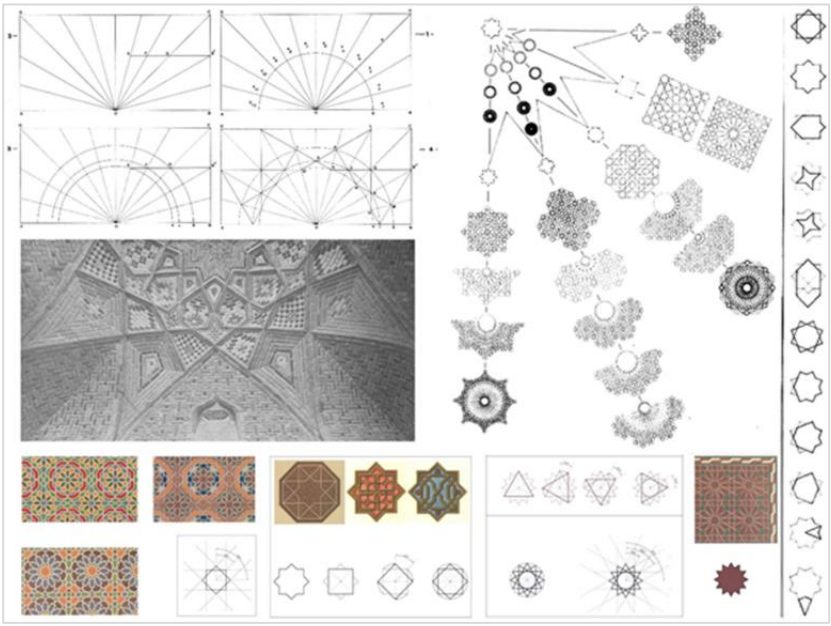


Figure 51. Color as a significant sign in the complex Arab-Islamic decorative system.

5.2.4 Color as a structuring element in Islamic decorative geometries

The following contribution (De Bernardi, Marchis, Mansour, 2016) enhances the culture of the Islamic world, rooted in a historical-geographical context from the Mediterranean to the Indian Ocean. In particular, the art of building had led to the construction of buildings of considerable architectural level where Islamic religious precepts had been the primary reason for the rich decorative elements characterized by geometric elements in which colour plays an important role. But if the example chosen here (fig. 52) refers to architecture in particular, the applications in other fields are no less significant, such as in the case of the carpets and the covers of the Koran.

As Elena Marchis notes, “Nor should it be forgotten that, if on one hand the Muslim religion has banned the portray of human figures in order not to give space to idolatry, on the other hand the chemistry of materials and in particular the techniques of fusion of glassy materials and firing ceramic materials, offered to the Islamic architects unknown potential in both Greek and Roman world. But the Islamic world is and remains a polychrome world because Allah “created all things on Earth for you with different colours. In truth, there is a sign in it for people who remember.” (*Koran*, Sura 16, 13)”.
Speaking about decorative patterns, colour and geometry, De Bernardi argued, in particular, that it is difficult to talk about Islamic decoration without considering the theme of “Symmetry” and “Colour”, as well as the effect that colour has in underlining or in inhibit the perception of symmetries in decorations in general, especially for floor and wall decorations. Exactly symmetry - a geometric condition (particularly fascinating and solidly innate in the human being) - is enhanced by immersing in the colour (De Bernardi, Marchis, Mansour, 2016).

At this point it is also necessary to introduce the symmetry of translation, that is the overlap of the figures with their simple translation. Ultimately, by highlighting the axes with red and blue, we are faced with 6+6 reflection symmetries, 4+4 rotation symmetries and 4 translation symmetries (horizontal, vertical, left diagonal and right diagonal). Others can even be discovered (4 glissosymmetries), as we will see later.

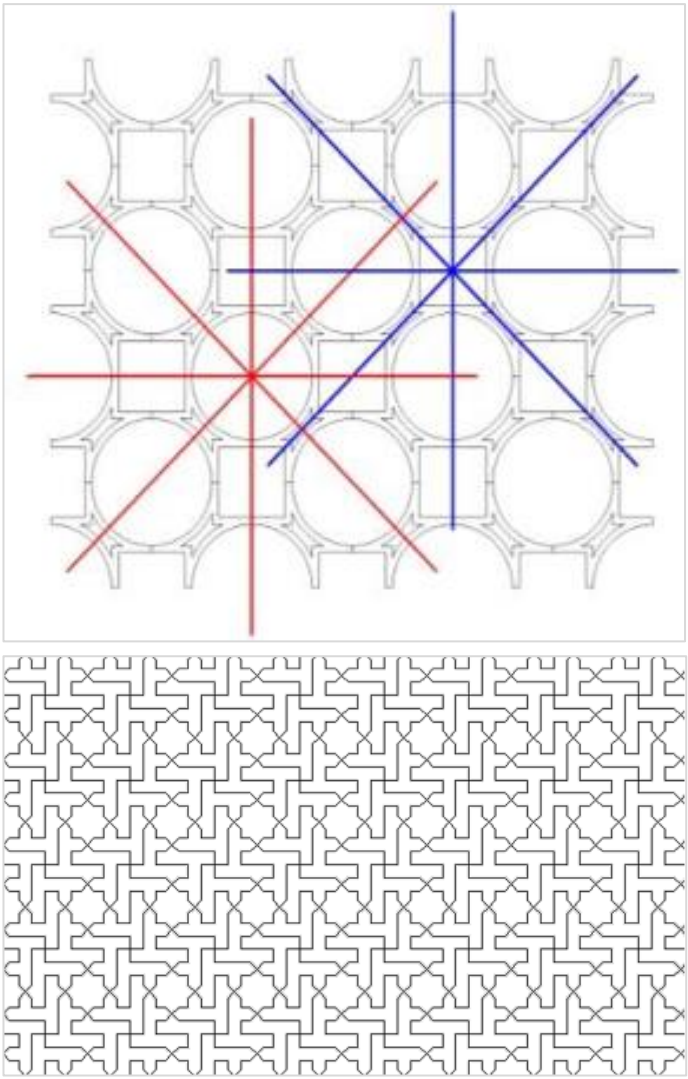


Figure 52. The articulated composition is devoid of the “banal” reflection symmetry and the two figures generate the exemplified symmetries in the figure above that is four symmetries of rotation in two centres, and two of rotation in one centre. Translation symmetries are always present.

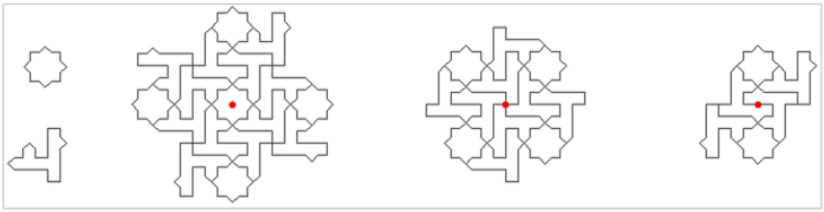


Figure 53. Colour is essential to favor the perception of a limited number of symmetries, as shown in figure 4, visible in a decoration of the Alhambra.

Figure 54. The symmetries of three rotations there with three centres, as shown in figure 7, are overwhelmed at a first glance by the symmetry of diagonal translation induced by the colouring of the basic figures.

Figure 55. “Here the perfect disorder is (Sautoy, 2007), the magic of a very strict order hidden in an almost uncontrollable richness of lines, figures and colours, at least for many of us Westerners” (De Bernardi, Marchis, Mansour, 2016).

To underline how close and complex the interweaving between colour and geometry is, we would like to conclude this synthetic example with a quote from Elena Marchis again: the philosopher and poet Ibn Hazm said "With the eye you perceive what you want, and the sight, in this sparkling of colours, assumes a function and a central role, because of all the five senses, which are the door to the heart, sight is the most penetrating guide, the one moving with greater clarity. Sight is the sure guide of the soul, it discerns the attributes and recognizes the sensible, so much so that we can say that what is told is not how it is seen". For Sufis, light is a symbol of the unity of existence and experience: God is light in heaven and on Earth (De Bernardi, Marchis, Mansour, 2016).

The decorations of Islamic architecture can be divided into three types: calligraphic, floral and geometric ones. At the regard, a special attention has been paid to the geometric patterns, since the very beginning, from the simplest tiling to the more complex tassels, even because of the religious ban to reproduce representations of a naturalistic-figurative nature.

In a such complex and articulated scenario, it was tried to verify the applicability of the semiotic square introduced by Algirdas Julien Greimas. By working on the expression level, it was then possible to identify the semantic categories (or definitions) that subsume (in other word, included in a larger subset that can contain them) the relationships of controversy, subcontrariety and subalternity.

The construction of Greimas's Square on Euclidean / Non-Euclidean and irregular / regular statements opens new perspectives around the analysis of the geometric dowelling of Islamic art.

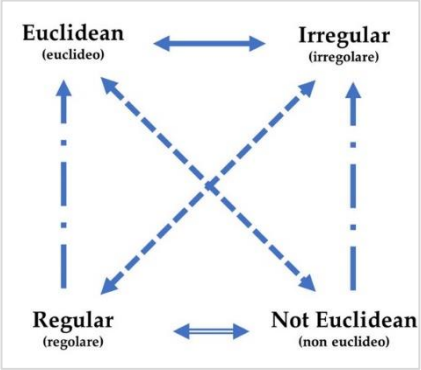


Figure 56. Greimas's semiotic square related to the geometrical / mathematical aspects typical of Islamic architecture.

On the left some examples of geometric patterns, represented in b/w line and On the left some examples of geometric patterns, represented in b/w line and coloured: instinctively it is difficult to identify the same symmetries of the b/w pictures and the trend will be the interpretation of the colour as a decisive factor, by reducing from one side the symmetries number (the one of reflection and the other of rotation for the pentagon (A) –identity – and two of reflection and two of rotation for the hexagon (B)). This operation fixes clear preferential alignments. Doing that, it is possible even to inhibit rotation. In fact, in figure C, if also the colour is taken into account, the picture in the right logically has no symmetry. So, an element with a single clear symmetry may be in the condition of losing it through the use of the colour. Similarly, the picture of figure D on the right side is not symmetric, except the identity, in the sense that the reflection one changes the colour position and only a double reflection leads to the initial state. On the right side a part of the Alhambra decoration.

Figure 57. Examples of geometric patterns.

The relationship colour-signification can be overturned in the respective negation where the colour negation does not necessarily imply absence of a symbolic value of the decoration itself. The same can be reflected about the absence of a symbolic value of the decoration. Particularly the primary

structure of the semiotic square on the linguistic plane con be transferred to a narrative level in the architecture formalism where, if "signification/ symbolic" and "colour" can be assumed as sub-contrary, the relations "signification/symbolic - colourless" and "colour - non symbolic" can be bounded to a complementary relation, from which it is possible start with an effective semiotic investigation full of implications.
Every investigation on the decorations of the Islamic architecture lends itself to a number of interpretations, which, beyond the immediate formal analysis, can start new study horizons. In our society, more and more pervaded by images, this approach can bring us to define new iconic paradigms that go further the simple pictorial interpretation, with implications that can lead to new areas, from psychology to storytelling, from design to cognitive sciences.

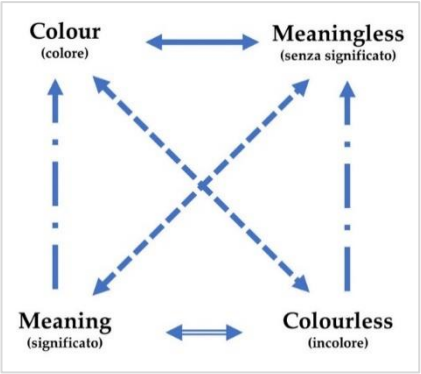


Figure 58. The Greimas semiotic square referred to the chromatic aspects and to the signification of the colours used in the Islamic architecture.

6. From theories to practice: a possible procedure for chromatic analysis and project

In conclusion, we can state that - in addition of describing and comparing cultural matrices, parameters and essential characters of the examined theories - the range of applications already implemented by the models appears to be of particular interest, not so much as a rigid automatism, but as a starting point to derive specific methods of approach, criteria, parameters, even in concrete and material experiments. In a dimension thus conceived, it may be useful to recall how is always essential an explicit and reasoned declaration of the method approaches and of the used parameters,

considered the most appropriate for the purposes of scientific investigations. Just as it can be a tool to settle the choices in the analysis and in the interrogation of sources. In the essential phases, basic criteria and parameters must be established on the basis of the project objectives and the required frameworks, keeping in mind the relationship between "text and context".

6.1 Methods, criteria, parameters for analysis and project. A "model" for the applications

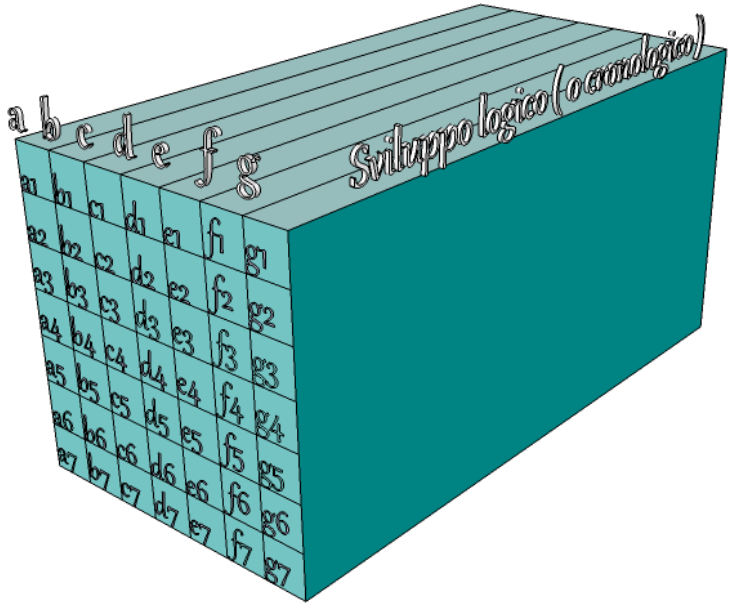
In this sense, a hypothesis already launched, presented on the occasion of the preliminary woorkshop at the Colour Conference in Geona in 2014 (Marotta, 2014) focused the attention - more than on technical parameters - on elements and factors, including the psychological ones, historical or more generally cultural, which come into play. Among these parameters, two classes have been identified, which can be placed in a reciprocal relationship, according to specific needs: the first includes those most closely related to the example subject of analysis and/or intervention, precisely understood (Application example, sampling; Analysis and/or project objectives; Conventions chosen; Dictionary; Significant parameters; Comparable examples; Biographies/ sources). The second class of parameters collects aspects of a more general nature (Historical, geographical and cultural context; Contents and symbolic values; Physio-psychological phenomena, controllable or applicable; Recognisable or applicable materials and technologies; Colour as light; Colour as pigment; Movements, theories, cultural and artistic protagonists of specific reference: matrices).

It is obvious that the path and the intertwining of the proposed "items" should not be strictly addressed in all its parts: it is possible to select only a few, in order to deduce further ideas towards new orientations and completions, for analysis and project.

It will be interesting to verify if by following this path over time and experience, we will be able to obtain useful and clear answers (also representative and significant, depending on the various parameters selected) which may be different, depending on the different chosen and consulted sources, just as it will be possible to evaluate the effectiveness of these criteria, also in connection with existing theories and models, confirmed as a moment of deep knowledge. Knowledge as a true and indispensable parameter of a conscious project.

Parametri scientifici per la classificazione del colore	Gamma	
	Nuance (sfumatura)	
	Tinta	
	Tono	
Parametri esterni	Luce	Tipo di illuminazione
		Posizione reciproca
		Orientamento
	Materia	Colore intrinseco
		Colore di finitura
		Tipo di superficie
	Percezione soggettiva	Apparato fisiologico
		Posizione
		Condizione emotiva

Figure 59: Anna Marotta, *Colour: analysis and design: notes for a procedural analysis*. The table shows a first critical synthesis of possible parameters able to guide the choices for the analysis and/or the project.



Historical and geographical (and cultural) context	Application example, sampling
Contents and symbolic values	Analysis and/or project objectives
Physio-psychological phenomena (controllable or applicable)	Conventions chosen
Recognisable or applicable materials and technologies	Dictionary
Colour as light	Significant parameters
Colour as pigment	Comparable examples
Movements, theories, cultural and artistic protagonists of specific reference: matrices	Biographies/sources

Figure 60. Anna Marotta, *Policroma model*. The image intends to visually communicate the possibility of relating some of the parameters that can be adopted in the design choices, in an alphanumeric relationship. The "third dimension" may include developments by themes or periods.

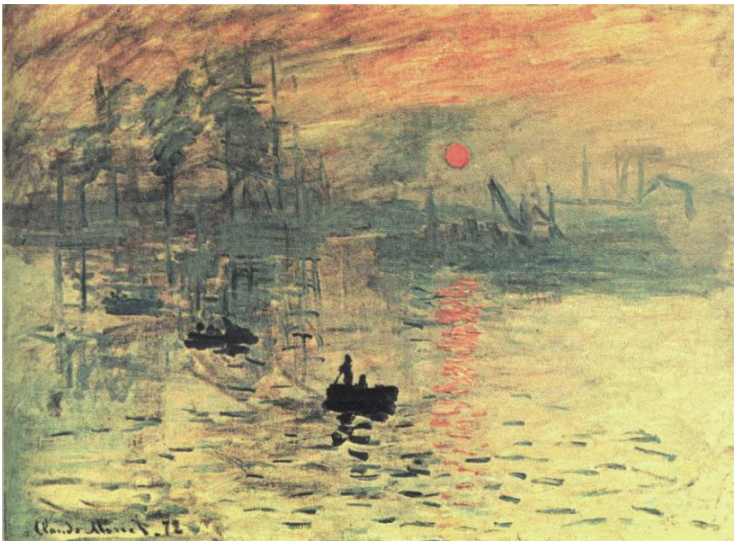


Figure 61. Claude Monet, *Impression, soleil levant* (1872), 48x63 cm, Paris, Musée d'Orsay, colour, oil on canvas.

Impressione, sole nascente (1872)	
Colori predominanti	*La fascia centrale presenta colori più freddi. C'è un contrasto di colori complementari: blu e arancio-rosa, rappresentati con dense macchie di colore puro. Una delle caratteristiche di questo dipinto è la scomposizione dei colori dello spettro solare, tipica caratteristica dell'Impressionismo. Il cielo è rappresentato da striature; il molo di Le Havre e le barche sono caratterizzate da colori caldi e freddi, le sagome dei pescatori e delle barchette sono solo macchie di colore, rese col nero. L'acqua acquista il suo peso grazie ai suoi colori più chiari. Le due macchiette nere che abbozzano le due barche le rendono pesanti perché spiccano su tutti i colori. Il sole è creato col caldo colore arancione. Il cielo illuminato è reso con ampie pennellate gialle e arancioni. Colori fisici catottrici e diottrici.*
Luce	*La fonte di luce è rappresentata nella tela dai riflessi dal cielo e dal mare. Il bianco della tela che traspare rende le zone più luminose. L'intensità della luce che questa tela rivela è un'altra caratteristica dell'Impressionismo. La luminosità del dipinto è resa anche dalla nebbia, che appare allo stesso tempo opaca. Per rendere le zone più chiare e luminose è stato steso meno colore ed è stata lasciata trasparire leggermente la tela.*
Prospettiva	*La composizione non presenta una visione prospettica.*
Piani	*In primo piano si trova la barca nera, seguita da altre due barchette leggermente più chiare. Sullo sfondo si trova il porto, il sole e il cielo. Il mare è tra i due piani. Il senso della profondità è reso con i riflessi del sole sull'acqua.*
Icone predominanti	*Prevale una tessitura orizzontale.* *Nessuna forma prevale; il cerchio del sole spicca su tutti*
Figure esistenti	*Le figure umane sono pescatori presenti sulle barche; sono forme indistinte ma nella loro immediatezza rendono l'idea dei pescatori e sono rese con rapide e dense pennellate nere. Non c'è flora. Le figure inanimate sono: la struttura del porto e le barche. Il porto e le barche si fondono con le striature del cielo e i riflessi sull'acqua. Le barche sono rese con una densa pennellata nera. Sono presenti anche altri elementi importanti come il sole, il mare e il cielo.*

Figure 62. Analytical sheet of fig. 61, according to some parameters derived from the experimental "Model" proposed here.

"… and nearby, rambling and clustering along low walls, purple flowers and red. And since there was always lurking in my mind the dream of a woman who would enrich me with her love, that dream in those two summers used to be quickened with the freshness and coolness of running water; and whoever she might be, the woman whose image I called to mind, purple flowers and red would at once spring up on either side of her like complementary colours."

Marcel Proust, Swann's way, 1913

Notes

[1] Nino Di Salvatore (1924 - 2001), after the artistic high school continued his researches about geometry, shape and colour, which lead him to perform the first "*non-objective*" works. In 1948 he joined the *Movimento Arte Concreta* starting the study of Gestalt Psychology, in which he identified his source of artistic inspiration, a theory that will also be the starting point of his intense didactic activity. In 1950 he wrote and published *Il problema spazio* in which Gestalt is proposed as a psycho-perceptive structure of the arts (the idea of a *concrete beauty*) for the first time in Italy. He had been presented in countless exhibitions and events all over the world (some of his drawings for fabrics are now at *Moma* in New York). He is also involved in cinematography, realizing "*Commento a punto, linea e superficie di Kandinsky*". Sensitive to training, he founded in Novara (1954) the *Centro Studi Arte-Industria*, a school for designers, the first institute in Italy that adopted a design methodology based on the principles of Gestalt. In 1970 he moved his school to Milan, where it became the *Scuola Politecnica di Design*, a para-university institute, to which teachers such as Bruno Munari, Max Huber, Pino Tovaglia, Attilio Marcolli, Alberto Rosselli will volunteer their contribution. He even taught a subject created by him: *Science of Vision*, a course that creatively taught visual perception. Parallel to the more planning and basic design subjects, Di Salvatore supported Antonio Grieco's *Ergonomics* course, *Physiology*, *Neurophysiology*, Gaetano Kanizsa's *Psychology of Perception* course and Guido Petter's *Psychology of Communication* course. In 1995 the *ADI* awarded the *Compasso d'Oro* for the career to the *Scuola Politecnica di Design* (Caramel, 1987; Lambertini, 1992).

[2] Luigi Veronesi, (1908-1998), leading artist of abstract research in Italy between the two Wars; his production is characterized by rigorous, kaleidoscopic geometric configurations. His interest in investigating the relationships between sounds and colours through the visual transposition of musical frequencies also built his work as a set designer. Léger's friend, he was particularly interested in the Russian and Dutch constructivists, dedicating to the search for an abstract language with a strong geometric tendency; in 1934 he joined the *Abstraction-Création* group. In relationship with Pagano and Persico, he collaborated with photomontages in Casabella. In 1939 he published *14 variazioni di un tema pittorico*, with the musical commentary by Malipiero, starting a series of researches about the relationships between musical scales and chromatic scales that will characterize much of his work. In 1949 he joined the *MAC* by participating from this moment on in the exhibitions of the movement. Veronesi never neglected the linear layouts and the rigorous geometric configurations of his debut (*Composizione 08*, 1964, Turin, Galleria d'Arte Moderna). From 1973 to 1977 he taught *Composition and Chromatology* at the Academy

in Brera (Veronesi, 1997). The three primary colours and their complementaries are associated with everyday objects in the first part of the volume, while the second part, more congenial to the "lyrical rationalism" of the Milanese artist, is dedicated to their overlap, giving rise to real "pieces" of abstract painting. In 1983 he was awarded the *Feltrinelli dell'Accademia dei Lincei* prize for painting.

[3] Akiyoshi Kitaoka: after his 1991 PhD from the Institute of Psychology, University of Tsukuba, he specialized in visual perception and visual illusions of geometrical shape, brightness, color, in motion illusions and other visual phenomena like Gestalt completion and Perceptual transparency, based on a modern conception of Gestalt Psychology. Noguchi, K., Kitaoka, A., and Takashima, M. (2008) Gestalt-oriented perceptual research in Japan: Past and present. Gestalt Theory, 30, 11-28; Kitaoka, A. (2008) Cognitive psychology of visual illusion. Japanese Journal of Cognitive Psychology, 5, 177-185.

[4] Among their publications we recall: *Gruppo μ, 1980. Retorica generale: le figure della comunicazione*, Milan: Bompiani, 1980. *Gruppo μ, 1985*. *Retorica della poesia*, Milan: Mursia 1985 and Klinkemberg Jean Marie, 1996. *Précis de sémiotique general*, Paris.

7. References

Aguilón, F. Rubens, P.P., Galle, T. (1613) 'Francisci Aguilonii e Societate lesu Opticorum libri sex Philosophis iuxta ac Mathematicis utiles', Ex Officina Plantiniana, Apud Viduam et Filios Io. Moreti, Antwerp.

Anolli, L., Cigoli, V. (1978) 'Lo sviluppo della percezione visiva', Giunti OS-Organizzazioni Speciali, Firenze.

Arnheim, R. (2002) 'Arte e percezione visiva. Nuova versione', Feltrinelli, Milano.

Barbero, W. *et al*. (1996) 'L'Enciclopedia dell'Architettura Garzanti', Garzanti, Milano, p. 813.

Benjamin, W. (2000) '*L*'opera d'arte nell'epoca della sua riproducibilità tecnica. Arte e società di massa' (trad.it. di Enrico Filippini), Einaudi, Torino, pp. 19-56.

Bernhard, E., Bürdek (1992) 'Design: storia, teoria e prassi del disegno industriale', Mondadori, Milano.

Boccardo, P. (2004) 'L'età di Rubens. Dimore, committenti e collezionisti genovesi', Skira, Genova.

Bouleau, C. (1988) 'La geometria segreta dei pittori', Electa.

Branzaglia, C. (2003) 'Comunicare con le immagini', Mondadori, Milano.

Branzi, A. (a cura di) (2007) 'Capire il design', Giunti, Firenze-Milano.

Bressan, P. (1992) 'La percezione visiva', CLEUP, Padova.

Calabrese, O. (1977) 'Le arti figurative e il linguaggio', Guaraldi, Firenze.

Caprettini, G. P. (1992) 'Comunicazione e scienza dei segni', Torino, CUSL Pier Giorgio Frassati.

Caramel, L. (1987) 'Movimento Arte Concreta 1948-1958', Galleria Fonte D'Abisso Edizioni, Modena.

Caramelli, N., Kanizsa, G. (1988) 'L'eredità della psicologia della Gestalt', Mulino, Bologna.

Castelnovi, P. (1980) 'La città: istruzioni per l'uso. Semiotica della comunicazione nel progetto e nello spazio urbano', Einaudi, Torino.

Colli, L. M. (1981) 'Storia dell'arte', n. 43, La Nuova Italia, Firenze.

Corno, D. (1978) 'Le strutture e lo spazio. Notazioni di semiotica dei linguaggi spaziali', Giappichelli, Torino.
D'Amato, G. (2005) 'Storia del design', Mondadori, Milano, pp. 178-191.
De Bernardi, M.L., Marchis, E. M. C., Mansour, O. (2016) 'Il colore come elemento delle geometrie decorative islamiche'. In: XII Conferenza del Colore, Torino, pp. 413-424.
De Carvalho e Sampayo, D. (1787) 'Tratado das Cores. Que consta de tres partes: analythica, synthetica, hermeneutica', Malta, Officina Typographica de S. A. E. Impressor Fr. Joaõ Mallìa, Com licença dos Superiores.
Di Fiore, E., Cardaci, M. (1981) 'La percezione visiva nel neonato', Palumbo, Firenze.
Du Sautoy, M. (2007) 'Il disordine perfetto', BUR.
Ferrari, G. (1925) 'Gli stili nella forma e nel colore. Rassegna dell'arte antica e moderna', Edizioni Crudo & C., Torino.
Gibson, J. J. (1999) 'Un approccio ecologico alla percezione visiva', Il Mulino, Bologna.
Gombrich, E. H. (1984) 'Il senso dell'ordine. Studio sulla psicologia dell'arte decorativa', Einaudi, Torino.
Hachen, M. (2007) 'Scienza della visione: spazio e Gestalt, design e comunicazione', Apogeo, Milano.
Hofstede, M.H. (2004) 'Rubens', Rizzoli/Skira, Milano.
Jaffè, M. (1989) 'Rubens', Rizzoli, Milano.
Jones, O. (1986) 'The Grammar of Ornament', New York, Portland House (first published in England 1856).
Kanizsa, G. (1980) 'La grammatica del vedere', Il Mulino, Bologna.
Koenig, G. K. (1974) 'Architettura e comunicazione', Libreria Editrice Fiorentina, Firenze.
Kohler, W. (1961) 'La psicologia della Gestalt', Feltrinelli, Milano.
Kuramata, S. (1988) 'Shiro Kuramata: 1967 – 1987', Parco, Tokyo.
Lambertini, L. (1992) 'Di Salvatore', Electa, Milano.
Mari, A. (2002) 'Steven Holl', Edilstampa, Roma.
Marotta, A. (1999) 'Policroma. Dalle teorie comparate al progetto del colore', Celid, Torino 1999.
Marotta, A. (2010) 'La teoria del colore di Philipp Otto Runge', Dispense del corso di Percezione e Comunicazione Visiva, Politecnico di Torino.
Marotta, A. (2010) 'Kunst der Farbe ovvero l'arte del colore di Johannes Itten', Dispense del corso di Percezione e Comunicazione Visiva, Politecnico di Torino.
Marotta, A. (2010) 'Eredità Goethiane Un segmento del raggio di Iride da Goethe al Bauhaus', Dispense del corso di Percezione e Comunicazione Visiva, Politecnico di Torino.
Marotta, A. (2014) 'Arte e Colore nella riqualificazione della città e del paesaggio', in: Conferenza del Colore GdC - Associazione Italiana Colore. Dipartimento di Scienze per l'Architettura - Scuola Politecnica - Università degli Studi di Genova, 11-12 settembre 2014.

Marotta, A.; Spallone, R.; Lo Turco, M.; Zich, U.; Vitali, M.; Marchis, E.; Pavignano, M. (2017) 'Visual Images and Language in Architecture: Signifier Semiotics and Meaning Semiotics', in: Proceedings - ISSN 2504-3900 - pp. 1-17.
Marotta, A. (2020) 'Diogo de Carvalho e Sampayo: un Tratado da riscoprire', in: Colore e Colorimetria. Contributi Multidisciplinari. Vol. XVI A, pp. 376-382, Milano: Gruppo del Colore - Associazione Italiana Colore.
Migliore. T. (2007) 'Trattato del segno visivo. Per una retorica dell'immagine', Mondadori, Milano.
Morteo, E. (2008) 'Grande Atlante del Desing dal 1850 a oggi', Mondadori Electa, Milano, pp. 346-347.
Napolitano Valditara, L. M. (1994) 'Lo sguardo nel buio. Metafore visive e forme grecoantiche della razionalità', Laterza, Bari.
Netti, R. (2019) 'The colours of the ancient Greek architecture', in Cultura e Scienze del Colore/Color Culture and Science, ISSN 2384-9568 - Elettronico - Vol. 11, 02, pp. 14-24.
Paleotti, G. (1582) 'Discorso intorno alle imagini sacre et profane diuiso in cinque libri', Bologna.
Parini, P. (2012) 'I percorsi dello sguardo', Ed. Artemisia, pp. 17 -73; 187 -205.
Pinotti, A., Somaini A. (2014) 'Teorie dell'immagine. Il dibattito contemporaneo', Ed. Raffaello Cortina, Milano, pp. 9-29.
Pisani, A. (2010) 'Il colore come parametro di progetto nell'architettura sostenibile', Tesi di laurea magistrale, Politecnico di Torino, a.a. 2010/2011, relatore Anna Marotta.
Potter, N. (2010) 'Cos'è un designer', Codice, Torino.
Riegl, A. (1963) 'Problemi di stile – fondamenti di una storia dell'arte ornamentale'. Feltrinelli, Milano.
Ronchetti, G. (1947) 'Pittura murale. Fresco, tempera, stereocromia, pittura ad olio, encausto, quinta edizione, Hoepli, Milano.
Sambursky, S. et al. (1990) 'Il sentimento del colore. L'esperienza cromatica come simbolo, cultura e scienza, Studio Redazionale, Firenze.
Scalvini, M. L. (1975) 'L'architettura come semiotica connotativa', Bompiani, Milano.
Sciolla, G. C. (1988) 'Insegnare l'arte', La nuova Italia, Firenze, pp. 3-80.
Tentori, F., De Simone, R. (1988) 'Le Corbusier. Guida all'architettura moderna', Laterza, Roma-Bari.
Vercelloni, M., Bianchi, R. (2004) 'Design', Mondadori Electa, Milano, pp. 146-150.
Veronesi, L. (1997) 'I colori', Corraini, Milano.
Williams, R. (1994) 'The Non-Designer Design Book', Peachpit Press, Berkely.
Zanuttini, L. (2001) 'Dalla luce all'immagine. Introduzione alla percezione visiva', Forum Editrice, Udine.
http://www.istitutograf.org/recensioni_genova_rubens.htm
http://www.sakuramatsuriantiquariato.com/schede.php

http://www.casazen.com/giappone_tradizionale/shoji.htm
http://www.casazen.com/arredo/arredo_fusuma.htm
http://www.toshiyukikita.com/english/works/03.html
http://www.art-directory.info/design/masanori-umeda-1941/
http://www.vitra.com/en-un/home/designers/sori-yanagi/
http://www.architetturaedesign.it/index.php/2008/05/22/makio-hasuike-design-materiali.htm http://www.elettronicaflash.it
http://en.wikipedia.org/wiki/File:Katsura_Imperial_Villa.jpg
http://en.wikipedia.org/wiki/File:Shokin-tei.jpg
http://www.schoener-wohnen.de/designer-lexikon/130330-homage-to-mondrian.html http://www.archiexpo.it/prod/cappellini/cassettiere-design-6547-3447.html http://www.moma.org/collection
http://www.casazen.com/giappone_tradizionale/estetica.htm
http://www.vitra.com/en-un/home/designers/sori-yanagi/
http://www.vitra.com/en-un/home/designers/isamu-noguchi/products/
http://it.wikipedia.org/wiki/Isao_Hosoe
http://www.architetturaedesign.it/index.php/2008/05/22/makio-hasuike-design-materiali.htm
http://www.makiohasuike.com/
http://www.art-directory.info/design/masanori-umeda-1941/
http://www.tobiamorra.com/