Indole of Material and Form: *an analysis of le fòrcole*

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To praise is easy when choosing an ice cream, but to make good architecture, now that's a bit more difficult. Andrea Memmo

Introduction

In the early eighteenth century Carlo Lodoli (1690-1761), an architectural apologist from Venice, made a radical critique of the orders. He argued that the orders were not truthful (read: meaningful) because they were an assemblage of stone that imitated a construction originally conceived in wood. Rather than continuing to blindly imitate the ancients, Lodoli proposed that new criteria of beauty should be understood through knowledge of the inherent nature of materials as well as the performance of architecture. Such knowledge, Lodoli argued, could be found through making and further that beauty would be found through use. In this paper, I describe and then elaborate upon Lodoli's criticism of the Orders to include an analysis of *fòrcole*—wooden oar-posts used in Venetian boats including the gondola. The twisted form of *fòrcole*, though seemingly arbitrary, is extremely precise. When complete, the form of *fòrcole* shares as uncanny similarity with much of the fashionable architecture being produced today. Intentions behind the work, however, could not be more different.

Lodoli's Critique

As little of Lodoli's writing survives, we must look to his most faithful student, Andrea Memmo, who established Lodoli's theoretical position with the publication of two major texts. The first, the *Elementi dell'Architettura Lodoliana* (1786, 1833) critiques almost all architecture since the ancients, though also contains a general approach to making meaningful architecture.[1] The other text, the *Apologhi Immaginati* (1787) is a collection of architectural apologues used by Lodoli in his lessons to young patricians.[2] Central to both texts is an understanding of *indole* or the inherent nature of something: in the *Elementi*, the discussion focuses on the nature of materials, in the *Apologhi*, the nature of students and that of architectural pedagogy.[3] Though Memmo continually stressed that Lodoli was not alone in this position, I have not found other references to indole being used with respect to materials and in the context of architecture. Memmo did, however, explain that Lodoli's understanding was based on the writings of Galileo.

Memmo referenced a dialogue found on the second day of Galileo's *Two New Sciences*. This particular discussion followed an attempt to support a column, which was lying on the ground. [See Figure One] A support was placed directly in the middle of the column, was now acting as a beam. A few months passed and the beam cracked exactly in the place where the support was placed. Sagredo (the character of Galileo's student GiovanFrancesco Sagredo) pointed out that a similar accident would not have occurred in a smaller column made of the same stone. As explained in proposition VII: "Among heavy prisms and cylinders of similar figure, there is one and only one which under the stress of its weight lies just on the limit

between breaking and not breaking, so that every larger one is unable to carry the load of its own weight and breaks, while every smaller one is able to withstand some additional force tending to break it."[4]

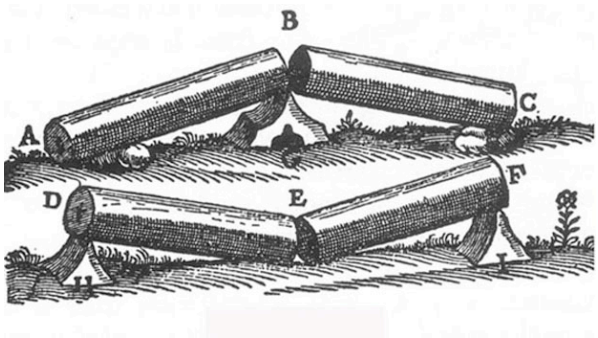

Figure One:
Proposition VII from Galileo Galilei's Two New Sciences, translated by H. Crew and Alfonso de Salvio (New York: Dover, 1952).

Salviati (one of the other characters in the dialogue, representative of Galileo's friend Filippo Salviati) illustrated this principle by sketching a bone three times the size of a normal bone. He observed that the new bone was out of proportion and concluded that if one wished to "maintain in a great giant the same proportion of a limb as that found in an ordinary man he must find a harder and stronger material for making the bones."[5] Following Galileo's example, one could say that the indole or nature of the material found in the bones of a cat is appropriate to its situation and, as such, is able to perform well.

Following this logic, Lodoli mocked the work of one of the more important architects of his day, Tomaso Temmanza. In 1755 the clock tower in Piazza San Marco was renovated. Temmanza added a column just to the inside of the existing openings at the ground level of the clock tower façade. [See Figure Two] Lodoli considered the addition untruthful and superfluous. His reaction was to paint the following graffiti on either column: "Illustrious mister column, what are you doing there? Truthfully, we don't know."[6] A closer look indeed demonstrates Lodoli's quip against Temmanza. Just above the capital of both columns there is now a crack in the beam—identical, in fact, to the one described by Galileo in his Dialogue. In this situation, the orders, though "correct," are not truthful with respect to the materials of which they are constructed and therefore fail exactly where they are supported by the column.[7]

Figure Two:
Clock Tower renovation by Tomaso Temmanza. The two interior columns were added and a crack now appears above each. Photo by author.

Function and Representation

This critique can be understood more clearly by looking to Lodoli's outline for a treatise on architecture in the *Elementi*. Lodoli used the word indole within the section on *solidità* to describe the inherent properties and characteristics of both natural and artificial materials. In the second book of the outline he explained, that "the function of material used in the construction of a building is that multiplied and modified action, which results from the same material, if it was employed demonstratively, according to its own indole and towards a proposed end, and always made in accordance with solidity, analogy, and commodity."[8] Materials, when employed according to their nature are according to Lodoli, considered to be functional.

For Lodoli function was a synonym for truth. Memmo claimed that Lodoli derived this understanding of function-as-truth from a quote of Vitruvius: "Ita, quod non potest in veritate fieri, id non potuerunt (antiqui) imaginibus factum posse certam rationem habere."[9] Lodoli translated the quote: "That which is not able to be made in truth, is not in representation."[10] This dictum was so essential to Lodoli that it was wrapped around his portrait in the frontispiece of both the *Elementi* and *Apologhi*.

The quote reads reads "Devonsi unire fabrica e ragione—e sia funzion[e] la rapresentazione" [Building must be unified with reason—and function will be representation]. This understanding of the representational component of the performance of materials is the basis by which Lodoli directly critiqued the orders and questioned the essential meaning of architecture. Lodoli claimed that the orders did not represent the indole of stone and further that they were based on an architecture of wood falsely translated into an architecture of stone. This argument was supported not by the scientific testing of materials but rather by looking to history to find a more truthful foundation. Lodoli implored us to remember that all architecture was not born in Greece. He wondered why all those who continued to imitate the past did not look to other histories, like the Egyptian, Etruscan, or Phoenician, to find inspiration or understanding.

Lodoli's historical inquiry was deeply rooted in the classical tradition. He also looked to more contemporary approaches, for example, the findings of Paolo Antonio Paoli, an eighteenth century archeologist and the president of the *Accademia Ecclesiastica* in Rome. According to Paoli, at the time that the Greeks transferred the orders from an architecture of wood to an architecture of stone the column had already been established as an element of architecture. Further, the invention of the Orders had predated the Greeks' knowledge of the chisel. It is an important distinction. Paoli looked not to style or to development of form, but to actual methods of construction to determine influence. Similar to reasoning espoused by Galileo concerning cat bones, Lodoli reasoned that the ancients who used wood, built according to the proportions of wood. Once such proportions had been established through making, Lodoli explained, the Greeks corrupted this wooden architecture by its translation into an architecture of stone. Lodoli did not fault the Greeks for using a more durable material; rather their mistake was in using the same form for a completely different material. Lodoli claimed that the Greeks were not able to reason well. He compared their buildings to a woman with three eyes and a man with two noses.[11]

Lodoli then looked specifically at the errors found in elements of the orders: the modillions, triglyphs, and dentils. These are the square-cut elements in the cornice of the orders that are representative of the ends of wooden beams and rafters, which would bear the weight of a floor or roof. After a series of comments regarding the placement of each in wood, Lodoli railed against the error in the representation of wooden rafters by the modillions at the corner of a building. A telling example of this particular flaw is at the Palazzo Barbaro in Maser by Palladio. [See Figure Three] Both systems of construction are demonstrated, one truthfully, the other less so. The stone construction indicates the rafters that are only truly present within the construction of the wooden roof. Palladio chamfered the ends of the dark wooden beams thereby reducing their visibility. It is interesting to notice that the wooden diagonal beam, essential to the roof construction, is not indicated in the stone representation.

Figure Three:
Villa Barbaro in Maser. Photo by author.

Lodoli's critique focused on the Ancient Greeks but was also directed to those Moderns who followed blindly in their footsteps. Both Memmo and Lodoli agreed that whatever Palladio did had been done without malice. Nevertheless, we should not shy away from recognizing mistakes

and at least have the fortitude to not copy them. It should be remembered that Venetian builders in the Eighteenth century did not have to look far to see the Palladian buildings, which were read as precedents for the more sober architecture of the mid-eighteenth century. Indeed, many such buildings were often imitated without the theoretical underpinning of Palladio's writings.[12]

To construct architecture solely based on the orders is not only to base it on a false premise: it is also quite limiting. Lodoli explained further in the "Story of a Little Spanish Island."[13] Lodoli remembered the Island well. He could recall the most pleasingly sweet and majestic sound of the native inhabitant's language. The foreigners who landed on the island were very excited to learn the new language quickly. They began with the alphabet but were only able to understand the meaning and pronunciation of the first three letters. They then left the island with the knowledge of only these letters and were not able to advance the language any further. Lodoli then explained that those who content with the little that they knew, by force of their industry and competition, could produce the language consisting only of words similar to these: *cabà, becà, cacabà, babac, becab.* Lodoli related this limitation in letters directly to the limited language of the orders and felt that the meaning of architecture need not rely upon such nonsensical constraints.

Lodoli was not the first to propose a break with the authority of the orders. Frémin and Cordemoy, at least, had attempted a break as well. Cordemoy was less radical than Frémin—or maybe just less sudden—but his treatise was more influential.[14] Though possibly similar in intention, Lodoli's critique differs greatly from his French counterparts. The critique here is three-fold. The orders are not truthful because they do not demonstrate the nature of the materials of which they are made: if a beam is made of stone and supported correctly, it should not crack. Secondly, the orders do not truthfully represent the means of construction that they demonstrate: the orders are a stone architecture derived from an architecture of wood. And, lastly, that the use of the orders is, quite simply, limiting.

Beauty and Use

Lodoli's critique is based on knowledge of materials and is understood through an awareness of making. Such knowledge, however, does not guarantee beauty. According to Lodoli, beauty may be found through use. Lodoli exemplified this understanding of beauty-through-use in the construction of his own chair. Rather than building a chair in the manner of the Ancients or in a more popular style of the day, Lodoli formed the back of his chair to fit his shoulders. His buttocks formed the seat. This way of making was named by Lodoli as "organica." Memmo believed the use of the word was original to Lodoli and that it related to all types of making. Lodoli observed that artisans who repaired and constructed things in wood (*facocchi*) approached making in this very way. He claimed that their work revealed a near perfect combination of solidity and apparent lightness, of commodity and of ornament. Lodoli described other examples of beauty understood through use: a cannon and various musical instruments. In each, the "beauty," or value is not found solely in the fabrication or representational techniques, or even visual criteria, but in the use and performance of the piece. Lodoli reserved special attention for the gondola.

The gondola is just one of the many boats that have been adapted to the specific conditions of the Venetian lagoon. Their wide flat hull allows the craft to move through relatively shallow water and still remain relatively stable. Perhaps the most odd characteristic is that gondola is not symmetrical in plan. If one were to push the gondola in the water from the back, *sans gondoliere*, it would arc to the left. Not only is it asymmetrical in plan, but in section as well. The rear of the gondola is elevated much higher out of the water. This section counteracts the weight of the *gondoliere* when he is perched at the back, rowing the craft. The asymmetry of the boat allows the rower to row from only one side, thus making the very large craft more easily maneuverable. In effect, the boat only "works" while it is being used. Many details of construction elaborate on Lodoli's approach to architecture and I will now, briefly, look to one piece: the *fòrcola.*

Le Fòrcole

Fòrcole, the wooden or-post found on the side of all Venetian boats, have existed as long as boats have moved throughout the lagoon. [See Figure Four] Just as the form of the boats has evolved, so too has *fòrcole*. Over time, *fòrcole* have become thinner, the curves tighter, and better woods are used. Both the boats and the *fòrcole*, however, have evolved in direct relationship with the conditions of the lagoon and of the expectations of the rowers. There are as many *fòrcole* as there are rowers— though no two are the same, and variations have been developed for each type of boat. The look of a *fòrcola* is, however, unmistakable.

Figure Four
Two variations of the fòrcola da gondola fabricated by the master Saverio Pastor

Common elements include the *morsi* (curved resting point) and the *sgubiàe* (facets that allow for various rowing maneuvers). While the image of a *fòrcola* is unmistakable, no two forms are the same. Each is dependent upon, the type of boat, number of oarsmen, and rowing purpose. Variations include one rower at the back, one in front and one in back, and a team of rowers. Each can occur with one or two oars. The most common is the single rower at the stern with a single oar. Even more specifically, *fòrcole* relate to the height, weight, and technique of the rower. In a sense, each *fòrcola* must be "in tune" with the rower. The curves and facets accommodate all of the various rowing techniques, maneuvers and variations of rowers. As mentioned, the asymmetric form of the gondola keeps the boat straight. So too does the rowing technique. The rower pushes and keeps the oar in the water for guidance. The various curves and facets also allow for up to twelve rowing positions – including stopping, turning, reverse, passing another gondola, and moving at various speeds.

Remèri, the craftsmen who also fabricate oars, have historically made *fòrcole*. The pieces cannot be made out of any other material; they simply wouldn't work. The material is always wood and the preferred wood is walnut – a wood used for its hardness, durability and tight grain. Prior to shaping, the wood is cut into meter long lengths and left to dry for at least three years. A general form is cut from the walnut log, lengthwise to take advantage of the grain, with a band saw. Four forms can typically be taken from each log. A template is then used to find the general form. Once the cut the general form has been made, the wood sits for another year to dry. The rough cut is then worked with hand tools while the form sits in a wooden vice to include small axes, various curved blades and finishing tools. The evolution and adaptation of the form has emerged due to localized conditions and variations amongst rowers, not taste. It is important to note that although idiosyncrasies do exist in the work, the differences were never about personal style of the craftsmen.

Conclusion

The *fòrcola* is not architecture. It is not spatial and it exists as one component within a larger system. That said, I do think the comparison to architecture is a fruitful one. As architects, we search for criteria by which to distinguish why one form is better than another. This may be decided in various ways: cost, efficiency, performance, use, aesthetics, taste, whimsy, intuition, influence, reference, etc. Architects, more recently, have found formal inspiration (and often rationale) from various fields including at least: biology, botany, philosophy, rendering and representational techniques, computational processes, and even pasta.

Certainly, recent developments in representation and fabrication techniques allow for a wide variety of form and if we look around, it seems that variety, innovation, and novelty is praised. Such innovation is aided by modeling techniques that can produce an array of iterations very quickly and with (seemingly) little effort. Within this forced evolution, however, one still must decide which $60,000 coffee set to fabricate (and purchase?!) or which multi-million dollar development tower should be built. In essence, which variation amongst the many is best?

Lodoli's critique of the Orders, and the example given of the *fòrcole*, offers a set of criteria. That the nature of materials and an understanding of fabrication relate directly to form. A building is simply different when made out of wood, concrete or ricotta. Such decisions should not simply be a change in surface rendering. Fabrication or rendering technique, however, is not enough. Judgment is still required and one such criterion for meaningful architecture is found through use. This is based in performance and not on imitation. Though, fashionable, it would is pointless to mimic the form of a *fòrcola* in a tower, as others have replicated flowers, seashells. Though the forms may seem "natural," "organic," or even just funky, each *fòrcola* responds to a specific set of conditions within the performance of a boat. If we follow this example, the role of the architect (and, by extension, the student) is to determine the conditions by which a building may perform followed by various iterations that may respond to the reception of the work. This, as demonstrated with the example of the *fòrcola*, may not be only one design, but rather can be seen as variations on a theme adapting to conditions.

Figure Five
A "skyline" of fòrcole

[1] Andrea Memmo, *Elementi d'architettura Lodoliana: Ossia l'arte del fabbricare con solidità scientifica e con eleganza non capricciosa libri due*, 2 vols. (Zara: Coi Tipi dei Fratelli Battara, 1834). An earlier edition was published by Memmo in 1786 and contained only one volume. The only difference between volume one in the first and second editions is a series of typographical errors.

[2] Andrea Memmo, *Apologhi immaginati, e sol estemporaneamente in voce esposti agli amici suoi . . . l'eccellentissimo signor Andrea Memmo cavaliere della stola d'oro* (Bassano: [s.n.], 1787). For a complete translation of the apologues contained in the *Apologhi immaginati* and the *Elementi,* see Marc J. Neveu, "Architectural Lessons of Carlo Lodoli" (PhD diss., McGill University, 2006), 237–358.

[3] The word *indole* was in use, but not widespread in the eighteenth century. The *Vocabolario degli Accademici della Crusca* (Venice: Giovanni Alberti, 1612), s.v. "indole," defines *indole* as "Naturale disposizione, e inclinazione allo'mparare, e dicesi de faniculli." Although Lodoli's use of *indole* with respect to pedagogy may be unique, he was not the first architect to use the term. In a retelling of Aesop's fables, *Centum Apologi* (1437), Leon Battista Alberti referred to the nature of animals as *indole.* The original version of the *Centum Apologi* was written in Latin and composed over nine days in December 1437. An Italian version appeared in 1568 in an anthology by Cosimo Bartoli. See Paola Testa Massetani, "Richerche sugli'Apologhi' di Leon Battista Alberti,"*Rinascimento* 12 (1972): 79-134, and Cesarini Lucia Martinelli, "Philodoxeos Fabula, Edizione critica," *Rinascimento* 17 (1977): 144-147., and *Renaissance Fables,* trans. David Marsh (Tempe: Arizona Center for Medieval & Renaissance Studies, 2004).

[4] *Galileo Galilei's Two New Sciences,* Trans. by H. Crew and Alfonso de Salvio (New York: Dover, 1952): 126.

[5] *Galileo Galilei's Two New Sciences,* Trans. by H. Crew and Alfonso de Salvio (New York: Dover, 1952): 131.

[6] "Lustrissime siore colonne cosa feu qua? No lo savemo in verità." *Elementi* I: 125.

[7] Ironically, or perhaps amazingly, the cracks also appear in the same location on the clock tower at the Venetian Hotel in Las Vegas.

[8] "Che la funzione della materia tutta atta a compor fabbriche, è quella moliplicata e modificata azione che risulta della stessa materia, qualor venga essa impiegata dimonstrativa-mente, secondo la propria indole ed il proposto fine, e fa sempre essere concordi tra esse solidità, l'analogia ed il comodo." *Elementi* II: 60.

[9] Berardo Galiani, *L'Architettura di M. Vitruvio Pollione colla traduzione Italiana e Comento del Marchese Berardo Galiani* (Naples, 1758): 136. The full quote continues to discus proper meaning and true nature: "Omnia enim certa proprietate et a veris naturæ [*indole*] deductis moribus traduxerunt, quorum explicaciones in disputationibus rationem possunt habere veritatis." See also *Elementi* II: 121.

[10] See *Elementi* II:13-16. For other references to the motto, see Milizia, *Memorie degli architetti antiche e moderni* (Venice: Remmondi, 1784): 14, "Quant è in rappresentazione deve essere in funzione." Memmo also referenced Algarotti's contribution from the *Saggio Sopra l'Architettura* (1756): 10, "Niuna cosa, egli insiste, metter s dee in rappresentazione, che non sia anche veramente in funzione."

[11] "Non potevano i Greci ragionare più giusto. Se fosse rappresentato quello che in verità, o nel probabile ed usato non potesse stare, come per esempio una donna con tre occhi, od un uomo con due nasi, sarrebbe questo senza dubbio contro la buona ragione." *Elementi* I: 331.

[12] It was not unusual for well-known architects to be poorly educated at best. Tomaso Temmanza described Domenico Rossi as almost illiterate. Andrea Tirali could hardly write. Both architects established a visual tradition based on work by Palladio. See, for example, *Ca'Corner della Regina* by Rossi and *S Nicolò da Tolentino* by Tirali. See Elena Bassi, *Architettura del sei e settecento a Venezia* (Napoli: G. D'Agostono, 1962) for other examples.

[13] *Elementi:* II: 126.

[14] See R. M. Middleton, "The Abbe De Cordemoy and the Graeco-Gothic Ideal: A Prelude to Romantic Classicism." *Journal of the Warburg and Courtauld Institutes.* Vol. 25, No. 3/4 (Jul.-Dec., 1962): 280-82. M. Petrocchi in *Razionalismo Architettonico e Razionalismo Storiografico* (Rome, 1947): 12, uncritically referenced Cordemoy's influence on Lodoli.