

## GIORGIO DE CHIRICO - THE PAINTER MATERIAL, GESTURE AND CHANCE<sup>1</sup>

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Painting is the corpus of form and image. The art of painting is the human ability by which an artist brings the urgings of his/her psyche into being, externally. Such pursuit is born of the need to reveal a thought through its portrayal; it offers the possibility of rendering intellectually generated visions concrete through an act of pure creativity; it satisfies the impulse and aspiration to sublimate, modify or even just represent the surrounding elements of reality; when practiced "on commission" it exemplifies the ability to make something known by means of its representation (a custom which, historically, has often determined and at times influenced the birth of invaluable masterpieces). Whatever the original motivations may have been for picking up a paintbrush or a tool, whenever it occurred, from the primitive, enchanting sketches of rupestrian painting to Flemish refinement, from monumental Renaissance and Baroque architecture to twentieth century action painting, the materialisation of painting passes unconditionally through the gestures of hands shaping and moulding material according to their will in an activity that must be defined as artisanal, in which such gesture constitutes the implementation of a technique, irrespective of the formal result of the creative synthesis.

During the period when Giotto organised the decoration of the Scrovegni Chapel, thus creating a workshop of wonders that would constitute the basis for all Art History to come, the painter was still assigned the social role of mere artisan, associated with ceramicists and tanners in whose guilds he was included. From Medieval times to the Modern era, a radical reversal occurred in the relationship between the figure of the artist and the work of art: the artist was qualified and recognised for the value of that which he created. Thus, it was the work of art itself that promoted the painter to the social status he would attain in the future, and that demonstrated the greater cultural constituent inherent in the artist's craft. In more recent history, however, an inversion of this tendency has occurred, in which the work of art is perceived as the fruit of the creative act of the artist regardless of its intrinsic quality. Considering extreme examples of this phenomenon, such as Manzoni's *Merda d'artista* (Artist's Shit) or Duchamp's *Fontaine* (Urinal), we are in the presence of an upgrading of "products" that are usually considered alien to the world of art and which, loaded with further meaning by their authors, fulfil a conceptual mission notwithstanding their scant objective value.

In making these observations, we have, however, surpassed the very meaning of painting and touched upon the vaster and more variegated universe in which the multitudinous fruit of human

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inventiveness revolves, for which, as brilliantly defined by Cesare Brandi, the essential moment of recognition of the work of art took place.

Through his numerous incursions outside the confines of figurative art, Giorgio de Chirico wore, with every right, the laurels of the versatile and complete artist. Nevertheless, as a true painter, he abhorred the macroscopic extension of what can be defined as Art and, with the authority acquired through a lifetime of painting, inveighed against what he called "Modern Art".

The development of Metaphysical Art, which so contributed to ferrying European iconography toward the contemporary era and which also won the favour of the public and critics in its early years, nevertheless did not provide de Chirico with relief from the artistic urgency he had felt since he was a child. Throughout his long career, he, the modern alchemist, practised ongoing research to recover that sublime symphony of materials and gestures that could have ratified a renewed alliance between *cogito* art and *facto* art, which, according to Maestro de Chirico, seemed to be separated by an abyss of ignorance and indolence.

What he never forgave the critics and artists of his day for, was their taking refuge behind the reputed ideals of intellectualism and spirituality to the detriment of "know how". Vice versa, they accused him of having betrayed these values, which were perceived as modern, by taking refuge in a universe of rhetoric and formalism.

His most malicious detractors came to sustain that his painting had died in 1919. However, de Chirico, the *Pictor Optimus*, simply considered it his duty as an artist to make his technical ability commensurate to his thought, so the one could act as the measure of the other. He trained his hand in order to give concrete form, through painterly gesture, to the multiform visions populating his variegated iconographic repertory, as reflections of the interior and visionary model from which they originated. Thus, for de Chirico, the artisan element of his craft, in the highest sense of the term, was not substituted, nor was its vigour diminished, in relation to the intellectual tension that constituted its foundation. The obsession to obtain perfection from the material substance of paint intensified rather than placated what he himself defined as "the adventure and drama of painterly quality".

Our interest in the material substance of paint, including its chemo-physical aspects, derives from our professional requirements as restorers. Gaining access to the more strictly technical level of de Chirico's corpus of painting from a scientific approach and with a noncritical spirit has made it possible for us to grasp the complexity of the artistic figure he wished to embody. The need to investigate and understand de Chirico's *modus operandi* for the purpose of conservation has led us to undertake a deep analysis of his work procedures and accustomed us to an extremely close observation of the painterly fabric.

It is from such a perspective that a series of reflections, including a consideration of style, originated in the search for the existence of a conscious connection between technical choices and descriptive will, while ascertaining how much that syllogism is determinative and strongly constitutive of the iconographic suggestion of each work of art and how much it influences, in a way we could define as subliminal, the message the observer receives.

In comparison to the abundance of attention that has been dedicated to the study of de Chirico's artistic poetics over the years, the treatment of queries linked to the technical production of his work has been limited. This has been the case even though conservation problems related to the reciprocal cohesion of layers of paint in certain sections of some paintings have come to light. The cause of this, as we shall see, is directly related to his incessant experimentation.

We neither intend to nor could fill this information gap, also because available scientific data remain insufficient even today for carrying out an exhaustive analysis and, as we shall see, due to the vastness of Giorgio de Chirico's *œuvre*, it is actually impossible to arrive at absolute values, despite the assistance of science in the formulation of findings. Thus, we will limit ourselves to sharing some considerations that have matured over the course of the years in "close contact" with his painting and to disseminating the results of research carried out for conservation purposes or resulting from the study of his technique. Using this knowledge to implement ideas held in the artist's technical writing, primarily but not limited to his *Piccolo trattato di tecnica pittorica* (Small Treatise on Painting Technique), we hope to contribute to rendering a realistic and deeply human portrait of de Chirico the artist and artisan, who – at the end of a day's work returned from fantastic journeys during which he had visited metaphysical piazzas and interiors or animated inhuman archetypes, contemplated solitary beaches walked upon by *dioscuri*, as well as arenas inflamed with gladiators, or touched upon glades brightened by the songs of maenads –, with traces, on his hands and clothes, of the materials that had made it possible to transform these dreams into reality, materials for which he always had the greatest respect.

## Material

Before delving into the labyrinth of dechirican painting technique, we believe it necessary to make a brief general digression on the characteristics of the materials that typically make up a painting's stratification, as well as the various technical choices the painter makes and the laws that determine the physical existence of painting. These subjects are strictly linked to the technical research de Chirico conducted by consulting bibliographic sources and reading technical treatises, as well as to his study of those paintings from the centuries of painting that had preceded him and which he held to be masterpieces, and to his questioning of the experts, such as restorers, who could provide him with specific techniques and infuse him with that artisanal knowledge with which he was inexorably fascinated, and finally to his own experimentation by means of which he gave life to his personal "recipe book".

The sections of a painting can be schematised as the overlapping of three basic layers: support; preparation; paint membrane (pigment + binder), in addition to which there are usually a number of coats of glue providing absorption and adhesion to the support, followed by a further "primer" over the preparation and a final coat of varnish over the painting's outer-most layer. Each of these elements possesses chemo-physical characteristics that make it suitable for carrying out its function in relation to the other layers and to the physical environment, constituting a complex, dynamic system, maintained by equilibriums that are as much internal as external. Thus, the work of art appears

to be subject to the influence of a multitude of variables, oftentimes not completely controllable, which occurs in the manufacturing process, at the moment of the painting's coming into being and throughout the entire course of its successive existence. For centuries, prior to the industrial revolution and the Modern era, the artist's empirical research was aimed at identifying a selection of materials of natural origins that met poetic and stylistic needs as well as physical needs. As long as errors were not made during the production process or unfavourable environmental conditions did not occur, these materials admirably fulfilled the expectations of artistic production.

By "support", we mean that which gives the painting its structure: surfaces such as paper, wood, textiles and metal (limited here to movable components), which, on their own, may not possess the requisites of absorbency, solidity, smoothness and uniformity, or stability with respect to the paint film, in order to be painted upon. (Although, in fact, there exist many works of art that have been created by conscious choice directly on a bare support with consequent, even aesthetic, results.) These requisites are attained during the preparation process, in which it is necessary to achieve a smooth, homogeneous and monochrome distribution of the material, whose function is to "accept" the polychrome layers of paint and serve as an underlying layer, implicitly influencing the final result. The primer is basically made of a mixture of inert substances (gesso and/or pigments) and a binding glue (historically, animal glue), which can be added, especially when textile supports are used, with fat substances (drying oils or natural resins). Although these substances increase flexibility, they tend to reduce absorbency. Some artists, including de Chirico, used an additional thin coat of monochrome primer made by mixing an inert substance with the same kind of binder used in upper layers. These upper layers constitute, in fact, the painting's surface or "skin", created by an impasto of prevalently inorganic mineral pigments in the form of an aggregate of loose pigment powder, which, with a binding agent, adheres to the undercoat. Thus, this impasto forms the colour that, chemically speaking, is a colloidal system in two immiscible parts in which the solid (pigment) spreads throughout the liquid (binding agent). The substance that serves as a medium must possess different, contemporaneous characteristics such as the capacity to form a film (adhesive + cohesive properties); the ability, in a fluid state, to form a stable homogenous and properly viscous paste with the pigments (without reacting chemically with them); the capacity to form a semi-solid, resistant, elastic and photostable membrane either through drying or through a polymerisation process. Additionally, the substance must be as transparent and colourless as possible. The chemical and physical properties of the medium contribute to the stability of the paint itself, while the optical properties, interacting with the refraction index of pigments, determine the appearance. Thus, it is the choice of the binder that determines the painting technique with which a painting is undertaken. It is therefore common usage to indicate, in a simplified manner, the macro-category by which the technical execution of a painting can be identified.

Although the original, literal meaning of the verb "to temper" refers to the action of grinding and blending pigments (by which, in fact, all painting technique could be called "tempera"), true tempera painting entails the use of a binder consisting of hydrophilic substances with a protein (egg, animal glue, casein) or polysaccharide (vegetable gum and amides) in a water medium. While ani-

mal glues are mainly used in the primer coats, the egg is historically considered to be tempera *par excellence*, particularly for painting on wood, due to its ability to form a film with excellent optical and mechanical properties, a subject which we will go into more deeply further on. Vegetable gums, used on their own as binders, are suited primarily to painting techniques on paper supports, such as watercolour, miniatures or ink. At any rate, they were also used in so-called mixed techniques where they were combined with other substances.

Oil painting calls for the use of siccative oils, lipid substances chemically identifiable as long chains of unsaturated vegetable triglycerides. The very characteristic of the unsaturation of the fatty acids (oleic acid, linoleic acid and linolenic acid) contained in the macro-molecules of siccative oils, determines their tendency to oxidise and polymerise, or rather, the ability to pass from a liquid to a solid state in contact with oxygen, which makes them a suitable binder for use in artistic activities. The ability to polymerise, and thus to dry, is characteristic of a limited group of oils: linseed oil, poppy seed oil, walnut oil. Each of these has its own distinctive characteristics determined by the different unsaturated fatty acid chains of which it is composed. The first generates a resistant, elastic film with excellent cohesion. Still, it tends to yellow more easily than the other two, which, on the other hand, create a softer and more sensitive film with a tendency to crack (the second) and deteriorate (the third), and are thus less used or are used in combination with flaxseed oil.

Then there is the so-called mixed technique. This term, which currently refers to the juxtaposition of the most varied techniques, traditionally referred to those colours created with a binder obtained from the materials of both of the techniques described above (from which the name oil tempera emulsion, or *oeltempera*, derives). Chemically speaking, oil tempera emulsion is a hydro-oleic emulsion (the dispersion of two immiscible liquids in the presence of an emulsifying agent) of lipidic and protein substances, principally including eggs and siccative oil in variable proportions with additional ingredients such as vegetal resins, gums, natural anti-fermentative and plasticiser agents, from formulas and procedures from different traditions, often modified by the artists themselves according to their own habits and preferences. In the identification of the individual compounds of so-called oil tempera emulsions, we find ourselves in choppy water since, contrary to what one would think, they make up a very high percentage of painting production worldwide. Such use is not limited to an interim phase between the proliferation of egg tempera and the introduction of siccative oils, but has constituted a conscious choice of many painters since the late 1400s and through the centuries – a choice made with the conviction (in a certain sense well-founded) that the mixing of tempera and oil exalts the relative properties of each and is thus the best compromise between the strengths and weaknesses of the two different types of binders.

With the dawn of chemical research and industry, commercial substances to be used as binders were introduced into the art supply market. De Chirico was familiar with these products and did in fact make use of them. Such binders were made of synthetic polymers, particularly acrylics and vinyls, or synthetic varnishes, which are fast-drying and provide solidity, brilliance and elasticity. These materials are, however, incompatible with traditional oil primers and should only be used on preparations specifically formulated so that the various substances work together. Today, such methodology is often neglected. It must also be noted that, even though the vast gamma of industrial compositions destined

for the artistic market are evaluated for their resistance to deterioration (in conditions simulated in laboratories), it is not always possible to determine the effective resistance to environmental agents, and to aging, which, as mentioned above, is subject to a series of variables that are at times unpredictable.

Giorgio de Chirico worked with awareness and flexibility in the dimension described above. If it is true that the artist's technical writings suggest a rather monolithic approach to painting materials, these texts should actually be interpreted as the sum of experience matured over the course of years through daily practice and the exercise of a profession that, as such, has produced a body of works that is rather more heterogeneous than has been described theoretically. Such results obviously included the experiments and attempts that the artist may not have considered satisfying enough to create a standard, but which nevertheless constitute an integral part.

After an initial lack of interest in matters relating to technical materials (even though as a young artist he came from an educational environment strongly linked to technical traditions, which would, in fact, influence his future research), it seems that Giorgio de Chirico came to realise that his artistic evolution would lack a fundamental element until he was able to master painting materials and subjugate them to his creative will. His first reflections and first systematic commitment to this issue correspond to his so-called classic period, which he defined as a "return to craft" and which saw him committed, among other things, to copying masterpieces of the past. In fact, it was thanks to these very subjects that the limits of commercial products, in reaching the desired effect, were revealed to him. In his later text *Discorso sulla materia pittorica* (A Discourse on the Material Substance of Paint, 1942), the artist indicated precisely what the characteristics were that he required of painting materials (in this case, the binder), and what was missing in commercially produced tubes of paint. What he wanted, in fact, was to be able to work on paint that was fresh, overlapping brushstrokes in such a way that the paint neither mixed nor altered underlying layers, even if such layers were not yet dry. Only by formulating a binder that made this procedure possible, a substance similar to that which he believed was used by the Old Masters and that he called an "emplastive substance", could he "model, draw, blend and shade the paint, that is, work with ease, without the physical nature of the substance working against the painter's effort and obstructing his work". Anyone who paints knows the difficulty of applying successive layers of oil paint without having to worry that a "pulling" movement might occur on the underlying coat. This defect has often been remedied by using absorbent preparation or siccatives to speed up the work.

The time de Chirico spent visiting museums at the beginning of the 1920s provoked in him an infatuation with Renaissance painting, through his discovery of the plastic strength, luminosity and solidity of the painterly material of works of that period. What de Chirico admired, in addition to the extraordinary detail and the purity of saturation in the colour (despite the centuries), was the subtle play of "velatura" (the painting technique of veiling) that generated a dense, deep, yet light and refined paint substance, obtained thanks to the fusion of transparent brushstrokes, which the artist considered possible only through the use of tempera. He would indeed go on to celebrate the enormous potential of tempera in his texts, *Pro tempera oratio* in 1920 and *Pro tecnica oratio* in 1923. We must, however, await his *Small Treatise on Painting Technique* of 1928 to find out just what the Maestro meant by tempera and how he used it.

The “lean tempera” that de Chirico, as copyist, used on canvas and panels prepared with gesso (absorbent preparation), is a protein-based tempera consisting of an animal glue (Carnicci glue), which is particularly prized and has few impurities because it is made by boiling sheepskin scraps. The tempera was then diluted and dampened in an emulsion of egg yolk, raw linseed oil, vinegar and water, which, as the author notes, “fattens” it a bit. With the same emulsion, a thin coat of primer was then spread on the plaster preparation until it became smooth to the touch of the brush. Areas of paint that were dry would be moistened with the same emulsion, which, besides securing the same effect, would also help the successive layers of paint adhere to the underlying paint during advanced stages of work. As is known, tempera has the disadvantage of muting its tonality as it dries. Generally, it tends to lighten and become opaque. Varnishing, which preserves and restores depth and brilliance, as well as re-establishing a “wet” look, has the effect of darkening the light colours. It is therefore clear just how difficult it is for a painter to keep the outcome of his work under control. Furthermore, glue-based tempera dictates the application of paint by means of numerous, fast brushstrokes, a method suited to detail but less so for large areas of colour. As we shall see, de Chirico possessed a gestural expressiveness in his painting that was smooth and sinuous, facilitated by binding materials that were fluid and elastic. Thus, he leaned toward emulsions, which, used initially only as paint thinners, would become a sort of “philosopher’s stone” for him, with which he believed he could reveal “the mystery of the ancients”, or more precisely, that of the material substance of their paint. This form of perfection was one to which he had long aspired. To its attainment, he undertook the preparation of hydro-oleic mixtures in varied compositions, applied in an overlapping and equally varied manner. The minimum common denominator of these mixtures was the use of egg mixed with oils as a binder and emulsifier.

The greater clarity and solidity that de Chirico recognised in some Old Master works – the achievement of which he attributed to tempera –, can, in fact, be traced back to the presence of egg in the composite. Modern chemistry has revealed the biological composition to which the egg owes its excellent binding qualities: while egg-white is a colloidal protein solution (albumin) that, when used alone, creates a fragile water-sensitive film, the egg-yolk, on its own, constitutes a protein and (predominantly saturated) lipid emulsion in an aqueous phase, stabilised by lecithin, which acts as an emulsifying agent. The protein component – made of water-soluble globular proteins, phosphoproteins and lipoproteins – determines the scant tendency to yellow and the photostability that characterises oil tempera technique. The lipid content of saturated fatty acids has a plasticising and protective function against humidity; the small percentage of unsaturated fats, subject to autoxidation, produces reactive radicals that interact with the proteinic material, favouring oxidation and cross-linking (which are significant in the drying phase). In addition, water evaporation triggers the denaturation process of proteins, which thereby lose their complex structure (secondary, tertiary and quaternary), as well as their ability to absorb fluid (hydrophilia), and thus become part of the primary structure. This process brings the reactive functional groups to the forefront, thus allowing them to interact with the metallic ions of inorganic pigments. The overall effect of these mechanisms consists in the formation of an irreversible, insoluble and elastic film, whose stability improves with time.

Due to the presence of lecithin, which, in emulsion, maintains its constituents, egg yolk tolerates

well the mix with oily and resinous substances with which it forms a stable, water-soluble emulsion. The pigments contribute to further stabilising a system that is already endowed with excellent flexibility and reduced fragility compared to the use of egg alone. As will be shown, other ingredients, depending on the artist's intent, are also added in the preparation of oil tempera emulsion. The painting of overlapping layers becomes more difficult in this case and constitutes a process closer to that of oil painting, permitting, however, an excellent amalgamation of the colours.

In practice, when de Chirico needed to execute a particularly well-modelled style of painting, such as portraiture and the human figure (and thus the subtleties of flesh), or still-life, landscape and vistas, oil tempera emulsion must have seemed an excellent compromise. On such occasions, he would dedicate himself to what some would refer to, with a touch of rebuff, as "cooking".

Given that, to use his own words, "experience in this field can stretch into infinity", indeed, a multitude of different mixes and procedures employing traditional artistic materials in emulsion – and which can be rightly called oil tempera emulsion – originated in the artist's studio. At the same time, he used industrial products in function of his contingent iconographic necessity. Thus, there is no chronological limit within which the use of a specific technique can be circumscribed. Rather, a technique was chosen according to the desired aesthetic effect and the subject to be portrayed, through its ability to facilitate the painterly gesture of its execution.

This is, therefore, why we find numerous oil tempera emulsion formulas in de Chirico's technical treatise of 1928, just as we find, from the chemical investigations carried out during restoration, the presence of this medium in the work, *Bagnanti con drappo rosso* (Bathers with Red Drape) of 1945. A group of manuscripts discovered in the artist's studio also bear witness to the use of tempera emulsion throughout the 1950s and 1960s.

When the restoration of *Bathers with Red Drape* proved necessary after the painting's surface suffered water damage, a diagnostic process was carried out that included stratigraphic analysis to determine the overall state of the work. The paint membrane, despite its apparently good state of conservation, had, in fact, shown an anomalous reaction to contact with water, in which layers of colour, velatura and varnish had been removed, exposing the underlying primer. Provoked by the action of dripping, the margins of the water damage proved to be jagged with no sign of solubilisation; it was not due to the liquid that the missing material detached; rather, the damage was identified as being caused by the physical-mechanical action of the dripping water. In this particular case, although the stratigraphic chemical analysis to identify the inorganic pigments did not reveal the data necessary for restoration purposes, it proved essential for determining the number, characteristics and reciprocal relationship of the component layers as propaedeutic data for understanding the cause for the detachment and for evaluating the need for an eventual reinforcement of the entire surface.

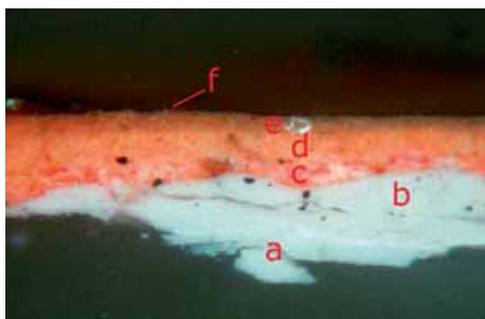
The existence of four fundamental layers was verified. The first: the preparation on the textile support, with an average thickness of 200 microns, which, (as revealed by X-ray analysis), was applied with 2-2.5 cm wide brushstrokes at an inclination of approximately 15° with respect to the horizontal axis and crossed at approximately 45° in the areas on the edges. This preparation consists of a mix of lead white, barium white and quartz in glue or animal gelatine (the presence of



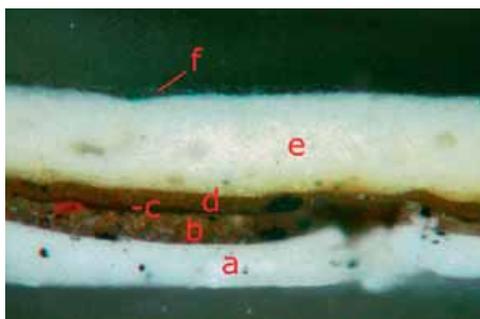
*Bathers with Red Drape*, 1945, oil tempera emulsion on canvas

protein and a complete absence of lipids). The second: a subtle coat of intense white colour particularly rich in protein binders that seals the preparation. The third: a grey undercoat with an average thickness of 60 microns made of lead white, zinc white and vegetal black (which bestows a light grey colouring) in a lipid-protein medium (with a predominance of protein), identified as an emulsion of animal glue and siccativ oils. The fourth: the paint with its relative thickness, colour and number of layers (depending on the different chromatic areas of the painting), which consists of different pigments ground in a medium containing variable proportions of lipids and proteins, attributable to an emulsion of egg, animal glue and siccativ oil. Finally, we note the presence of a further, more superficial layer, identifiable as velatura and varnish, imbued with organic material and containing variable proportions of lipidic substances, natural resins (probably dammar) and essential oils (turpentine).

From these observations, a series of considerations regarding conservation resulted: the mediums used in the priming and in the various layers of paint were traceable to oil tempera emulsion, each of which contain specific percentages of distinctive protein and oil components. In areas where subsequent layers proved richer in oily components and thus more subject to “contraction” (a phenomenon not shared with the underlying layer of primer, composed of a “leaner” and intentionally “slippery” material, with low absorbency capacity), the various layers did not adhere one to another and lay, rather, upon the substratum in a condition of delicate equilibrium. In this specific case, the water



Stratigraphic section of a sample taken from the red drapery. Microphotograph in white light



Stratigraphic section of a sample taken from the white drapery. Microphotograph in white light

dripping on the painting's surface disturbed the delicate balance of the paint, causing the infiltration of liquid into the micro-cracks of the velatura and the varnish that removed the paint film in the form of minute scales. After verifying the stability of the layers of paint in areas unaffected by the passage of water, it was decided that a general consolidation of the painting was not necessary, and the restoration work therefore proceeded only with regard to the aesthetic continuity of the work.

The diagnostic techniques used to identify the generic group (lipids, proteins, etc.) of the binders present in *Bathers with Red Drapery* consisted in histochemical and microchemical analyses applied in cross section, as well as heating tests. Such analysis did not allow for the identification of the specific substances (siccative oil, glue, etc.). Despite the use of stratigraphic analysis, the classification of the principal and additive components of the binding mixes and their specific proportions is difficult. The diagnostic investigation of this complex mixture of organic molecules is limited by the reduced quantity of material that can be removed, of which the binders constitute less than 10% of the overall weight. Additional factors influence such analysis: alteration resulting from the aging process; the complexity of the laboratory analyses needed to reveal and recognise the distinctive functional groups of the various substances (which, due to the fact that they belong to the same chemical family of proteins, lipids and polysaccharides, present similar results); the exiguous reference data available with which to compare the quantitative test results and permit them to be read.

Recognising the binders on polychrome works requires precise determination of fatty acids (which form lipids), amino acids (which form proteins), monosaccharides (which form polysaccharides) and terpenic components (which characterise natural resins). Today, the best results – also in terms of precision and thoroughness – are obtained by means of chromatography, which permits analytical separation of organic molecules, combined with mass spectrometry analysis, which provides structural information, even with very small samples. The results of these analyses are visualised using a chromatogram, which reveals the presence and abundance of single monomers for every analysed sample. By comparing this data with results acquired from the analysis of sure samples (often specifically created), the different complex polymers of the various materials can be identified. The elevated costs of execution have, thus far, slowed down the diffusion of this analytical technique in diagnostic processes, thus deferring systematic, vital data collection, which, in terms of possible comparisons would increase the understanding of the painting's inner workings.

Furthermore, despite the potential of analytical techniques, in the case of oil tempera emulsions, many components present in small percentages are still difficult to identify.

Therefore, at times science does not suffice in gaining understanding of all the “secrets” held within a painting formula. It is easy, then, to understand how precious de Chirico’s experience is, contained not only in his *Small Treatise on Painting Technique*, but also in his substantial collection of painting formulas discovered in the artist’s studio in the form of simple memos jotted down for personal use (which until now, had never been disclosed). These texts describe, in detail, the materials, dosages and procedures used on a large number of occasions, even if the title of the work to which they refer is often not recorded. Even the working habits are outlined with precise notes, and it is easy to imagine that the most satisfying procedures were often repeated.

This documentation will be used to draw up a list of ingredients, which, through our knowledge of the individual characteristics and functions of each, an initial understanding of the painting system may be obtained.

Among the siccative oils used by de Chirico we find linseed and poppy seed oil (the latter of which he particularly appreciated for its luminosity), in raw or cooked form. Precooking is a practice that has been used since antiquity and is carried out at temperatures above 100°C to accelerate the polymerisation time, which reduces the drying time of the paint film and hence the need to use massive doses of siccative materials. In ancient times, these were made of substances containing lead or manganese, which, due to their toxicity, have only recently been substituted with metal linoleates or other synthetic products. De Chirico was well aware of the risks involved in the immoderate use of the latter, which, while notably reducing drying time by catalysing the oxidation reactions, can also cause an abrupt and excessive contraction of the paint film that consequently tends to crack and deform in an exceedingly precocious manner, beginning already in the drying phase. Nonetheless, he did not completely reject their use: for this reason, his ingredients include Courtrai siccative (a highly powerful drying agent composed of manganese oxide and lead oxide that is notorious because it decreases the fluidity of oil and provokes cracking, and, if not pure, turns out rather dark) and litharge (an orange-yellow pigment, with reduced covering ability, with a lead monoxide base from which it derives its drying power).

Another material much used by de Chirico was stand oil, or rather, linseed oil industrially heated to temperatures above 250 °C without oxygen, which is a prepolymerized material that, contrary to oils heated in the presence of air, dries more slowly, creating a longer lasting paint film that is resistant and less inclined to yellowing. In ancient times, a similar product was created by exposing linseed oil to the sun for long periods in transparent glass containers. It is for this reason that de Chirico particularly appreciated a product by Windsor & Newton, marketed under the name Fat Oil, which is no longer in production. It was obtained by following the ancient tradition of exposure to the rays of the sun, which gave it the quality of reduced yellowing and the ability to dry quickly.

De Chirico used almost all the substances classified as protein binders, often employing the egg, the characteristics and properties of which were discussed above. He also used animal glues, or casein and milk, in preparations and as additives in painting mediums. Animal glues mainly contain collagen (a fibrous protein), in watery colloidal dispersion with small percentages of inorganic sub-

stances and salts. Such material is obtained by a lengthy process of boiling pieces of animal skin and other cartilaginous parts (bone glue, strong glue or fish glue), mammal glue (bone glue) or sheep-skin remnants (the fine and rare Carnicci glue). Whilst each of these glues possesses special chemical and physical properties depending on their provenance and the type of processing and purification incurred, they unilaterally have the ability to form a reversible film, due to the fact that even after drying by water evaporation, they remain absorbent and can be dissolved again. It is this characteristic that determines their tendency to degrade in environments where humidity is high or subject to notable variations, or due to direct contact with water; furthermore, they are easily assailed by fungi and bacteria. Casein is a phosphoprotein contained in milk, from which it is extracted by flocculation and then dried. To be able to use it, it must be newly solubilised with ammonia or ammonium carbonate (caseinate of ammonia) or with slaked lime (lime paste or lime glue and cheese); both versions have good adhesive properties, but they form subtle paint films that are not very elastic, are fragile, and tend to crack even after brief aging. Better properties, however, are shown by milk, which, like egg, is a naturally stable emulsion of proteins (casein) and lipids in the watery stage. Like egg, it is able to form elastic and stable membranes with good cohesion. The liquid state of milk also makes it suitable for use as a fixative.

A necessary ingredient in many of de Chirico's tempera and emulsion formulas is vegetable gum, or complex polysaccharides with long sequences of simple sugar monomers. These amorphous sticky and transparent substances are exuded by broad-leaved plants as a protective secretion and, as will be explained below, are different from natural resins because, contrary to the latter, they can be dissolved or reinflated in water but not in organic solvents or alcohol. To his mixes, de Chirico added gum arabic, extracted from the acacia tree from which it secretes in the form of light reddish drops, forming colourless, gelatinous solutions of excellent texture and stability when purified and added to water. He also used what is generally referred to as cherry gum, but which is derived from the secretions of various fruit trees and is highly transparent, which makes it appealing to those seeking a light and luminous paint. It is also rather fragile.

Nevertheless, we can confirm an extensive use of natural resins, conifer secretions that are soluble in organic solvents and have very complex polymeric structures, the partially identified components of which can still be traced back to the class of terpenic hydrocarbons, including aromatic acids, essential oils such as essence of turpentine, resinous acids and resenes (other minor inert components). We can distinguish between resins, which have a solid texture, and oleoresins, the components of which have a lower molecular weight and a high essential oil content in the liquid state, which gives them a soft and sticky consistency. These substances have filmogenic, adhesive and water-repellent characteristics that lead to their use as binders and protective varnishes. One of the most common among those in de Chirico's research is dammar, a tropical Asiatic plant recognised since ancient times as the best resin for painting varnishes, thanks to its remarkable protective power against humidity. Dammar can also be used as a medium (and in emulsion) with temperas. Mastic, an extract of the mastic tree (*Pistacia lentiscus*), has a very solid consistency and is suitable as a base for varnishes with oleoresin. It forms a very shiny elastic film, but with aging it becomes fragile, yellows and cracks. Venice turpentine, an oleoresin secreted by the larch from

which essence of turpentine is extracted, is viscous and sticky, with a yellowy colour and a reduced tendency to dry and to ulterior yellowing. Besides being an ingredient for varnish, it is used as a binder when mixed with wax. Colophony (or Greek pitch), a dry resinous residue obtained from distilling Venice turpentine, does not have good characteristics for varnish because it forms a fragile, brittle and short-lived film due to its excessive acidity and low melting point. Still, its use is widespread due to it being inexpensive; it is marketed, depending on the quality, in varieties ranging from light to very dark.

Inexorably, de Chirico also felt the charm of wax mixed with oils and resins used to obtain a “soft and mysterious” look recalling that of ancient encaustic paintings. Although the term wax is improperly used to indicate a large group of solid malleable substances (including even synthetic ones) characterised by low melting temperatures, low viscosity in the liquid state, insolubility in water and hydrophilicity, waxes belong, more correctly, to a family with natural animal or vegetal protective substances mostly composed of saturated fatty acid esters, saturated monovalent alcohols and long-chain hydrocarbons. Even though they are lipidic substances, their saturated components do not polymerise; thus waxes are not filmogenic and, on the contrary, show a notable inertia to any chemical reaction, which means they are practically unalterable materials. De Chirico used the best quality raw beeswax he could find in the market, or one of its variants known as French wax, which was also high quality, reddish, elastic but not sticky, normally used for modelling or in the “lost wax” process of bronze casting.

Finally, de Chirico used a series of natural substances that can be called additives, which were traditionally used by artists of every era. His use of such material was appropriate and extensive: vinegar (anti-fermentative, anti-coagulant and fluidifying properties mixed with temperas and emulsions to keep them from decomposing); honey (a humectant and plasticising function); glycerine (an oily substance that belongs to the polyalcohol family, which, extracted by saponification from fat materials, can nonetheless be mixed with water and, besides providing an elastic quality to varnish, primer and tempera preparations, is used to emulsify wax in water).

The artist also used a range of industrial and commercial materials in his formulas, such as Duco, which belongs to the category of nitrocellulose synthetic glazes (produced as an indoor paint by Dupont Coatings from the mid-1930s) in which oil was substituted with camphor, which has a plasticising function. De Chirico used it as an undercoat, almost always beneath the primer. In addition to using various materials to create his own formulas, he also commonly used commercially available oil paint in tubes.

We have indicated de Chirico's frequent use of primers for the preparation of a painting surface on which the brush could flow smoothly, consonant to his *modus pingendi*. Consisting of a thin, transparent or coloured layer, the primer functioned as an interface between the preparation and the paint film and, when necessary, served as a background tone that facilitated the successive chromatic passages or remained visible through a paint-saving technique known as “a risparmio”. The colouring of this layer was obtained by adding finely ground powdered pigments to his mixes, particularly white pigments such as white lead, Spanish white (lime carbonate) or zinc white, which were often added to carbon black to achieve light, almost silvery grey backgrounds (frequently used), or raw sienna for

warmer backgrounds tending toward ochre. The primer was applied in one or two coats on absorbent preparations (like gesso and glue) and on oily ones, as well as on previous layers of oil paint that de Chirico wished to repaint. It was used on both self-produced priming and on ready-to-use purchased canvases. Often the same mix or one of its variants was also used as a binder for the surface layers of paint. The primer was applied as the base for hydro-oleic emulsions, as well as for use with oil paint in tubes, for which the artist also made his own preparations with which to dilute them. His notes show that, at times, a layer of varnish was also used on top of the primer before beginning to paint.

In tempera preparation, egg yolk and/or milk, gums and plasticising and anti-fermentation additives were mixed together. In the case of oil tempera emulsions, oil, varnishes (resins and oleoresins) and essential oils (without turpentine) were emulsified to obtain hydro-oleic binders.

For oil binders, siccative or prepolymerised oils with wax and natural resins were mixed cold or heated and diluted with essential oils. Resins with or without wax and diluted in essence of turpentine were also used to achieve binders with a varnish base with which veiling was carried out, but which was also used at times for the execution of the entire painting. An oleoresin like Venice turpentine was used too, along with its volatile fraction (essence of turpentine), as a thinner for paint in tubes.

Contrary to the information contained in *Small Treatise on Painting Technique*, these notes were never organised, sorted or rationalised by the author with the intent of making them known, and due to their intrinsic qualities, they possess more spontaneity and greater pertinence to daily life. Their assessment reveals an absence of fixed canons for operating methodology and material usage, which appear, rather, to be totally and pragmatically at the service of the achievement of aesthetic results. Thus, we see de Chirico's attention in the preparation of painting mixes and formulas that vary not only in terms of ingredients and proportions, but also in the method used, especially in the consecutive application of the layers of paint. In these formulas, substances of a different nature are found side-by-side, producing the extremely varied results often seen in his *œuvre*. Furthermore, the natural materials and industrial products conserved in his studio proved to be the same as those identifiable in the works of art themselves. De Chirico is thus revealed as a true experimenter, despite the traditional image attached to his name, someone who, whilst emphatically captivated by classical painting, also subverted the rules.

An in-depth knowledge of Giorgio de Chirico's "painterly consciousness" would seem, therefore, to prohibit any attempt to label his technique, and dictate rather, a constant renewal of investigative critique for each of his creations.

## **Gesture**

It is painterly gesture that transforms material into art. It is the stroke-by-stroke movement of the hand that brings about the appearance of form. Like calligraphy, the brushstroke cannot but be considered a deeply personal and distinctive gestural habit, which, despite having been influenced, along the course of life, by multiple factors such as the maturation process, practice and psychic condition, preserves characteristic and identifiable features that can always lead back to the author.

Writing consists of heterogeneous repetition of graphic symbols that belong to an alphabetic code made up of a limited number of characters. Painting, instead, is effected through the representation of an unlimited quantity of polychrome shapes. It therefore seems evident that, whilst it was possible to develop a method of study (graphology) in which the evaluation of multiple parameters allows for the classification of the writer's psychological constitution, and thus, the determination of the authenticity of a written script and, thereby, the identification of eventual fraudulent intention in the production of a piece, equivalent categorization in the art of painting turns out to be much more complex if not impossible. The difficulty of applying a scientific method to the study of the brushstroke's movement in the execution of a painting, together with the impossibility of obtaining unequivocal results from such analysis, does not, however, exclude the possibility of investigating a painted image by adopting, from graphology, an approach that focuses on the shaping of marks. To this end, attention must be afforded to detail as well as to its interaction as a whole, through an unravelling of the painted surface in search of representative traces of the author's intrinsic habitual gesture. In order to access the more strictly calligraphic data of which the image consists, one must renounce the vision of a work in its entirety and ignore a multitude of information that is habitually conveyed to the observer.

In the writing process, the author's attention is principally focussed on the meaning of the text rather than on the symbolic signs that represent it and which originate in the subconscious; painting must be considered a more aware and controlled graphic activity, given that in this case the signified and signifier are intimately connected and equally reasoned out (where representation coincides with message). It is possible, however, to trace, over the years and independently from their formal context, extremely instinctive calligraphic elements, which the hand generates unconsciously with a morphology that is always similar to itself and which pertain to some of the most varied iconographic choices. Furthermore, in more specific terms and within the framework of specific subject matter and periods of execution, it is possible to identify homogeneous painting methods that constitute definite points of reference that in turn constitute a shared common denominator regarding all autographic works.

In addition to demonstrating a refined philosophic sense of form, as well as a brilliant, fervid, laboured creativity and a highly cultured and intimate descriptive sensitivity, Giorgio de Chirico's natural aptitude for painterly gestural expressiveness, which he cultivated, at times even to the point of exasperation, is of primary importance. Instead of going into the physiological changes that occurred in his art over time – from the early academic production to that of his senior years –, we shall limit ourselves to focusing on persisting, distinctive traits. If one were obliged to define de Chirico's painterly gesture with a single word, the most suitable would no doubt be “fluidity”. Not only the material fluidity of the paint – in the use of which de Chirico knew no limits –, but also the fluidity with which his hand embodied the paintbrush: from the rarefied spirit of many works of the 1910s to the full-bodied works of the mid-1920s and early 1930s, and his later search for a soft and supple medium.

It is not only in paintings in which the artist consciously endeavoured to achieve a specific, plastic effect that we find sinuous, shapely brushstrokes, but also in paintings where, along with the increment of painterly material, a greater firmness and definition of line is evident. Such tracings are subject to the most disparate iconographic functions and, indeed, act like hidden signatures set within the “fabric” of the painted image, where they trace an outline, define a shadow, describe a detail,



*Dioscuoro with Horse*, 1954, detail

suggest a shape or accentuate a highlight. Upon closer examination, similar calligraphic tracings occur, unimpaired by the stirrings and inclinations of the soul or by the course of events, in each of de Chirico's artistic phases. Their identification constitutes a contribution to the body of information necessary for the evaluation of a painting's authorship.

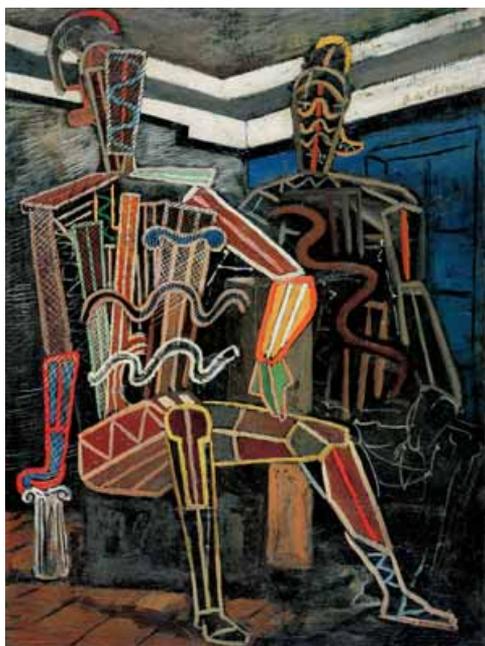
This is the case of the painting, *Manichini guerrieri* (Warrior Mannequins) that dates to the second half of the 1920s, the iconography of which is atypical. An exhaustive research campaign was carried out with the aim of verifying the work's authenticity. The painting underwent non-invasive testing, including Energy-Dispersive X-Ray Fluorescence Analysis (EDXRF). Whilst limited by the fact that such analysis does not foresee the sampling of material, this technique is used for the identification of inorganic elements (pigments) present in the paint layers. The results showed the presence of elements wholly compatible with de Chirico's palette of pigments and painting habits, to an extent that no doubts could be raised with regard to the chronological congruency of the work with its presumed period of execution. An X-ray examination was carried out in order to identify a number of compositional elements unrelated to the painted image, which were discerned in the underlying layers of paint, visible to some extent to the bare eye.

In point of fact, the X-rays revealed an almost fully achieved painting underneath, which could not be interpreted simply as a sketch, layout or pentimento, but that seemed rather to be a repeatedly modified, laboured work, which, for unknown reasons, was abandoned and covered over. The resultant image, moreover, is one of most atypical depictions in the Maestro's entire pictorial *corpus*. Together, the pair of paintings represents an enigma of difficult resolution.

The painting – which, from the point of view of its material constitution turned out to be absolutely congruous (with the artist's work methods) and did not present doubttable aspects – nonetheless posed some questions with regard to its unusual iconographic structure. Thus, as final confirmation as to its authenticity, the only further requirement was an evaluation of the calligraphic characteristics of the brushstrokes of both paintings: the surface painting and the one underneath. This analysis was carried out on the latter using the greyscale images, provided by X-ray analysis, regardless of the fact they lacked chromatic data.

The X-ray images revealed two “Archaeologist Mannequins”. The general features and the positions of these anthropomorphic figures could be easily recognised, along with a number of other details that proved fairly easy to make out. Both figures seem to have undergone significant variations in the course of their elaboration, particularly as regards the position of the heads (of which, at first glance, there appear to be at least four). The head of the mannequin on the left looks as if it were conceived in two different versions: erect and frontal with an oblong shape, or three-quarters tilted and more oval. As for the one on the right, the head, tilted toward its companion, shows traces that indicate a reworking of its shape and proportions. In both the figures, changes seem to have been made, particularly with regard to the extended shape of the head, but also in the treatment of the profile, as well as the legs and pedestals, which bring to mind the painting, *Il giorno e la notte* (Day and Night), of 1926. Lastly, a fourth head visible on the upper right side could be yet another adaptation of the character on the right (but turned in the opposite direction). Its countenance seems to suggest works such as *Manichino triste* (Sad Mannequin), *La famiglia del pittore* (The Painter's Family) and *La moglie del filosofo* (The Philosopher's Wife). Further evaluation regarding the numerous pictorial tracings could, however, lead back to the presence of not just one underlying work but two different compositions, the elements of which, when observed by X-ray, overlap on a single plane and are muddled to the point of being difficult to distinguish.

Despite the objective limits of X-ray observation, which, for example, does not provide data regarding the order in which different versions were painted (and which, in this case would be key to understanding de Chirico's original compositional intent and a clue to the mystery of the hidden work), such analysis nevertheless provided fundamental information (in addition to the iconographic



*Warrior Mannequins*, second half 1920s, photographed in visible light



*Warrior Mannequins*, X-ray imaging composition



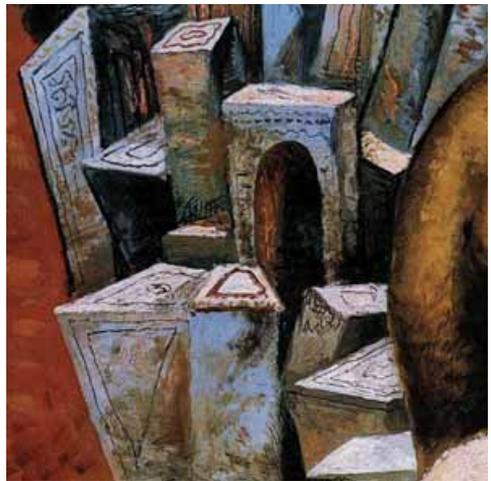
*Warrior Mannequins*, detail, X-ray with colours inverted



*Sad Mannequin*, 1926, detail, black & white photograph



*Warrior Mannequins*, detail, X-ray with colours inverted



*The Painter's Family*, 1926, detail, colour photograph



*Warrior Mannequins*, detail, X-ray image



*The Philosopher's Wife*, 1925, detail, black & white photograph



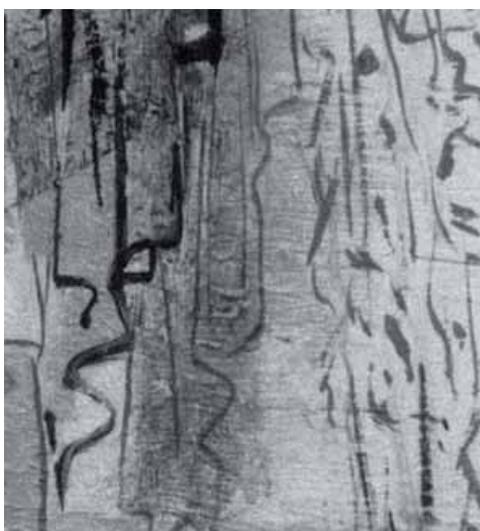
*The Morning of the Nymph*, 1948, detail



*Battle with Horses and Knights*, 1939, detail



*The Reading*, 1926, detail, black & white photograph



*Mannequin*, 1926, detail, black & white photograph

data) regarding the movement and form of the brushstrokes with which the work was executed (and that were no longer visible on the painting's surface). For example, in the mannequin on the right we see a soft outlining curve describing the triceps and forearm in a single, long, fluid, steady and uninterrupted brushstroke which, on its own, suffices to define the profile of the limb in its extension along the bust and down to the knee upon which it rests. On the upper right, the curve of the nape is accented in an elegant and graceful manner, whilst two additional light brushstrokes contribute, not only to define the face (which is barely perceptible) but also to convey emotion. In observing other famous works on this theme, one clearly sees the strong expressiveness and human-



*The Painter's Family*, 1926, detail



*Still Life with Fruit*, 1948, detail



*Still Life with Fruit*, 1948, detail



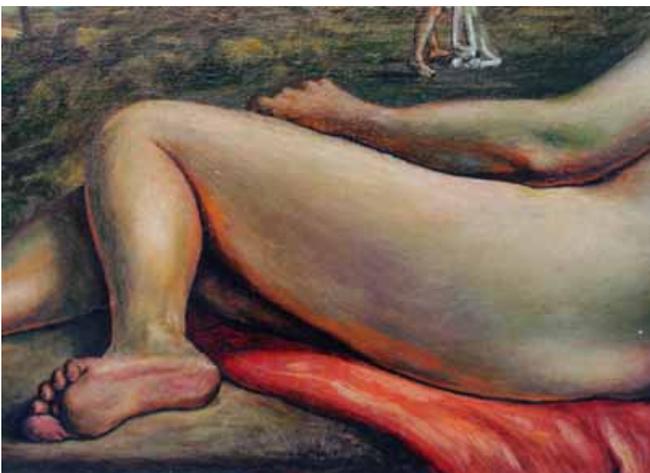
*Portrait of Isa in Oval*, 1950, detail



*Dioscuro with Horse*, 1954, detail



*Gladiators After Battle*, 1968, detail



*Bathers with Red Drape*, 1945, detail



*Return to the Castle*, 1969, detail



*Still Life*, 1950s, detail



*Battle with Horses and Knights*, detail



*Still Life*, 1942, detail

ity (a seeming contradiction in terms) with which de Chirico imbued his inhuman archetypes. On the mannequin on the left, fine, continuous and sinuous brushstrokes can be distinguished outlining the profile of the trunk and knees, as well as some internal details, which perhaps can be interpreted as drapery. In the area corresponding to the bust, we find once again those soft, “curly” brushstrokes, which, as mentioned above, can be considered a habitual, stylistic, strongly characteristic gesture. In the brushstrokes composing the parallelepiped emerging from the figure’s abdomen, de Chirico’s painterly calligraphy can be seen in the fluidity of the impasto as well as in the fluid movement of the hand that generated them.

Describing the character of the author’s brushstroke is not an undertaking to be entrusted solely to words; thus, we have chosen to present a selection of detailed images of paintings (including a number of macrophotographs), with the aim of evoking specific characteristics of Giorgio de Chirico’s painterly gesture. Although the group of works chosen includes a range of heterogeneous works, both in chronological as well as in iconographic terms, it cannot be considered an exhaustive anthology of the artist’s brushstroke. To this end, a systematic study (and publication) dealing with the evolution of de Chirico’s work over the course of his long career would be necessary. Although extrapolated from their specific context, the details presented here manage nonetheless to illustrate an innate similarity of gesture, which qualifies them unilaterally and unequivocally as being born of the same hand.

In these examples extrapolated from different paintings, one notes a sinuous, shapely, almost curly brushstroke, created with a controlled and continuous movement of the wrist. To achieve this painterly fluidity, de Chirico preferred to use brushes with soft bristles, known as “flats”: “A long, flat brush has greater elasticity; it can hold a greater amount of paint, which, consequently, makes it possible to work longer without having to dip it into the paint again. It also glides more easily and, being more flexible, it is possible to make longer brushstrokes and make the impasto surface thinner.”

## Chance

Finally, there is a component that can influence the genesis of a work of art but that is often neglected because, by its very nature, its circumstances can not be determined: the factor of *chance*. This determining cause bears upon the making of an artwork during the production process and regards variables that are either beyond the limits of control, or, more precisely, are not considered in the planning stage because they are unpredictable.

And yet, anyone with experience in an artistic and artisan environment knows all too well to what extent specific environmental conditions and even small contingent events can, at times, affect the good outcome of a work, despite the diligence with which the paradigms of the “rules of art” are applied. At times, such influence can also give rise to surprising variants that lead to innovation. The Old Masters defined this ineffable event a “golden moment”, a moment when, in the learned hands of the artisan, all things come together to their greatest potential. Fully conscious of the fortunate accord between this condition of optimal atmospheric conditions and a maximum predisposition of his soul, such happenstance allows the artisan to aspire to perfection in his work.

Nevertheless, artists have always worked above and beyond such golden moments, carrying out their craft in the face of all the conditions and contingencies society could indeed confront them with, exercising their sublime profession in the yoke of an everyday life that is not equally exalted and that obeys mortal laws; where an excessively humid day becomes the enemy of good painting (a craft subject to hygroscopic action), and excessive heat, rapidly drying the paint, obliges the use of larger quantities of solvents. A commitment to fulfil an important commission may require the artist to adapt to time-constrained working conditions imposed by necessity; the arrival of an unexpected visitor at the studio may cause an unforeseen interruption of work. These, as well as other, more extreme factors, such as a war (making commercial goods, including canvases, paints and fine art supplies, suddenly unavailable) can influence the outcome of a work. In reality, an artwork can be affected by an infinite number of unimaginable factors, resulting in an infinite number of consequences. The element of chance is indeed the keystone to many mysteries contained in the pages of art history: unknowns that trouble restorers and that science, archival research and the tracks of paint are incapable of revealing.

A systematic study of chance as a factor affecting the making of an artwork is impossible. One needs to be aware, rather, of the fact that, like life, Art cannot be fully understood through the mere application of a scientific canon and that, in some cases, only a voyage into the past can reveal the secrets of a painting.

*Translated by Kristy Davis*