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HOMO FABER VS *HOMO ARTIFICIALIS*: FOR AN ARTIFICIAL CRAFTSMANSHIP OF SICILIAN MAJOLICA

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Abstract

The paper aims to present and explore one of the most debated topics in recent years: the use of artificial intelligence for the production of images, and visual content in general, to the detriment of the creative process linked to the use of human intellect. Starting from the concept of *homo faber*, man as creator, we propose the examination of a new figure, *homo artificialis*, for a greater understanding of the man-artificial instrument bond. The focus of the paper is the artistic production linked to Sicilian majolica, a product particularly distinguishable due to its marked craftsmanship, through which to understand whether the creation of "artificially handcrafted" artefacts is possible and how consistent the latter are with the artistic consistency of the Sicilian ceramic production.

Keywords

Artificial Intelligence, *homo faber*, *homo artificialis*, craftsmanship, Sicilian majolica

1. *Introduction*

The use of Artificial Intelligence (AI) marks an undeniable revolution regarding numerous aspects related to human life, from the daily sphere to the scientific field, defining as necessary considerations regarding the possible use of new intelligent technologies for construction of new generative paradigms (Mancini, & Menconero, 2023).

Since the invention of Generative Adversarial Networks (GAN) in 2014 (Goodfellow, Pouget-Abdie, Mirza, Xu, Warde-Farley, Ozair, Courville, & Bengio, 2014), we have witnessed an inexorable revolution in the field of creativity and imagination which, in 2016, will lead to the creation of a GAN architecture capable of generating images starting from detailed texts (Reed, Akata, Yan, Logeswaran, Schiele, & Lee, 2016).

The process, shaped by different disciplines, includes numerous definitions and classifications, thanks to its particularly multidisciplinary nature. In general, AI is a branch of information technology dedicated to the exploration of techniques and technologies aimed at designing systems useful for giving the machine specific abilities, similar but distant from human intelligence (Somalvico, 1987).

For a scientific definition of artificial intelligence we can refer to what is reported by the Group on Artificial Intelligence (HLEG-AI) of the European Union, which defines it as a system designed by man which, given a complex objective, becomes capable of interpret structured and unstructured data, reasoning and processing information based on the knowledge acquired. The success of the machine is therefore defined by its ability to achieve its objectives.

This process represents the basis of AI text-to-image production, then strengthened by Contrastive Language-Image Pre-training (CLIP), a more effective method as it is capable of processing natural language (Radford, Wook Kim, Hallacy, Ramesh, Goh, Agarwal, Sastry Askell, Mishkin, Clark, Krueger, & Sutskever, 2021). In the field of architecture and design, the processes that can be implemented for the creation of new "intelligent" images can be divided into: text-to-image, image-to-image, image-to-video, text-to-video, text-to-3D and image-to-3D. These processes, although recognizable as methodologies common to analogue drawing, implement a revolution in the field of production and representation associated with all fields, from architecture, to representation, up to design, writing new paradigms of creativity.

In this sense, it is now undeniable how these processes are becoming part of a new creative trend, enhanced by intelligent systems capable of carrying out repetitive actions or completely original creations. The current partial denial of this type of methodologies does not appear to be sufficient to hinder the use of this tool, the more it defines its development in an uncontrolled and poorly measured way, as occurred in the transition process between analogue drawing and digital drawing (De Baggis, & Pulifiato, 2023).

The aim of this contribution is not to analyse the debate on the actual "profane" nature linked to the use of artificial intelligence, but rather the relative and current potential associated with creativity and creation. Are current technologies therefore capable of generating effective creative "artificial" intelligence?

Intelligence can be defined as the complex of psychic and mental faculties which, through cognitive processes, allow us to understand things and concepts, organizing ideas and behaviors to achieve an objective (Treccani). Although a meaning shared by the entire scientific community is not yet available, the latter defines intelligence as the ability to successfully face and resolve new or unknown situations and problems (A.A. V.V., 2005); or, moreover, as «the measure of an agent's ability to achieve objectives in a wide variety of environments» (Legg, & Hutter, 2007).

If we think of all the "intelligent" tools on the market, they can mostly be summarized as complex and high-performance recorders of third-party experiences, programmed in advance by human intelligence (De Biase, 2015).

The idea that artificial intelligence would totally revolutionize the world dates back to around sixty years ago. As claimed by Herbert Simon (1965): «Within twenty years machines will be able to do any job a man can do». This vision, after particularly difficult past times, the so-called "AI winters", corresponds to being almost entirely true, if we innate the "intelligent" instrument solely as the result of the process of domestication by man.

The analysis as well as the identification of potential and critical issues of intelligent systems therefore represent the useful basis for building a concretely functional and coherent relationship with the processes underlying human knowledge and production.

Within the sector of representation, these methodologies must therefore be investigated, in search of a correct balance between *homo faber* and "*homo artificialis*", through which to understand the link between man and the artificial instrument.

2. *Homo Faber* vs *Homo artificialis*

Sennet, in the opening text of the essay *L'uomo artigiano*, immediately places us in front of the relationship between the human and the interaction between the processes: «what does the process of producing material things reveal to us about ourselves?» (Sennet, 2012, p. 17). The author immediately focuses on the theme of "material consciousness", that is to say on the structuring of human faculties through the succession of actions in the world and the direct relationship between man and the surrounding space. Human action in the world therefore becomes the instrument through which to build common processes and meanings.

During the analysis for the definition of a material consciousness, Sennet proposes a watershed between the two different processes linked to human production, defining two categories: *homo faber* and *homo laborans*. If the activity of *homo laborans* is an end in itself, the production of *homo faber* becomes the product of a mixture of common life paths, of a reification resulting from experiences and collective doing. Ultimately, man's material creation cannot be reduced to the bond that unites him to the object produced, but is defined as much by the relationships created with himself, with others and with tradition.

With the theorization of a "*homo artificialis*", that is, a *homo faber*, is a new paradigm perhaps established? In fact, the processes that substantiate the creation of an artificial system find as a fundamental action the "feeding" of the machine with structured and unstructured data[1], and then, once the algorithm has been created, it is "trained" on the basis of human processes, evaluated from a physical entity (De Baggis, & Pulifiato, 2023). It is therefore an entirely humanised, totally subjective process, and therefore susceptible to that human action useful for building common processes and meanings

[1] Structured data refers to a fixed and consistent format; unstructured data refers to the output formats of the content (e.g. images, video, audio).

(Sennet, 2012), capable of making artificial intelligence a tool for the externalisation of thought human.

Or, as defined by the report for a digitalized craftsmanship (Kofler, Habicher, Walder, & Tomelieri, 2022), a "cyborg craftsman", for which machines and AI can work independently and take delivery of large parts of work. This scenario, in addition to being based on the now well-established digitalisation of production processes, is based on an increasingly sudden abandonment of artisanal professions, linked purely to manual skills and creativity.

The process linked to a new craftsmanship therefore places its foundations in the rediscovery of ancient arts and crafts, through which to merge tradition with digital innovation.

3. *Artificial "creative" thinking*

In the analytical context between creative production and artificial process, we want to delve further into the methodology linked to the use of artificial intelligence systems, with the consequent focus on text-to-image (TTI) type processes.

The functioning of AI can be summarized in four different functional levels. The first level is determined by the ability to learn and compare data and events through the recognition of texts, images, audio, video and voice, useful for processing specific information. As a consequence of understanding there is reasoning, useful for logically and autonomously connecting the data through the use of mathematical algorithms. The third level, mainly used for the performance of certain actions and tasks by the machine, consists of the resolution of inputs on the basis of autonomous learning. In the last level, called Human Machine Interaction (HMI), the machine is finally capable of making decisions autonomously, interacting with the user and giving answers.

Based on these latter functional levels, generative AI stands out for its ability to generate data and support human activities and creativity. Inserted in the field of Machine Learning, it is able to quickly generate responses to some inputs of various nature –text-to-image, image-to-image, image-to-video, text-to-video, text-to-3D and image-to-3D– creating outputs more or less similar to the desired result.

Such images can be created using three generative models: Stable Diffusion, Midjourney and DALL-E, equally based on an artificial intelligence algorithm capable of generating output through syntography. They use a diffusion model (LDM), trained with the aim of removing Gaussian noise on the training images, through the use of noise reduction autoencoders. The decoder finally generates the image by reconverting the representation into pixels (fig. 1) (Rombach, Blattmann, Lorenz, Esser, & Ommer, 2022).

The use of one of these systems mainly depends on the usability of the interface, as well as the possibility of imposing more or less substantial changes in the creation of the image itself, such as the size, the accuracy and the basic "seed". The text-to-image processes described in the following paragraphs follow the Stable Diffusion model, detailed below in its semantic component, associated with the textual prompts for the creation of images.

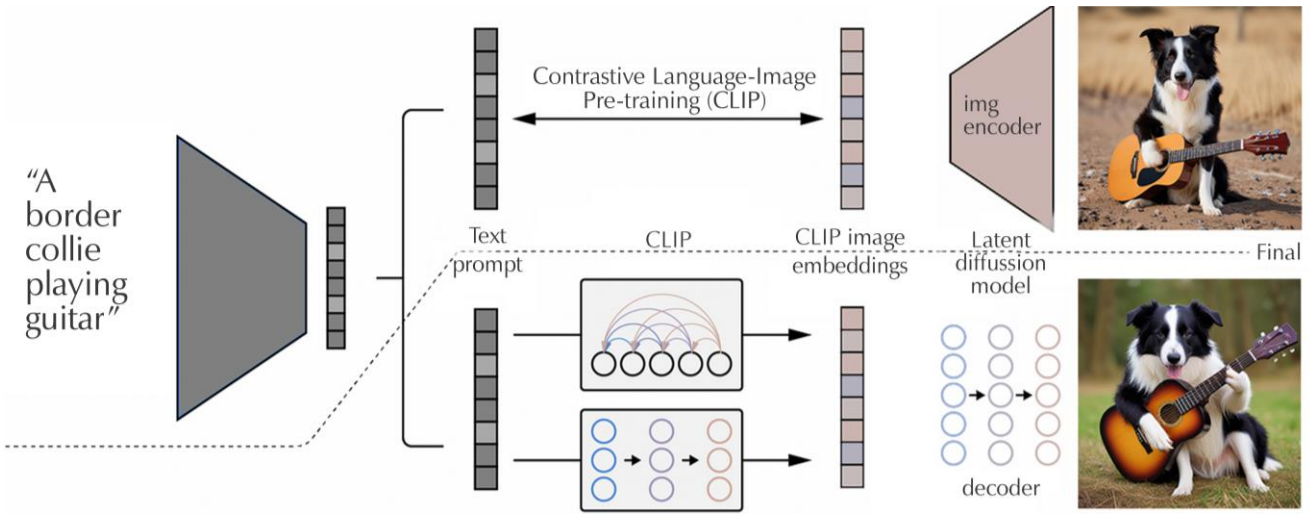

Fig. 1: From the text prompt to the final image: LDM and decoding. Elaboration by the author.

4. *Semantics and semiotics for understanding the method*

The training process[2] explained takes place through the insertion of textual and representative semantic data, making it possible for the system to understand the link between the words/phrases and the visual representations. The insertion of the textual prompt therefore corresponds to the production of an image resulting from the meaning given to the latter by the TTI system.

It is in this context that semantics and semiotics play a fundamental role. Semantics is a useful tool for understanding the meaning of words, sets of individual letters and words within sentences and texts; semiotics is a discipline aimed at the analysis of signs and the interaction between them. Finally, intersemiotics, relating to the passage between systems of representation and different signs, useful for understanding the meanings of texts and images in relation to each other (Osimo, 2016).

Segmentation is therefore an end-to-end analysis process capable of dividing a digital image into multiple segments, duly classified. Semantic segmentation[3] assigns specific labels to individual pixels of the image, useful for distinguishing the contours and specific shapes of different objects, subsequently classified based on colour, positioning within the image, contrast and other attributes. Instance segmentation instead focuses on the semantic classes contained in the image –people, animals, cars, trees– on which it creates a segmentation mask and a specific identifier tag for each instance. Finally, panoptic segmentation models involve both types of information, capable of detecting and segmenting individual instances, providing a more complete analysis of the image.

In general, tools based on generative AI therefore use a neural network trained as above, on the basis of a large set of visual and textual data. Upon insertion of input by the user, be it text and/or an image, it is therefore possible to generate the relevant output of an image, video or three-dimensional model, further modifiable using the same procedure.

Understanding the methods and processes underlying the training of generative artificial intelligence, we want to show below an application process useful for understanding them in the context of text-to-image restitution. Starting from the result of the text prompt "blue bird"[4] (fig. 2), proposed to the generative artificial intelligence machine Stable Diffusion AI (CreativeML Open RAIL-M), it is possible to highlight how the TTI system has learned the semantic meaning of the word "bird", a word to be associated with a specific rounded animal shape with wings, beak and legs; the color "blue" is instead recognized unambiguously as a color. Despite the apparent objectivity of the semantic characteristics, and the structural coherence relating to the characteristics specified in the prompt, the production of different images is not always completely univocal. Exactly as in the case

Fig. 2: Prompt “a blu bird”, Stable Diffusion method. Elaboration by the author.

[2] Generative artificial intelligences, used for image production, function similarly as Large Language Models. These are therefore machines trained with a notable corpus of cultural elements (literary texts, works of art, music, and more, depending on the output to be generated), capable of imitating the semantics contained in the prompt or in the starting image.

[3] In the generative AI process, semantic segmentation becomes fundamental as it helps the machine distinguish different classes of objects and background regions in an image.

[4] A negPrompt, or Negative Prompting, was used, useful for filtering the contents to avoid within the images, through which to better control the rendering. The negPrompt was: «ugly, tiling, poorly drawn hands, poorly drawn feet, poorly drawn face, out of frame, extra limbs, disfigured, deformed, body out of frame, blurry, bad anatomy, blurred, watermark, grainy, signature, cut off, draft".

of "human" creative production, certain characteristics, while maintaining the identified semantic coherence, appear to be explained in different, dissimilar ways in: representation technique, gradation of blue; scenography/background and additional elements, functional to the completeness of the representation.

In support of how the TTI system depends on "human creativity", and therefore cannot replace human thinking, a more in-depth structuring of the textual input was therefore carried out at the semantic level. Through the use of the same Stable Diffusion AI machine (CreativeML Open RAIL-M), the following prompt was inserted: "a blu bird, the bird is of the Sialia currucoides species, realistic drawing, resting on a branch, gray background" (fig. 3). Starting from a prompt, whose descriptive structure is significantly more detailed than the previous one, it is possible to notice a more coherent and homogeneous representative assonance compared to the textual input inserted. Despite the ever-increasing detail, the generated result is always different, still leaving room for further possible variables.

It is therefore possible to observe how the rawPrompt, despite being bound only to the prompt, without restriction constraints, offers greater performance compared to the generation of images with multiple elements. When inserting the details –negPrompt, addModifiers, addContext– it is possible to highlight a more or less evident distortion of the result, despite managing to define a more detailed image relevant to the textual description provided.

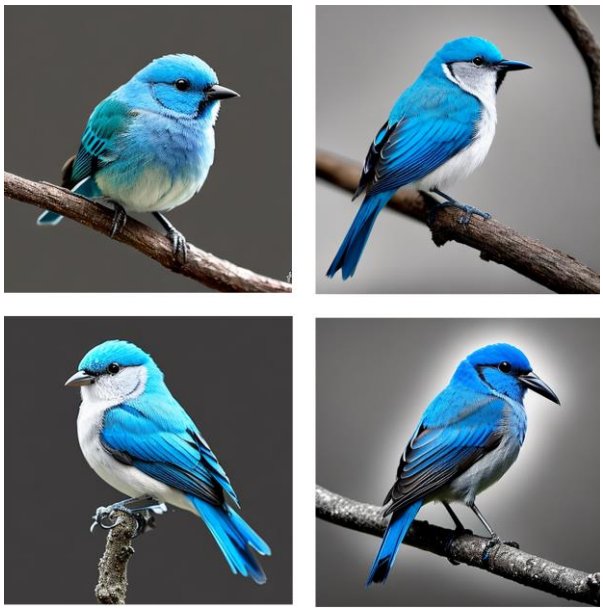

Fig. 3: Prompt "a blu bird, the bird is of the *Sialia currucoides* species, realistic drawing, resting on a branch, gray background", Stable Diffusion method. Elaboration by the author

5. *AI for the creation of artisanal products*

Leaving aside the phases necessary for the development of a new product (NPD) –such as planning, market research, development, production and management– the text aims to analyze the relationship between the creative idea realized through artificial intelligence and existing artisanal products, through which to understand the actual existence of a new man-machine relationship.

The artisanal product, the result of the union between cultural design and manufacturing system, is traditionally characterized by a constant creative relationship between innovation and tradition. A resilient system characterized by an increasingly precarious balance in which the awareness of historical and socio-cultural identity contrasts with new methodologies of creation and production.

Re-establishing the relationship between craftsman and local[5] design represents a great resource and challenge (Puglia, & Terenzi, 2020), a strategic driving force for promoting craftsmanship for the development of "design-driven" innovation (Verganti, 2009).

This is Generative Design, a new frontier in the ideation and creation process, useful for conceiving, suggesting and modeling creative elements. In fact, AI allows the generation of an infinite number of graphics, helping the designer to speed up the creation process, dramatically increasing productivity and creativity (La Via, 2023).

This approach allows for the rapid generation of new alternatives and aesthetic-functional solutions, effectively acting as a useful search engine for finding new design information, for the creation of new products (Boldrini, 2023): «generative design methods utilise algorithms to produce a large number of new and alternative design solutions in an automated procedure» (Rodriguez, Soares, Fernandes, Gaspar, & Costa, 2018). A Generative Design system is therefore

[5] Local refers to the individual, organization or community that has an extensive network of local relationships and long-distance interactions. It is the way in which local forces and global relationships take concrete form.

designed to assist the craftsman in making more informed decisions, with a greater wealth of information, taking advantage of computational processing to manage a quantity of data that would otherwise be unavailable to humans.

This process –already widely used in the architectural, construction, healthcare, automotive fields– therefore allows a deep understanding of the design and creative idea, making the creative process more efficient (Westerveld, 2021).

In this context, a new approach in the field of design has already been undertaken in the design and production of marble, a realistic and customized "hypermarble" capable of opening up different scenarios, towards a new approach to creativity (Ferlazzo, 2023).

Ceramic, more than any other manufacturing product, has always been a material associated with a great artisanal and cultural tradition, often already included in industrial and semi-industrial manufacturing processes. In addition, the renewed production and the digitalisation of decorative processes allow the development of detailed graphics and different textures, capable of developing new aesthetic and emotional paradigms (Goretti, & Terenzi, 2023).

The final objective is therefore the redefinition of the current characteristics of the ceramic production of the past, based on stratifications of material and immaterial values, between history and contemporary values.

6. Sicilian majolica: for an artificial creativity

The field of testing between artisanal production and artificial creation processes is Sicilian majolica –a product particularly distinguishable due to its marked craftsmanship– through which to understand whether, through the use of TTI systems, the creation of "artificially crafted" artefacts and how consistent the latter are with the artistic consistency of Sicilian artisanal ceramic production.

Regarding the origins of this type of production, the first origins of ceramics in Sicily can be traced back to the Neolithic, a period during which the processing of ceramics found particular development, abruptly stopped by the Roman and Byzantine denomination. Therefore regaining strength with the Arab conquest, which took place in 827, associating production with a renewed refinement of style, shapes, decorations and manufacturing techniques.

Fig. 4: Ceramic tradition: the majolica of Santo Stefano di Camastra (ME).

If the Arabs made important changes regarding production, it was the Spanish who introduced new, particularly bright colours, such as blue, manganese, yellow and green. The influences of the Renaissance, up to the 17th century, brought final changes to the majolica that we know today, produced mostly in the cities near Palermo, Syracuse and Messina. Here the style is characterized by ash blues, then changed to bright blue, with motifs that recall vegetal decorations, peacock feathers and many other symmetrical geometric figures (fig. 4).

In contrast to a production with a structured and representative style, in the nineteenth century the use of cement overshadowed the production of ceramics, defining a downward trend as regards production, use and marketing (Ragona, Buttitta, Sellerio, & Jung, 1975). It is only recently that, thanks to the desire to rediscover ancient traditions and processes, we are witnessing a new flowering of Sicilian-style ceramics, an area in which "intelligent" productions and experiments find a possible field of experimentation.

The text therefore intends to explore and test the similarities and discrepancies generated by the relationship between artisanal production and "intelligent" production, the ultimate aim of which is not the replacement of the figure of the artisan, but rather a possible support in the conception and enhancement of creativity and in a possible technological revival of ancient knowledge.

The objective pursued is the verification of the actual existence of connections and mixtures between *homo faber* and "*homo artificialis*", whose product becomes the result, on the one hand, of a productive intention and, on the other, of the relationships created with oneself, with others and with tradition.

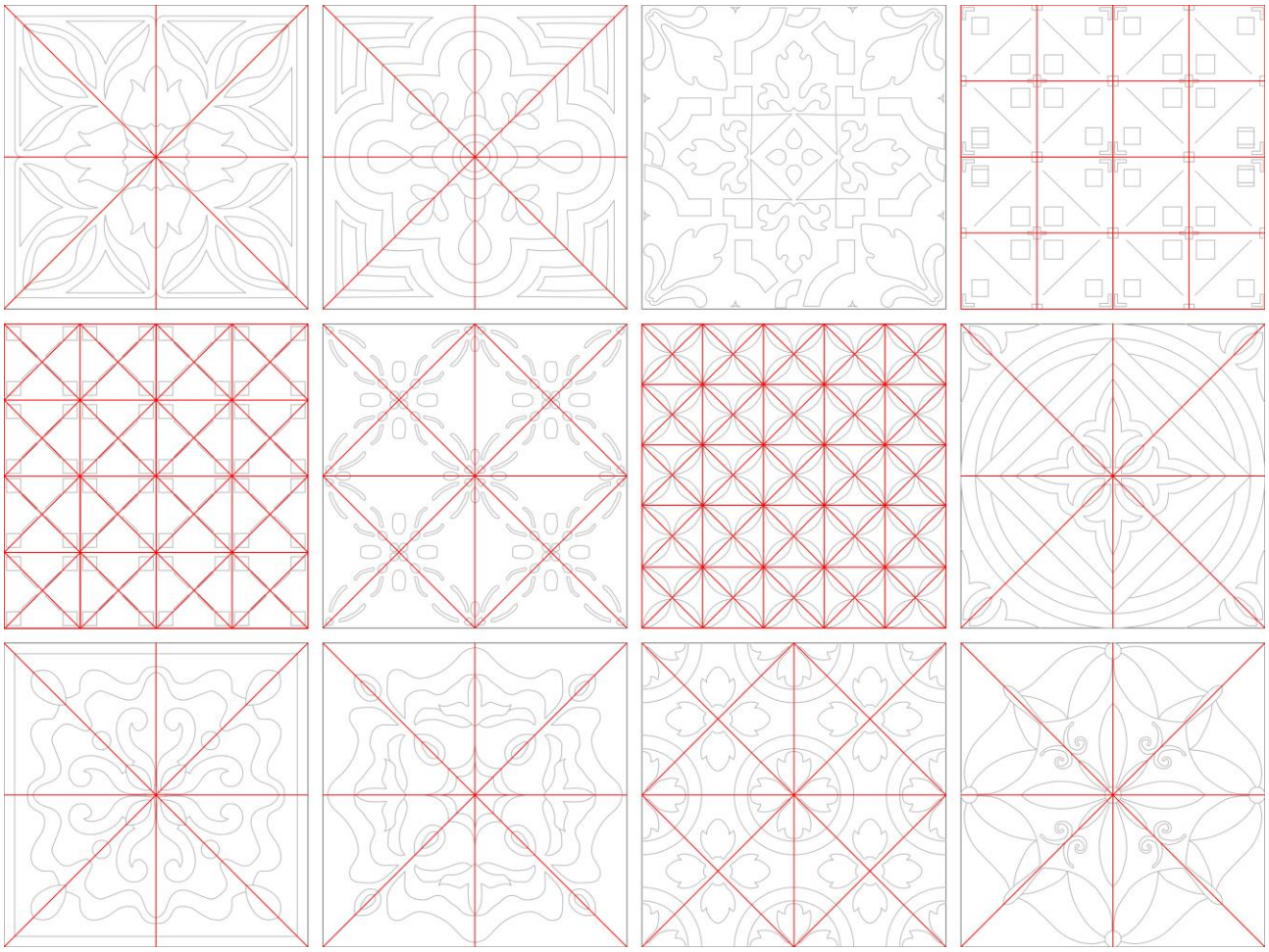

Fig. 5: Sicilian majolica: geometric analysis. Elaboration by the author

Fig. 6: Sicilian majolica: Identification of recurring colours. Elaboration by the author

As already mentioned, the production of Sicilian majolica is part of an artistic and mutative context of significant importance, in which craftsmanship becomes the precious essence of the product. However, if in the generative AI testing phase the product obtained appears to be particularly malleable compared to the product to be obtained, in the case of the artisanal production of Sicilian majolica, the domestication of the machine appears to be a topic of fundamental importance, as it contains the thought and the representative tradition indicated for this production.

In the prompting phase for the creation of the majolica, the text focuses on verifying the level of understanding of almost intangible factors linked to tradition, therefore how much the machine is capable of interpreting and processing the prompt in a valid manner, testing the correct "domestication" of it.

In the course of structuring regarding the proposition of the text prompt, we wanted to delve into the aesthetic issues related to geometry and colors, in order to evaluate the actual correspondence between the artisanal product and what was developed by the generative AI.

Regarding the geometric structuring of the majolica, it is possible to notice an axial or mirror-like symmetry (fig. 5), with a rational but never predictable aesthetic. Geometry alone, however, is not sufficient to define the characteristics of these elements, clearly distinguished from the remaining ceramics by virtue of their bright colours, superimposed on soft background colours, of which it is possible to define particularly recurring chromatic shades (fig. 6).

As regards the proposition of the prompt useful for the creation of majolica, we therefore wanted to insert the generic rawPrompt "a Sicilian majolica tile"[6], proposed to a Stable Diffusion type machine.

The result, in contrast to the geometric and colorimetric analysis previously proposed, shows valid representations regarding the aesthetics, proportion and coherence of the shapes associated with Sicilian-style majolica (fig. 7). In order to verify this correspondence, it was therefore decided to compare the majolica generated with AI with the majolica on the market, similar in shape and color (fig. 8).

The geometric correspondence between symmetries and modules appears remarkable, with what has been produced and with the majolica already known.

[6] Maintaining the average negPrompt: "ugly, tiling, out of frame, extra limbs, disfigured, deformed, body out of frame, blurry, bad anatomy, blurred, watermark, grainy, signature, cut off, draft".

Fig. 7: Prompt "a Sicilian majolica tile", Stable Diffusion method. Elaboration by the author

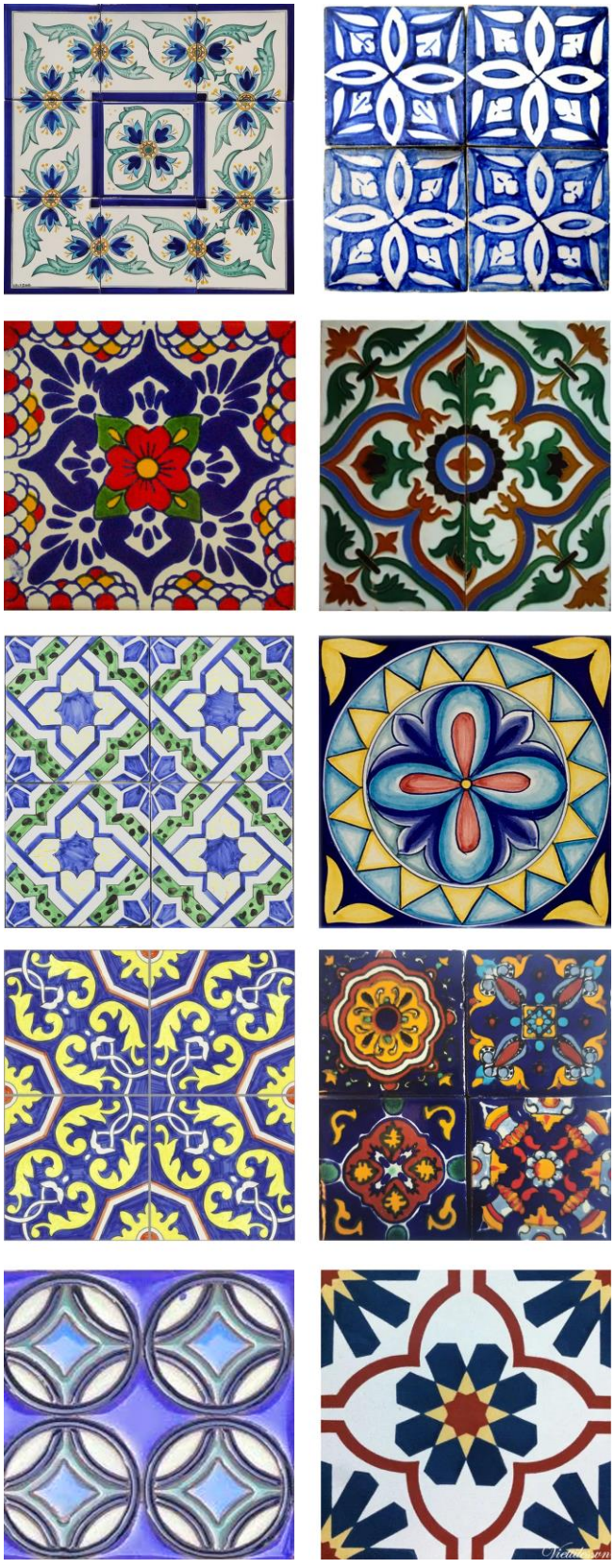

Fig. 8: Existing Sicilian majolica, arraged in relation to similarity with the production generated through TTI.

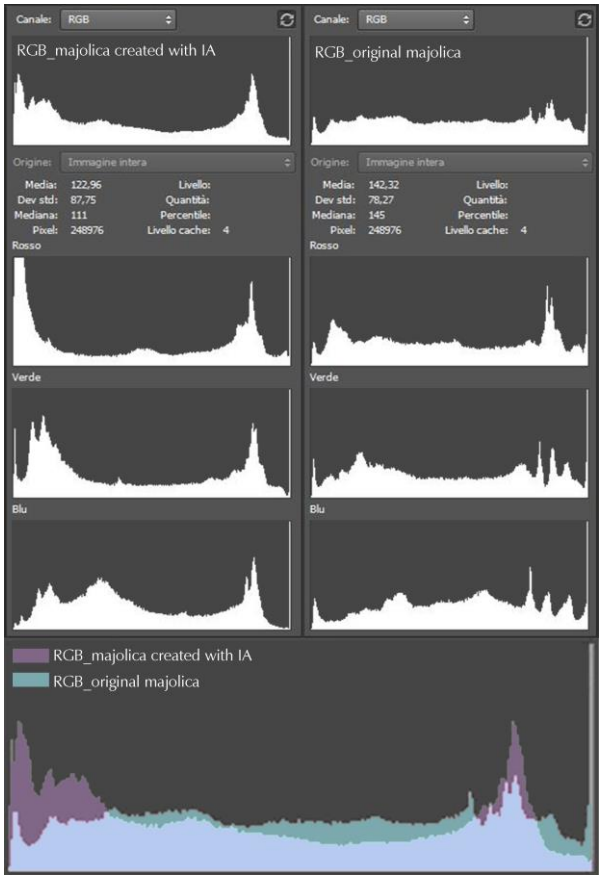

Fig. 9: Colorimetric comparison between majolica generated with text-to-image method and traditional majolica. Elaboration by the author

At a colorimetric level, it was possible to compare the two productions through a histogram, useful for displaying the pixels corresponding to each brightness level or tonal value for each image. Along the horizontal axis of each histogram we find the number of pixels for each tonal value, in which shadows, midtones and highlights are reported, left to right. The higher the height of the graph, the greater the number of pxels concentrated in a certain tonal value.

The histograms belonging to the red, green and blue tones are reported in the figure (fig. 9) on the left the histograms belonging to the majolica generated with AI, on the right the histograms of the artisanal majolica. The histogram at the bottom finally represents the comparison of the RGB tones of the two images, of which it is possible to note a notable correspondence, specifically for half tones and lights.

In order to ponder the actual generating correspondence, as well as the possible real artisanal creative basis, we therefore proceeded by reversing the structuring process, from the real to the artificial. Based on the figurative characteristics of some Sicilian majolica in production, through an image-to-image process, the prompt "a Sicilian majolica tile" was imposed on the system, through which to create a further artistic production, on the basis of what exists.

The product (fig. 10) demonstrated a notable correspondence with the basic element, similar in shape and/or colour, through which to enhance artistic productions.

Taking it for granted that the artistic and human product cannot be compared to merely mechanical production, it is instead the product with AI that is a valid starting point for the creative assistance of the works, relaunching the latter according to a new, technological key.

In this sense, setting aside the existing debate between art and technology in the contemporary scenario, the proposal of a leap in scale with respect to the case study of Sicilian majolica is useful to test the TTI process according to a multilevel and multiscalar strategy, taking into consideration the Sicilian majolica inserted in the architectural context, to be compared with the existing architectural consistencies.

The prompt associated with this leap in scale was defined as "a wall with Sicilian majolica", maintaining the generic standard chosen in the construction process of the majolica themselves, as it is more useful for testing the machine's training data. The product was therefore compared with existing architecture present in the Sicilian territory, through which to evaluate the actual correct insertion of the shapes and geometries inspired by Sicilian ceramic art.

In the left column (fig. 11), whose images were generated through the previously mentioned prompt, it is possible to notice a particular correspondence with some spaces of well-known Sicilian buildings, including: Palazzo Landolina Sant'Alfano in Noto, Villa Palagonia in Bagheria and Palazzo dei Normanni in Palermo, comparable in the images present on the right column of the same image. The styles, colors and geometries of the latter are taken up, partially or substantially and evidently.

Fig. 10: AI vs Real. On the right, the tile from which the semantic prompt was produced; on the left the form generated via the TTI system.

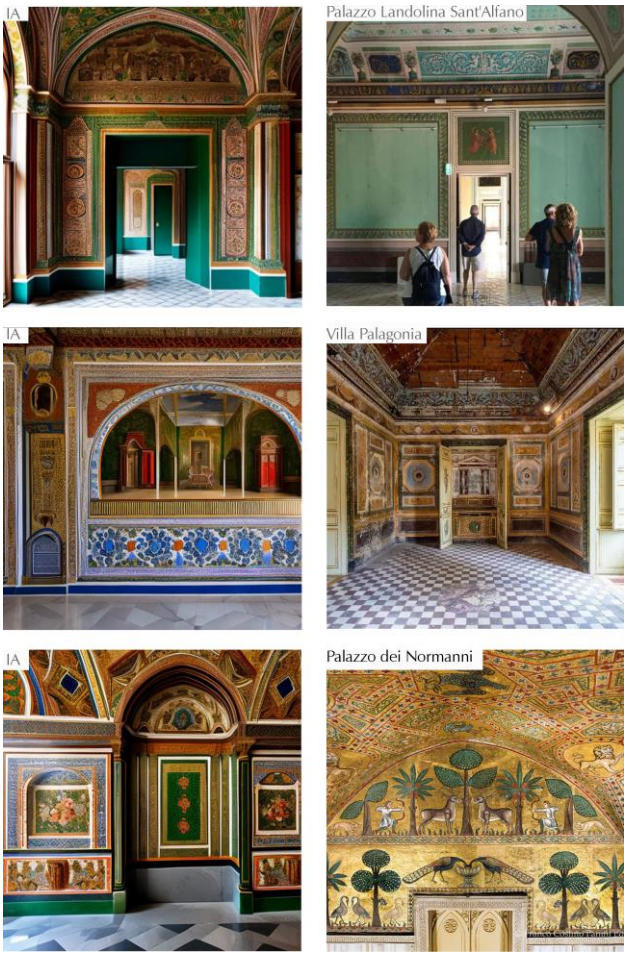

Fig. 11: AI vs Real. On the left: AI-generated image. On the right: Palazzo Landolina Sant'Alfano in Noto; Villa Palagonia in Bagheria; Sala Re Ruggero, Palazzo dei Normanni in Palermo.

Experimentation at multiple scales, useful for verifying the actual correspondence between tradition and training elements, has therefore made it possible to demonstrate how the relationship between AI and creative production is a particularly valid process, to be combined with "human" productions and minds, making it necessary to theorize a new figure capable of correctly "training" the machine, as well as structuring the prompt in a functional way, in a perfect mix of real and artificial.

7. Conclusions

The debate present within the dichotomy between real and virtual has represented and still represents today a topic full of potential and risks. Artificial intelligence has entered this debate in recent years, a field that today manages to find increasingly fertile ground for research, studies and analysis.

It is in the context of AI experimentation that the ceramic sector fits in, in particular Sicilian majolica, the object of a renewed plasticity and a new sensorial value of shapes and aesthetics, in a cultural environment that is now increasingly digital and digitized. These aspects open up new possibilities between the object, its production and its values, in which the aesthetic component becomes fundamental in the development of the sensorial values of the product, towards a new contemporary aesthetic, in any case linked to traditions.

The relationship between AI and the traditional ceramic production of Sicilian majolica aims to be a starting point for relaunching the manufacturing production of these territories, through which to generate a new driving stimulus based on new technologies and new paradigms.

Despite the clear and well-known implications at an ethical and cultural level, the results of the experiments communicate a partial correspondence between the creative product and the elements that can be associated with the real world, the result of an algorithm often unable to find answers in the "objective world".

Moreover, the idea that human beings themselves "create" reality is rather recent. According to Bruner (2005), what exists is a consequence of thought, the product of which is projected into the "objective world" through the knowledge of causal models and causality.

The prodigious ability of the human being to develop cause-effect learning processes represents the undeniable gap between representation and artificial intelligence, while defining itself as a field of study with enormous potential and flourishing development.

It is within the scope of the potential of these systems for manufacturing production that we hope for the theorization of a new figure capable of correctly "training" the machine (Palmieri, 2023), as well as structuring the prompt in a functional way, a sort of "prompt designer" capable of coherently managing the union between human and artificial production.

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