

The application of surface geometry to works of art as an aid in the exegesis of the visual image: the case for and against

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The application of geometric configurations to the surfaces of architectural elevations, reproductions of classical vases and sculpture, and Renaissance paintings based on perspective, for the purpose of revealing structural formulae for their design or composition, is a common art historical activity. Often there is evidence of the planning of geometric proportions within the work of art itself, while no historical documentation exists to support the claim that hidden formulae were intended. Thus, geometrical analyses of works of art may or may not contribute to the interpretation of works of art. Because of this ambiguity, the practice of using surface diagrams has recently been questioned.

Die aanwending van oppervlak-geometrie op kunswerke as 'n hulpmiddel by die verklaring van die visuele beeld: bewysvoering ten gunste daarvan en daarteen

Die aanwending van geometriese konfigurasies op die oppervlaktes van argitektoniese aansigte, reproduksies van klassieke vase en beeldhouwerke, en Renaissance-skilderye wat op perspektief gebaseer is, met die doel om strukturele formules vir die ontwerp of komposisie daarvan te ontbloot, is 'n algemene kunshistoriese praktyk. Daar is dikwels getuieis vir die beplanning van geometriese verhoudings in die werk self, terwyl geen historiese dokumentasie bestaan om die aanname te staaf dat verborge formules beoog is nie. Vandaar is dit moontlik dat geometriese ontledings van kunswerke tot die interpretasie van kunswerke mag bydra, maar die teendeel mag ook waar wees. Vanweë hierdie dubbelsinnigheid is die aanwending van oppervlak-diagramme onlangs bevraagteken.

The metaphysics of systems of proportions as expressive of order and harmony in works of art was discussed by Rudolf Wittkower as long ago as in 1953. His article refers to various examples and includes a diagram by himself of the executed design for Milan Cathedral, based on a combination of equilateral and Pythagorean triangles. This design replaced a previous project for a more soaring elevation. Wittkower (1953: 12-13) explains by means of both diagrams (Figures 1 & 2) why the revision was made:

The interesting thing is that nobody suggested lowering the nave [for the design of Milan Cathedral] arbitrarily, but that it was regarded as necessary for the new height to tally with an established geometrical concept. This was found in the celebrated Pythagorean triangle, which had always been given a place of honour by virtue of its mystical qualities; for this is the only right-

angled triangle in which the sides are in an arithmetical progression.

In 1991 James Elkins reopened the controversy surrounding the use of geometrical schemata, with specific reference to Renaissance paintings based on a perspective composition. His argument against "the *painted* patterns we find so compelling in fifteenth- and early sixteenth-century paintings and reliefs" (Elkins 1991:143) derives from the observation that there is no contemporary theoretical source to justify the idea that the perspective of Renaissance pictures and reliefs may be connected to patterns of surface geometry. He furthermore distinguishes "surface geometry" from other kinds of

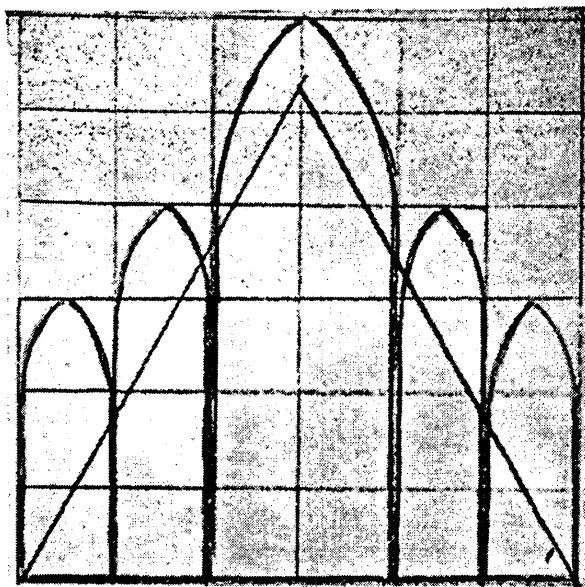


Figure 1
Diagram of the elevation of Milan Cathedral, ad quadratum (Wittkower 1953: 13)

geometric and perspectival adjustments and briefly defines the former as “systematic *non-illusionistic* geometric schemata” (1991: 170, note 1). Such schemata have been compiled in various ways. Surveying these, Elkins (1991: 143-144) concludes that the most immediately convincing are those that “do not propose to explain more than is necessary”, but also bring, besides perspective, narrative and iconographic matters into connection with surface patterns. He explains his argument by means of a combined geometric scheme¹ of Masolino’s *Disputation of St Catherine* and the adjacent *Miracle of the Wheel* (1428-30) in San Clemente, Rome (Figure 3):

The principal vanishing point of the latter painting is unexpectedly the place to which the diagonals of the *Disputation* converge; and even more subtly, diagonals in Maxentius’s loggia (T) converge to the principle point of the *Disputation*. It is probable that Masolino did not understand the theoretical implications of his construction, but was simply intent on organizing his picture as rigorously as possible. The fact that point A is also in the exact

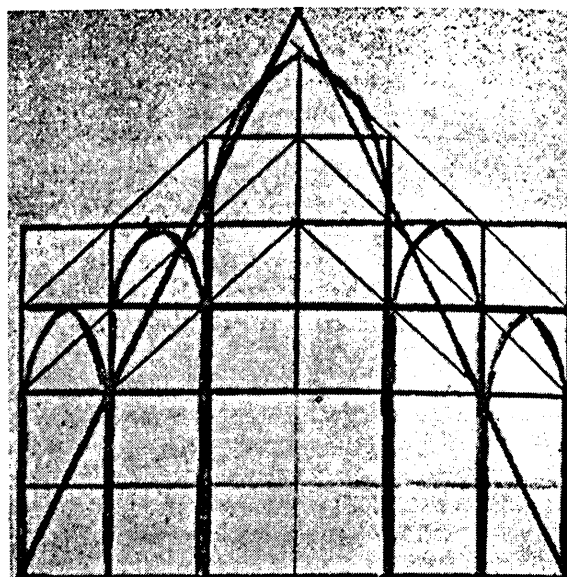


Figure 2
Diagram of the executed design for Milan Cathedral. Combination of equilateral and Pythagorean triangles (Wittkower 1953: 13)

centre of the painting recalls the medieval practice recorded by Cennini, in which two strings were snapped against the wet plaster to locate the centre of a composition. Cennini’s practice is close in its level of detail and its rectangular divisions, if not in its perspectival ties, to Masolino’s composition. Thanks to the newly awakened interest in perspective, Masolino was able to elaborate on the old procedure by bringing the coffered ceiling into harmony with Cennini’s symmetric schema. (Elkins 1991: 144)

Elkins notes pertinently that the constructions pass beyond what is visible to the naked eye, and are therefore hidden. It is notable that in his analysis, Elkins indicates that the point where the diagonals converge is hidden. Concerning the narrative meaning of the surface patterns he also notes that, besides the fact that St Catherine’s head is in the exact centre of both panels,

the tension between Catherine and Maxentius in the *Disputation* is palpable, and the quick violence of the right hand scene is brought home by the cornice slashing down from the upper right. Other lines, such as the diagonals, are without immediate meaning. This kind of dual purpose is

common in the fifteenth century, where the mixture of pattern and perspective is partly expressive, and meant to be noticed, and partly hidden, put there for the sheer pleasure of constructing so tightly harmonious a structure. (Elkins 1991: 144-5)

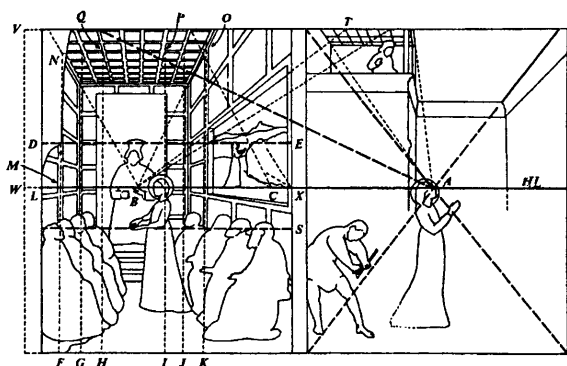


Figure 3
Masolino's *Disputation of St Catherine*, with reconstruction (Elkins 1991: 144)

In general, it may be said that works of art often gain depth of meaning through the play between concealing and revealing. Hidden meaning could be intended by the artist or, in rare instances, created by chance. If any hidden meaning is revealed through an analysis of surface geometry, the validity of such an art historical interpretation of works of art and architecture may, however, remain controversial. Many instances of analyses by means of schemata are compelling, especially in Western art based on classical principles, or in works in respect of which there is documentary evidence that geometrical proportions were applied or intended.

It is my intention to elucidate hidden meanings of three works, not specifically discussed previously by any other art historian. My method is to apply systematic non-illusionistic geometric schemata to a scale drawing of a classical Greek temple and prints of two late Renaissance paintings. It is my purpose to show the way in which these surface diagrams reveal unexplored

meanings, even though it may be, as Elkins (143) argues, that whatever harmonious relations we discern by means of such diagrams, are "our own discovery". This statement is in line with Elkins' argument that the most immediately convincing schemata are those that "do not propose to explain more than is necessary", but it remains a moot point as to the criteria that should guide the art historian in deciding on the limits of necessity.

Since Elkins' caveats against the search for hidden meanings in works of art are somewhat ambiguous, I offer explanations for my analyses of three works of art that yielded "hidden" meanings. These are the Parthenon, a classical Greek temple; a portrait by the Italian Mannerist painter Agnolo di Cosimo, called Bronzino (1503-1572), and the *Burial of the Count of Orgaz* by Domenikos Theotokopoulos, called El Greco (1541-1614), the Cretan born Spanish painter.

The Parthenon, fifth century BCE, Acropolis, Athens (Figure 4)

An analysis of the Parthenon diagram illustrated below reveals a paradox between the visible and the invisible. The visible and the invisible are also present in Greek mythology. Only human beings have a visible form, but gods, heroes and the spirits who are captive in the underworld may be embodied in figurative art. By contrast, Ideas belonging to a metaphysical Platonic realm are not given a visible form.

If the Doric temple is representative of a mythological concept of the underworld, the world of humans, heroes, gods and ideas, then the unity of and distinctions made between spirits, humans, heroes and ideas in classical times are relevant to the discussion of its structure as a representation of the classical world view or cosmology.

However, within the frame of reference of this article, only one aspect of the meaning of the temple will be dealt with, namely the different ways in which the entities - ideas, gods, heroes, humans and spirits - are represented in the hierarchy expressed in the temple structure. The discussion will be based solely on an analysis of the unity and the relationships between the architectural forms embodied in the Parthenon's eastern (or western) façade. In this analysis it becomes clear that gods and ideas were represented by the upper half of the temple's façade, while heroes and people belonged to the lower half. Ideas having no incarnate form and were represented by the reaches above the edifice, while the demigods occupied the unstructured underworld.

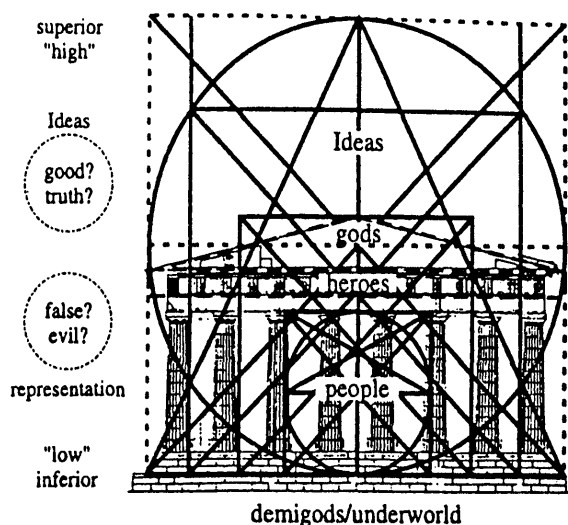


Figure 4

A diagrammatic representation of the eastern facade of the Parthenon, representing the Greek concept of the hierarchy of being (Maré 2000: 212)

The Greek gods were animistic, personified, anthropomorphic beings who lived on Mount Olympus or in the heavens, although the god Dionysus was also associated with the earth, while Pluto dwelt in the underworld or Hades. In this respect, Jean-Pierre Vernant's (1989: 23) research on

the "body of the gods" is revealing and relevant to the present discussion:

To pose the problem of the body of the gods is thus not to ask how the Greeks could have outfitted their gods with human bodies. It is rather an investigation of how the symbolic system functions, how the corporeal code permits one to think of the relation between man and god under the double figures of the same and the other, of the near and far, of contact and separation, while marking between the poles of the human and the divine that which associates them through a play of similitudes, mutual advances, overlapping areas, and dissociates them through the effects of contrasts, opposition, incompatibility and mutual exclusion.

The Parthenon diagram illustrates the symbolic system to which Vernant refers. Moving down the hierarchy of being, one encounters the heroes below the gods. Heroes like Hercules who as the son of Zeus and a mortal woman was half-human, half-divine, and as such was held in higher esteem than ordinary mortals, because he was of more than human stature, and capable of greater feats of endurance and strength. Thus, heroes were related to human beings in a relationship of sameness and otherness. They were similarly related to the gods.

The Greeks conceived humanity primarily in terms of a body/soul dualism. The Platonic concept that the soul (*psyche*) should be independent of the body (*soma*) because the latter was an impediment to the soul, resulted in hostility towards the corporeal. However Aristotle subsequently argued, the Platonic affirmation of the superiority of the psyche over the body only exhibited a failure to grasp the relationship between the former and the latter. That the two could be separated did not have to preclude the fact that the body serves as the instrument through which a soul expresses itself. As W.K.C. Guthrie (1975: 143) rightly suggests, the Aristotelian emphasis on body/soul organicism indicates "a hint that a satisfactory study of life must be based on a

study of the living body". This dualism finds a unity in what mortals affirm about their own existence. According to Heidegger (1949: 274), this affirmation implies that they belong to the earth. But being on earth means being "unter dem Himmel" (Heidegger 1954). Humans embrace the notion of *eros*, which was derived largely from the philosophy of Plato (*Symposium* 210A-E), for whom it meant humans' love for the divine, a desire by which they seek a wholly satisfying contemplative state that leads to the transcendence of the transient things of the world.

For the Greeks, the underworld was the lowest of all possible worlds. It was thought that the spirits and the dead dwell everlastingly in the underworld like shadows, without any real bodily substance.

What should emerge from any approach to architecture is a holistic view, a view according to which the greatest unity is achieved by the fusion of divergent relations. This is in agreement with Christian Norberg-Schulz's (1965:109) statement that "architecture controls or regulates the relations between man and his environment". While it has seldom been acknowledged that architecture is a representative art, one may be more radical than Norberg-Schulz and state that in architecture, human beings represent themselves. While in Greek architecture "man" is the dominant subject of representation, in Doric temples the object of his representation is the totality of classical cosmology.

The diagram imposed on the geometric design of the Parthenon's eastern (or western) façade elucidates the hierarchy of being in classical Greek culture. What is clearly seen is that the relationship between the architectural forms resting on the temple's stylobate is dynamic and symbolic. The diagram reveals the interdependence of all forces comprising the order of the

universe and the place of ideas, gods, heroes, humans and demigods in that order.²

The Portrait of Eleanora of Toledo and her son Giovanni, by Bronzino, 1545, Uffizi, Florence (Figures 5 & 6)

Bronzino's portrait depicts the heir of the great Duke Cosimo I of Florence at his mother's side. The political importance of the double portrait which the ruler commissioned for the glorification of his heir is not as relevant to this discussion as is the fact that this striking and life-like double portrait is based on a most intricate geometrical scheme.

Bronzino's formal solution to the problem of depicting a seated adult woman with a four-year-old child by her side is ingenious, as revealed by an analysis of the composition. For present purposes, the author has constructed a surface diagram that reveals the geometric structure and of the painting and the hidden psychological link between the sitters.

Emphasis is placed on the faces of both sitters and the exaggerated mass of Eleanora's dress partly covers the standing child so that what is visible of him is his completely full frontal face (while the face of his mother is more or less in three-quarter view), the upper part of his body, his right arm and left hand next to his sitting mother. The dimensions of the two figures on the panel combine to give them a formal importance, while the rather skimpy indication of a landscape in the background enabled the painter to individualize the sitters' heads against an azure sky. However, in order to interpret the integration of the figures in the double portrait a deeper scrutiny is necessary than a mere interpretation of naturalistic detail.

Eleanora's elaborately detailed satin dress embroidered with gold brocade patterns fills a substantial part of the canvas. However, it

is the placement of the two sitters' heads in relation to each other that is the main focus of the composition, thus emphasizing the human dimension as more important than the elaborate material decor of the dress. The scale of the sitters' heads differs and their heads are not in the same relationship to the



Figure 5
Portrait of Eleanora of Toledo with her son Giovanni

bodies. This is measurable on the diagram. While the figurative presentation is dominated by the scale of the woman, the painter subtly integrates two portrait schemes on one panel as is clear on the diagram: the diagonal through the point on the vertical middle line of the panel (marked A), which is exactly one head height under the chin of the woman, cuts through the corresponding point in the secondary portrait scheme on the scale of the child (marked B), that is also exactly one head height under his chin. The hidden geometric scale patterns that correspond so exactly not only afford the representation of the two sitters a formal integration, but also

emphasize their close psychological link, thereby establishing their attachment to each other, which their rather unemotional gaze directed outward at the viewer seems to belie.

Therefore, the analysis of art historian Harry Berger (1994: 109-111) of this portrait

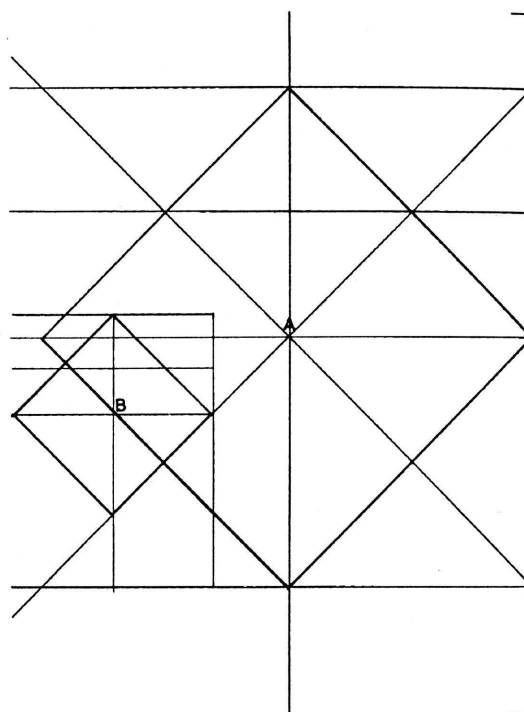


Figure 6
Diagrammatic representation of Figure 5 (Maré 1978)

is somewhat superficial – and also contradictory – as an interpretation of the psychological portrayal of his sitters. Berger acknowledges the portrait as a double portrait but mentions Giovanni only once by remarking that he “fixedly stares us off” (110). His concluding evaluation of the portrait reduces the woman to her courtly role, ignoring the way in which the portrayal bonds her with her son:

Hers is the calm of a stately, ascetic, and profoundly sumptuous Madonna with features vaguely evocative of Piero della Francesca’s Marian faces. The pose declares that what she gives to be seen is the essential *she* of courtly culture and its gestures of religious appropriation.

Regal, maternal, conjugal, her fate ... is to be transfigured into exemplary artifact. (111)

Berger underestimates Bronzino's skill as an artist to communicate deeper psychological meaning. Merely to typify him as the maker of an exemplary artifact, which is in this case is said to be transfigured into an object with regal, maternal and conjugal qualities is to emphasize the formal qualities by means of which the graceful fluency of the image of Eleanora is achieved. Berger implies that her humanity is recognizable, but he does not clarify his observation in terms of the composition of the sitters. The intrinsic message of this double portrait is revealed by the diagram, which emphasizes most clearly the maternal bond of Eleanora with Giovanni who is depicted at her side.³

The *Burial of the Count of Orgaz* by El Greco, 1586, Santo Tomé, Toledo (Figures 7 & 8)

In the *Burial of the Count of Orgaz* the angel who links the heavenly and the earthly worlds in the painting acts as an intermediary to whom the ascent of the deceased person's soul is entrusted.

In well-researched articles on the *Burial*, both Franz Philipp (1981) and S Schroth (1982) neglect an aspect of the work which is contained in the intermediate zone of the painting, namely that zone between the earth into which the body of the deceased Count is lowered, and the celestial zone or Gloria around the throne of grace on which Christ is seated with the Virgin to his right and St John the Baptist to his left. An analysis of the style of the central zone suggests that the respective descriptions of the action of the central angel by both Philipp and Schroth, are inadequate in the context of the total meaning of the work.



Figure 7
El Greco, *Burial of the Count of Orgaz*



Figure 8
Diagram of Figure 7 (EA Maré)

Philipp (1981: 81) says that the soul of the Count is "borne aloft" by the angel. Schroth (1982: 7 & 14) avers that it is "being carried into heaven" and that the angel is shown "conveying the soul upward". Also Francisco Calvo Serraller (1995: 15) commits this inaccuracy by referring to "the angel bearing the soul of the dead man".

A close look at the central area by means of a surface diagram reveals that this area is shaped like an inverted funnel formed by cloud-like formations above the horizontal line of the heads of the mourners into which the form of the angel and the soul of the Count are fitted. The shape of the angel suggests a vortex of powerful movement around a diagonal axis which runs through the line of the right leg to the head, and which is balanced by the outstretched wing, an image of divine power according to Plato (1914: 473): "The function of the wing is to take what is heavy and raise it up into the region above, where the gods dwell; of all things connected with the body, it has the greatest affinity with the divine."

The outstretched wing is emphasized as it fills the shape of the "funnel" to the left side, forming a triangular shape, with the angel's bent arm below the apex, which opens into the top and through which the soul of the Count is being pushed. That the angel initiates a powerfully energetic action may be deduced from the muscular action of his right arm with its conspicuously flexed biceps. The hand holding the nascent soul is rotated in anticipation of the exertion required for a dynamic push. This contracts the muscles of the forearm in a spiral fashion. In the action that will follow a second later, the hand will be opened and the elbow will be straightened so as to boost the impetus which will deliver the soul of the Count through the thin cylinder of the funnel into the celestial zone.

The greatest oddity in the painting is the cloud-like shape, which is the Count's soul.

In the phrase of W.H. Janson (1973: 66), this became a "pictorial device for representing incorporeal beings" during the Renaissance. In the *Burial* this is particularly apt since the soul of the Count is indeed at that stage an incorporeal being, midway between death, to which the human body is subject, and an everlasting existence in a spiritual body in the spiritual realm represented in the Gloria. Because the soul of the Count is represented as being so insubstantial in the moment before his spiritual birth, the strenuous action of the facilitating angel who helps the Count's insubstantial soul to rise upwards is strikingly anomalous. Also, the cloud-like nascent soul seems to be attempting to push itself upwards by displaying a climbing motion. Every effort is made by the angel and the soul itself to obtain its salvation, and perhaps its salvation is understood in the Byzantine tradition as divinization, which is a kind of celestial apotheosis.

It is worth noting that there is a complementarity between the action of the angel and the postures of St John and the Virgin. The latter holds out her hand to receive the Count's soul, which still has to pass through the womb-shape below her hand. The metaphorical allusion to the womb strengthens the Christian idea that one experiences a second (spiritual) birth only after one has risen from the dead. Thus resurrection is a symbol of rebirth. In El Greco's representation, the Virgin awaits the unborn soul and the spiral curves of her sleeve echo the lines of contraction in the angel's forearm muscles - contraction, which suggests the sheer force with which the angel pushes. St John, in contrast, kneels before Christ in accordance with the intercessory role of the Virgin and the Baptist in the Throne of Grace iconography, in order to plead that the soul, which is in the throes of birth, might be received into heaven.

Indeed, the soul does receive help. This is vividly illustrated by the action of the angel,

as it drives the soul upwards with tremendous force, emphasized by the prominence accorded it in the painting, as revealed in the diagram.

Although, theologically speaking, there may still be some doubt about the Count's salvation, the imminent physical action of the angel negates the possibility of such doubt. It "ascends with his soul to heaven", according to Davies (1984: 69). In a later statement, Davies (1990: 31) refers to the movement of the angel as "spiralling". He does not, however, elucidate the formal, expressive qualities of the angel's movement: "The most important link in the chain between earth and heaven is the angel, who, at the hub of the composition, spirals heavenwards bearing the soul of the Count in the unsubstantial form of a child."

Looking at the picture, however, it is clear the angel cannot ascend any further, as his way is blocked by the narrow diameter of the funnel-like cloud. It is not the angel, but rather the soul, which is stepping with its right foot on the tensed hand, and which will, in the very next moment, be forcibly pushed up into heaven. Nevertheless, Davies had sensed that the movement of the angel is related to that of a spiral. His analysis is, however, incomplete. The angel is indeed transformed into a vortex and its powerful movement contributes to the depth of meaning inherent in its presence in the painting.⁴

Conclusion

The experimentation with surface geometry, exemplified by the examples discussed, suggests that geometric schemata are valuable aids in researching meanings that are not evident to the unaided eye, or are useful in correcting a repetitive erroneous interpretation, as in the case of the *Burial of the Count of Orgaz*. It is maintained that if there is empirical evidence of geometric

proportions in a figurative work, surface schemata may often reveal hidden meanings or unsuspected relationships, as in the case of the Bronzino portrait. However, the examples treated thus are limited and cannot lead to any final conclusion about the value of the application of surface geometry to works of art.

Notes

1 According to Elkins (1991: 144) this scheme was proposed by Oertel and Wohl, but no reference to these art historians is included in the notes to his article.

2 This discussion is based on two articles by the author. See Maré (1998 & 2000).

3 This discussion is based on the author's Master's dissertation. See Maré (1978).

4 This discussion is based on an article by the author. See Maré (1999).

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