Scientific basics in art from the Theories of Colour: Authors, methods, rules, applications

Anna Marotta

Department of Architecture and Design, Politecnico di Torino, Torino, Italy, nannarella.marotta@gmail.com

ABSTRACT

In the "chromatic way of thinking", between Art and Science, between the Nineteenth and Twentieth centuries, colour played an essential role: between Romanticism and Modernism, between Impressionism, Post-Impressionism, Neo-Impressionism (and other derivated movements). This complex phenomenon (with its experiences and manifestations) is connected programmatically to the equally complex phenomenon of the Theories of Colour, which has to insert in the debate about contemporary artistic theories. In a broad cultural and scientific territory, starting from the qualified literature and from the publications of the time, the analysis methodology addresses the relationships between institutions, and the exchanges between individual theorists and protagonists, paying attention to the artists that have punctually and consciously applied and experimented those theories, up to the examples in executive techniques, practised in relation with their training. It is consistent with my thirty-year investigations on 48 chromatic beliefs, collected and systematically compared (Marotta 1999). The critical rereading of the treatises and works through their interrelated cultures and experiences confirms a system of knowledge stratified and verified in practise, in an international and interdisciplinary dimension, all to be explored.

KEYWORDS Theories of Colour, Artistic movements, Impressionism, Treatises and publications, Techniques

RECEIVED 09/11/2021; **REVISED** 02/01/2022; **ACCEPTED** 05/04/2022

1. Introduction

Part of the contemporary "chromatic way of thinking" is rooted openly and continuously with some theories from the past (or, on the contrary, in strong dissent with them): the intuitions and observations of figures from the Eighteenth and Nineteenth century, such as Goethe and Runge, have been fruitfully resumed (from various points of view and with a significant increase in the scientific field) by Michel-Eugène Chevreul (fig. 1), Charles Blanc (fig. 2) from James Clerk Maxwell (fig. 5) to Ogden Nicholas Rood (fig. 4), up to Ludwig von Helmoltz (fig. 5) and Wilhelm von Bezold (fig. 4) throughout the Nineteenth century (for images of the relevant Models see Marotta 1999). Nevertheless, it is confirmed how much the aforementioned contributions have exercised decisive influences in the formation of artistic movements that have been decisive for the Nineteenth-century culture, such as those linked to Impressionism (in all its variants): works by painters such as the French George Seurat and Paul Signac, or the Italians Gaetano Previati (fig. 3) and Giovanni Segantini, are born programmatically from the comparison and application - between science and art - of the same theories just mentioned.

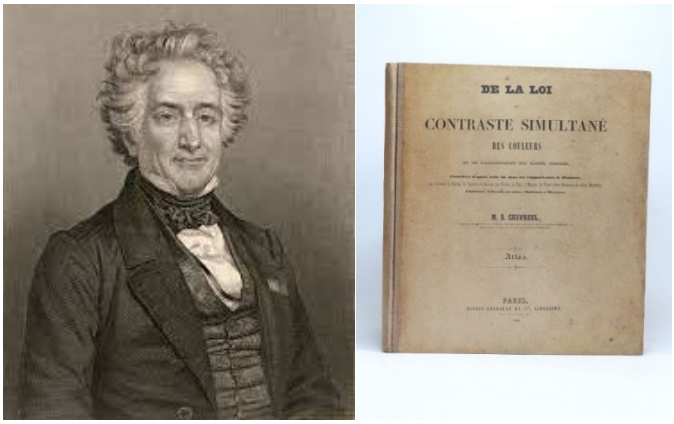

Fig. 1. Michel-Eugène Chevreul (1786-1889).

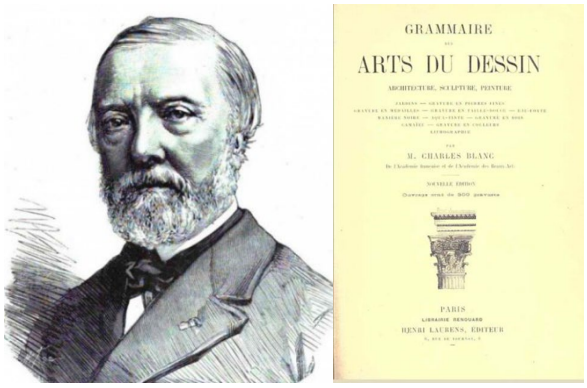

Fig. 2. Charles Blanc (1813-1882).

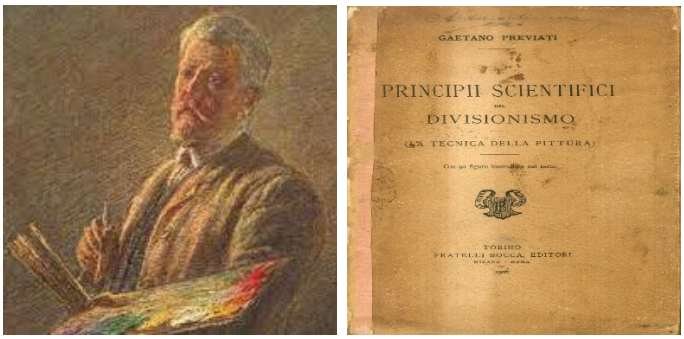

Fig. 3. Gaetano Previati (1852-1920).

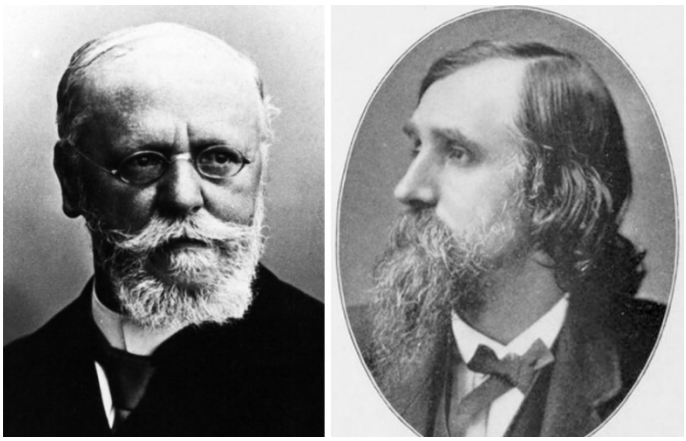

Fig. 4. Wilhelm von Bezold (1837-1907) and Ogden Nicholas Rood (1831-1902).

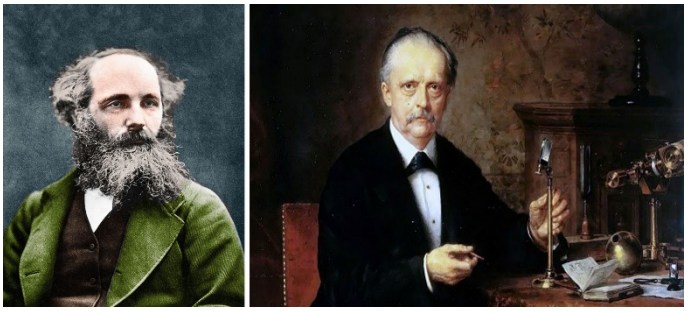

Fig. 5. James Clerk Maxwell (1831-1879) and Ludwig von Helmoltz (1821-1894).

2. Between science and art: Chevreul's theories in Monet's experience

Our journey begins with the relationship (a little examined) between Monet and the French chemist Michel Eugène Chevreul (Marotta 1999) - above all according to the rule of simultaneous and subsequent contrast - in the representation of gardens (a passion and an artistic practice by Monet) content of famous pictorial cycles. Chevreul's experience also includes a wide range of applications to the complex universe of vision,

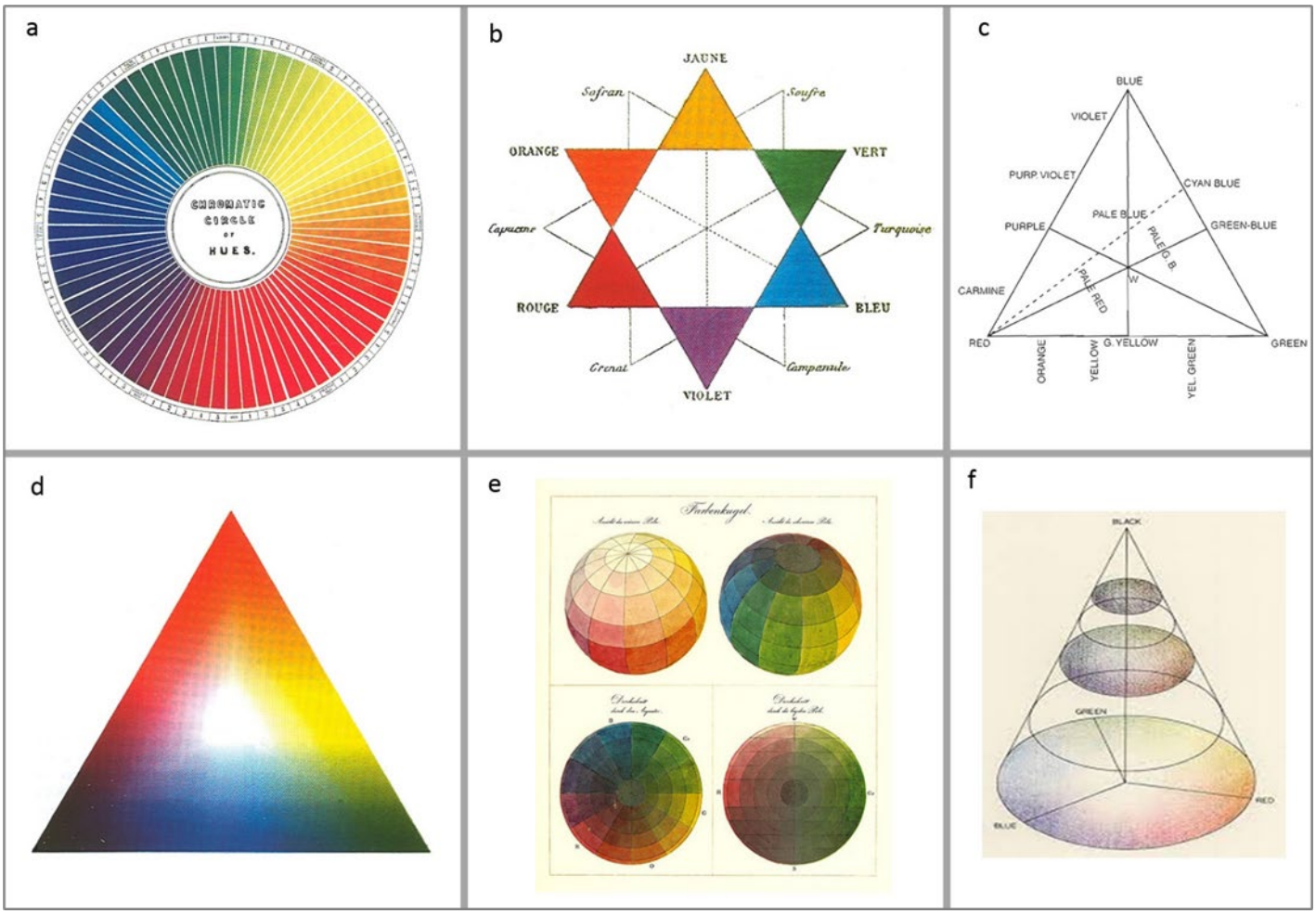

Fig. 6. Models: a. Michel-Eugène Chevreul, Chromatic Circle, 1839; b. Charles Blanc, Chromatic Rose, 1867-1881; c. Ogden Nicolas Rood, Colour Triangle, 1879; d. James Clerk Maxwell, Maxwell's Triangle, 1861; e. Philipp Otto Runge, Farbenkugel (Sphere of Colours), 1810; f. Wilhelm von Bezold, Colorsystem (Source: Marotta 1999).

Fig. 7. Claude-Antoine Prieur-Duvernois (1763-1832) and Garden in the Bois de Boulogne.

Fig. 8. a. Claude Monet in the garden; b. Claude Monet, Bassin des Nympheas, 1904, Denver Art Museum; c. The garden of Giverny of Claude Monet.

involving different material objects and behaviours, as specified in the title: De la loi du contraste simultanee des couleurs et de l'assortiment des objects colorées (…) from 1839, (Marotta 1999). For the elaboration of his scientific theories, Chevreul had Goethe as his first inspiring basics, but also the essay by Claude-Antoine Prieur-Duvernois (fig. 7), Considerations sur les couleurs et sur plusieurs de leurs apparances singulières (Prieur-Duvernois 1805). He was the Director of the dyeing department at the Gobelins tapestry shop and took an interest in the theory of colour and texture because of his work of controlling the preparation of the dye, which led him to discover that the bigger problems of this procedure did not derive from processes of chemical nature but of optical nature, since the false perception of colour was often due to the influence of the colours in the adjacent context, rather than to innate blemish in the pigments themselves. Particularly interesting (and generally less known) is the part of the book dedicated to the design and care of gardens. Starting from the belief that colour is the most appreciated and evocative part of the plant world, Chevreul applied the principles of simultaneous and subsequent contrast to the choice and combinations of the various plants, indicating the rules to follow to determine a chromatic harmony, in the temporal succession of the various months and seasons of the year. The colour of flowers and leaves, with contrasts, similarity, range, shades, but also size, shape, repetition, variety of landscape, symmetry and correspondences are the fundamental elements of his idea of a garden. His prescriptions are detailed, broad and precise from a botanical point of view too, with a competence that Chevreul had acquired working since 1804 in the Nicolas Buckwellin's Chemistry Laboratory at the Musée National d'Histoire Naturelle in Paris, of which he will be the director from 1864, after the employment at the Gobelins since 1824 (Marotta 1999).

Chevreul's way of thinking about the chromatic harmony of plants turns out to be a rich starting point for the history of art: he approached with an experimental method the representation of nature, which was usual for the time not only in painting but also as part of the recent expansion of private and public gardens (such as the Chamois and Bois de Boulogne parks in Paris). Rare but significant are the references to his instructions on colour combinations for the gardens, such as by Gertrude Jekyll, a painter and gardener who was already famous in the early 1900s for her borders directly inspired by Chevreul's theories (fig. 9). Her most significant innovation is the practice of the tonal theory of colours to informal ranges of plants: 'the creation of paintings with living plants'. For the above-mentioned observation, the relationship between Monet and Chevreul about gardens still needs to be explored (fig. 8a, 8b, 8c).

Fig. 9. Gertrude Jekyll, 1843-1932; Manor House garden, upton Grey, Hampshire, UK.

It is well known that the "theory of simultaneous and successive contrast" was sufficiently widespread among the Impressionists; as it is equally well known, the garden was for Monet a passion and a very important artistic practice: at Giverny with the irises and water lilies (which became famous pictorial cycles) the choice of flowers and plants - according to the harmony of colours and the changing seasons - refers more or less directly to models of chromatic association. Moreover, Monet must have had direct contact with the scientific environment in which he had developed and applied the principles of contrast when, at Geffroy's invitation, he designed a Tapis de Savonnerie for the Gobelins factory, decorated with water lilies; there are traces of this among the small proofs produced and kept in the Gobelins museum. indicated by the author(s). Please consider a limit of max 6-7 for images and tables.

3. Between Science and Art: Blanc, Seurat and the others

On the same themes and methods, I was able to deepen - in part - the developments in the close relationship between the theories of colour between science and art, especially between Seurat (fig. 16) and Blanc. Founder of the Gazette des Beaux-Arts, historian and critic, first professor of Aesthetics and Art History at the College de France, Charles Blanc (Marotta 1999, Zimmermann 1989) is the author of a scientific treatise about optical phenomena (inspired by Chevreul's theory): Grammaire des arts du dessin: Architecture, sculpture, peinture (1876), with the attached model called "Rose of Colour" (fig. 6b) (Marotta 1999), which had an enormous influence (Song 1984) also on Georges Seurat (Fénéon 1966 Herbert 1968). Furthermore, many of the works that the painter later read (not only those by Chevreul and D. P. G. Humbert de Superville, fig. 10) were mentioned by Blanc, while some principles for the analysis and experience of colour, light and shadow have been guided by Thomas Couture's ideas (fig. 10), set out in his most important text, Methode et entretiens d'atelier (Couture 1867).

Fig. 10: D. P. G. Humbert de Superville (1770-1849) and Thomas Couture (1815-1879).

It is essential to remember how Blanc coherently interpreted traditional art (such as Eugène Delacroix's) through Chevreul's theories, an attitude shared by Seurat. He is a pioneer of Neo-Impressionism, but he also confronted with Post-Impressionism, Neo-Impressionism, Pointillism, a name rejected by the involved group (also called pointillistes or confettistes) who chose the term "divisionism". Up to Chiarism, Chromoluminism (and more). In particular, from the years 1880-1882 Seurat marked the transition from a romantic to a scientific Impressionism: by partly overcoming Chevreul's laws on accurate lighting and background shading, he thus realized a new stylistic phase. There is a "technical" reason for it (Cullen 1983): in previous drawings (as with Bathers), George had observed that his method of lightening or darkening the background to surround an element of value through its opposite, creating halos or auréoles (theorized by Chevreul), was exalted in the reflections of the water (according to the observations already intuited by Goethe) (Marotta 1999).

Fig. 11. George Seurat, Bathers at Asnières, 1884.

In the liquid substance, the contrast of the halos around the figures is noticeably clearer and brighter than in the grass. The 1886 marked the last exhibition by the Impressionists and the beginning of new artistic movements anticipating avant-garde experiences. If the first phase of the movement tended to measure against nature realistically, the second (Neo-Impressionism), rightly considered the most important by Faber Birren (Faber Birren p. 299), overcame the antagonism between disciplinary knowledge and artistic creativity, to experience a new scientific observation of the phenomenology of vision, chromatic maxims. Innovators, but at the same time attentive to tradition and coloured light (from Delacroix onwards), these artists can still be considered in part as "post-Newtonian colourists", but already engaged in seeking the subjective perception of the vibration and irradiation of light in nature, but not as uncritical opponents of scientific rules.

As stated in the essential text already mentioned, Couture distinguished two ways in which painters treat colour. The first, used by a group he called "the colourists", engaged in the harmony of colours with natural tones. The second, used by the "luminarists", sacrificed the exact shade of nature to the magic of light: he considered Rembrandt as the "supreme luminary" and Veronese as the "supreme colourist" (Couture 1867: 222-226).

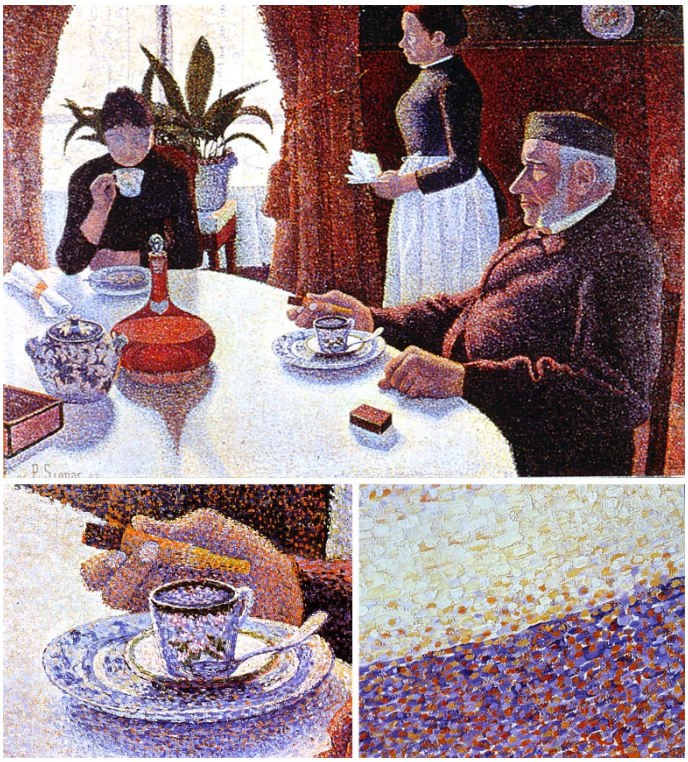

Fig. 12. Paul Signac, La Salle à manger, 1886-1887.

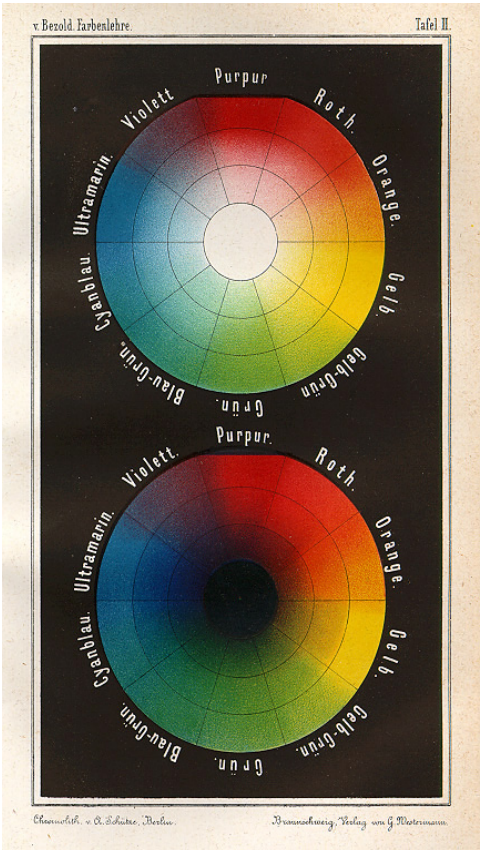

Fig. 13. Wilhelm von Bezold, Bezold Farbentafel, 1874. Signac was inspired by his theory of colours.

Signac also contributed to lay the foundations of the new artistic expression (Divisionism) (fig. 12), underlining the need for precise operations (to perceptually "divide" the colour before the material) based on luminosity and harmony: optical mixing of pure pigments (all the "prismatic" colours and their shades), the separation of the various elements (such as “local colour", lighting colour, their optical reactions), the balance of these elements and their proportion according to the laws of contrast, degradation and irradiation. The developments of Seurat's art concerning scientific culture (especially the part derived from Blanc) confirm the numerous principles that have become the theoretical basics of Neo-Impressionism: the distinction between shade and colour, the idea of optical mixing inducing on the retina vibrations obtained by combining different tones of the same colour.

In this sense, further confirmation came from another very participating theorist in the debate and in the studies of the protagonists of the time: the American Ogden Nicholas Rood with his work on physiological optics, Modern chromatic. He, too, argued that optical mixtures of coloured light rays, which were reflected from the pictorial surface and merged into the observer's retina, would have been much superior in brightness to the effects obtained from the conventional, dull mixes of the

palette. Actually, in Seurat's painting, the rays of coloured light coming from each separate stroke or "dot" of coloured pigment were not intended to obtain optical mixtures of greater intensity than their original individual components. Nor were they destined to merge completely on the retina, because they were generally too far apart to do so: it was rather expected that by observing the painting at the right distance - calculated as three times the length of the diagonal of the paintings - the incomplete fusion of the individual brushstrokes would have generated a "vibrant" optical sensation (perception). This was because, as the influential Symbolist critic Félix Fénéon acutely observed in 1886 (confirming Goethe's intuition, later taken up by Philipp Otto Runge), "the retina, which expects distinct groups of rays of light to act upon itself, perceives in very rapid alternation both the dissociated coloured elements and the resulting colour (optically A.D.)". That Seurat's chromoluministic conception based on a profound sensitivity and optical knowledge is attested by Paul Signac too in the following description of the artist at work: "in front of the subject, George Seurat, before placing a touch of paint on a small flap of canvas, observes, compares, tries to glimpse the play of light and shadows, to perceive contrasts, distinguish reflections, fighting with the argument as he fights with nature; then he draws from the small columns of different pigments according to prismatic colours, different coloured elements constituting the tonality destined to best express the mystery that he has discovered.

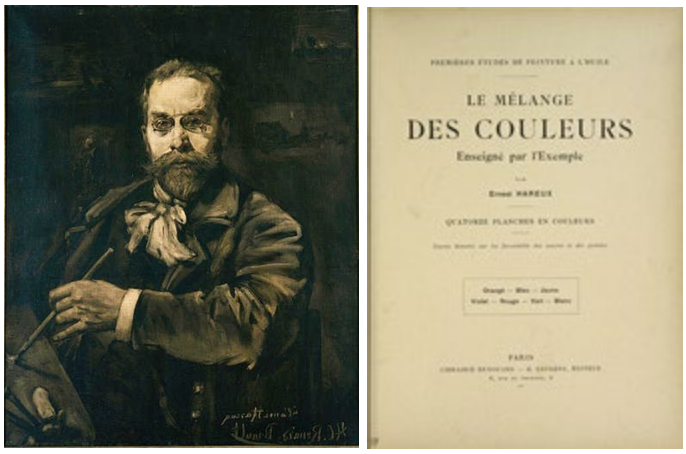

Fig. 14. Ernest Victor Hareux (1847-1909).

From observation to execution, from brushstroke to brushstroke, the painting is realized" (Cullen 1983). A tool to translate chromatic theories for more specific applications is the one shown in Figure 15a: a Complementary Harmony palette, published in 1889 by Ernest Victor Hareux (1900) (fig. 14) conceived as a popular version of the typical Impressionist and Neo-Impressionist palette, confirmation of the expansion that these artists' ideas were reaching. The scarce space grant does not allow to report of a precise list of the individual colours.

Fig. 15. Colour palettes: a. Hareux, Palette of "complementary harmony", 1889; b. Hareux, Le melange des couleurs, 1889; c. Paul Signac, "Prismatic" palette; d. Georget Seurat, Palette.

A brief but significant methodological reflection, aiming at integrating other methodological approaches of a geometric-mathematical nature - beyond the one on the theories of colour - is necessary here. It should remember that George drew inspiration not only from numerous research on physiological optics, such as Rood's - already mentioned - but also from Les phèonomenes de la vision by David Sutter, a critic from Geneva (Sutter 2018), intent on comparing mathematics and musicology.

From the latter, a teacher of Aesthetics at the Ecole des Beaux-Arts from 1865 to 1870, attentive to the construction of figures according to precise geometric patterns, Seurat confirmed (after 1886) the tendency to systematize a visual project more attentive to the geometric composition of the whole and the spatial rendering, also according to the perspective principles (moreover already clearly participant in Blanc's treatise). This conviction reinforced Charles Henry's pseudo-scientific theories (Henry, 1889) based on the principles (fashionable at the time) inspired by the physiology of the nervous system (Maffei 2008).

Based on this, in 1887 George conceived the work La Parade, (fig. 16) with a strict geometric-mathematical structure (between cognition and unconscious) derived from the theories on Dynamogenicity by the scientist.

Fig. 16. George Seurat, portrait; George Seurat, Parade du Cirque, 1888.

4. Previati and the Scientific Basics of Divisionism

The influence of Seurat and on some Italian painters became evident in the First Triennal in 1891 in Milan. Led by Grubicy de Dragon, and codified later (in 1906) by Gaetano Previati in his Principi scientifici del divisionismo (la tecnica della pittura): it is an emblematic title establishing and expressing the programmatic and not casual relationship between scientific way of thinking (also in the chromatic field) and expressions of art, in a relationship known and addressed in all its complexity.

Some painters - mainly in Northern Italy - experimented with these techniques at various levels: they combined Neo-Impressionism with Symbolism, creating paintings (not only realistic) using a divisionist method. For example, Pellizza da Volpedo applied the technique to social (and political) subjects such as Disappointed Hopes (1894) and The Rising Sun (1904).

It was, however, in the theme of landscapes that Divisionism found strong supporters, including Segantini, Previati, Morbelli and Fornara, also playing an important role in the work of the Futurists: Gino Severini (Souvenirs de Voyage, 1911, fig. 17); Umberto Boccioni (La città che sale, 1910, fig. 18); Carlo Carrà (Uscita di scena, 1910, fig. 19) and Giacomo Balla (Lampada ad arco, 1909, fig. 20).

Previati designed his book as a broad and articulated review of critically presented treatises and Authors, in the concrete possibilities and application methods too, in an interdisciplinary dimension. In one of the first chapters, La percezione normale dei colori he talks about the importance of the perceptual whole: "Furthermore, to make a colour right and natural, it is not only the accuracy of its copy from life, as a separate colour, but how much the harmony of the adjacent colours contributes", underlining "the difficulty of arousing an aesthetic balance, completely independent by methodical considerations". He takes the example of the various tones of green that can induce an unpleasant effect: "the serious difficulty of harmonising greens, Rood observes, is well known to all painters and many of them avoid using them as much as possible. The presence in a painting of colours approaching blue-green or emerald-green exerts an almost general feeling of repulsion and makes even a considerable work appear cold and hard" (Rood 1881, p. 56, footnote 5).

Fig. 17. Gino Severini, Souvenirs de Voyage, 1911.

Fig. 18. Umberto Boccioni, La città che sale, 1910.

Fig. 19. Carlo Carrà, Uscita di scena, 1910.

Fig. 20. Giacomo Balla, Lampada ad arco, 1909.

In the chapter on luminosity, Previati agrees that "common to every degree of luminosity, because it is a distinction typical of radiant energy, is the sense of vibration, by which bodies that are touched by light seem to become animated as if the force that arouses vision were in them, a force in which the colouring substances also participate, as long as they are illuminated in the common conditions of the other objects of reality, but which they lose in pictorial use, losing also the property of transmitting the sense, when their use is conditioned by the technical means of impasto and velatura".

And again in relation to the techniques, Previati mentions pastels and tempera which, "compared to wet painting and oil painting, represent a quite relevant difference in tonality, one could say they are brighter than oil paintings and frescoes, while this is not the case, artistically, as long as the art, with which the truth is interpreted, remains equal in the one and in the other; for the obvious reason that the merits of art do not consist, nor come from the qualities of the materials used, but from the relationships that the artist establishes between the colours he uses. He then notes that excessive brightness "substitutes the sensation of pain for that of pleasure".

To give examples - among many others - about the brightness of colours, Previati compared Helmholtz to Bellotti (Bellotti 1886: 93) with Rood's "rotating discs", of which he punctually reported the values in percentage. He defines the models of chromatic theories as "colour cards or tables" with which one tries to offer the complementary of a specific colour at a glance through graphic means or arithmetic calculations. It belongs to the empirical process of determining the complementary colours", considering Newton "the first who had the idea of distributing the 7 colours in a circle that he found most effective in the prismatic spectrum by arranging the saturated colours on the periphery and degrading them to pure white in the centre of the circle". Among the authors, he then cited Otto Runge and Chevreul, demonstrating a more attentive knowledge of Maxwell and Rood.

Fig. 21. Gaetano Previati, La danza delle ore, 1899.

Fig. 22. Gaetano Previati, Paesaggio, 1910.

Chevreul - he noted - used a circle divided into three equal parts by a triangle resulting from three rays by an angle of 120°. For each angle, he placed the typical red, yellow and blue of the solar spectrum and between these he introduced three intermediate shades, thus constituting the first circle of pure and intense colours to the maximum degree, then continuing the description with the "second circle". But he continued with a critical note: "But the defect of this is to give as a reference for

real lights the result of mixtures of colouring substances, as indeed all similar papers do, and from these to attribute a way of behaving similar to the mixtures of light rays (therefore confusing additive synthesis with subtractive synthesis), and what most disconcerts every criterion on the intrinsic and enormously different properties of light rays and material colours, that regular distribution reducing the ratio between lights and conversion colouring dyes or volumes of things that cannot be equivalent".

Fig. 23. Giovanni Segantini, The Nature Triptych, Life (becoming), Nature (being), Death (passing away).

Keeping on with the comparisons, he stated that even Rungen "tried to solve this difficult problem, as the Chevreul's chromatic hemisphere (instrument of mediation between Maxwell's triangle and Rood's one, an unsurpassed monument of the tenacious belief of the practical advantage of a systematic ordering of colours among scientists". But this means (it is still Gaetano's way of thinking) "it could not be a guide for the painter, if not when the knowledge about colours and the means to analyze them and those to reproduce them - as Rood opines - respond to a truly scientific classification and execution plan and it is not subject to any arbitrary ideas".

The possibility of experimentation for the research of complementary colours is more optimistic with the application of the "rotating discs", or Maxwell's discs, based on the mixture obtained from the rotation of different colours.

5. Concluding remarks

In chapter XII about Divisionism, Previati arrives at first partial reflections: "The breakdown of colours tends to obtain luminous vibrations, as well as from the overall shade of the painting, from every single element with visible derivation's from Mile's method, it is enlighted only in the pointilliste, to assume a definitive systematic character in Segantini's works (fig. 23), in particular in the great triptych Vita, natura e morte, a milestone of the glorious journey of art in the conquest of luminous objectivity, the goal of the breakdown of colours".

Previati concludes the argument thus: "as long as more detailed investigations into the priority of the practice of the breakdown of colours in painting will come from art historians, we must therefore reserve to Mile the possession of the hitherto unknown property of an unknown colouring substance, that is being able to reproduce the additions of light through a methodically minuscule separation of complementary colours, which today takes the name of divisionism in art.

These last words confirm how much comparative chromatic theories are an essential approach for a correct context of the birth and development of artistic movements, starting from Impressionism onwards. They constitute the Fil Rouge linking the protagonists of science and art of the chromatic culture of the time - by analogies or differences: as we have experienced and proved (authentic organic system to analyze and learn), they can enrich the culture of chromatic vision (understood as Weltanschauung, that is a complex and interdisciplinary vision of the world) which can still be full of new developments and reflections, in a renewed awareness.

6. Conflict of interest declaration

The author declares that nothing has affected her objectivity or independence in the production of this work. There are no actual or potential conflicts of interest, including financial, personal or other relationships with other people or organizations within three years of beginning the submitted work that could inappropriately influence, or be perceived to influence, this work.

7. Funding source declaration

This research did not receive any specific grant from funding agencies in the public, commercial, or not-forprofit sectors.

8. Short biography of the author

Anna Marotta - Architect, PhD, Full Professor of Drawing and Survey at the Department of Architecture and Design (DAD) of Politecnico di Torino. She teaches disciplines related to drawing and representation fields, including Visual Communication, Laboratory of Drawing and Architectural Survey, Atelier of Representation and Project, Drawing from the True and the Imaginary. Since 2012 she is a member of the Scientific Committee of the Gruppo del Colore and she is a member of the Presidential Committee of the Associazione Nazionale Colore.

References

Bellotti, G. 1886. Luce e colori. Milano: Edizioni Hoepli.

Blanc, C. 1876. Grammaire des arts du dessin: architecture, sculpture, peinture. Librairie Renouard.

Birren, F. 1965. History of the color in painting. With new principles of color expression, New York: Van Nostrand Reinhold Company.

Cage, J. 1987. La tecnica di Seurat: una rivalutazione. The Art Bulletin 69: pp. 448-454.

Couture, T. 1867. Methode et entretiens d'atelier. Paris: Typ. de L. Guérin.

Cullen, A. 1983. La tecnica degli Impressionisti. Rusconi Libri.

Fénéon, F. 1966. Au- delà de l'impressionisme. Paris: Hermann.

Gallo F. 2010. Regole ed eccezioni: note sulla Grammaire des arts du dessin di Charles Blanc. In Studi di Storia dell'Arte.

Giorgi, G., Rosati M. 1928. Sulla teoria dei colori, in "Atti della R. Accademia Nazionale dei Lincei", Città di Castello, s. VI, (1928-29), pp. 149-51.

Guaita, L. 1905. La scienza dei colori e la pittura. Milan: Hoepli.

Hareux, E. V. 1900. Le mélange des couleurs enseigné par l'exemple: Leçons données sur les fac-similés des oeuvres et des palettes. Paris: Librairie Renouard, Laurens éditeur.

Henry, C. 1888. Repporteur esthétique de Charles Henry: notice sur ses applications à l'art industriel, à l'histoire de l'art, à l'interprétation de la méthode graphique, en général à l'étude et à la rectification esthétiques de toutes forms. Paris: G. Séguin.

Herbert, R. 1968. Neoimpressionismo, New York: Solomon R. Guggenheim Foundation.

Humbert de Superville, D. P. G. 1827. Essai sur les signes inconditionnels dans Part. Leyden.

Kemp, M. 1994. La scienza dell'arte: prospettiva e percezione visiva da Brunelleschi a Seurat. Florence: Giunti.

Marotta, A. 1999. Policroma. Dalle teorie comparate al progetto del colore. Turin: Celid.

Previati, G. 2012. Principi scientifici del divisionismo: la tecnica della pittura. Florence: Nabu Press.

Prieur-Duvernois, C. A. 1805. Considerations sur les couleurs et sur plusieurs de leurs apparances singulières

Rood, O. N. 1881. Theorie Scientifique des couleurs. Paris: Felix Alcan.

Rood, O. N. 2009. Modern Chromatics: With Applications to Art and Industry [1879]. Cornell University Library

Song, M. 1984. Art Theories of Charles Blanc 1813-1882. Ann Arbor: Mich., UMI reserach Press.

Sutter, D. 2018. Philosophie des Beaux-Arts Appliquée A la Peinture: Contenant l'Esthétique, Ses Applications, la Loi des Opposants Harmonieux des Couleurs Et des ... Manière de Peindre Ses Anciens Vénitiens, Etc. Forgotten Books.

Zimmermann, M. E. 1989. Seurat, Charles Blanc, and Naturalist Art Criticism. The Grande Jatte at 100, Vol. 14, No. 2.