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# EXPLORATION ON DRAWING FROM TRADITIONAL REPRESENTATION TO NEW EMBODIED AND IMMERSIVE PRESENTATION OF IDEAS

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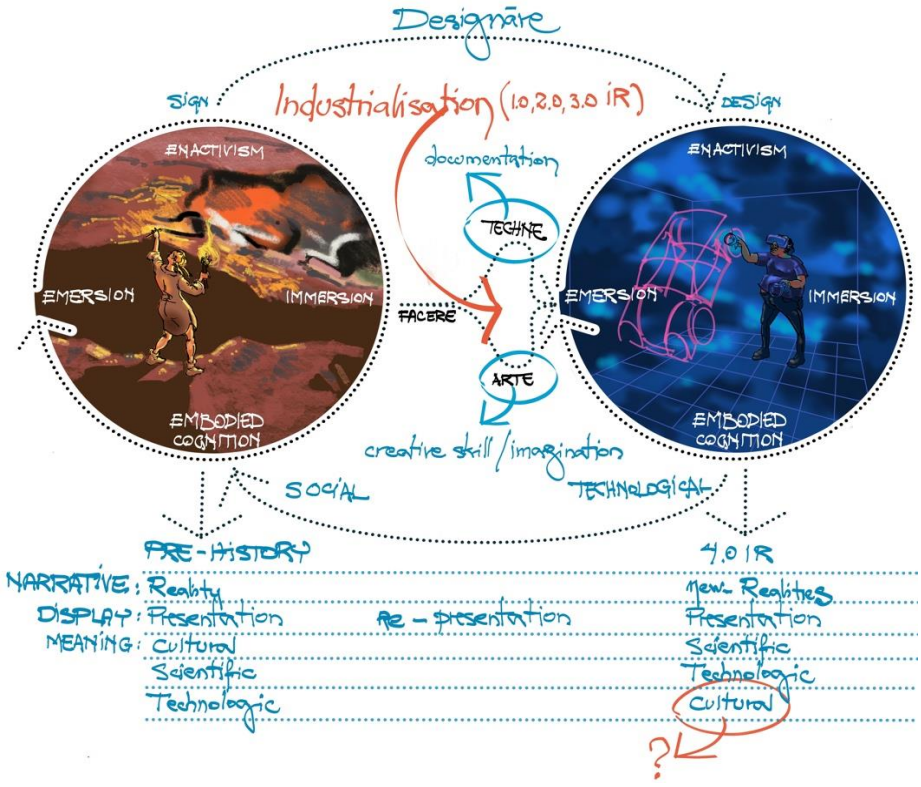
**ABSTRACT**

This visual paper tells on the experience of drawing and how its skills translate into technologies that expand it to a new level of intelligence. Traditionally, drawing was a physical activity conditioned by its two-dimensional support (e.g. rock walls, parchment, paper). However, its visibility changed over time. It was often hidden behind an illumination or painting. For modernist and post-modernist sketchers, the core complexity of drawing was still a challenge since it depended on multiple combinations of two elements: lines and dots, it was a solitary endeavour that kept a distance between a subject and its object and from a potential audience, and it was likely an individual subjective observation of an event, an object or the world. However, technology in today's meta-modernist era has broken a sketcher's isolation and his/her Cartesian framework with co-evolutionary, embodied and immersive dynamics, three-dimensional virtual space-based scenarios, and artificial and machine learning intelligence. These are new experiences between the mind, body and the environment that enact drawing as an activity of shared knowledge physically and digitally with technological mediation and telepresence with others. Findings indicate to behaviour that no longer relates to a two-axis relationship between pen and paper only. Outcomes of this visual paper intend to depict a current take on milestones for the transformation of drawing from pre-classic skills to augmented virtual scenarios where the subject is also embedded with the object of observation, the interaction with it and other artificial agents that require new expertise that can enrich this practice's narrative and application.

*Keywords: Enactivism, embodied knowledge, intelligent agents, generative design*

**VISUAL ABSTRACT**



# 1 INTRODUCTION

There is a revived interest on drawing and sketching for visualization lately. Appropriately, it is fitting to revisit its evolution to reposition it in relation to recent incarnations that open new challenges and opportunities for practitioners.

# 2 PROBLEM STATEMENT

There are old and new manifestations of drawing that occur concurrently today. Hence, this renewed interest needs to answer

- *What is the drawing practice for today?*
- *Are there new circumstances that require new skills?*

# 3 METHODOLOGY

Two methods were chosen for this visual paper. A *visual history* to learn about the past and seeing through drawings that *present* and *represent* different milestones. An *epistemology* (from Greek *epistḗmē:* science, knowledge; *logía*: discourse) approach to explain drawing's nature, justification, belief and knowledge.

# 4 RESULTS

## 4.1 Definition and roles

Drawing is the closest skill to design. Both share the same Latin and Italian origin (*designāre, disegno:* to design, mark a sign). Historically, drawing is the means to project intellectual ideas in fine arts, architecture and engineering. However, it has differences at two levels. Skill wise, drawing means a finished artwork, and sketching (Latin *schedium,* Greek skhédios: made suddenly) is a splash of quick ideas. At meaning level, a drawing's message can be an act of *presentative* (Latin *praesentare*: to place before) *imagination* (Latin *imaginari*: to picture to oneself, conceptualize) of a creative vision, or an *image representation* (Latin *imago:* copy of; *repraesentare:* to describe) similar to narratives and symbols that help societies to preserve their identity and systems over time.

## 4.2 Integrated presentative and representative communication

From pre-history, drawing was about integrated *presentative* and *representative* markings on rock walls of novel imagination and scientific (e.g. biology, botany, ecology) and cultural (e.g. belief, social hierarchies, territorial demarcations) knowledge for a community. 2018 discoveries based on uranium-thorium research dated drawings in caves of Altamira and La Pasiega as 34,000 and 64,000 BC. These findings demonstrated pre-homo sapiens had capacity for abstractionism and realism with charcoal and ochre that defied traditional palaeontology timelines [1].

## 4.3 Representation of oral and official history

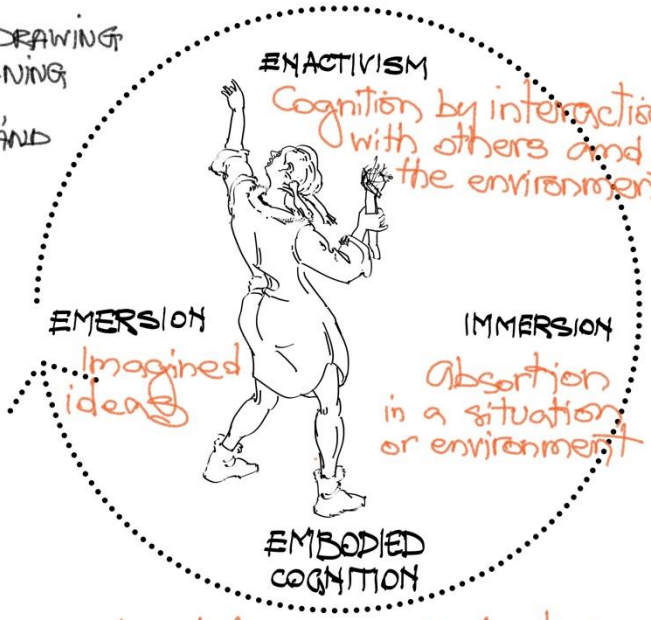
From the Neolithic onwards (e.g. Egypt, Greece, Italy), there were two types of drawing. Visual communication (e.g. everyday things, rituals) and abstract written coded language characterized by logography (character represents a word or sentence), syllables (symbol set as word sound), or alphabets (standardized letters that equate to the shortest sounds that form a word). Commonly seen publicly in museums today, both types of drawing were for royal and elite private viewing only. For the rest of the population, drawing was used to depict images and stories in pottery, to structure sculptures, iconic buildings and stonewall engravings.

## 4.4 Hidden structure for propaganda representation

Up to the Middle Ages and after, the drawing skills were used as the hidden structure for architecture, illumination, painting and sculpture. Political and religious powers also kept social control by saving the written language from the dominated classes while using propaganda in the form of awe-inspiring devotional objects and branding (e.g. portrait painting, sculpture, buildings) to control the spiritual and physical will of the population

IN THE BEGINNING, DRAWING WAS SIGN AND MEANING TO EXPLAIN BELIEF, CULTURE, SCIENCE AND TECHNOLOGY SIMULTANEOUSLY

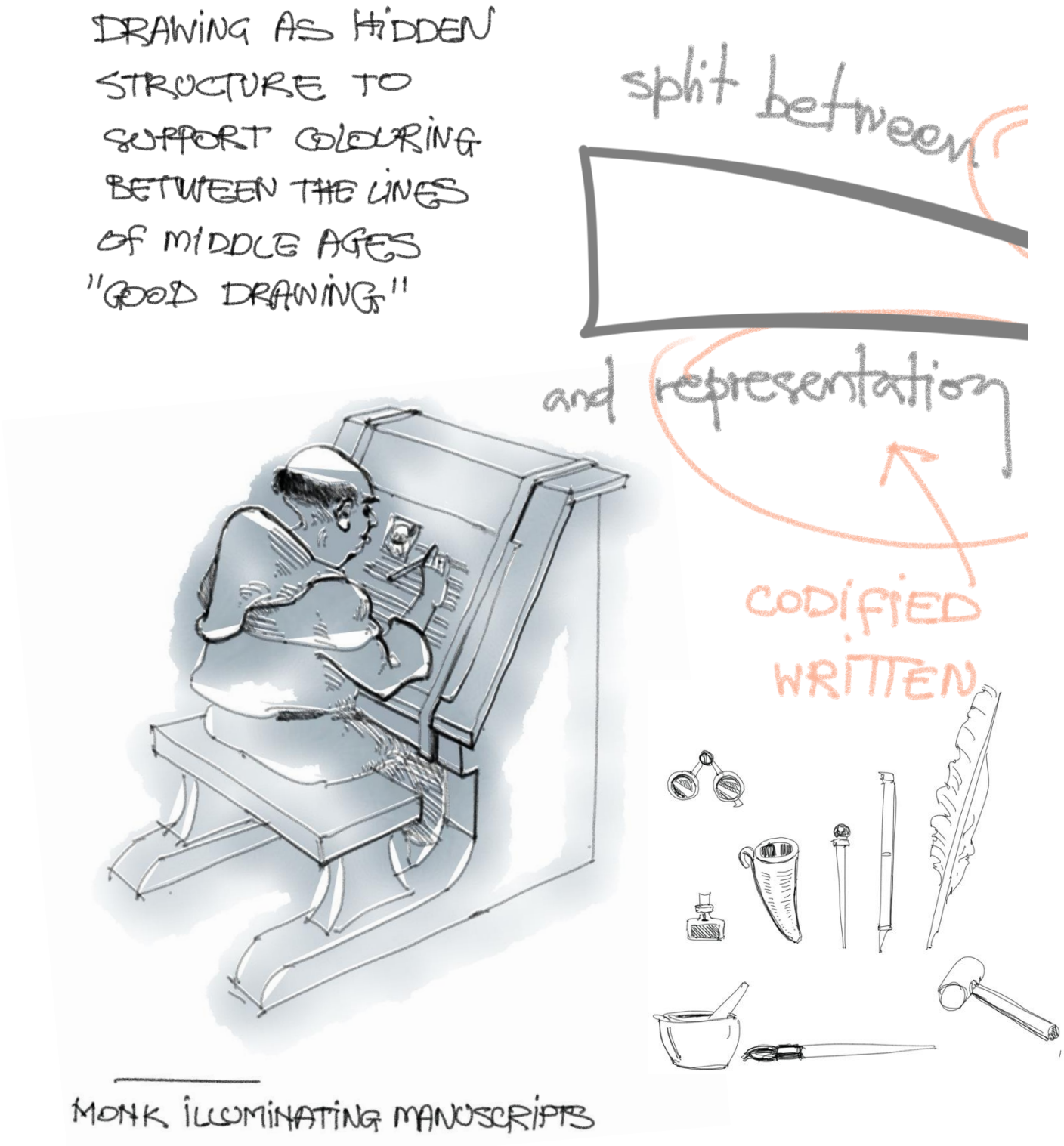
DRAWING MEANING PROCESS




knowledge aquired when coordinated within the entire organism, not just the brain

Discovering and interpreting meaning and reality

BISON FROM ALTAMIRA CAVE, SPAIN

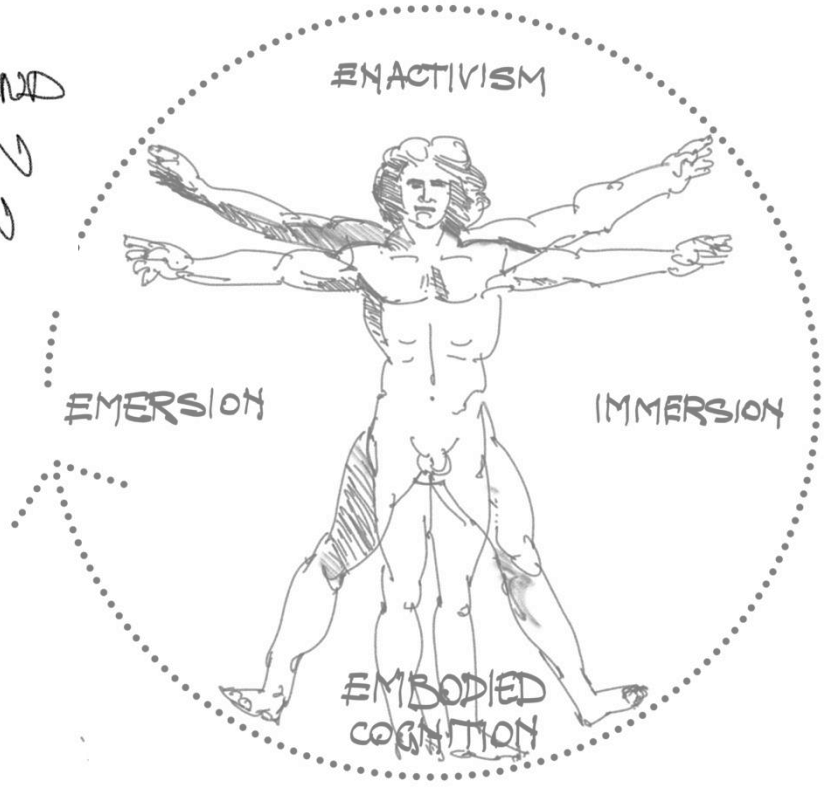


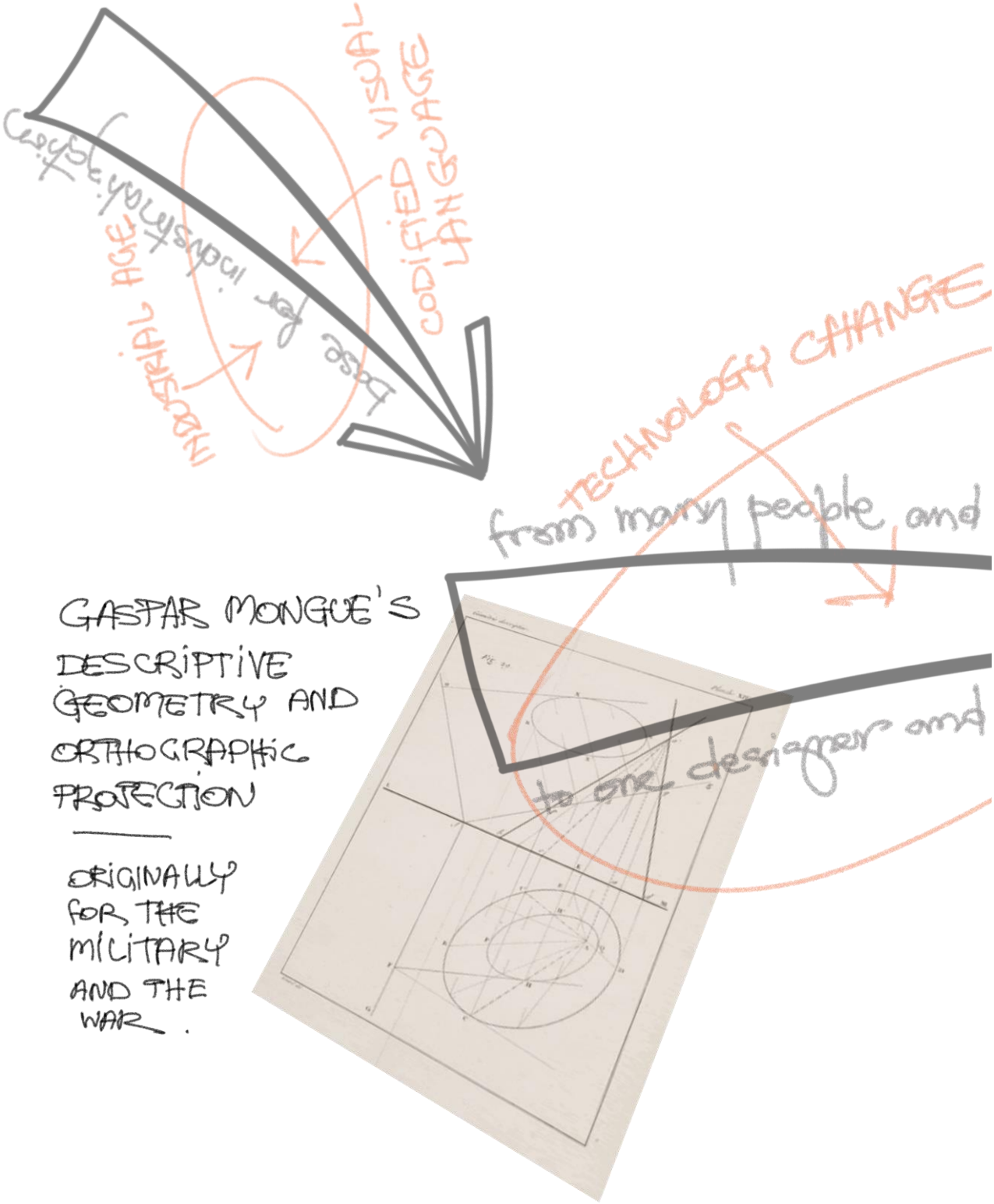

### 4.5 The hidden and visible structure

From the Renaissance, a new form of *presentative* drawing appeared with the popularization of paper while its use as *representative* hidden tool for other types of fine arts persisted. Drawing started to be seen as an end in itself for visual and scientific research (e.g. astronomy, biology, engineering). Masters and apprentices gained deep expertise on human anatomy, geometry, mathematics and physics. Drawings became an act of *emersion* (Latin *emerso:* to emerge) of visual concepts that were *enactivated* (interaction with the model, the drawing and its context) by *immersion* (integration of *presenting* and *representing* new ideas and reality) into a full-body and intellectual process of *imagination* and knowledge creation (*embodied cognition*). However, many discoveries and innovations were not shared because of the secrecy of one-off commissions and the taboos of the time.


LIFE DRAWING

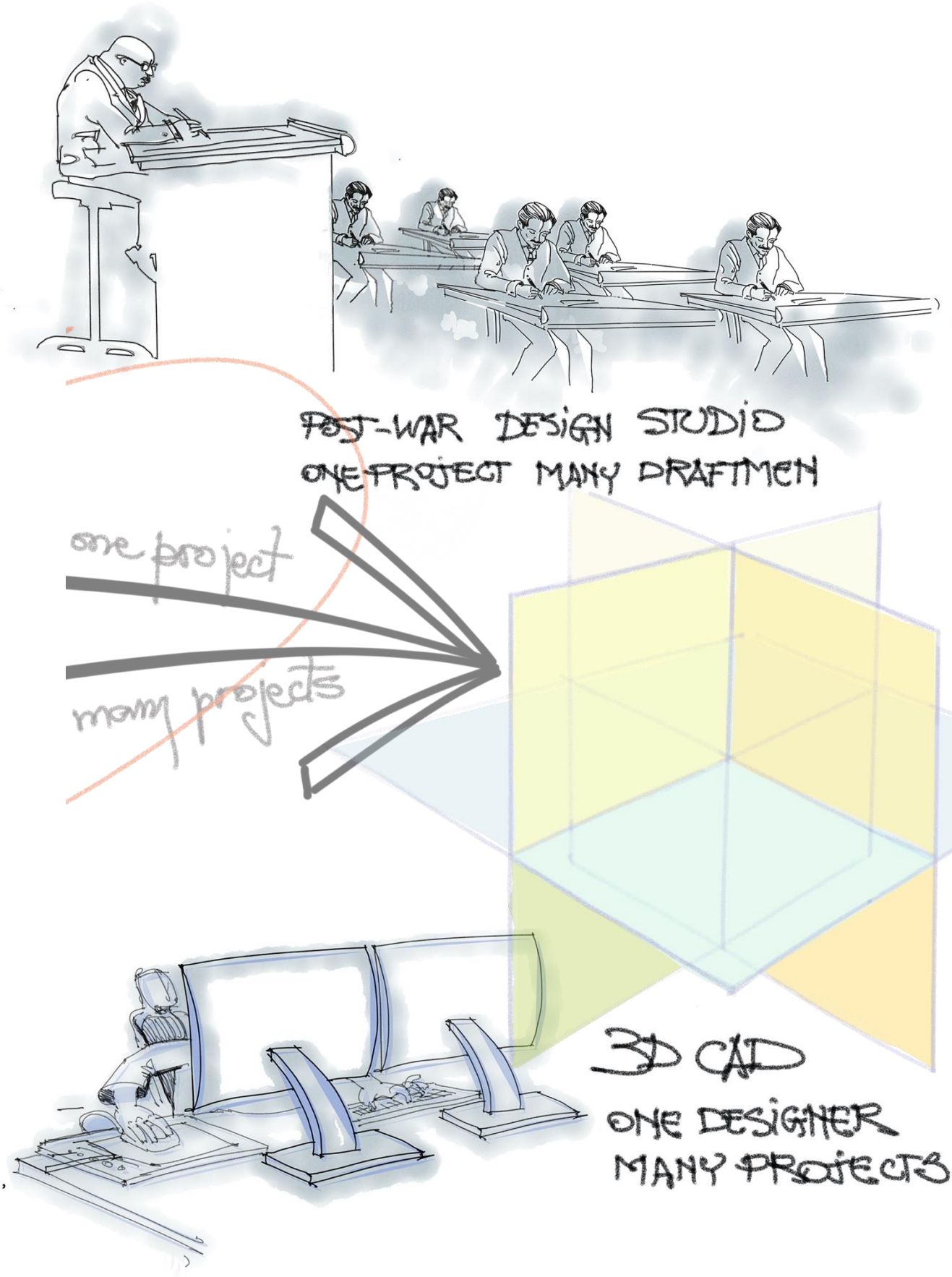
RENAISSANCE'S VISUAL AND SCIENTIFIC RESEARCH AS THE MERGE OF PRESENTATION AND REPRESENTATION OF IMAGINATION AND INNOVATION






### 4.6 The representation of industrialization

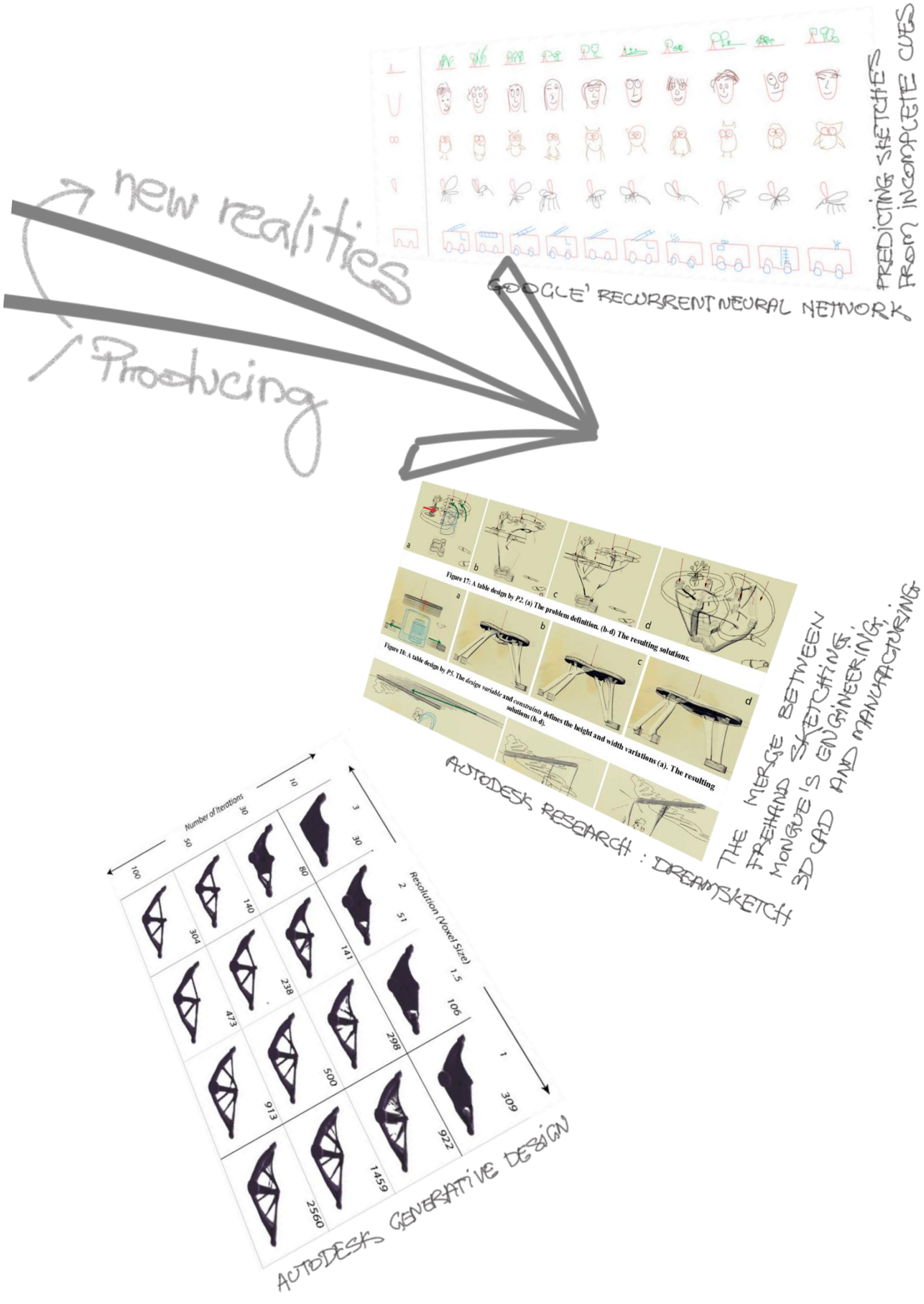
It was only at the start of the Industrial Age that Monge (1765) invented a coded *representation* of visual communication and objects (descriptive geometry) that he shared in plan drawings from one place to another [2]. Again, drawing split between *representation* work (e.g. applied arts, building, manufacturing) and presentation work (e.g. painting, sculpture) by artists that considered themselves as part of the high culture. However, from the start of the 20th century, labour and productivity roles inverted. At the beginning, many people worked manually on one project. By the end, less workers were able to work in many projects thanks to 3D CAD computing.

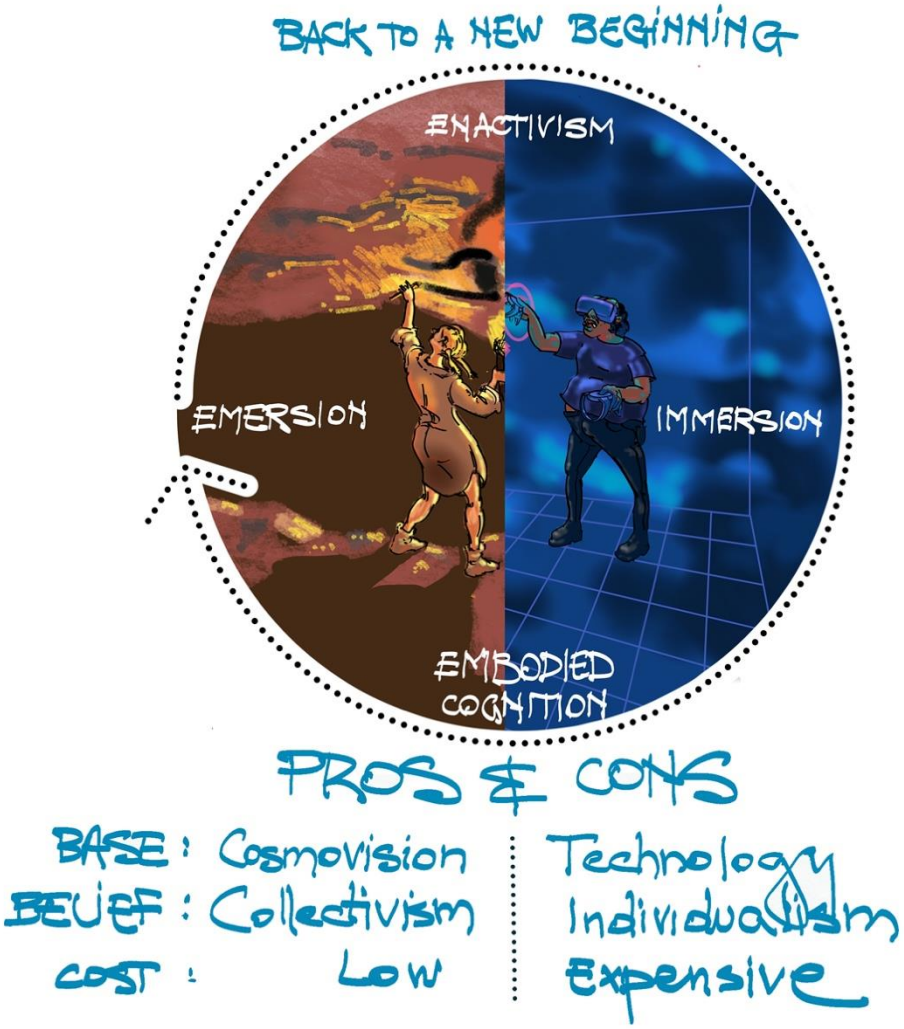

POST-WAR DESIGN STUDIO
ONE PROJECT MANY DRAFTMEN
one project
many projects
3D CAD
ONE DESIGNER
MANY PROJECTS


### 4.7 New means for human and artificial participation

Today, technology allows us to again integrate drawing *presentation* and *representation* with a collective cyber-physical process that offers to accelerate and expand drawing and design exploration in two directions. One relates to augmented and virtual reality experiences as modern realizations of similar old human community understandings present from pre-history. The other, is a curatorial relationship with algorithmic intelligent agents that can generate multiple data alternatives for

modelling, performance, spatial requirements, materials, manufacturing methods, and cost constraints [3, 4].






## 5 CONCLUSIONS

The designer's capacity to *think with the pen* appears to be lacking today. However, it is simplistic to think that the solution is more freehand drawing training alone. There are new skillsets that a designer needs that enrich the drawing practice now. We can integrate *presentative* and *representative,* 2D, 3D, 4D time-space, recurring neural networking and generative design with a full process of *emersion, enactivism, immersion and embodied cognition* to advance new forms of knowledge creation, imagination and innovation for drawing and design. Renewing the know-how will also upgrade their romanticism to a new level.

## REFERENCES

[1] Hoffmann, D.L., et al. U-Th dating of carbonate crusts reveals Neandertal origin of Iberian cave art. *Science,* 2018. **359**(6378): p. 912-915.
[2] Monge, G. *Géométrie descriptive*. 1811: J. Klostermann fils.
[3] Ha, D. and D. Eck. A neural representation of sketch drawings. *arXiv preprint arXiv:1704.03477,* 2017.
[4] Kazi, R.H., et al. DreamSketch: Early Stage 3D Design Explorations with Sketching and Generative Design. In *UIST*. 2017.