

**Analysis of Étienne-Louis Boullée's
Cenotaph for Isaac Newton**

Bryar Lindenmeyer

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University of Illinois at Urbana-Champaign

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The Cenotaph for Isaac Newton is a perfect merger between nature and structure. The mere concept of this homage to Newton has influenced modern architecture and, if built, would have been a unique source of scientific and architectural inspiration. In this design, Boullée attempts to reveal the importance of nature's inclusion in architecture. The analysis of this site will provide a background of Boullée's motivation and design philosophies, and will touch on the site's underlying purpose and function. It will also propose how the site was intended to fit into the surrounding landscape, and if the site is able to be constructed.

Étienne-Louis Boullée was born in Paris on February 12th, 1728. His father was an architect, so Boullée followed in his footsteps. As a young architect, he did not design many notable buildings. He is mostly known for his monumental conceptual designs, and his literary

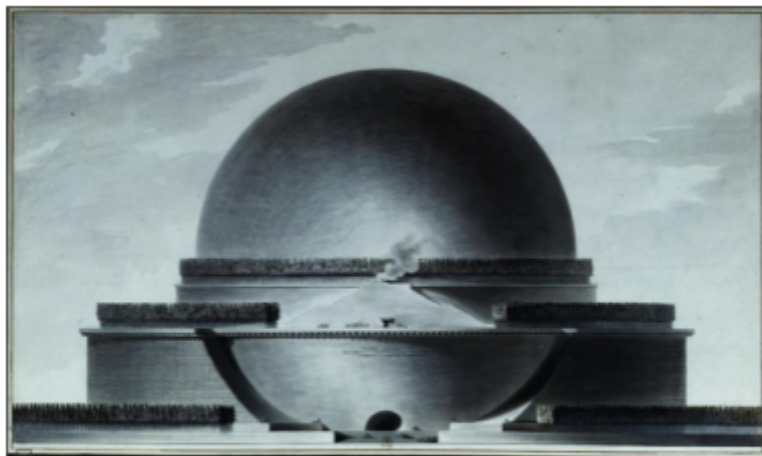


Figure 1. Elevation View of the Cenotaph for Isaac Newton, from AD Classics: Cenotaph for Newton (archdaily.com: Michelle Miller, 2014).

work titled, "Architecture, Essay on Art." In his essay, he provides many philosophical declarations about architecture that he learned throughout his lifetime. Perhaps the most powerful of these statements is when he defines architecture as,

"The art of bringing any building to perfection." He clarifies this definition by saying, "A building is considered perfect when its decoration corresponds to the kind of building to which it is applied and when its layout corresponds to its function."^[1] Assuming that he designed all of his works based on this principle, what then was the function of his Cenotaph for Isaac Newton (figure 1)?

¹ Helen Rosenau, and Étienne Louis Boullée. Boullée & Visionary Architecture : Including Boullée's Architecture, Essay on Art. (London: Academy Editions, 1976), 83.

Clearly, Newton must have been an inspiration to Boullée, and to most of the population at the time. According to Vogt et al., “Newton was revered by Boullée’s generation as a superhuman hero of science, the first to define with mathematical accuracy the cosmic “machine,” the product of the architect of the universe.”^[2] In a time when much was still to be discovered, it must have seemed like the freshly published works of Isaac Newton were a complete summary of nature. In an eighteenth century poem dedicated to Newton, James Thompson writes, “Nature herself stood subdued by him, and open laid her every latent glory to his view.”^[3] During the first half of his lifetime, Newton explained: white light is a mixture of all colors, the nature of gravity, the theory of calculus, and his three Laws of motion. To Boullée, these feats were not the driving force that compelled him to design this massive structure. Isaac Newton also discovered that the Earth orbits around the sun.. Additionally, he confirmed that Earth and the other celestial bodies in our solar system are almost perfect spheres. Boullée explains the motivation behind his design by saying, “O Newton! With the range of your intelligence and the sublime nature of your genius, you have defined the shape of the Earth; I have conceived the idea of enveloping you within your discovery.”^[4] From this quote, it is obvious that Boullée wanted to pay homage to the great scientist and mathematician by designing a monument, not only in the shape of a sphere, but more specifically, the newly defined shape of the Earth.

Boullée’s ultimate architectural goal was to provide the observer with a source of inspiration. When explaining the motivation behind his works in his Essay, he states, “I have made it a rule that I shall work for the benefit of society and thus merit public esteem.”^[5] It can

² Vogt, Adolf Max, Radka Donnell, and Kenneth Bendiner. “Orwell’s ‘Nineteen Eighty-Four’ and Etienne Louis Boullée’s Drafts of 1784.” *Journal of the Society of Architectural Historians* (1984), 60.

³ Thomson, James. *A Poem Sacred to the Memory of Sir Isaac Newton* (London: Printed for J. Millan, at Lock’s Head in New-street, between Marybone-street and Piccadilly: 1727).

⁴ Rosenau and Boullée, 107.

⁵ Rosenau and Boullée, 90.

be unclear how the Cenotaph for Isaac Newton would have benefited society without knowing what Boullée's intended benefit was. Luckily, the writings in his "Essay on Art" leave little to the imagination. When addressing the reason for designing the Cenotaph, he claims that the site "provided the Enlightenment with the perfect image of the expansive fullness of the mind which attempts to broaden the scope of its sensory experience."^[6] With this design, he wanted to motivate the observer to look beyond what can be seen with the naked eye, and ponder the limits of one's own creativity.

The size and shape of the Cenotaph is just the beginning of its uniqueness. The concept for the interior of the structure is what sets it apart from the many other cenotaphs and monuments that Boullée conceived. For Boullée, the great superiority of architecture over the other arts lies in the fact that it is capable of implementing nature.^[7] Not only does the interior design of the Cenotaph implement nature, it transcends the notion of night and day. Figures 2 and 3 depict the "night" and "day" effects, respectively. The night effect is visible during the daytime, and is produced by small slits in

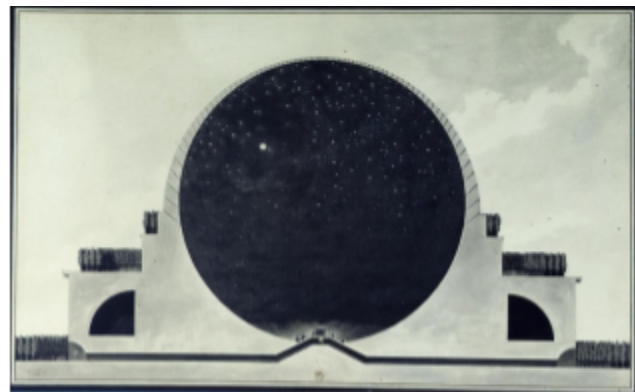


Figure 2. The Night Effect in the Cenotaph, from AD Classics: Cenotaph for Newton (archdaily.com: Michelle Miller, 2014).

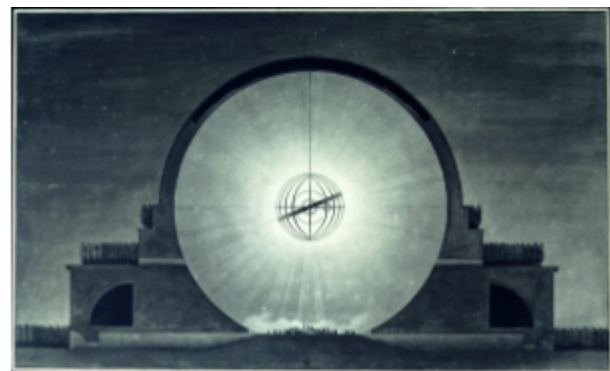


Figure 3. The Day Effect in the Cenotaph, from AD Classics: Cenotaph for Newton (archdaily.com: Michelle Miller, 2014).

the top of the sphere, placed in the pattern of constellations, that present the illusion of a night

⁶ Rosenau and Boullée, 19.

⁷ Pérouse de Montclos, Jean-Marie. Étienne-Louis Boullée (1728-1799); Theoretician of Revolutionary Architecture (New York: Braziller, 1974), 39.

sky. Conversely, the day effect is produced by a large armillary sphere with a shining “sun” at its core surrounded by elliptical rings which symbolize the orbiting planets. Imagine visiting this site, and stepping into the night sky during the middle of the day. The vastness of the structure would certainly create this illusion. Boullée reveals the intended interior effect when he says, “With the design before one's eyes, one will see what would have been thought impossible. One will see a monument in which the spectator finds himself as if by enchantment, transported in air and carried on the vapors of clouds in the immensity of space.”^[8] The function of the site was to provide the observer with a unique perspective of nature. One that could not be concluded by simply looking at the night sky, or sailing on the open ocean. He wanted to encapsulate Newton in a space that was intended to be a representation of Newton himself. The contrast between the interior and exterior informs the observer that only by turning against the natural order, as Newton did, can the world be sublimely gathered by man.^[9] Boullée not only created an homage to Newton, but he was able to symbolically resurrect the great scientist and his ideals by integrating nature and architecture.

Even though Boullée never specified the intended location of the structure, it can be inferred that it was not meant to be built in the middle of a town square. Like the interior, the site as a whole was meant to be integrated into nature. This is evident from the hundreds of cypress trees that surround the perimeter of the multilevel substructure that seems to hold the spherical core in place. Perhaps the site could be sat on top of a hill, away from any manmade structure, so that the observer could be entranced by its isolation. The only accessible path should wrap around the hill so that the observer can take in the beautiful symmetry of its shape. This symmetry is another one of Boullée’s architectural philosophies, and can be seen in figure 4.

⁸ Rosenau and Boullée, 107.

⁹ Bressani, Martin. “Étienne-Louis Boullée, Empiricism and the Cenotaph for Newton” (1993), 47.

Almost every monument, coliseum, or public space he created possessed the theme of symmetry and simple geometry. He explains the reason for this in his Essay when he says, “We are able to best perceive regular bodies because their regularity and symmetry are the image of order, which is the image of evidence itself.”^[10] He believed that simple geometry could create a powerful

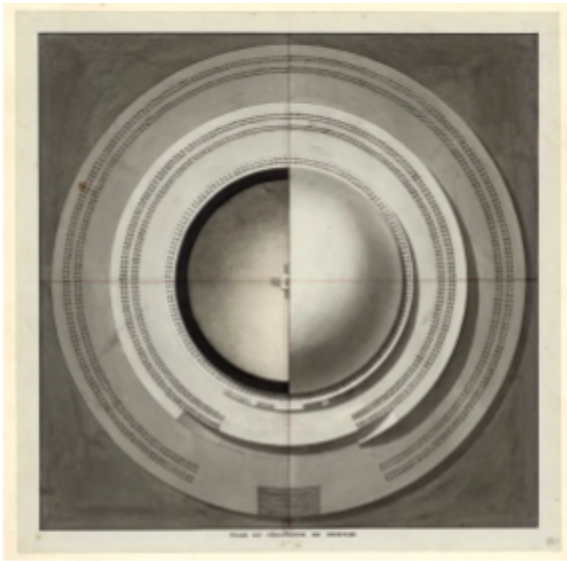


Figure 4. Plan View of the Cenotaph, from AD Classics: Cenotaph for Newton (archdaily.com: Michelle Miller, 2014).

emotional effect on the observer, because it is easier to comprehend. Buildings with complex geometries which are not found in nature leave no room for imagination. Instead of spending time trying to contemplate the unusual geometry of an eccentric facade, only to be left with a new visual, Boullée wanted the site to provide the observer with a new perspective that would spark creativity. In an article about Boullée’s impact in the 1700s,

Martin Bressani states, “Architecture, for Boule, is that art which most immediately produces imaginative pleasure.”^[11] The location for this site that would leave the most room for imagination would be in a landscape that has not been disrupted by civilization. The site should be viewed as if it were a natural feature of the landscape, like a rock formation or a waterfall.

It is amusing to think about the impact that this site would have had on the population if it were built at the time of its conception in the late 1700s. Unfortunately, Boullée’s monuments and cenotaphs were never recognized as serious designs, as the scales of his projects were mostly reserved for churches and cathedrals. Even though the dimensions of the Cenotaph were never

¹⁰ Rosenau and Boullée, 84.

¹¹ Bressani, 43.

specified by Boullée himself, they can be estimated by observing the height of the people depicted in the images, relative to the top of the sphere. Assuming that the average human stands at five feet and nine inches tall, and the height of the sphere compared to the human depictions is measured to be sixty to one, the diameter of the sphere can be approximated as three hundred and fifty feet! Although it was the peak of the Enlightenment movement, which was partially fathered by Newton's discoveries, Boullée was not renowned enough to receive funding for this project. Perouse de Montclos adds, "Boullee himself cannot be held responsible for his failure to do greater things. Political circumstances were unfavorable to the development of monumental architecture as Boullée conceived it."^[12] Even if he did have the political backing to go through with this project, it may not have been constructible.

A dome structure is one of the most efficient shapes to use in construction, as it is able to support its own weight better than any other geometry. Reinforced concrete was not invented until the mid 1800s, so it could not be relied on for tensile strength. Luckily there is no need for tensile support, as the structure would be able to stand using only compression forces; the main benefit of arches and domes. However, a few constraints would have to be considered. It is typical in dome construction to set the minimum thickness to be greater than 4.2% of the radius to ensure that the outward thrust stays within the thickness of the concrete.^[13] This means that the thickness of the Cenotaph would have to be seven and a half feet. Again, estimating dimensions from the cross-sectional elevation views shown in figures 3 and 4, the thickness is measured to be seventeen feet, which is more than double the minimum thickness requirement. Also, the horizontal thrust at the equator of the sphere must be counteracted by some sort of buttress, usually in the form of a wall of concrete. Again, the elevation view of the site shows exactly that.

¹² Perouse de Montclos, 26.

¹³ Abbie Dutton, Professor M Rotter, and Professor Yong Lu, "Analysis of Domes," Domes of different geometries (The University of Edinburgh: 2013).

The complete analytical design of this structure would require extensive calculation and modeling, but the typical preliminary checks that can be done from the few drawings that exist are more than satisfactory.

Even though the site was never built, there are a few examples of famous works of architecture that may have drawn inspiration from Boullée's philosophy, and from the Cenotaph itself. When talking about the influence that the Cenotaph has in the modern day, architectural historian Jean-Marie Perouse de Montclos says, "The ubiquity of its form made his project the paragon of all that the 20th century created in design: all bowls became Boulléen!"^[14] The complete spherical design, without the use of a supporting base, would be made popular by Buckminster Fuller in the mid 1900s. When relating Boullée's designs to more contemporary ones, Helen Rosenau claims, "In many ways [Boullée's] ideas seem to foreshadow Buckminster Fuller's geodesic dome."^[15] This shape takes the form of Disney's Epcot Center, and Paris' Géode of La Villette. In fact, the Cenotaph to Isaac Newton is presented in homage at the Géode website.^[16] His architectural philosophies seem to live on as well. Perouse de Montclos goes so far as to say, "There are close parallels between Boullée and Frank Lloyd Wright in their concern with merging nature and architecture."^[17] The inclusion of nature in Lloyd Wright's work is most notably demonstrated by his "Fallingwater," where the use of simple geometry integrated with nature seems to leave a lasting impression on those fortunate enough to tour the site. This is exactly the effect that Boullée wanted the Cenotaph to have. Perhaps the planetaria of the future will integrate the Boulléen sphere with modern technology, and bring to fruition the original

¹⁴ Pérouse de Montclos, 40.

¹⁵ Rosenau and Boullée, 19.

¹⁶ Jean-Michel Faidit, *Spheres and starry temples in the Enlightenment : Boullée's Newton Cenotaph, architectural precursor to Planetaria ?* (Revue Planetarian: 2003), 12.

¹⁷ Pérouse de Montclos, 44.

intent of the Cenotaph by immersing the visitor into the vastness of space.^[18] Only time will tell what the influential limits of Boullée's Cenotaph for Isaac Newton will be.

Through this design, Boullée suggests that the incorporation of nature into architecture should not be bound by parks and gardens. Every architectural design should attempt to imitate the sublimity of the landscape in some way. Boullée's fascination with the implementation of nature in structure, especially in Newton's Cenotaph, is why he is still recognized today. Even though he has very few physical sites that bear his name, his beautiful conceptual works and his philosophical stance on nature and architecture seem to elude the furnace that is the passing of time. The Cenotaph for Isaac Newton would have provided an enlightening experience for those who were willing to succumb to its influence. It seems fitting to end on a quote that summarizes Boullée's relationship with nature: "Oh Nature! How true it is that you are the book of books, universal knowledge! No, we can do nothing without you! But although each year you begin again the most interesting and instructing course of study that exists, how few men pay attention to your lessons and know how to benefit from them!"^[19]

¹⁸ Jean-Michel Faidit, 13.

¹⁹ Rosenau and Boullée, 89.