The Tactile Light of Guarino Guarini's SS. Sindone Chapel

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> "Wallace Stevens said *What slice of sun does your building have?* and I added *What slice of sun enters your room?* as if to say that the sun never knew how great it was until it struck the side of a building."
> - Louis Kahn[1]

The journey that leads to the rotunda of the SS. Sindone reliquary chapel plays out a dramatic progression from darkness to light, beginning with a long procession through the San Giovanni cathedral of Turin to the chapel portals, followed by an ascent up one of two dark massive staircases, to an anteroom, and finally to the famous domed rotunda. There the reliquary for the Holy Shroud advances into space just as the dome evaporates into light high above it. It is a unique construction, filled with openings to let light through—at once dome and lantern, covering and oculus. This configuration is the result of the dome's double shell construction—an inner vertical stacking of six tiers, each of which is composed of a ring of six shallow arches with a window set deeply into the space of each arch, and an outer system of twelve buttresses. Not only does the inside of the dome have the appearance of a woven screen, but, as revealed by structural investigations, this is in fact what it is. The structural load is carried by the buttresses and the inner weave is dedicated solely to supporting the load of its own skin. The two systems are seen to peel apart at the apex of the dome, where ovaloid windows set between each buttress backlight the twelve point star that culminates the weave of arches and which frames a dove. The language of rolling lintels and rounded moldings intensifies the blurred appearance of the space.

The ethereal quality of the dome is often commented upon by architectural historians but more prevalently still, the dome is described as an expression of the infinite, an endless projection upward, or as a perspectival illusion of infinity.[2] Considering that Guarini was very critical of perspective representation, another characterization must be sought.[3] This paper proposes that a description of the dome that deals primarily with its luminous and diaphanous qualities is better suited to the meaning this late seventeenth-century work. To this end, this paper examines the architecture of the chapel alongside writings by Guarini that deal with light and vision. Guarini's architectural treatise, *Architettura Civile,* published posthumously in Turin in 1737, and portions of his philosophical work, *Placita Philosophica,* published in Paris in three years before Guarini began working on the SS.

Fig. 1. SS. Sindone Chapel dome (author).

Sindone Chapel, are examined here. This study considers the role of light in the chapel and aims to elucidate the relationship between light, surface, and geometry, as Guarini envisioned them.

When Guarini was brought in by Duke Carlo Emmanule II in 1668 to complete the chapel for the Holy Shroud begun ten years previously, he had been a member of the Theatine order for almost thirty years, travelled extensively, and designed a number of churches for the order. His endeavors unfold in the aftermath of the Counter-Reformation. The Tridentine debates of the previous century had resulted in a reaffirmation of the importance of tangible expressions of the presence of God in spiritual life, in response to the Protestant challenge.[4] This emphasis would be inherent to the edifice destined to house the burial cloth of Christ. Prized possession of the Savoyan Duchy and cherished relic of the Church, the shroud was perceived by many as a sign of contact between body and the divine. Guarini's work and writings praise the role of matter in the spiritual journey.

It is revealing that *Placita Philosophica,* for all of its logical proofs and argumentation, includes a proof of the dogma of the transubstantiation, and elsewhere in the treatise, a refutation of Copernicus' concept of planetary motion.[5] Such details are useful in defining the mind-set of the architect of the chapel, especially because of the tendency to perceive Guarini as somewhat more adventurous in thought than he really was (because of the technical appearance of the architectural treatise). Indeed, Guarini is often portrayed as a revolutionary mathematician or even as a precursor of descriptive geometry. Ultimately, however, his thought is rooted in experience.[6]

The geometrical methods in Guarini's *Architettura Civile* are still very concrete, and must pass through the hands in order to be able to give shape to stones;[7] lengthy geometrical demonstrations on how to project and intersect geometrical forms conclude with a "gentle hand" pulling the curved lines.[8] Precision hinges not on abstract operations but on the agility of the maker, and the sharpness of the drawing tools. Thus Guarini describes them in detail:

> "Pens are to be made of raven, goose or eagle feathers, both hard and shiny...The pen should be of soft steel, with a fine and well burnished point to pull very fine lines. The stone should be leaden so that it can be rubbed out with fresh bread...The compass shall have a steel point, which when open, can be closed with equal force and the same movement, not too stiff, not too limp, but yielding to the hand with equal resistance."[9]

The architecture treatise is concerned with primarily two things: how to build the complex forms resulting from the undulation of the classical orders (elliptical, conoidal and parabolic vaults and intersections thereof), and secondly, how to represent them. Guarini's famous premise is that "Even if architecture is dependent on mathematics, it is nonetheless an art of flattery, and which should not offend the senses purely for the sake of reason."[10] The correlation between architecture, mathematics, and pleasure of the senses, is subtle. The following quote is its important counterpart:

> "Architecture should not be as permissive as perspective: Perspective, because it fools the eye and makes the surfaces of bodies appear, obtains its end and achieves what it sets out to do; whence even an unruly architecture can achieve its end, receiving the praise of all. But architecture cannot achieve its end of pleasing the eye without true symmetries, its ultimate end being not to fool the eye."[11]

Hence we know that "true proportions" are safeguarded in parallel projection, and that they are the pre-condition for pleasure in architecture. This correlation contains the key to understanding the role of light in the SS. Sindone Chapel.

Indeed, an important aspect of a discussion on the chapel's light concerns the creation of projections which "advance out of a building face," as Guarini would say, to be met by light. It is to these projections that he attributes the source of pleasure in buildings. Indeed, when expounding *ortografia elevata*—frontal parallel projection—in the third book of the treatise, Guarini describes the geometrical procedures to follow in order to create "different kinds of overhangs called projections, and other reveals, which advance out of a building face, and, folding themselves into various forms, give *delight* to the work."[12]

Ortografia therefore allows the idea to be formed in matter, casting it outward into form, and offering it to perception and the enjoyment of the senses[13] (without disrupting the idea's "true symmetries"). Another way to say this is that unprojected geometry remains flat and imperceptible. Guarini's definitions of his geometrical method are vivid; differentiating *ortografia elevata* (raised parallel projection) from *ortografia gettata* (thrown parallel projection), he writes:

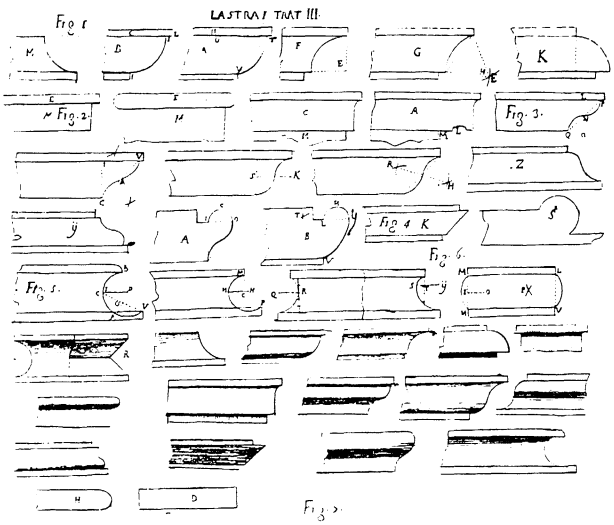

Fig. 2. Various projections outward of the building face, from *Architettura Civile.*

> "Just as it is opposite in its title to the first, so it is in its mode of operating; for where in the first, plane surfaces were raised with perpendicular lines to give them body and form the *fabbrica,* the second on the contrary reduces in plan bodies which are suspended above, in order to extend their surfaces."[14]

This "throwing and stretching" of plan to three-dimensional vault is seen in the floor-ceiling relationship of the anterooms of the SS. Sindone Chapel, as well as in the relationship between floor, pendentive and dome in the chapel proper (with *ortografia,* these become temporal relationships). Geometries which are latent in plan become explicit three dimensionally in the coffering and articulated ribs of the raised cupolas. This is where light becomes involved. Indeed, when geometry acquires mass through "outward projection," it can then interplay with light and have a tactile presence.

Throughout the architecture of the chapel, Guarini is seeking to create occasions for light and stone to "mix." This is played out slowly from the stairs to the dome on the chapel's surfaces: pilasters and ornaments are embedded in the stairs, then, the orders detach from the wall surfaces in the anterooms, and finally, the surface transforms into a filigree of light and stone in the dome. What is more, one of the

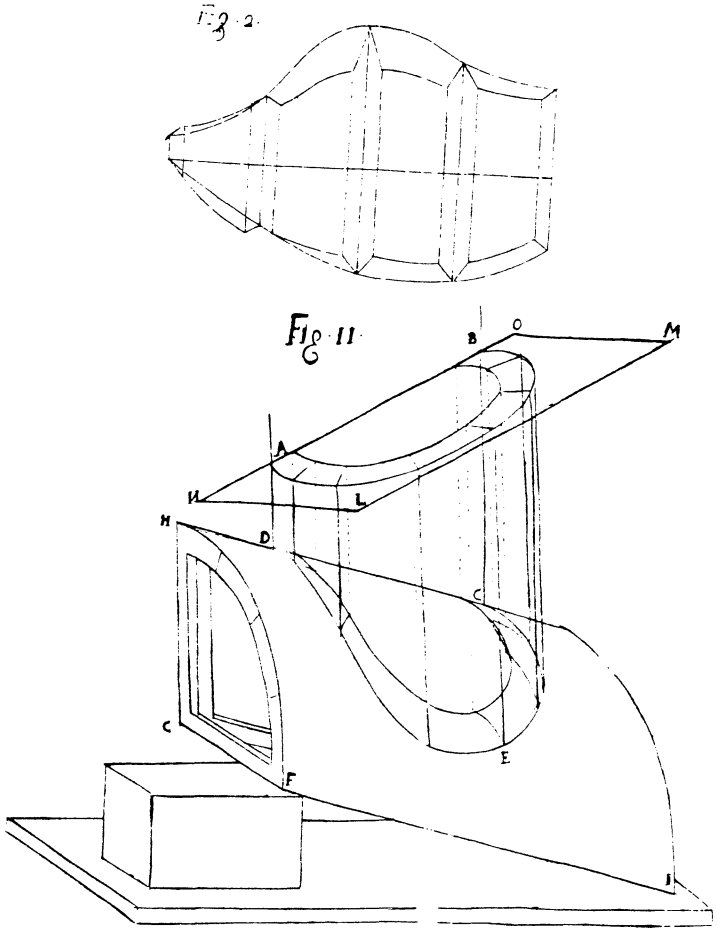

Fig. 3. Cast and stretched geometry, from *Architettura Civile.*

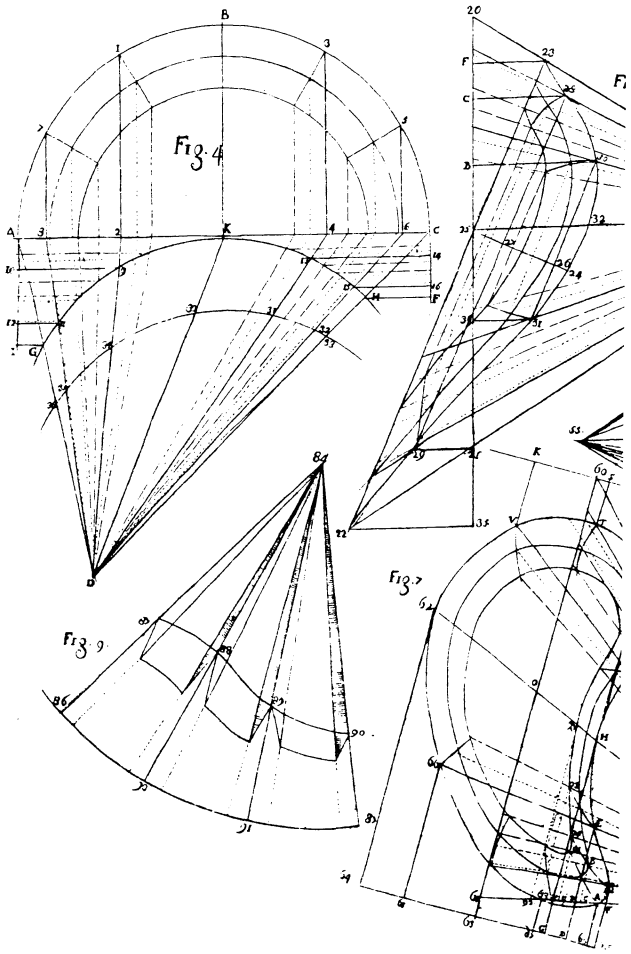

Fig. 4. *Ortografia,* from *Architettura Civile.*

reasons Guarini gives for using elliptical sections rather than hemispheres for domes—he takes his own advice in the chapel—is because the former reaches higher and captures a brighter light.[15] Moreover the SS. Sindone chapel is a manifestation of an encounter between light and stone.

Guarini's *Placita Philosophica,* or "Pleasing Philosophy," sought, like all scholastic treatises, to give a rational account of the relationship between matter and mind, and contains frequent references to Aristotle, Aquinas, Duns Scotus and Francisco Suárez among others. After establishing a basis in logic, the *summa* inquires into, consecutively, the physical world, the body, spirit, and finally, metaphysics. Notions such as the idea that distance cannot be measured in an imaginary space without the "creation of a body" are discussed at length.[16] As alluded to above, Guarini emerges as a thinker still deeply attached to traditional models of the physical world, and rooted in reality. It is in this treatise that a dialogue in which Guarini wrestles with the question of light is found.[17]

Guarini begins "De Luce" ("On Light") by acquiescing that many have attempted to break open the mystery of light, but asking poor questions, only received uncertain answers. He will not arrive at a certain explanation either, and will

resort to defining light with a series of negations: that it is not a body, that it is not a spirit, that it is not a mixture of the corporeal and the spiritual. Logical argumentation proves that light cannot be a body because "it is able to pass through diaphanous subjects, even very dense ones," and that it cannot be a spirit, because light is subject to alteration.[18] It is also established that light is not a substance, nor is it the "presence of transparent luminous bodies."[19] It does not move through space by generation, but requires a continuous subject in which to propagate itself through. Within Guarini's Scholastic Philosophy, light is an "accident," that is, it cannot exist on its own but rather, its essence requires that it exist in another being.[20] The mutual relationship between the luminous and the nonluminous is described in a dialogue on "the diaphanous."

The passage begins with the statement "light, for its conservation, needs a diaphanous medium in order that it might be in a subject."[21] Part of the logical proof of this is expressed as such: "Light is an accident... therefore it should be in the subject so that it can exist and be held. Wherefore it is gathered ... that in no way can it be in a vacuum."[22] Toward the end of the dialogue the corollary to the principle of light needing a diaphanous medium is articulated: describing light "coming out of an object and leaning toward another," Guarini reasserts the need for extended matter in the creation of an image, for that which is completely translucent cannot be imprinted by images since the latter would pass right through it.[23] The previous description of the relationship between light and the diaphanous seems to describe accurately the "light-stone" mixture that organizes the section of the chapel.

Other analogies could be suggested: Guarini advances that the "diaphanous" subject must have some measure of clarity, for the more saturated it is, the more clarity it will lose. Thus, he writes, it is necessary that the diaphanous be white in color.[24] This principle is in keeping the fact that Guarini abandons the black marble already in place in the stairs when he began his work, and employs stones that are increasingly light in color as the section of the chapel progresses vertically.[25] This principle is reiterated in *Architettura Civile* when Guarini writes that light colored objects appear larger than dark ones.

The diaphanous subject is also "that which has all equal surface areas," whether separated, divided or agitated, always adding up to the same surface area, just as water when it moves, or crystal when it shatters.[26] The meaning of this statement is not limpid (it is even contradictory) but it does convey a sense of the diaphanous as a homogeneous medium for light to employ as it migrates to objects. The highly articulated but meticulously symmetrical language of the dome, and the rounded moldings that blend the composition, are not in contradiction with this attribute of the diaphanous. An analogy could be drawn with a passage in *Architettura*

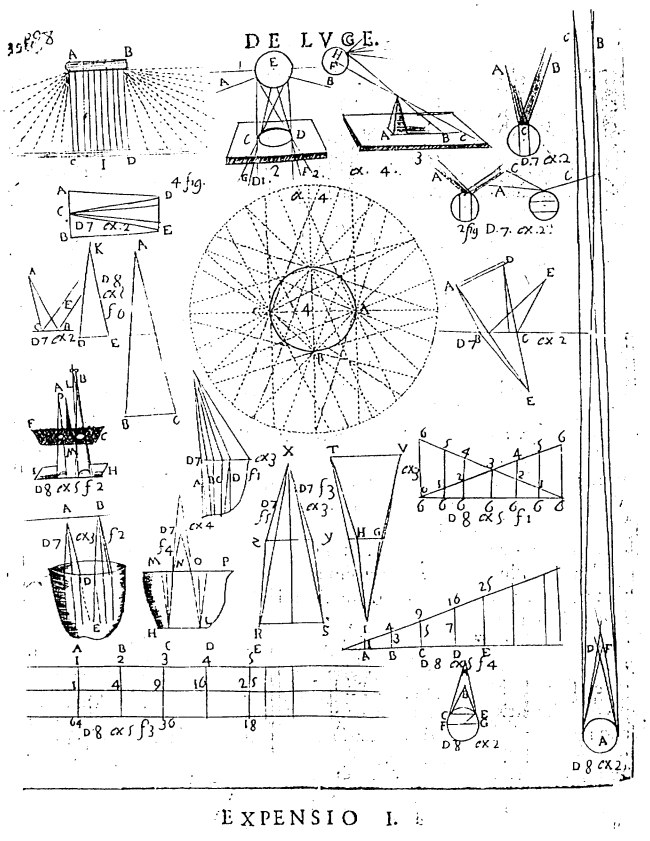

Fig. 5. "De Luce", from *Placita Philosophica.*

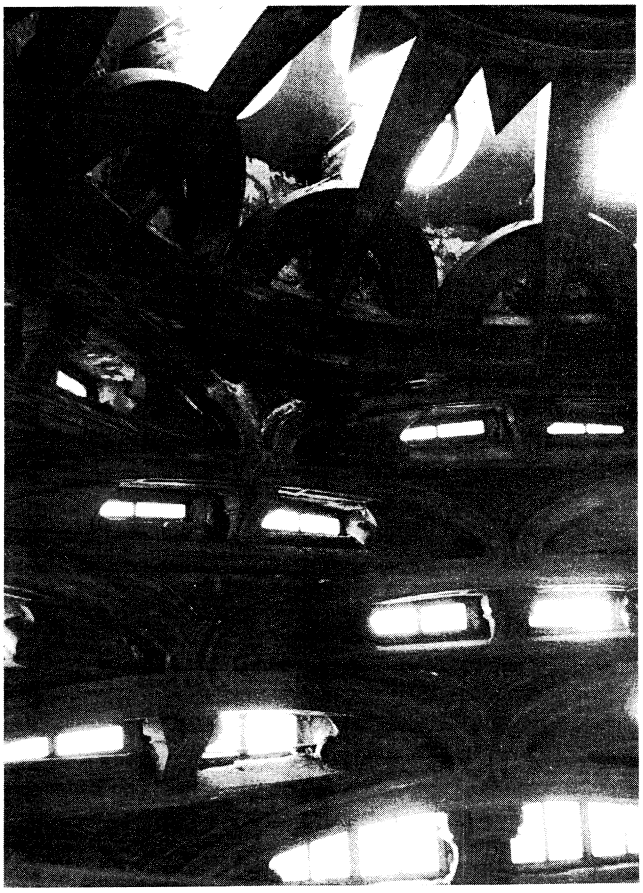

Fig. 6. The "diaphanous" dome, detail (author).

Civile, when Guarini, commenting on visual perception, writes that articulated surfaces appear larger than unified surfaces, because these cause vision to "dilate more, seeing more surfaces rising from the plan," not simply seeing in plan "but also the sides, or curvature."[27] Applied to the chapel, this principle would explain what appears to be a deliberate attempt on Guarini's part to agitate surfaces that are near light sources. The result is a space where light can migrate uniformly, thus rendering the fullness of three dimensional space as comprehensively as possible.

The inclusion of an unnecessary pendentive between the drum and dome of the chapel is a case in point.[28] The pendentive's densely coffered surfaces bear the same pattern as the floor directly beneath. The crosses and squares in the shells, and hexagons and six-point stars in the interstitial shells, repeat the pattern of the grey and white stone floor, illustrating poignantly the act of "throwing and stretching" according to the principles of *ortografia gettata.* But equally important is the fact that these surfaces, their geometries cast outward, provide a substrate for the play of light and shadow.

Although Guarini does not write specifically about light in the architectural treatise, he does address questions of optical corrections and vision in the third book. Repeatedly, Guarini underlines the problems of vision, that because rays "intercross in the eye," distortions occur in vision with relation to the true proportions of geometry. His main concern is that in the collapsing of the optical image, part of the volume of objects is lost to perception. Light and shadow are perceived when surfaces project outward, and this cannot happen if the perspective vantage point has flattened the view. It is imperative for Guarini to recover the fullness of the surface, which is why he devotes himself to outlining corrective methods to be used in the design of building façades where a "competent viewing distance" is not possible due to site constraints[29] or the excessive proximity of the viewer.[30]

In this regard, we recall that perspective collapsed objects' surfaces with their appearance, making "the surfaces of bodies appear," and leaving no room for light to infiltrate the space between the two. Guarini describes the inadequacy of the optical process in *Placita Philosophica* in strikingly similar terms. In an account of how the eye assesses distance in vision, Guarini insists on the problem of loss of depth when viewing objects at close range, he writes: "What likenesses most obliquely reflect is not an object far from itself but the rather the object integrated into its own surface." In short, distance is needed to ensure the truest image.[31]

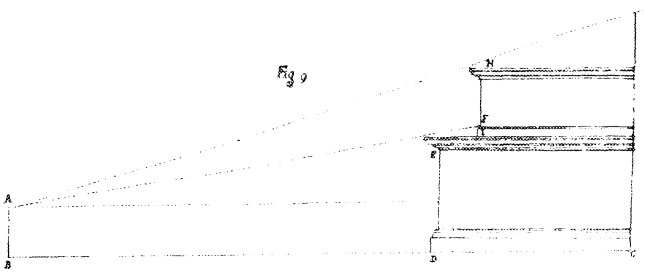

Fig. 7. Optical corrections of façades, from *Architettura Civile.*

If Guarini did not understand light as a spiritual entity *per se,* he did characterize it in the very same way that he characterized the substance needed to connect body and soul: a medium that is neither corporeal and neither spiritual. The geometrical method behind the making of the chapel, *ortografia,* is able to pull the plan upward into a vault or dome; when this form is windowed it can be filled with light, and given an appearance beyond its surface and a presence in space. Thechapell's stones, whitish in color from the cornice upward to the dome and articulated into numerous equal surfaces, celebrate this event. The liminal dome, half stone - half aperture, resembles a "diaphanous subject" for the "accident of light" to move through. More that an infinite expansion, it is a wavering between near and far, presence and absence, clarity and cloudiness. It is with this wavering that the chapel, with its relic,[32] is able to circumscribe the impalpable mystery of the Incarnation.

As we have seen, Guarini's SS. Sindone Chapel raises a way of dealing with light that is intimately involved with materiality, and that reminds us of the value of the surface. The chapel unfolds between its presence and its absence, revealed in light after being made and standing precariously from then on, at the foot of darkness. It is perhaps of an architecture such as this one that Louis Kahn was thinking when he wrote that "a wall is built in the hope that a light once observed may strike it again in a rare moment in time."[33]

NOTES

[1] Louis Kahn, "From a Conversation with Peter Blake," *What Will Be Has Always Been: The Words of Louis Kahn,* Richard Saul Wurman (New York: Rizzoli 1986), 127.

[2] Regarding Guarini's domes, Wittkower writes: "They seem the result of a deep-rooted urge to replace the consistent sphere of the ancient dome, the symbol of a finite dome of heaven, by the diaphanous dome with its suggestions of infinity." *Art and Architecture in Italy 1600-1750* (New York: Viking Penguin 1985) 413. H.A. Meek describes the dome in terms of an "illusion...of almost endless distance" and of an "infinite recession" upward, *Guarino Guarini and His Architecture* (Yale University Press, New Haven: 1988), 75. Robison describes the domes as "forced perspectives," and perspectival "optical effects." "Optics and Mathematics in the Domed Churches of Guarino Guarini," *JSAH* (Dec. 1991): 385. Robison examines the elongated section of the dome according to the methods of optical corrections mentioned in *Architettura Civile.* I would disagree only with the statement that Guarini made these corrections to force an illusion of *increased* height, and state that corrections were implemented to ensure that the dome would not be perceived as "less" than its geometrical reality. Implicit in this is the important distinction Guarini maintains between geometry and optics, a point made very clear by Alberto Pérez-Gómez, *Architecture and the Crisis of Modern Science* (Cambridge: MIT Press 1983), 88-96.

[3] Guarini believes that perspective distorts and makes "true symmetries" unmeasurable, unlike parallel projection which leaves proportions unchanged.

[4] Decrees on the Eucharist and on Transubstantiation were formulated in 1551 during the thirteenth session of the Council of Trent. See *Canons and Decrees of the Council of Trent* tr. H. J. Schroeder (St. Louis: Herder Book Co, 1941). See also Paul Kunkel, *The Theatines in the History of Catholic Reform* (Washington: The Catholic University of America Press 1941).

[5] "Corpus Christi in hostia, existit totum et toto, & totum in qualibet parte..." Guarini, *Placita,* 797. "Transubstantiation" stresses whole and complete coexistance of God's "true body" in the bread and wine of the Eucharist. As for Guarini's defense of an immobile earth. Ibid 389.

[6] On this topic, see Bianca Tavassi La Greca's article "La Posizione del Guarini in Rapporto Alla Cultura Filosofica del Tempo," included in the 1968 edition of *Architettura Civile* (Milan: Edizioni il Polifilo), 439-59. The author cites passages from *Placita Philosophica* concerning the necessity of experience in cognition and philosophy.

[7] For a contestation of the idea that Guarini's mathematics were innovative see for example Werner Müller, "The Authenticity of Guarini's Stereotomy," *JSAH* (Oct. 1968), 202. F. G. Tricomi identifies errors and inaccuracies in Guarini's mathematical treatise, the *Euclides Adauctus* (1671) in his article "Guarini Matematico," *Guarino Guarini E L 'Internazionalita del Barocco* 2:553. Werner Oechslin's comments on this evidence in a discussion of the "mediatory function of theory" in Guarini's work, are enlightening. See "Even if Architecture is dependent on Mathematics," *Daidalos* (Berlin: Brtelsmann Fachzeitschriften 1985) 18:29.

[8] "...con dolce mano si condurrà una linea curva che esprima il circolo." Guarini, *Architettura,* 296. All translations are by the author. My thanks to Herman Muller S.J. for his assistance with the Latin texts.

[9] Ibid 22-3. Guarini insists that the artist's tools and materials must be aptly chosen in *Placita Philosophica* as well, 214.

[10] "L'Architettura, sebbene dependa dalla Matematica, nulla meno ella è un'arte adulatrice, che non vuole punto per la ragione disgustare il senso." Guarini, *Architettura,* 10.

[11] Ibid, 19-20; and also: "Per serbare le dovute proprozioni in apparenza l'Archiettura devesi partire dalle regole e dalle vere proporzione." Ibid, 17.

[12] "...e sono in generale diverse sorte di sporti detti *Proiectiones,* e degli altri aggetti, i quali si avanzano fuori di qualunque fabbrica a piombo, e con diverse forme piegandosi, danno vaghezza all'opera." Ibid, 113. The italics are Guarini's: the word "projection" was obviously unfamiliar. The meaning of the word "vaghezza" (translated here as "delight") is associated in Guarini's day to pleasure, love and desire.

[13] Books two, three and four of *Architettura Civile* deal with parallel projection, or *ortografia.*

[14] Guarini, *Architettura,* 113.

[15] Ibid 259. See also E. Robison, "Optics and Mathematics," 393-4.

[16] Guarini, *Placita,* 274.

[17] Guarini's theory of vision is expounded in *Placita Philosophica,* 711-25 - and in chapters twenty one and twenty two of the third book of *Architettura Civile.* Guarini's theory of vision is examined by Corrado Maltese in his important article, "Guarini e La Prospettiva," *GGIB* 1:559.

[18] "Lux non est substantia spiritualis, neque aliquid participans spirituale & corporeum ... Non autem substantia spiritualis Suspicit magis & minus, & alterationem: quod de substantia spirituali credere absurdum est." *Placita,* 408.

[19] Ibid, 400.

[20] Bernard Wuellner, S.J., *Dictionary of Scholastic Philosophy,* (Milwaukee: The Bruce Publishing Company 1956).

[21] "Lux, ad sui conservationem, diaphano medio indiget, ad hoc ut sit tanquam in subiecto". Guarini, *Placita,* 417.

[22] Ibid, 417.

[23] Ibid, 418. "Nam lumen, quod à quocumque corpore egreditur, debet illud nobis ostendere: in id enim institutum est. Quae vero translucida sunt, visum non terminant, & maximé si de summa transparentia agatur." Interestingly, Guarini uses the same visual analogy to discuss the interaction of spirit and matter, and suggests that an intermediary, something "neither spiritual nor thick," and neither apt to support images nor transmit them, is needed to imprint soul into matter: "Ergo debet dari aliqua substantia media, quae neque sit spiritualis, neque sit crassa. Quod autem substantia haec opaca & crassior, non sit apta ad suscipendas species, & eas transmittandas..." Guarini, *Placita,* 637. The movement of angels in bodies is also compared to that of light through glass. Ibid, 282.

[24] Guarini, *Placita,* 418.

[25] Meek, Passanti and others have commented on this tonal transition.

[26] Guarini, *Architettura,* 288.

[27] "Quanto in più numerose parti sono divisi gli oggetti, tanto appariscono più grande, e men numerosi, appariscono più piccoli ... E ne adduce la ragione, perché la vista più si dilata, vedendo più superfizie rilevate dal piano, perché non solamente vede il piano, ma di più, i loro fianchi, o curvità, per le quali più si diffonde." Ibid, 245.

[28] A pediment is needed to make a transfer from a square to a circle, but here, it is introduced between two circular forms. This redundancy is amply commented upon; for example Wittkower, *Art and Architecture in Italy,* 408 and H.A. Meek, *Guarino Guarini,* 71.

[29] "How to proportion a façade which appears flawed because of the site." Guarini, *Architettura,* 248.

[30] "Cornices viewed from too close must increase in height in reduce in width." Ibid, 258.

[31] Guarini, *Placita,* 721.

[32] Georges Didi-Huberman's description of the shroud as a "luminous index of the absent wound," is most poignant in this context. "Index of the Absent Wound - Monograph of a Stain" *October* 29:41.

[33] "Architecture: Silence and Light" (1971), in *Louis I. Kahn, Writings, Lectures, Interviews* ed. A. Latour (Rizzoli, New York: 1991) p. 252.