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Light and Shadows in Bernini's Oval of Saint Peter's Square

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Abstract

Gian Lorenzo Bernini planned Saint Peter's Square with an oval part surrounded by a colonnade that was imagined as 'the maternal arms of Mother Church' embracing the crowd. The pivot of this masterpiece is an obelisk, which is also the gnomon of a huge sundial. With vertex at the obelisk, the azimuth spanned by sunrise throughout the year corresponds to the eastward entry end of the colonnade, as noted by writer and lecturer Robert Bauval. Besides the crowd then, Bernini's colonnade is also embracing the light of the sun on its local horizon. In this Baroque architecture, also the shadows are playing a very important role. An example is given by those of the colonnade statues that move through the oval over the day.

Keywords: Solar Orientation, Solstices, Architectural Planning, Satellite Images, Google Earth.

Introduction

St. Peter's Square is a huge square located in front of Saint Peter's Basilica in Rome. At the center of the oval part of this Square stands a four-thousand-year-old Egyptian obelisk of red granite, placed at the current site in 1568 by Domenico Fontana, architect and engineer [1]. At that time, Saint Peter's Square was quite different: the layout that we see today is due to Gian Lorenzo Bernini [2,3], who planned it in 1657, almost 100 years later then, with a colonnade that - Bernini himself put it - was imagined to embrace people like if it were 'the maternal arms of Mother Church'. The colonnade is framing a large area which has the shape of 'ovato tondo', a round oval with its long axis parallel to the Basilica's front (Figure 1). The presence of the huge Egyptian obelisk influenced Bernini's project who used it like centrepiece of his project. As we will see in the following discussion, this obelisk is the gnomon of a huge sundial, the shadow of which has a time-telling function. Besides the obelisk, the Bernini's oval is linked to the sun in another manner too. As observed by writer and lecturer Robert Bauval [4], and shown by satellite images, the entry end of the colonnade is large enough to correspond, with vertex at the obelisk, to the angle spanned by the sunrise azimuth throughout the year. Besides the crowd then, the colonnade is also embracing the light of the sun on its local horizon.

In this Baroque architecture, also the shadows are playing a very important role. An example is given by the shadows of the colonnade statues that move through the oval over the day. In the following discussion then, we will investigate the role of light and shadows in the elements of the planning of Bernini's oval.



Figure 1: Piazza San Pietro and Basilica (Courtesy Google Earth). Note the oval part of the Piazza, with obelisk and two fountains.

The Obelisk

The obelisk erected at the current site in 1568 by Domenico Fontana, was originally located at Heliopolis in Egypt by a king of the Fifth Dynasty. During its history, it had been moved three times, from Heliopolis to the Julian Forum of Alexandria, then to Rome, placed on the “spina” running in the middle of Nero’s Circus. Finally, in 1568, Pope Sixtus V ordered to move it to its current site.

The ancient obelisk acts as the gnomon of a sundial, which can accurately indicate midday and the two solstices thanks to a marble line and markers embedded in the pavement of the square. Pope Benedict XVI pointed out this fact during an Angelus address he gave on winter solstice of 2008. "The great obelisk casts its shadow in a line that runs along the paving stones toward the fountain beneath this window and in these days, the shadow is at its longest of the year" [5]. Benedict XVI also reminded that the church had always been interested in astronomy, because it is the science that, in the past, guided and established the liturgical days and prayer times. Sunrise and sunset are easy to figure out - he said too - but the obelisk can tell precisely the midday [5].

In fact, Benedict XVI was referring to the canonical hours which mark the divisions of the day in periods of fixed prayers. This set of daily prayers is collected in Liturgia Horarum, a liturgy which has its origin in the Jewish practice, continued by the early Christians, of reciting prayers at certain hours of day or night [6]. The obelisk in Saint Peter’s Square was the solar Horologium telling then the time for prayers when mechanical clocks were quite rare and precious devices.

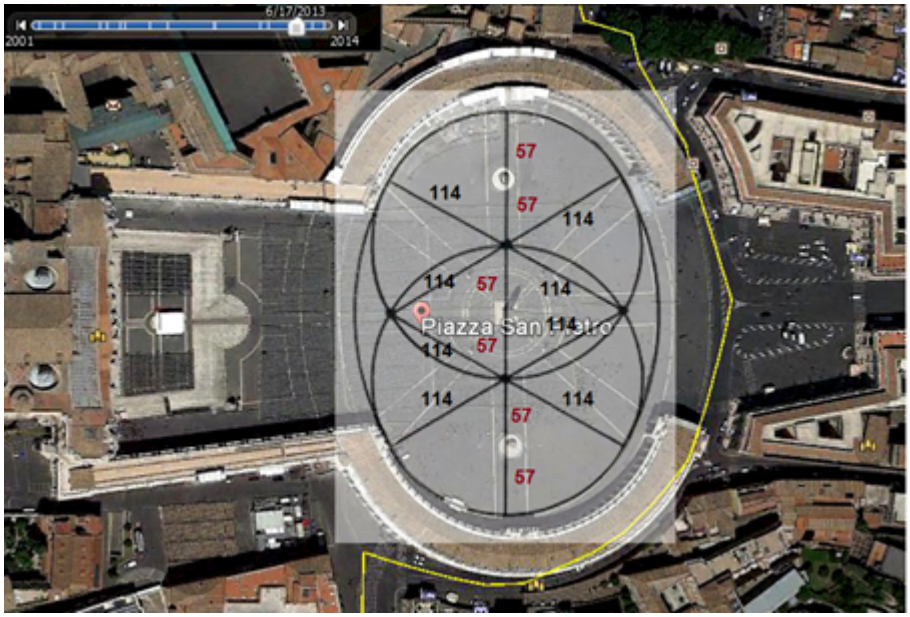


Figure 2: The "ovato tondo" and its geometry. The obelisk acts as a pivot. Note that obelisk and fountains are halving the bases of equilateral triangles. To evidence the geometry of this ovato, black and red numbers are the lengths (in pixels) of the corresponding lines.

Bernini's Ovato Tondo

Bernini was born in Naples in 1598. His father, Pietro Bernini, was a sculptor that occasionally worked for the Vatican; for this reason Gian Lorenzo was involved from his childhood in several artistic projects in Rome. The young Bernini was soon noticed for his skill by Annibale Carracci, the painter, and by Pope Paul V. For this Pope and his nephew, Cardinal Scipione Borghese, the prolific Bernini designed statues, monuments and fountains, besides working for the Saint Peter's Basilica and Square.

It seems that Bernini was a deeply religious man [7]. In [7], it is told that he "used light as an important metaphorical device in the perception of his religious settings, often using hidden light sources that could intensify the focus of religious worship, or enhance the dramatic moment of a sculptural narrative". As this was true for Bernini as sculptor, we can imagine this was also true for Bernini as architect. Therefore, let us consider the planning of Saint Peter's Square again. It is almost certain that Bernini was well aware of the role the obelisk' shadow had in the Liturgy of the Hours. It is then quite possible that he used the path of the sun in planning the colonnade too. Let us note that the colonnade is surrounding a space with was planned using the geometry of 'ovato tondo' (this geometry is shown in the Figure 2). This is one of the geometric planning of oval shapes, described by Sebastiano Serlio (1475– 1554), an Italian Mannerist architect, who was part of the Italian team building the Palace of Fontainebleau. Serlio wrote an influential treatise on architecture, variously known "Seven Books of Architecture" or "All the works on architecture and perspective". The ovato tondo created by Bernini is the only one of Serlio's constructions that enables ovals with varied eccentricities to be drawn [8].

The role of sun and light in the building of churches is well known. In Reference 9, for instance, we discussed and analysed orientations of Gothic cathedrals of France. These buildings have the apse facing the rising sun, according to a practice adopted during the Middle Ages, which was orienting the main axis of new churches to the rising sun on the day of their foundation. Previously, many churches were like Saint Peter's Basilica, which has entrance to the East and apse to the West. It is oriented like the Temple of Solomon [10,11]. Saint Peter's Basilica and Square are perfectly aligned along East-West cardinal direction. Then, Bernini's planning of the square is perfectly aligned to cardinal directions. However, as shown in Refs. [12-15], such a cardinal orientation of architectures allows alignments to sunrise and sunset on solstices too. In this manner, as we discussed in the given references, the planning of Mughal gardens or ancient Chinese towns can be imagined as local horizons, symbolically embracing the motion of the sun throughout the year. We find a solar alignment in Bernini's oval too: as Bauval shows in [4], the entrance of Saint Peter's colonnade is corresponding to the azimuth spanned by the

sunrise on the year.
Let us view the sunrise azimuth on satellite maps, like we did in [12-15], by means of web sites (sollumis.com, SunCalc.net; the use of SunCalc was proposed in [16,17]). Let us apply SunCalc for the analysis of Bernini's oval: in the Figure 3, we applied SunCalc to the obelisk at the center of Bernini's oval on summer and winter solstices (in the figure, we merged the two images at solstices). We can easily see the angle, between solstices' azimuths, with vertex at the obelisk, angle which is spanned by the sunrise azimuth throughout the year. The arc on the oval is clearly corresponding to the eastern entry end of the colonnade. Since the oval is symmetric, an equal angle is spanned by the sunset azimuth.
If we assume that the ovato tondo is representing the world and the two symmetric arcs the sunrises and sunsets throughout the year, as viewed from the local horizon, the Roman church is imagined embracing the universe as a whole. Let us remember that the word "World" in ancient philosophical context had the meaning of "Universe". Moreover, the Roman Church is "Catholic", that is, literally "universally accepted," from Latin catholicus "universal, general," from Greek katholikos, "on the whole, in general".



Figure 3: SunCalc applied for the analysis of Bernini's oval, using the obelisk at the center of Bernini's oval as a pivot. Yellow and orange lines correspond to sunrise and sunset azimuths on solstices. The angle between sunrise azimuths corresponds to the entry end of the colonnade.

Fountains and shadows

As told in [18], "the way the sunlight falls on the columns (of Bernini's colonnade) adds to their strong grace. The curve of the colonnade answers to the angle of the sun, making shadows cross obliquely up the column shafts. North European architects might not think of shadow effects as integral to the architecture, but few Mediterranean architects would be likely to ignore it. In this respect architecture differs from every other art, with the partial exception of sculpture. A piece of architecture is inseparable from its surrounding, and integrally involved with rain, the sun and the color of the sky". The scene Bernini created is completed by the statues ringing the two arcs of the colonnade [18].



Figure 4: During the winter, at noon, the obelisk is casting its shadow on Maderno's fountain, whereas the shadows of colonnade statues move near the southern fountain of the oval (Courtesy Google Earth).

Let us look at the satellite image shown in Figure 4. It was taken on November 10, in the early afternoon. The noon altitude is 31°, whereas at the winter solstice it is 25° (sollumis.com). We see that the shadow of the colonnade is just about to touch another element of the oval, the southern fountain. As told in [19], Bernini had constraints from existing structures. He had, besides the obelisk, a granite fountain made by Carlo Maderno (1556-1629) that stood to the northern side of it. Bernini made this fountain appear to be at a focus of the ovato-tondo (see Figure 2), matching it on the other side with another fountain. Note that at noon, during the winter, the obelisk is casting its shadow on Maderno's fountain.

We have already seen in the Figure 2, that fountains are important elements in the planning of Bernini's oval. In fact, in many temples or holy sites, water is a fundamental element. It is associated to the Water of Life or to the Rivers of Earthly Paradise, such as in the Mughal gardens [15]. Sometimes, these waters are flowing in building themselves. "While there is not a spring that comes forth from St. Peter's Basilica, there are several ways in which St. Peter's is associated with the waters of life" [11]. One way are the two fountains of the square. In the following image (Figure 5), we can see another view from satellite, with the shadows of statues cast on the square near the southern fountain. During the winter, when sun shines at a lower angle, closer to the horizon, light and shadows move, playing with the water of the southern fountain. Even on winter solstice, the sunlight is scattered by the water of the fountain, so that light and water are symbols of life that overcomes the darkness. Let us conclude then that Bernini used his Baroque theatre of light and shadows to have symbolical meanings too, besides providing an effect of movement and action in his architecture. In his art, as in the Baroque art in general, movement and action had been added to the effect of symmetry and balance that dominated the art of the Renaissance [20]. The Baroque artists operated within a context where the vision of the world of Catholic theology, which placed Earth at the center of universe, was challenged both by scientific advances and Protestant Reformation. The Church answered with the Counter-Reformation movement and the Baroque artists, influenced by this environment, created an art that added dynamic effects and disorder to the traditional and hierarchical representation of the world [20].

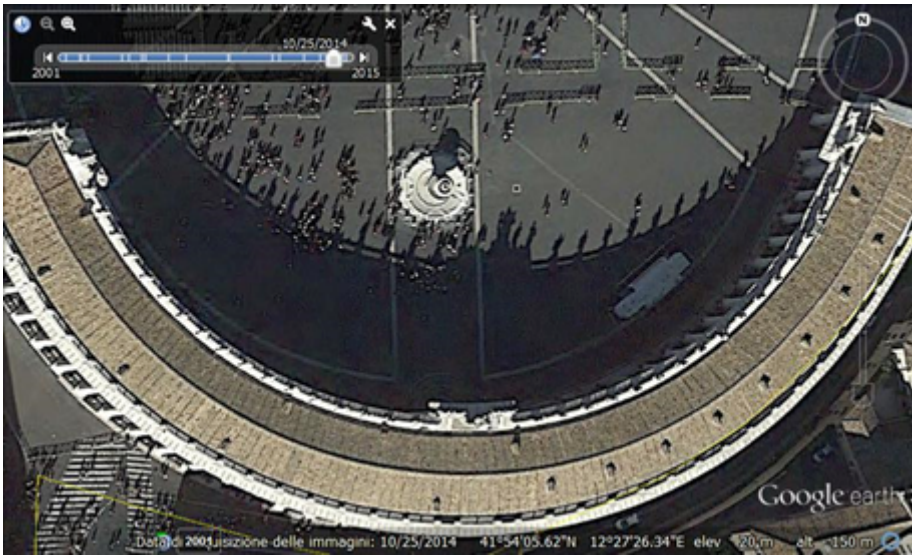


Figure 5: Another view from satellite (Courtesy Google Earth), with shadows of statues cast on the square near the fountain.

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