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Circle, Triangle, and Square: Trinity of Geometry in the Architecture of Aldo Rossi

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Abstract. This paper is to reveal geometric development of the architectures of Aldo Rossi in 1960–70 through relationships between Rossi and *The Circle, Triangle, and Square*, the picture of Zen, drawn by the Japanese artist Sengai-Gibon. First, we analyze Rossi's works in the 1960s by extracting the three geometries. Then, we show that Rossi applied his impression of Sengai to design for important works such as *Modena Cemetery* and *Teatro del Monde*. Finally, the paper elucidates the trinity of geometry inherited from Sengai.

Key Words: circle, triangle, square, geometry, architecture, Aldo Rossi

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1. Introduction

This study focuses on geometric characters of architectures designed by Aldo Rossi (1931–1997). Rossi was one of the most famous Italian architects in the 20th century. His architectural works are characterized by geometric simplicity such as triangle fountain, thick column, and square windows [3, 4, 5, 8, 17]. Many of former studies on Rossi focused on his design and political ideologies [1, 2, 6, 7]. However, as far as the author knows, none dealt with his religious interest in Japan.

Through a diachronic analysis of his works in the sixties and seventies of the last century, the study revealt what Rossi changed in his geometric composition after his meeting with *The Circle, Triangle, and Square (The Universe)*, drawn by Sengai-Gibon (1750–1837), the Zen painter in the Edo period. Indeed, Rossi was impressed by *The Circle, Triangle, and Square* of Sengai, so that he even reproduced it (Figure 1).

First, in Section 2, we analyse Rossi's early works in the sixties in terms of three geometries. In Section 3, through Rossi's impression of *The Circle, Triangle, and Square* in 1971, we reveal that this drawing influenced Rossi in terms of geometry in his works. In Section 4, the geometric influence from Sengai is discussed at the designs of *Modena Cemetery* (1971) and *Teatro del Monde* (1979). The documents written by Rossi are translated by from Italian to English unless there is extraordinary explanation.

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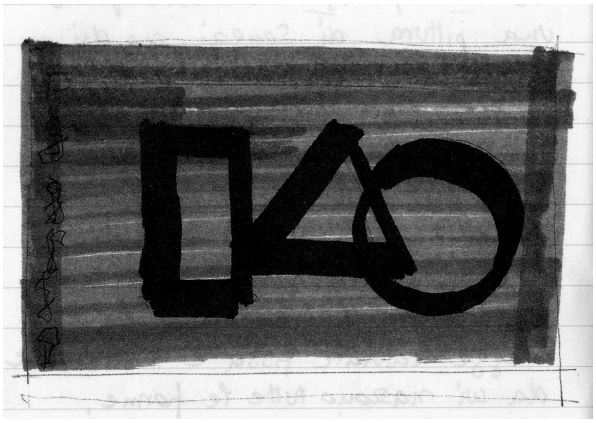


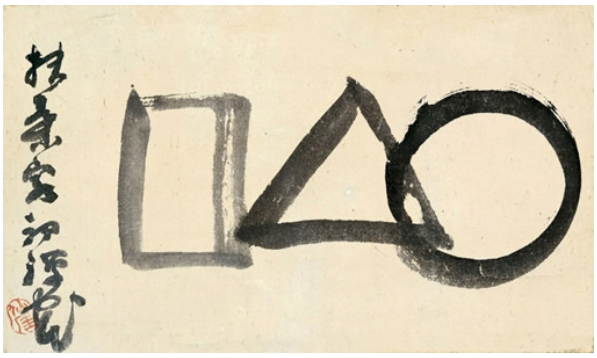


Figure 1: Left: reproduction of *The Circle, Triangle, and Square*, drawn by Aldo Rossi [11]; Right: Sengai-Gibon, *The Circle, Triangle, and Square (The Universe)* [18]

2. Geometric analysis in the 1960s

2.1. Geometric components

Ezio Bonfanti, who was the student of Rossi, analyzed Rossi's earliest works chronologically and associated them with *Cittá analoga* [3]. Since Rossi started his career as architect from 1960, his works had been characterized in regard of simple geometries from his earliest time [17].

For example, the *Fountain in Segrate* (Figure 2, left) is characterized by an extruded triangle beam, which represented the geometry of a triangle "△" in the façade. Furthermore, the fountain included a generous cylindrical support that represented "○" in the plan. Finally, the rectangular hollow behind and the pedestal of the column represented "□" in both in façade and plan. In this regards, the *Fountain in Segrate* included the three geometries of "○", "△", and "□" but "○" and "△" are not in the same plan.

For another example, in *Gallaratese Housing*, square windows were composed repeatedly as two lines of 1st and 2nd floor that represented "□" (Figure 2, right). *Gallaratese Housing* included white huge columns that represented "○" in its corridor. However it excluded components of "△" in the whole building. For that, this housing included two geometries, "□" and "○".

Figure 2: Left: Rossi, *Fountain in Segrate*; Right: Rossi, the *Gallaratese Housing;* both photos shot by the author

2.2. Geometry from 1960 to 1969

Table 1 shows the geometries extracted from the outline in façade or plan of his works from 1960 until 1969.

Table 1: Rossi's Works in the 1960s

Year	*Name*	○	△	□
1960	**Villa in Ronchi**	–	–	✓
1961	Skyscraper in Buenos Aires	✓	–	✓
1961	Worker's housing in Caleppio	–	–	✓
1962	Monument in Cuneo	–	–	✓
1962	Monumental Fountain in Milan	–	–	✓
1962	**Exposition in Museum of Cotemporary History**	–	–	✓
1962	Special School in Monza	–	–	✓
1962	Country Club in Fagagna	✓	–	✓
1962	Centro Direzionale di Torino	✓	–	–
1963	**Bridge in Triennale** (not existed)	–	✓	✓
1964	Ticino River Sport and Leisure Center in Abbiategrasso	✓	–	✓
1964	Pilotta Square and Paganini Theater in Parma	✓	✓	✓
1965	**Fountain in Segrate**	✓	✓	✓
1966	Residence in San Rocco	–	–	✓
1967	Piazza in Sannazaro de'Burgodi	✓	✓	✓
1968	City hall in Scandicci	✓	✓	✓
1968	Junior High School in Trisete	✓	–	✓
1969	**Gallaratese Housing**	✓	–	✓
1969	**Elementary School in Broni**	✓	✓	✓

To analyze the geometries of outlines of his architecture, three elementary geometries were extracted according to three rules below:

1) "○" means columns, sphere or hemisphere;

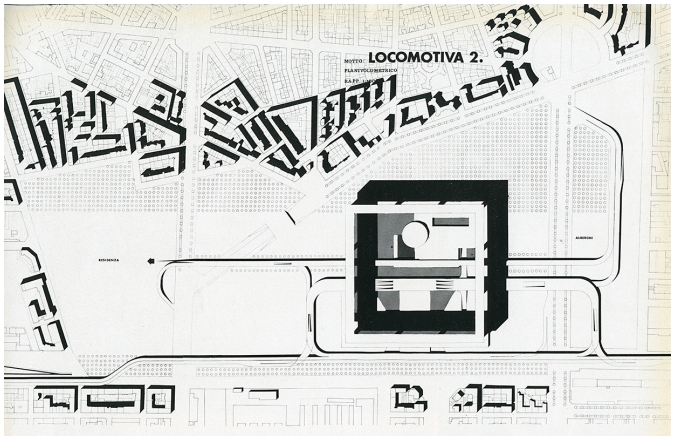
2) "△" means the extruded triangle frame in the façade;

3) "□" means a cube volume or square window in the façade.

In Table 1, according to Aldo Rossi's *Buildings and Project* [16], the "Year" is pinned at the start of the constructions. A bolded name means that the project has been realized.

About "○", the columns were used from the *Skyscraper in Buenos Aires* on (1961). Rossi repeated the columns from the *Ticino River Sport and Leisure Center in Abbiategrasso* (1964) to the entrance of the *Elementary School in Broni* (1969). Especially, the three projects *Country Club in Fagagna* (1962), *Centro Direzionale di Torino* (1962, Figure 3, left) and *City Hall in Scandicci* (1968, Figure 3, right), he applied not only columns but also a large hemisphere.

About "△" at the *Bridge in Triennale* (1963) , Rossi first applied the extruded triangle with columns. In the *Elementary School in Broni* (1969–70), he separated "△" and "○" , for



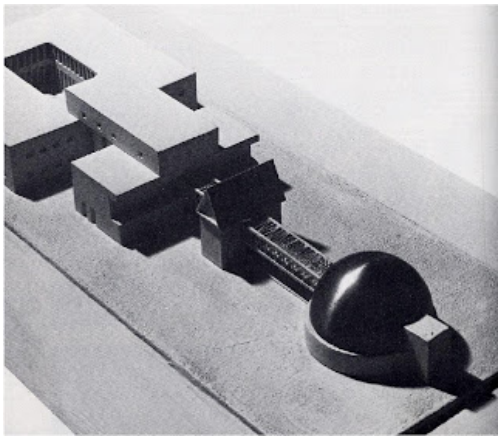


Figure 3: Left: *Centro Direzionale di Torino*; Right: Rossi, *City Hall in Scandicci*, both shown in [16]

he applied columns in the entrance and set an extruded triangle in the courtyard without a round component (Figure 4).

About "□", all of his work in the 1960s included a cube volume or square window in the façade. In Rossi's works in 1960–1969, the components of "△" and "○" were complementary to each other, except the *City Hall in Scandicci*. Even in the project for Scandicci, the perfect circle and the triangle were not coplanar. Therefore it showed that Rossi had separated the two geometries of "△" and "○" on each façade in his architecture in the 1960s.

3. Learning from Sengai

3.1. Reproduction of *The Circle, Triangle, and Square*

According to *I quaderni azzuri* [The Blue Botebook], the facsimiles of Rossi's diaries, Rossi read the article of Le Monde on *The Circle, Triangle, and Square* on March 19, 1971 [11]. He associated *The Circle, Triangle, and Square* of Sengai with the *Elementary School in Broni* (Figure 4, left).

The school seems to be built or under construction in 1971 with a triangular fountain and a rectangular window on the wall in the courtyard and with columns of the entrance added by Rossi, which means components of circle, triangle, and square. He noted the whole article as following:

> Le Monde, 19 March 1971, cited a painting of Sengai (1750–1835), one of Japanese great artists of Zen who 'represents the three fundamental geometries of the universe' (translated from the original text in French). The circle represents the infinity and infinity is the base of all the beings which any form possesses. The triangle is the fixed and unalterable natural law from which all forms are born. The square is the first form it generates. A square is a doubled triangle. This duplication process goes on endlessly and we have the multiplicity of things including human beings [*"Le Monde, -19 marzo 1971. riporta una pittura di Sengai, uno dei grandi artisti giapponesi dello zen (1750–1835) che 'represente les trois forms fondamentales les de l'univers'. Il cerchio reppresenta l'infinito e l'infinito è la base di tutti gli esseri qualunque forma possiedano. Il triangolo è la legge natural fissa e inalternabile da cui nascono tutte le forme. Il quadrato è la prima*

> *forma che esso genera. Un quadrato è un triangolo raddoppato. Questo processo di duplicazione prosegue all'infinito e abbiamo la molteplizità delle cose compreso l'uomo"*] [11].

Moreover, he reproduced not only the text but also the picture of SENGAI. ROSSI sketched *The Circle, Triangle, and Square* on his notebook. ROSSI sketched SENGAI's work with black thick lines of the marker pen in the same composition of a circle, a triangle and a rectangle (Figure 4, right). He also tried to reproduce kanjis on the left with fine lines and painted the whole with a light black marker, so that he had been strongly impressed by this image. In other words, this reproduction reveals that he was eager to learn from SENGAI's composition of geometry.

3.2. Studies for the *Pompidou Centre*

Around 1971, famous architects like PIANO and ROGERS, Kisho KUROKAWA, and Carlo AYMONINO (the co-worker of ROSSI in the Gallaratese project), ROSSI took part in the competition for the *Pompidou Centre*. Also he wanted to participate at this time. On the page next to the sketch of SENGAI in [16], there were studies and notes about the designs for the *Pompidou Centre* [Plateau Beaubourg] (Figure 4, right). These studies showed that ROSSI tried to apply SENGAI's composition of the three geometries to his architecture. About the center sketch in the notebook, he noted;

> There is a problem of bonds and attachments-bonding by means of a single axial element [*"Questione dei legami e degli stacchi-legame mediante un elemento unico assiale "*] [11] (Figure 4, right).
>
> This progressed idea can be related to the project of Scandicci; but the more obvious the idea should be, the more it can create architecture [*"l'idea della progressione può essere riportata al progetto di Scandicci; ma più essa è cosciente più può creare architettura"*] [11] (Figure 4, right).

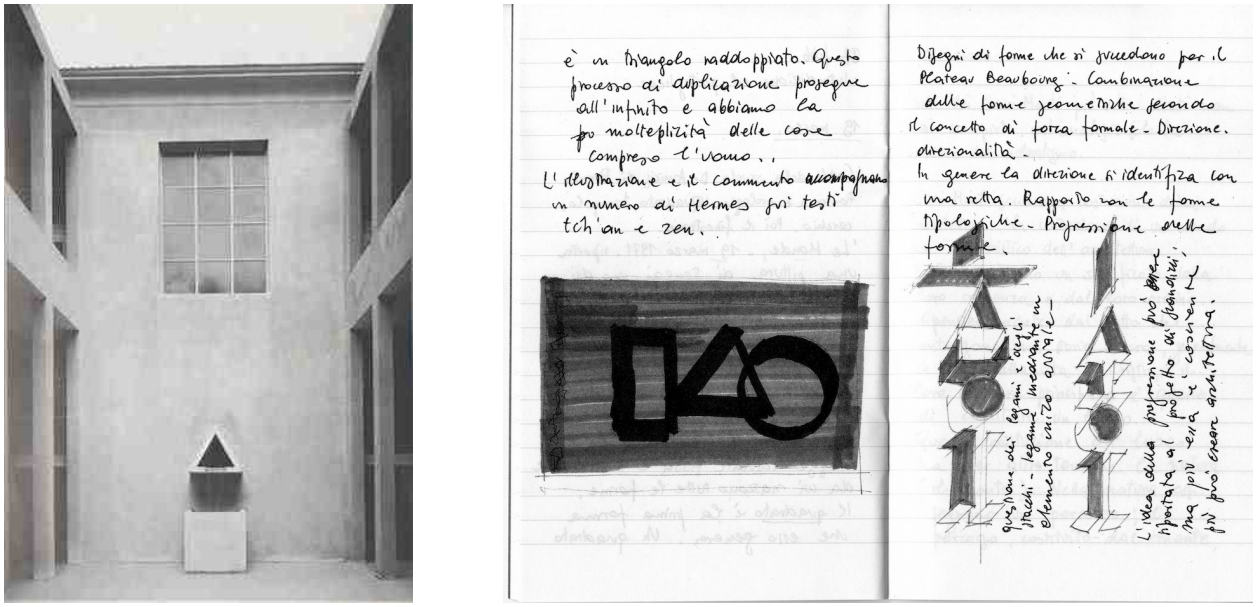


Figure 4: Left: ROSSI, The courtyard of the *Elementary School in Broni* [11]; Right: Page from ROSSI's diary [16]

The second study resembled the project for Scandicci (Figure 3) in terms of "○" and "△" by the bridge, but all three are coplanar. Seeing these, ROSSI developed the composition for the *Pompidou Centre* according to SENGAI. He treated "△" and "○" complementary in plan and façade in the 1960s, but *The Circle, Triangle, and Square* urged him to treat all of three geometries coplanar in the plan.

4. Geometric influence to architectural design

4.1. From *Pompidou Centre* to *Modena Cemetery*

When a car accident happened to ROSSI in Yugoslavia in April 1971, he cancelled his participation at the competition for the *Pompidou Centre*. After this accident, the primary idea of the *Modena Cemetery* appeared [10]. The announcement of the competition for the *Modena Cemetery* was on May 6, 1971, and the deadline of the competition was November 2, 1971.

According to LOPES, *Modena Cemetery*, the masterpiece of ROSSI, has something to do with the project for the *Pompidou Centre* [6]. After quitting the competition for the *Pompidou Centre*, ROSSI designed the *Modena Cemetery* and, in the next year, he was elected as architect for the cemetery on August 2, 1972.

Not only chronologically but also geometrically, the studies for the *Pompidou Centre* had something to do with the *Modena Cemetery*. In the studies for the cemetery (Figure 5), ROSSI treated the comb-shaped ossuaries as a triangle line and linearly aligned a circle, a triangle, and a square. They show that he was occupied in aligning three geometries, the same as the studies of three geometries for the *Pompidou Centre* (Figure 4). Therefore, the design for the *Pompidou Centre* was succeeded by *Modena Cemetery* in terms of linear composition of three geometries.

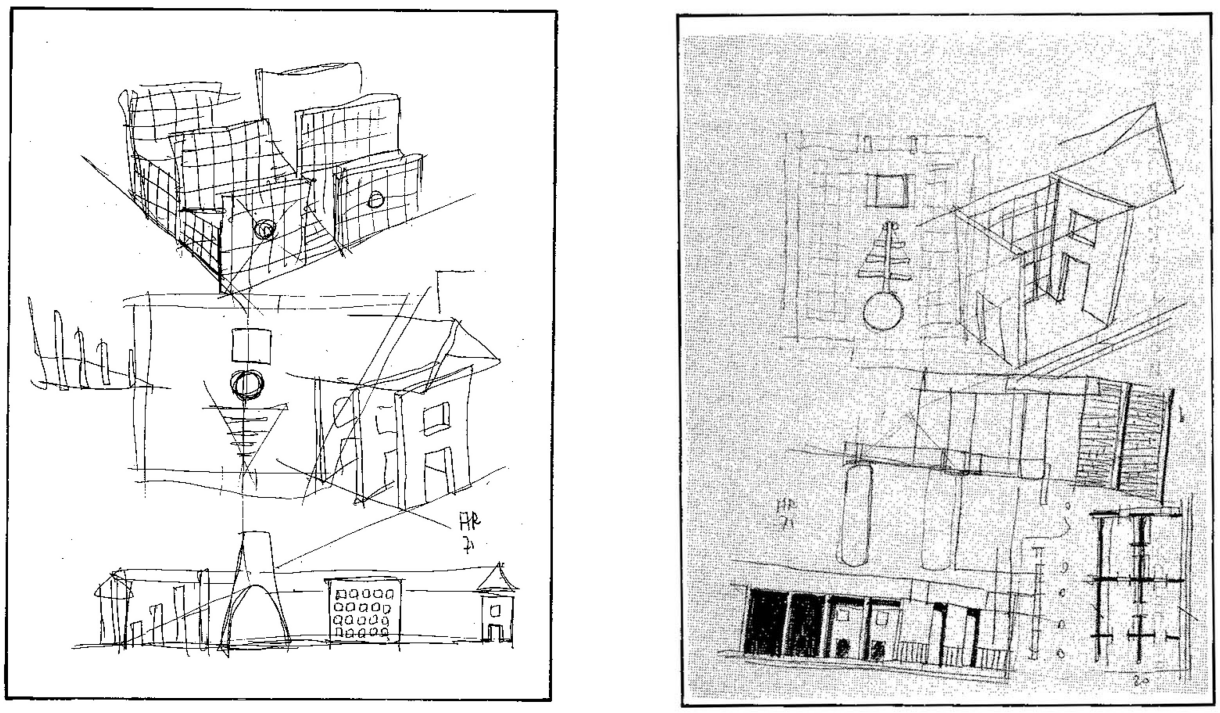


Figure 5: ROSSI, study for the *Modena Cemetery* (1971) shown in [15]

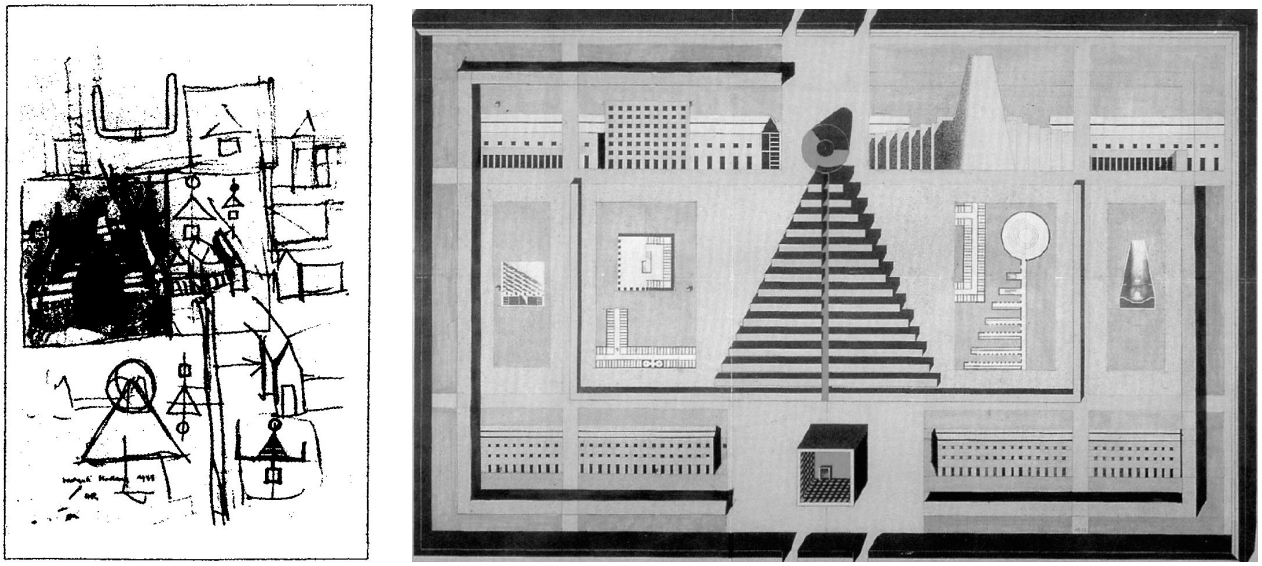


Figure 6: Left: ROSSI, Study for the *Modena Cemetery* (1971) [15]; Right: Final plan of *Modena Cemetery* (1971) [16]

4.2. ○ △ □ at the *Modena Cemetery*

In his notebook, he came up with the final plan of composition on August 5, 1971 [12]. He decided to put a triangle-shaped plan like combs of the ossuaries in the center . This final plan also followed a linear composition of three geometries. There were a circle-shaped plan of the conical building on the top, and a square-shaped plan of the cube sanctuary on the bottom. The coplanar order of three geometries followed the order of *The Circle, Triangle, and Square*. Therefore the *Modena Cemetery* had a coplanar order of three geometries " ○ △ □", the same as that of SENGAI. In this regards, whether he was conscious or unconscious, ROSSI struggled to apply the three geometries learnt from SENGAI .

Also, in the 1970s, there is another important masterpiece that made ROSSI world-widely famous. *Teatro del Monde* (1979, Figure 7), was the floating theater for the Venice Biennale.

Interestingly, the theater had an order of three geometries, the same as that of the *Modena Cemetery* (Figure 6). In the façade of *Teatro del Monde*, there was a sphere on the almost regular triangle of roof above square windows (Figure 7, right). Not in a coplanar plan but in a coplanar façade view, it has the same order of the three geometries " ○ △ □".

5. Conclusion

In summary, ROSSI clearly changed his composition in his works at 1971, when he met SENGAI. Before ROSSI saw *The Circle, Triangle, and Square*, he used three geometries, but the two geometries of "△" and " ○" were complementary to each other in his works in 1960. After he read about the painting in 1971, he tried to learn the idea and composition from SENGAI and came up with the design for the *Pompidou Centre* (1971). This design was finally succeeded by the *Modena Cemetery* (1971) in a linear composition of three geometries in the order following as *The Circle, Triangle, and Square*. Moreover, the same order was applied to the façade of *Teatro del Monde* (1979). In conclusion, especially *Modena Cemetery* and even *Teatro del Monde*, both have been acknowledged as masterpieces of Aldo ROSSI, followed the order of " ○ △ □", which means "trinity of geometry". This study alluded to shed another light on

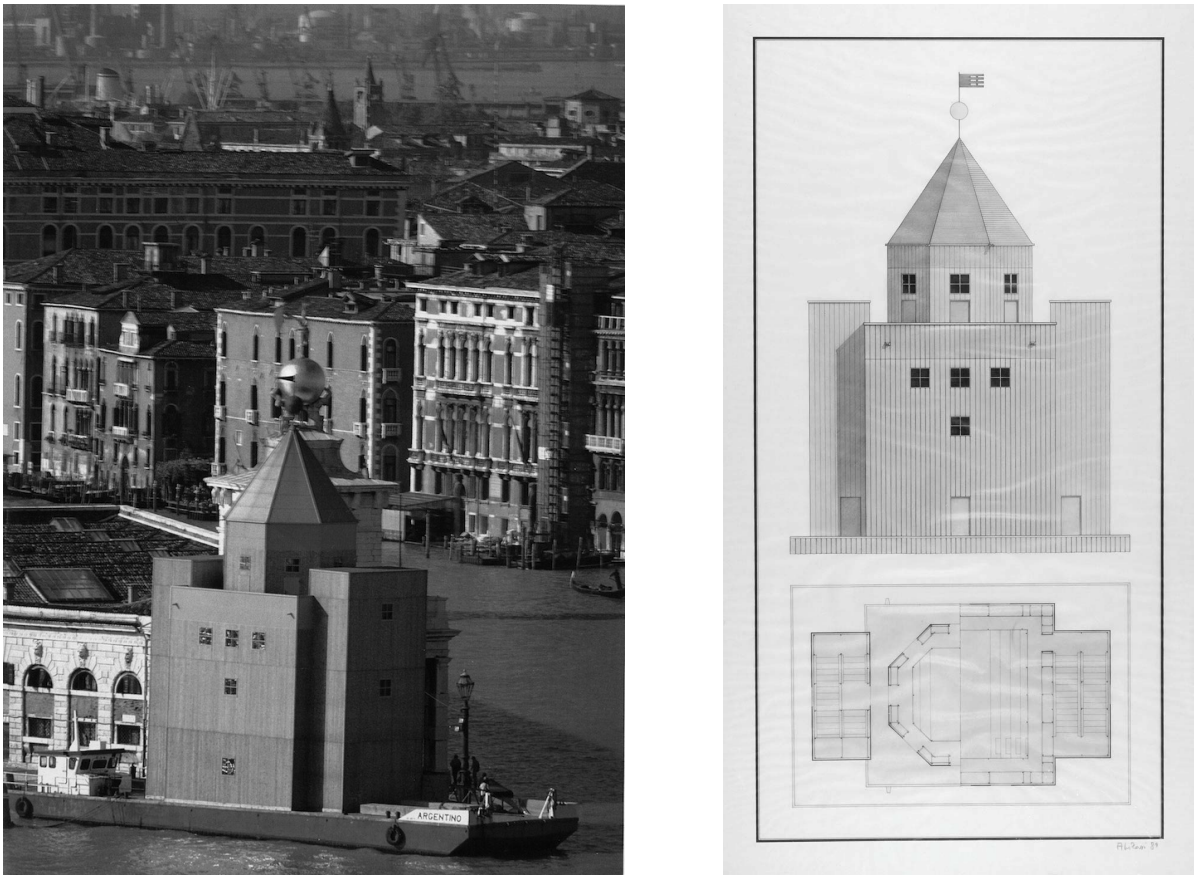


Figure 7: Rossi, *Teatro del Monde*, as shown in [16]

an interesting connection between Italian architectural movement and Japan. *Tendenza*, an architectural movement led by Rossi, was organized at the Milan Triennale in 1973, just two years after Rossi inherited geometry from Sengai in 1971. Therefore it showed to reveal the architectural theory of the movement *Tendenza* in terms of geometry.

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