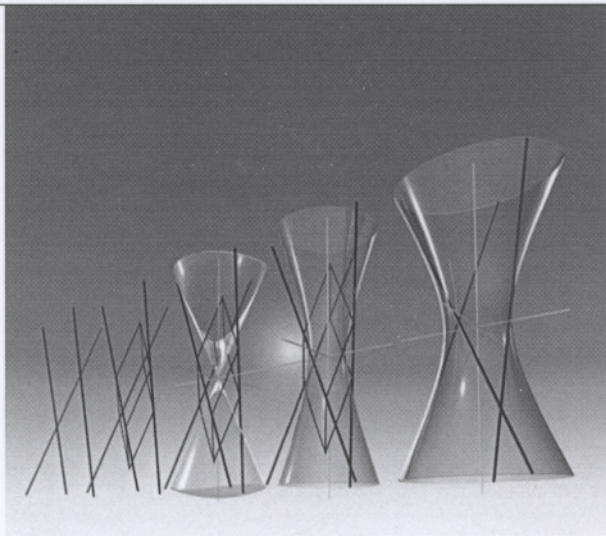


Michela Rossi (editor)

Descriptive Geometry and Digital Representation: Memory and Innovation

General Investigator Prof. Riccardo Migliari



**Goals of the National Research Project
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dell’Istruzione e della Ricerca” of Italy**

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Michela Rossi (editor)

Descriptive Geometry and Digital Representation: Memory and Innovation

"... Descriptive Geometry has a historically consolidated relationship with the art and the construction in general, and it could therefore not fail to be affected by the technological evolution we mentioned earlier. The classical corpus of texts on the discipline, based first of all on the representation methods, understood as the theories of the construction of the encoded image, appeared to be completely inadequate compared with the contemporary project procedure and, what is worse, it seemed unrelated to the new representation techniques of the space, while these last, at the same time, did not seem to have a basis theory of general character, but only the algorithms that permit to solve this or that particular problem." (Riccardo Migliari)

This book gathers some essays of a wider research project, developed in Italian university about the renewal of the scientific contents of design representation. The research stresses the heritage of Descriptive Geometry in the digital era, which provides new tools of investigation but keeps its roots in a rich tradition. The authors present to the scientific community the main goals of their two-years work, in order to open the debate on the future of the old discipline in the didactic of architectural design and of its representation.

- **Methods and Applications, the Theory**

Marco Fasolo - Federico Fallavolita, Marta Salvatore - Leonardo Baglioni - Jorge Enrique Botero Riveros - Andrea Casale, Graziano Mario Valenti, Michele Calvano.

- **Digital Representation, the Tools**

Cristina Cándito - Massimo Malagugini - Ruggero Torti - Giampiero Mele - Roberto Ranon, Raul Pellarini.

- **Formal Concepts, the Languages**

Luisa Cogorno - Michela Mazzucchell - Fabrizio Gay - Cosimo Monteleone - Giuseppe D'Acunto - Gabriella Liva - Alberto Sdegno.

- **Design Application, the Colour**

Michela Rossi - Mario Bisson - Roberto de Paolis - Giuseppe Amoroso - Giorgio Buratti - Valentina Vezzani.



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**Descriptive Geometry
and Digital Representation:
Memory and Innovation**

I Descriptive Geometry and Digital Representation: Memory and Innovation I

General Investigator

Riccardo Migliari (University of Rome "La Sapienza")

2008_Research Project of National Significance

Methods and Applications

Research Unit of Rome

Modeling, Graphic and Experimental Characterizations

Research Unit of Genoa

The Relation Shape/Color.

Digital Procedures for Color Management and Representation

Research Unit of Milan

Natural Interfaces for the Shape Genesis and Improvement in Artefact Design

Research Unit of Venice

Intelligent User Interfaces to support Modeling and Navigation in 3D Graphics Application for Architecture and Design

Research Unit of Udine

*Research of national relevance granted by MIUR
(Ministry of Education, University and Research)*

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3. Color Culture and Meta-Design Interactions

Roberto de Paolis

In recent decades the dynamics of urban transformation have been accelerated by the sudden occurrence of a considerable quantity of design objects. These objects are colored, and considering, as Michel Pastoreau suggests,¹ that the history of the relationship between design and color is a social history yet to be written as a whole, studying its phenomenology, its reading and its project codes is a research activity that involves not only domestic use objects, interiors and architectural space, but it also sinks its roots in symbolic, functional, formal and aesthetic meanings intertwined with the dress codes of clothing and fashion.

In addition to the physical structures crafted by humans (façade colors, materials, building details), the background against which urban action takes place, its landscape, is populated by “minor” objects not belonging by statute to architecture but pertaining rather to the interpretative and project-related codes typical of design (structured in types of means of transportation, signs, information distribution, fixed as well as mobile structures, merchandise pick-up and distribution devices, lighting apparatus, parking structures and urban furnishings) with more minute and widespread details.

The rediscovery and topicality of the perceptive approach to the reading of the city image, initiated by Kevin Lynch,² brings the observer (and more generally users of new media, specifically social networks) to the center of the perception and usability of urban space, configured in the multimedia age as a synaesthesia of factors,³ not all returned to the viewer as exact representations, but influenced by multisensory experience rich in visual as well as cultural (artistic, literary, poetical, musical) aspects, which, in a way, are objects of quantification and representation or, at least, objects of quali-quantitative analyses of flow generation and social-interest dynamics.

Objects designed away from consumption situations spark strong visual interaction the moment they are noticed in the landscape. The nature of this interaction is similar to the subject/background relationship detailed in Gestalt psychology. It differentiates itself on the basis of the double system of independent variables to be controlled: on one hand the urban environmental background; on the other, the changeability and “mobility” of the objects placed against it.

To the object level one must add the human. Fashion trends, with the changing shapes of clothing and accessories, when historicized represent a field of variability that designers have to control and manage, in all its complexity, finding themselves in front of a tall order of analysis, collection and selection of parameters that concur to determine the morphological, technological, typological choices of surfaces and materials and, last but not least, colors.

Hence the necessity of having at one’s disposal model instruments capable of reducing the complexity of the real and providing the designer with agile tools enabling conscious choices in view of the targets set.

One of the objectives of the research taking place in the Research Unit of Politecnico di Milano is to predispose technical tools for the preliminary analysis of the perceptive contents of urban areas and of the furniture objects they include, with an eye to their planning and the evaluation of the chromatic qualities of the projects. The research has developed protocols of pre-planning investigations useful to the designer operating in various commodity fields (urban design, product design, fashion design, interior design, furnishing and communication) and utilized for the creation of color-generating codes in representation and visualization forms that are also digitalized, taking into account the interactions between fashion, design and environment. The challenge is to match aspects that exist between color design in a scientific-technological field with related geometrical shaping and variables in human sciences, between the denotative dimension (merely descriptive, for representation) and the connotative (interpretative,

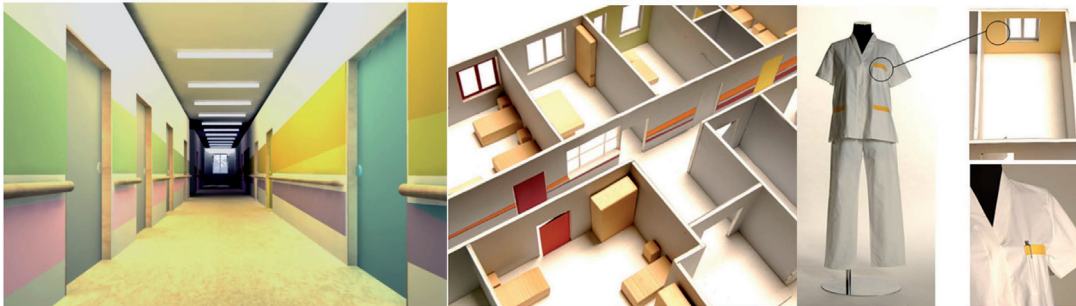


(figure 1) Textile Research, Winter 2005-06, CHIRON di Gerosa Ronchi snc, Como



hermeneutical, experiential, symbolical), maintaining intact the semantic densities deriving from the layering of meaning due to historical heritage, cultural anthropology and cognitive psychology.

Through didactic experimentation and research, the Research Unit of Politecnico di Milano has perfected methods of cross-fertilization of often unconnected competences and multidisciplinary know-hows, apt to investigate tools, methods and strategies of support to the designer's activity during the phase of analysis and reality reading, in the preconfiguration of circumstantial paradigms, and in the generation of possible building scenarios of new product concepts or concept designs. The core of this approach to the organization and management of design activities is the notion of *meta-design*⁴ powered by theoretical assumptions rooted in the experimentation begun in the mid-seventies and resumed with renewed interest toward the end of the nineties.



(figure 2) Wayfinding. Comunicare spazi, percorsi e abiti attraverso il colore nelle strutture ospedaliere. Progetto di laurea di Marcella Molinari.

In synthesis meta-design is a controlled planning of the project in its commodity, sector, territorial components and/or materials, with the aim of supplying designers with a normative system of restrictions and, at the same time, margins where they can carry out, more freely during the project phase, in market-controlled timeframes as well as private commitments, a reasoned selection of parameters for the development of the subsequent executive planning, which could be outsourced to expert professionals.

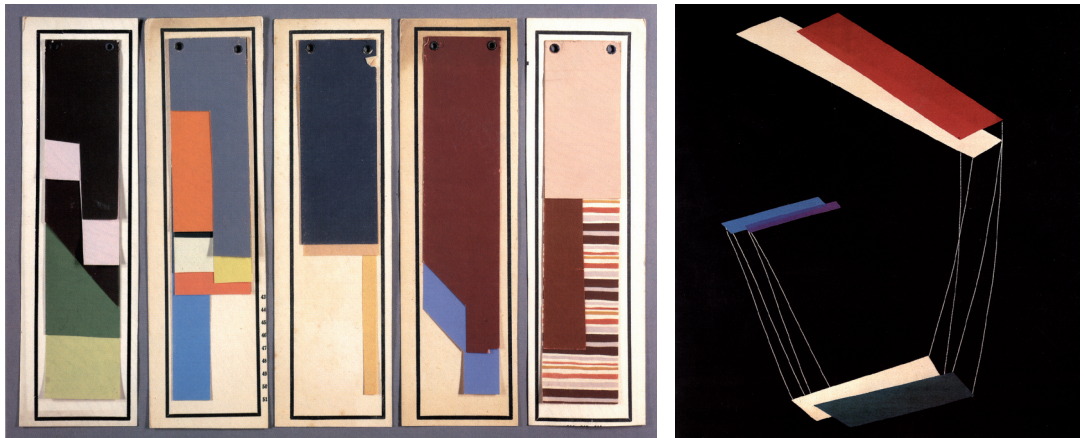
On the basis of the experiences and professional practices investigated with research completed in the textile and fashion sector, specifically in the Como textile area,⁵ certain methodologies have been transferred and currently employed, for example, in colorways, and even in broader areas, or in environmental design, as well as in the design of objects with chromatic determinations. The textile designer developing these colorways utilizes a color selection taken from references to any subject developed by the creative research department. Once designs, patterns, distribution and relationship to the drawing have been determined, the chromatic variable comes into play in the composition of fabrics, clothing items or accessories following interchangeability criteria that in turn refer to so many chromatic values showing different color families. The variables of colors follow trend pointers and input supplied by the sales department (market know-how) the production department (technological potential and plant productivity) and management (plant ranking in the marketplace), and depending on season (spring/summer or fall/winter collections), destination of products (upholstery fabrics, clothing fabrics, accessories), geographical area (Europe, other continents, etc). The circular relationship that connects trend researchers, scientific and technological researchers, color chemistry experts, printing paste developers, textile manufacturing facilities (spooling, yarns, printing and weaving) and fashion, are the backbone of the project, in which colors play the pivotal role.

The relationships among objects, consistencies, backgrounds, environment, architecture, natural or artificial landscapes, chromatic atmosphere, and materials, are well known to cool-hunters, creative people who constantly search for signals of originality, with highly expressive targets and a large dose of evocation and inspiration. Their working tool

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is the *cahier de tendance*, where the results of seasons research and possible trend scenarios are shown with great advance.

Shifting our point of view from fashion to the demo-ethno-anthropologic sphere, we encounter another series of factors that demand investigation. These refer to recurring chromatic tendencies involving users and the physiopsychological construction of sample groups, different psychological specimens.⁶ It's a two-way correspondence that shows preferences for recurring chromatic groups as evidenced by the observation of experimental samples of users representative of different statistically relevant psychological groups.



There is another dimension of use where colors play a pivotal role with respect to clothing, furnishings and interior decorations with symbolical functions: that of religious worship, of liturgy, vestments and the communication codes of sacred space.⁷

Now, if we move these processes of reading, interpreting and representing relationships generated by chromatic masses in textile design to a more complex level, such as the reading of interiors and the object artifacts within them or, by further increasing complexity, to reading on the scale of the environment (architectural, urban, landscape), we can hammer out an experimental prototype capable on one hand of perceptively appraising the structural value of objects' meanings and, on the other, of building a circumstantial organizational model which, by the use of defined diagrams, will represent, in approximate form, the structural setting of space perception and, once the paradigmatic model has been fine tuned—following a pattern dictated by the language sciences, based on axes that are orthogonal (the interchangeability of possible senses registries) and syntactic (the modalities through which the phrase is interconnected)—may provide a foundation for the next generation of scenarios for the intentional pre-configuration of projects.

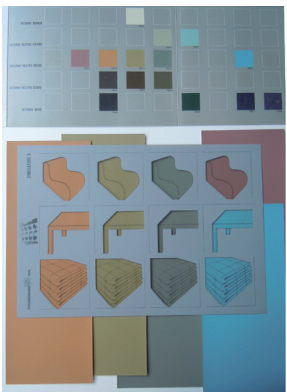
The openings and interconnections in this research offer and require (due to the distinctly interdisciplinary character of the subject) support to/from electronic engineering and information management,⁸ which are needed to control the high number of variables that come to play, in the handling of color projects, in the scale of utilization as well as in the control of space—confined space (interiors, architecture, furnishings etc.) and environmental space—fixed or mobile fragments of territory.

If color can be considered pervasive (enjoyable everywhere and anyhow), ubiquitous (accessible everywhere), independent of context (if we refer to non-fixed objects freely moveable in the environment, road-system infrastructures, temporary urban signage and signaling systems, people and mobile objects), dependent upon context (if permanently set in the urban landscape or in the territorial iconography), even considering that the

(figure 3) Left: Manlio Rho, *Cartelle colore* 1935-1950.

Right: *Crespo* stampato al quadro per corrosione. Disegno di Manlio Rho 1935-1938 (Archivio Famiglia Rho) Tessiture Seriche Lombarde Aliverti e Stecchini snc.

Source: BUSS C., *Seta: il Novecento a Como*, Silvana Editoriale, Cinisello Balsamo 2001



(figure 4) COLORDINAMO. Manuale ad uso professionale. Centro Design Montefibre, Milano, 1976

variability of the surrounding conditions is a result of the breadth of temporary oscillating terms (even landscape, orography and geomorphology undergo perceptive mutability processes if we consider significant intervals) it is really even more opportune that designers have at their disposal tools for modeling, managing and controlling the variables that intervene in the color project, allowing them to make intelligent choices sustained by semantic values to be transferred to the project.

Then the definition of thematic maps correlated to reading matrices of reality performed on various levels of research which, starting from contextual analysis, will show macro trends as well as super constants which will return information not only pertaining to color (having various characterizations depending on the historical phase considered, in textiles, fashion, costume, interior decoration, everyday objects, and architecture), but also capable of intertwining relationships and crossed hybridizations with formal, esthetic, linguistic, and perceptive referents from the areas of cultural production (the arts, sound and music, scientific and technological imaginary, poetry and narrative, movie and multimodal productions, etc.), to become instruments for the control of color projects available to designers for the creation of future scenarios and the generation of new concepts.

Hand in hand with colors goes the investigation of project parameters related to materials, surfaces, textures, mass, extensions, intensity, dissemination in the areas of signs and symbol systems, in natural or artificial codes, of rituals, which as a whole constitute the "metaproject" analysis revolving around potential innovation paths.

If these techniques and investigation methods find in the physical constitution of objects or decorations, interior spaces, coverings, and interior finishing and architecture a discreet number of variables whose management and control remains within a limited number of parameters, when one confronts the theme of landscaping the number of independent variables increases, posing difficulties in the management and control of the complexity of morphologically catastrophic events.⁹

With an attitude that is similar, but sustained by a radical change in the perceptive and organizational context of reading perceived reality, it is opportune to rediscover the situational values in the design, and the relevance of the real, which led urban environmentalists to formalize, in the urban project phase, a morphologically controlled but not necessarily harmonious whole in which colors played a constituent role, returning the observer's vision to the center of the perception of urban space. Gordon Cullen,¹⁰ when designing a city from the viewpoint of the person moving within it (pedestrian or motorist), identified three major items on which to build an urban morphology: *optics* (serial visions, visual contrasts, emerging views, emotional solicitations), *site* (relative to the body's positioning compared to the environment; inclusion, restriction, revelation, dramatization) and *content* (in which category he placed the building of the city: color, structure, scale, style, character, personality and uniqueness).

Numerous examples witness the effort to classify and manage the decision-making processes for attributing chromatic qualities.

The new evidence is that color is considered as a project material that will contribute to the definition of the environment in an integrated and coordinated manner, as a mobile and dynamic component of the morphologic determination rather than a static and unmovable component of architecture anchored to the ground. Hence the complexity, and the difficulty, of presenting the integrated tools that allowing control over the numerous variables presented to the designer. Objects, ground, building materials, surfaces, decorations, vantage points, views, panoramas, light quality, natural elements (such as bushes, landscaping, gardens, lawns, wooded areas; stratified, hilly or flat land) and artificial elements (events and emergencies, events that modify the grounds and anthropic space) intervene and increase the variables to deal with. The outcome is no longer the abstract plan, the program and analytic geometric representation typical of mathematical modeling useful in supplying an interpretative picture of the transformations taking place, but a rediscovery of the central vision, the perception of the environment reconfigured and modeled on the beneficiary, following specific angles or

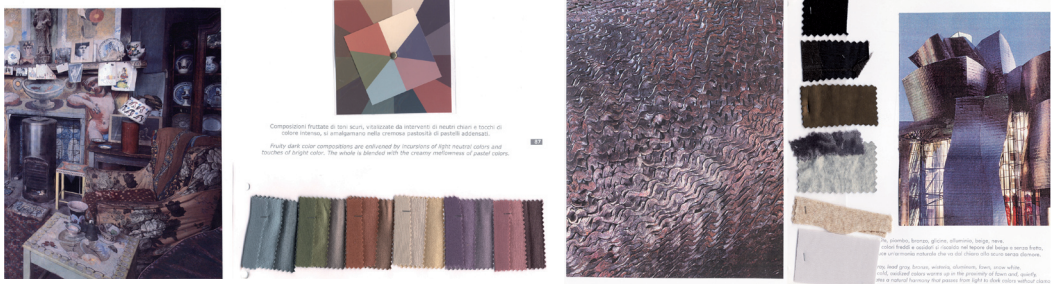
Design Application, the Color

perceptive fractions of reality. Everything subject to individual and collective judgment of the beneficiary/ies. The color and appearance of objects as “fragments” of the perceived landscape are at the basis of an environment reading that “crystallizes fractions of appearances,” not wanting to make them homogeneous but, on the contrary, interpreting them as peculiarities of our time opposed to the homogenous art of the past.¹¹

In the late seventies the Montefibre Design Center introduced *Decorativo e Colordiniamo*, a contemporary aesthetic research project that made color and décor the highest priorities in the process of reestablishing design methodologies. The manuals,¹² precursors of the “metaproject” method devised by Andrea Branzi, Massimo Morozzi e Clino Trini Castelli, with contributions by Adela Turin-Coat and Franco Brunello, on one hand set out to rediscover the semantic values that express the cultural identity of the décor of surfaces of the everyday environment and, on the other, offered a tool to support designers’ decisions and chromatic choices.

The publications, consisting of presentation boxes containing very informative manuals as well as working tools easily utilized by architects and designers (monographs, simulators, isolators, color tables, color-selection charts complete with spectrophotometric data, used for industrial color reproduction), aimed to present explain, on a yearly basis, the latest trends in research.

(figure 6-7) Ricerca Tessuti, Inverno 2005 2006, CHIRON di Gerosa Ronchi snc, Como.



Notes

[1] M. Pastoureau, *I colori del nostro tempo*, Ponte alle Grazie, Milano, 2010.

[2] Lynch K., *L'immagine della città*, Marsilio, Venezia 1975; Appleyard D., *The view from the road*, MIT Cambridge 1966.

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[12] Cfr. Branzi A., Morozzi M., Trini Castelli C. *Decorativo e Colordiniamo. Manuali per Uso Professionale*, Centro Design Montefibre, Milano 1975, 1976, 1977. The issues addressed by manuals were: in 1975, Colour of Energy; in 1976, Pre-Synthetic Colours: new colours for the environment according to the recipes of the ancient dyers; in 1977, the ambient colour of the 70s for a new colour quality of the environment.