ON IMAGES:
BASIC AND APPLIED RESEARCH

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IMAGES
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In numerous disciplinary fields, images are fundamental sources of information for research activities and, as such, are collected, used, and discussed within their respective theoretical and methodological frameworks. However, it is in the specific field of graphic sciences that the production of images becomes the primary focus of research and teaching activities. In this field, the scientific community focuses mainly on this aspect, although based on a complex set of theoretical, historical, geometric, and operational insights, as highlighted by the taxonomy reconstructed and discussed in this paper. Five years after the launch of the img journal publishing project this article offers a systematic reflection on the main strands of research and teaching in the field of images today. The analysis of scientific production related to graphic sciences allows us to identify some prevailing research trends, both in basic and applied research. These categories include not only individual scientific contributions —which, as already noted, may intersect and feed into several strands at the same time— but also publications such as journals and series, as well as conferences and scientific events that contribute to the structuring and dissemination of disciplinary debate.

The research and teaching activities of researchers working in the field of images are now divided into multiple forms, depending on the different cultural and disciplinary traditions of reference. In many fields of knowledge, images are a primary source of information and knowledge, forming the basis of studies conducted in disciplines such as art and architecture history, sociology and anthropology, psychology and pedagogy. In these contexts, images —in their various forms of drawings, symbols, photographs, illustrations, maps, diagrams, videos, and other graphic languages— are collected, analysed, and discussed as support for the processes of verifying research hypotheses and demonstrating the theses developed within the various disciplinary strands.

The role that images play in the graphic sciences is different, characterized not so much, or not only, by the analysis and interpretation of existing images, but above all by their design and production. In this disciplinary field, images are understood as the results of design processes aimed at representing ideas, narratives, events, messages, objects, environments, and spaces, and are both tools of investigation and results of research.

Within the scientific community of graphic sciences, however, there are also areas of research that address topics and adopt approaches that are apparently distant from the operational dimension of design and image production, favouring theoretical, historical, and cultural perspectives. Far from representing a departure from the core discipline, these studies play a fundamental role in the acquisition of critical awareness and conceptual tools that are subsequently applied in design processes, both in research and teaching.

In this sense, contributions relating to theory, history, geometry, and the study of representation tools constitute the main areas of basic research in graphic sciences, providing the necessary premises for the observation and analysis of the phenomenology of images, as well as for the identification and discussion of case studies on which design experiences are based. The application and experimentation activities

related to the design and production of images, on the other hand, are the privileged fields of applied research in this disciplinary area, completing and integrating the overall picture of graphic sciences. A dialogue and continuous cross-fertilization are established between the knowledge of basic research and the know-how of applied research, giving rise to the eminently design-oriented nature of graphic sciences.

BASIC RESEARCH: IMAGE ANALYSIS AND STUDY

History and iconography

A fundamental aspect of basic research is the reconstruction and critical analysis of the history of images and drawing, from its origins as a tool for documentation and pre-linguistic communication, through the great historical traditions, to its transformations in the modern and contemporary era. This includes the study of treatises, theories, schools of thought, and key figures that have shaped the discipline. Historical research is not only a retrospective exercise but provides the basis for understanding the evolution of methodologies, techniques, and meanings associated with images, informing and guiding current and future practices.

Historical and iconographic studies in the field of graphic sciences focus on the analysis of the history of images, techniques, and methods of representation, with particular attention to visual production processes and their relationship with the history of art and graphic languages. Such research generally adopts an iconographic or iconological approach, aimed at systematizing images from different eras and cultural contexts, or at exploring specific subjects, reconstructing their iconographic evolution or collecting and analysing the available documentary and archival repertoire.

This field also includes biographical studies, which examine the work of significant figures such as designers, illustrators, artists, architects, and planners, as well as mathematicians, surveyors, and other scientists, helping to reconstruct

the role played by individual authors in the development of representation practices and knowledge.

However, historical research in the graphic sciences is not limited to the analysis of past productions, but also includes studies of contemporary production, observed with historical sensitivity and an awareness of the relationship between the experiences analysed and the broader socio-cultural context of reference. In this perspective, images are investigated with an approach like that of art history, which considers them as works with aesthetic and symbolic value, embedded in the processes of evolution of visual and cultural sensibility.

Historical research on images frequently requires the identification and analysis of unpublished sources, found in both paper and digital archives. This area also includes research aimed at exploring, enhancing, and making available archival collections, with the goal of recovering, cataloguing, and contextualizing images and drawings within their respective cultural and scientific frameworks, contributing to the construction and dissemination of new knowledge in the field of graphic sciences.

Form and geometry

Basic research explores theories of representation, analysing projection systems and their historical, mathematical and philosophical roots. This includes the study of projective and descriptive geometries, their evolution and their implications for the perception of space and form.

Geometry, and in particular descriptive geometry, provides the theoretical and practical foundations necessary for the representation of objects and spaces. Research in this area focuses on the use of geometry to describe, analyse and generate spatial configurations and complex objects. Geometry and form are closely intertwined, as geometry provides the theoretical and mathematical tools necessary to define, understand and analyse the forms of existing or designed objects.

Approaches in this field are oriented towards the study and three-dimensional modelling of complex shapes, including

through generative and parametric techniques, often aimed at digital prototyping and 3D printing. The formal complexity that is the subject of this research may concern both objects to be designed and created, and existing or historically significant objects, for which it is necessary to study in depth the history of the evolution of architectural and artistic forms over the centuries, as well as the methods of representation and construction that made their creation possible.

Images also play a fundamental role as sources of information for the investigation of design criteria, construction methods, properties and aesthetic sensibilities. They can be subjected to graphic analysis that reveals hidden rules and geometries, essential for understanding generative and perceptual processes. In this context, proportion, harmony and geometry become crucial tools for analysing both visual artefacts and the objects they represent.

The theory of colour, light and shadow, texture and material are also subjects of study, not only in terms of aesthetic rendering, but as structural elements of perception and communication.

Tools and techniques

This strand includes research and teaching experiences relating to the tools used in image construction, in the representation of shapes through drawing and descriptive geometry, but also in digital modelling and manufacturing and three-dimensional modelling. Three-dimensional models are also mainly used through their visualisations and, consequently, communicated through the images that represent them.

This type of research is taking on an increasingly central role in contemporary scientific debate, characterised by the introduction of new methods, tools and digital technologies. However, these developments often generate phases of great interest which, over time, tend to peter out when they are superseded by subsequent technologies, which render previous approaches obsolete or marginal. Some of the

research in this field takes a critical approach, aimed at placing the tools or techniques in a cultural context, highlighting both their potential and their limitations; others, on the other hand, take a practical approach, with the aim of highlighting the innovative aspects compared to the state of the art.

In recent years, this trend has also been enriched by ethical considerations, particularly in relation to the impact of generative artificial intelligence, which raises ethical questions about the nature of algorithmically produced images and their relationship with human authorship.

APPLIED RESEARCH: IMAGE DESIGN AND PRODUCTION

Uses and applications

A first area of research consists of studies that adopt the case study method, through which researchers select, collect, analyse and discuss significant examples relating to specific areas of application, themes or theoretical-methodological approaches. This type of contribution plays a fundamental role in building a shared critical awareness, on which subsequent experiences and design experiments are based and developed. This area includes, for example, studies on visual communication that do not focus on the processes of image production —the subject of other lines of research— but rather on their use within communication processes, through the analysis and commentary of visual artefacts from both historical tradition and the contemporary context.

The cross-disciplinary nature of images is particularly evident in studies of a predominantly interdisciplinary nature, which investigate their use and role within different disciplinary fields, such as psychology, pedagogy, sociology and the medical-health sector. These contributions may take a strictly disciplinary perspective, focusing on the use of images within a single field of study, or an explicitly interdisciplinary perspective, based on a comparison of methods, techniques, tools and procedures specific to different fields.

In the latter case, research encourages processes of cross-fertilisation and methodological hybridisation, contributing to the development of innovative practices in the use and interpretation of images.

Experiences and experiments

The field of image production is at the heart of research in graphic sciences and represents its most distinctive feature. Starting from the established tradition of drawing, this field is mainly oriented towards the design and creation of visual artifacts, placing the image at the centre of the processes of investigation, experimentation, and design production. This perspective encompasses the entire field of studies dedicated to teaching, which includes both the teaching of drawing and image production in school and university contexts, and the development of advanced representation methods based on the use of digital technologies, applied in various professional fields.

This category also includes research aimed at representing architectural heritage, both existing and planned. The reproduction of the form of the environment at different scales, as well as the processes of designing new spaces, involve the production of images as a fundamental tool for analysis, description, and design. These studies focus on the methods of producing representations, technical procedures, and the application of technologies, highlighting the central role of images in the processes of knowledge and design of the built environment.

This area also includes all research experiences that present and document the processes of producing graphic artifacts, going beyond a merely descriptive or interpretative dimension of images produced by other authors. This research directly addresses concrete design issues, experimented with through the elaboration of images and other visual artifacts in different application contexts, emphasizing the operational and experimental dimension of visual production.

Overall, these contributions take the form of research that is eminently design-oriented, in that the production of imag-

es and visual artifacts requires structured design processes like those needed to create material artifacts. These characteristic places graphic sciences squarely within the design disciplines. Design is expressed through different operating methods and the use of heterogeneous tools and technologies, ranging from graphic design to virtual and augmented reality, from traditional drawing to digital modelling, from photography to video animation, and from manual illustration techniques to artificial intelligence.

CONCLUSIONS

Five years after the launch of the img journal publishing project and four years after the revision of the scientific-disciplinary sector declaration, this contribution highlights the vitality and complexity of research in the field of images within the graphic sciences.

The proposed taxonomy offers a structured view of research, dividing it into two main macro-categories: basic research and applied research, between which a continuous and fruitful dialogue is established. Basic research, exploring the strands of theory and visual culture, history and iconography, form and geometry, and the tools and techniques of representation, provides the conceptual, critical, and methodological foundations necessary to understand the ontological, aesthetic, and cognitive nature of images. Although these studies may often seem distant from operational practice, they represent the essential foundations for any design activity, fostering a critical awareness that nourishes both research and teaching.

Applied research, on the other hand, focuses on the design and production of images as creative acts and tools for investigation, ranging across the fields of interdisciplinary uses and design experimentation. It is in this dimension that the eminently design-oriented nature of graphic sciences emerges most clearly, as a discipline of visual "know-how"

capable of generating graphic artifacts in response to concrete problems and contributing to the representation and transformation of reality.

Basic research often inspires and underpins innovations in applied research, providing the necessary theoretical and methodological principles. At the same time, the challenges that emerge from applied research can prompt new questions and investigations in basic research, creating a virtuous cycle of knowledge and innovation.

The overall picture that emerges confirms the hybrid and cross-cutting nature of the sector: graphic sciences are not limited to an interpretative analysis of existing images, as is the case in many other disciplines, but make them the heart of cognitive and creative production, thus emphasizing their eminently design-oriented connotation.

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