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Paolo Soleri and Arcology:

An Analytical Comparison to Frank Lloyd Wright and Louis Kahn

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ABSTRACT

The city proposals of Paolo Soleri, he called them arcologies, are monumental and complex geometric megastructures intended to project great heights above desert horizons. These proposals purposefully abandon conventional notions of the city.

Soleri was physically isolated in his remote Arizona urban laboratory, Arcosanti, and philosophically detached from the professional urban design community. His proposals were often too easily understood as foreign and radical dystopian architectural metaphors meant to provoke thought more than to project an actual future. There is limited discourse on Soleri and this tends to isolate him in a vacuum, ignoring possible connections or parallels in his work and that of his contemporaries or predecessors. Contextualizing Soleri in history and with other more prominent architects makes his work more accessible, allowing for a more complete evaluation of the merits of compact three-dimensional cities of great density. With the ecological future of the planet in a state of crisis due to rapid climate change and explosive population growth in developing countries, there is an imperative to explore possible urban living solutions that in the past may have been deemed "too radical".

Two preeminent architects are needed to understand Paolo Soleri. Frank Lloyd Wright and Louis Kahn. Wright served as a mentor that Soleri could react strongly against conceptually. Kahn was a peer whose heralded built work has strong similarities to the limited architectural oeuvre

of Soleri. Therefore, Kahn's work provides one the best simulations of the potential architectural qualities of arcologies.

There is a contemporary imperative to explore ideas about where and how people live. Many developing parts of the world are experiencing booming population growth. It is reasonable to ask where will all these people live? Where will they work? What will they eat? Will they have access to fresh and clean water? Will this new growth only continue to negatively contribute to climate change? Cities are extremely connected to the future of the planet. But what should they look like? What models of urban life might make the most sense looking towards the future? Looking at the recent past is important to recognize starting points for design of the future.

During the second half of the twentieth century Paolo Soleri began producing models for future cities. His work was largely ignored or misunderstood at the time, but was responding to similar factors that are faced by the architecture community still today. A clearer picture is necessary in order to begin to make any sort of value judgement on his work. Understanding Soleri's personal history, along with comparison to his mentors and peers will help explain his work and its motives. This broadening of the understanding of Paolo Soleri will be beneficial for future research and design related to arcology.

1. PAOLO SOLERI + ARCOLOGY

Paolo Soleri studied architecture at the Polytechnic University of Turin. Shortly after graduating in 1946, Soleri became fascinated with the work of Frank Lloyd Wright and was invited to live and work at

Taliesen West. Soleri was a junior intern his entire time at Taliesen West, only asked to complete tasks such as gardening, meal preparation, and some construction. However, Soleri contributed a conceptual sketch for a bridge to a collection by a colleague that would become a book. This collection was ultimately featured in an exhibition at the Museum of Modern Art bringing Soleri some notoriety (Mock, 49). Soleri was eventually asked to leave due to personality conflicts with Mr. and Mrs. Wright. Soleri went back to Italy and found some professional work due in large part to recognition from the bridge design. Most notably he was commissioned to design a ceramics factory for the Solimene family in Vietri sul Mare. Shortly after its completion Soleri moved back permanently to the American Southwest (Soleri & Strohmeier, 2001).

In the late nineteen-fifties Soleri was focused primarily on handcraft. He was casting bells, ceramic and bronze. Soleri experimented with his method of earth-casting and modified it for similar use with concrete. In Scottsdale, Arizona, Soleri began expanding his home and studio using these techniques creating Cosanti, a village within the city limits dedicated to arts and craft. In his spare time, Soleri began thinking and sketching about an idea much larger than bells, the city. His first action in the design of the city was the selection of the site, the mesa. Elevated and distinct from its surroundings, the mesa is a site not unlike the hill towns of Orvieto or Civita di Bagnoregio in his home country. Soleri believed that any fertile land should be reserved for agricultural use, and that barren land was ideal for the site of a city. The mesa would then provide a beautiful open view of the unsullied agricultural landscape below (Soleri & Strohmeier, 2001).

Soleri's concept of arcology took shape after his critical response to his own work in the Mesa City project. Soleri appreciated what he described as a coherence due to the sharp distinction between the built and natural environment (Soleri, 1971). However, he recognized a lack of efficiency due to the footprint of the mesa. When drawing and modeling circulation for the city, Soleri noticed a need for an extensive road system to connect disparate parts of the city. Soleri had created in his mind a version of Broadacre City, albeit limited in its ability to infinitely sprawl due to the cliffs of the mesa. Soleri saw this modifier to Wright's influential model as an improvement but believed it was still fundamentally flawed (Soleri & Strohmeier, 2001). Soleri's subsequent thirty city prototypes collected and published in *Arcology: City in the Image of Man* would maintain Mesa City's relationship to the landscape, but would transform the city from a set of parts into a unified form of immense scale and density (Soleri, 1969).

The thirtieth arcology prototype, Arcosanti, is the only built city, although it will likely never be fully realized. In its current state, it is merely a fragment of the proposal, with less than one hundred full-time residents. Arcosanti may be merely a village of concrete structures, lacking the monumental and unified form of the full proposal. It is not complete enough to draw conclusions about the efficacy of megastructural cities and their organizational patterns or their forms. The masterplan of Arcosanti has been redesigned multiple times, with each subsequent edition of the arcology more modest and feasible. However, Arcosanti does offer glimpses into the potential

architectural reality of desert arcologies not offered in Soleri's drawings and models (Soleri, 1984).

Soleri did not limit himself to the design of cities and bells, over the course of his life he developed his "Eschatological Hypothesis". This hypothesis described a system of evolution that would lead toward a final state of grace and self-revelation known as the "Omega Seed". This evolution is desirable and achieved through his "Miniaturization-Complexification-Duration" triad. Soleri's opinion was that organisms evolved to be efficient, therefore would benefit from physical miniaturization, internal complexification, and a collective complete memory of the past, known as duration. Soleri believed this evolutionary process should apply to cities as well, with arcology being what he considered a necessary proposal of which there should be many (Soleri, 2001, 2003).

Soleri's philosophical theories coupled with the paradigm-shifting earned him the label of Radical. The city proposals of Soleri were relatively disregarded by the architecture community. His work was regarded as a radical provocation. Soleri was described as an avant-garde architect and as an artist. Arcosanti did not grow in population enough to become more than a village and so interest in arcologies has largely been diminished. Paolo Soleri's cities were ultimately dismissed. In 1970 Ada Louis Huxtable wrote, "He has been the prophet in the desert and we have not been listening". But she also declared, "the professional dismisses them as non-architecture" (Huxtable, 1970).

How can the work of Paolo Soleri be understood without context? He exists as an isolated enigma in architectural history. Comparison is a powerful tool of understanding, and Soleri has been under-compared. Who are the appropriate figures and groups to relate or juxtapose him with?

Charles Jencks's 2000 version of his Evolutionary Tree of Architecture is an arbitrary, yet interesting, starting point for finding context for Soleri. Jencks' and others attempts to map and categorize so many architects over time is inherently a problematic and difficult task. For example, Frank Lloyd Wright and Le Corbusier are included in several portions of the graphic to account for their long careers which included their own specific architectural evolutions. Despite its shortcomings, this graphic does offer one view from a mainstream source on how Soleri is related historically and stylistically to the larger architectural community of the last century.

Jencks places Soleri in a small misshapen bubble labeled "organic" with Frank Lloyd Wright, Bruno Zevi, and Ronchamp Chapel by Le Corbusier. The graphic implies that this group could be described as "intuitive" and "activist". Soleri is positioned at the top of this group moving him closer to the "self-conscious" category. The "organic" group exists on the timeline after the Expressionist, Utopian, Futurist, and Art Nouveau movements of the first half of the twentieth century with a gap between these movements due to World War II (Jencks, 2000).

The descriptors "activist" and "intuitive" seem apt. There was a strong activist stance in his work. He advocated for systemic changes to the contemporary automobile-centric cities. He was an early proponent

of sustainable design in response to environment factors. Arcosanti at its peak was a sizable community of people who believed the current way of life was out of sync with nature.

Listing Soleri as intuitive works because his intuition was what was the driving force in his design work. He employed a heuristic design approach, not burdened by any rigorous process, to develop his arcologies. He relied on his common sense, rules of thumb, and his own guiding hand to design cities, and then began building Arcosanti to learn from and respond to its faults with greater clarity in the future (Soleri, 2003). Soleri was inspired by science and technology, but relied only on his insights, experiences, and his hand in his design of arcologies.

Understanding Paolo Soleri and his work is made easier by analyzing his relationship to two seminal figures in architectural and urban design history: Frank Lloyd Wright, and Louis Kahn. The former is somewhat obvious, Soleri studied under Wright, created his own version of Taliesin West only seventy miles north in Arcosanti, and both produced models of the city often described as utopian. Louis Kahn and Paolo Soleri were never colleagues, collaborators, or companions. Despite this, parallels emerge between the two in their work. Soleri is seen as much more radical, but their built and un-built projects share many characteristics such as monumentality, gestalt monolithic forms, and use of a repeated module.

2. PAOLO SOLERI + FRANK LLOYD WRIGHT

Soleri's clearest entry-point to the web of architectural history is Wright. Wright was a mentor figure against whom Soleri could react.

Aspects of his personality and work left an impression on Soleri. The draw of studying under an exciting international architect in Wright brought Soleri from Europe to the American Southwest. Even though the internship was relatively short-lived, Wright left an impression on him. Soleri ended up spending most of his life in Arizona, establishing Arcosanti roughly seventy miles away from Taliesin West. Soleri was very familiar with Wright's work and ideas (Soleri & Strohmeier, 2001).

Wright was a champion of "organic" architecture. The built environment in harmony with the natural world (Wright & Meehan, 1987). Soleri personally resisted the "organic" label in preference for the term "coherent" or "mineral" (Soleri, 2003). Soleri understood Wright's term organic to be dealing with nature in metaphors. This idea of nature and metaphor as a driving force in design work in the built environment was certainly imprinted on Soleri, as it was at the forefront of all his work, at the scale of the city and the building.

One of Soleri's first built projects upon returning to Italy after his time at Taliesin West was the Solimene Ceramics factory in Vietri Sul Mare, Italy (Soleri & Strohmeier, 2001). With this project Soleri is beginning to tackle the ideas of organic architecture at the scale of the building. Soleri uses the metaphor of the tree in the multi-level atrium building. This gets picked up strongest in the structure of the building. Soleri uses large branching structural members to support the skylights and the intermediate surrounding floors of the atrium space. The exterior of the building seems to reflect Soleri's time in Arizona with Wright. The façade is an assemblage of small ceramic tiles and

glass, and from a distance reminds one of the sides of a mesa, in its form and colors.

Arcologies are a sharp reaction to Frank Lloyd Wright's Broadacre City. Wright's model of the city was based on the automobile. To Soleri, Broadacre City was the epitome of his idea of a "better kind of wrongness". Soleri argued that Broadacre City was the perfect model for a city based on a flawed idea: the reliance on the car. The car mandated the spreading out of the city out into nature. This led to more roads, more parking lots, and more individual homes. Wright was able to stylize Broadacre City in a way that rendered these aspects of the proposal as a positive. Soleri saw Broadacre City as incoherent with nature (Soleri & Strohmeier, 2001). Wright's organic city divided nature amongst the individuals. An individual could find unity with nature on their personal lot. When Soleri began to develop arcologies, he was responding to what he saw as the fundamental flaws inherent in Broadacre City.

Wright's Broadacre City is built around the automobile. Personal automobile transportation allowed for people to move out of cities and into the suburbs. Soleri recognized the negative effects the car had on cities when designing the Mesa City Project. Soleri's first city proposal was problematic in his view. Although it looked very little like Broadacre City in terms of style, it took up a lot of area. Soleri realized this city would have to rely on a system of streets and private transportation with an automobile, which he found too inefficient. Soleri advocated for an urban evolution, and evolution is a process of fine tuning and efficiency through miniaturization (Soleri, 2003).

The city proposals of Soleri and Wright are both often described as utopian. The term "utopia" means "no-place". Both architects were attached this label because of their unbuilt urban design proposals. Soleri's work has also somehow earned the label of "dystopian" literally meaning "not good place". Many if not all architects will have unbuilt projects, but this is not the sole criterion for a "utopian" label. Wright and Soleri had a shared ambitious quality with projects that were fundamentally different than prevailing practices and that would require deep systemic changes to human life.

Broadacre City does not strike the twenty-first century mind as utopian because for much of the latter half of the twentieth century it became convention. Wright's de-emphasizing of the city center and the business district in favor of the sprawl of gridded streets and single houses was quite radical (Wright, 1940). His Modern city was focused on the exciting potential of the automobile to inform the design of cities. This was a planned community that was never built but the ideas carried forward and were used as precedents by other architects and city planners.

Soleri was resistant to the term utopian but drew often the label because his work had some common "utopian" characteristics. His work was site-less. His arcologies were often designed with desert climates like Arizona in mind, but no true sites existed. Some were built into fictional canyons or stretched over idealized rivers. Only Arcosanti ever had a physical site and it was not a utopian community in his mind. By the virtue of existing it violates the "no-place" definition. Soleri's

personal eschatological theories did not allow for the existence of any utopia in the present, only at the end of time. He saw his own work as a part of the evolution of cities as well as humankind.

Wright and Soleri did make proposals that represented drastic shifts for the city and its inhabitants, but a better term for to describe their work is forward-thinking. What Soleri developed on his own or through his connection to Wright was a desire to challenge convention and project a future. Neither limited themselves or their design process to what had been the standard in the past. Both also were eager to take on the task of designing across scales. Wright had a vision for the city as well as for the chair. Soleri designed bells at the same time as megastructures.

The relationship between Wright and Soleri is interesting but has not been written about at length objectively. Doing so reveals that he picked and chose what aspects of Wright and his work he valued, and which he did not. Many of Wright's apprentices chose to be continuators, adopting his ideas wholesale, and trying to replicate their success. Soleri, perhaps due to his limited time with Wright and its somewhat tumultuous conclusion, was more inspired to question him than others. Wright's descriptions of organic architecture are echoed by Soleri's talk of the built environment in coherence with nature. Both men were ambitious across scales and forward-thinking in the design of cities at their respective points in architectural history. But Soleri chose to divert from Wright whenever he felt it necessary, whether it was a conscious decision or not.

3. PAOLO SOLERI + LOUIS KAHN

Few architects of the twentieth century are easily compared to Paolo Soleri. He did not have many built projects to analyze alongside other designers, and his unbuilt work was mostly at a scale that draws few comparisons. However, if one disregards scale, Louis Kahn emerges as an interesting figure to whom Soleri can be compared.

The relationship between the work of Soleri and Louis Kahn has not been explored thoroughly. This is unfortunate because many parallels exist between the two men. Both were born in Europe, but lived and worked in the United States. Both also were professionally interested in design at the scales of the house, housing, and the city. Across these scales several themes emerge that seem to be shared between Kahn and Soleri. Geometric clarity through structural order, monumentality, and symmetrical planar organization are present in the work of both architects.

Arcosanti is incomplete as a city but architectural work has been done. What seemed foreign in the drawings seems strangely familiar in physical construction. The earth-cast concrete vaults and apses of Arcosanti are monumental in character. The architecture of Arcosanti's public spaces suggests knowledge of historical precedents such as the ruins of the ancient Romans. Soleri being Italian was extremely familiar the monuments of the past like the Baths of Caracalla or the Basilica Maxentius. In 1928, Louis Kahn traveled to Europe and spent time in Italy after his graduation and later went back in 1950 as a fellow at the

American Academy in Rome. Kahn's interest in Italian architecture led to a set of shared experiences with Soleri.

The study of the urban artifacts of the Romans was important for both in developing a shared architectural language consisting of solid, simple masses, using masonry or concrete, and limited glass (Sully, 1993). Kahn and Soleri's work both have a Gestalt sense of completeness. Their forms are simple and clear, using proportion to guide decision-making. Working with proportion, Kahn and Soleri routinely developed a module that would be repeated throughout a project. The repetition of a similar element also contributes to the Gestalt psychological reading of their work. This language results in a certain primal severity and monumentality to their work which is timeless.

Louis Kahn was able to produce much more built work than Paolo Soleri, culminating in the 1971 AIA Gold Medal. Several of Kahn's most well-regarded projects are interesting to look at as alternative possibilities for the types of spaces possible in an arcology. Arcosanti's incomplete and under-funded state does little justice to the ideas of Paolo Soleri. Looking at some of Kahn's work provides better built examples of the potential architectural nature of arcologies than Soleri was able to provide during his career.

This forthcoming analysis relies on several ideas presented in Aldo Rossi's *Architecture of The City*. One of which is that urban artifacts do not rely on function nor are determined by function is important to these comparisons. Louis Kahn was not necessarily designing a city when

he drew these projects, but one can imagine them functioning as cities, or as fragments of a city that would inform the rest of it (Rossi, 1967).

The Phillips Exeter Academy Library in New Hampshire (1965-72) strongly shares several recurring themes of the work of Paolo Soleri. The library has a central public space, square in plan, and nearly seventy feet tall. Four large circles are cut into the walls above in this space, revealing the stacks behind and bringing light into the center. These surrounding smaller and less public spaces are for storing and circulating through the books as well as for check-in and check-out. The exterior wall takes on a thickness and becomes occupiable, providing more intimate spaces for the individual. Using Rossi as a guide, this diagram for a library is similar in principle for how Soleri's cities would be arranged, with large central gathering spaces surrounded by multiple levels of smaller more specific spaces, and even smaller spaces on the periphery (Gast, 1998). Local brick was used throughout the project (Sully, 1993) which is in line with Soleri's view on local resource usage. An arcological version of Exeter would have to increase in size substantially and likely aggregated into a larger system to be large enough to house a city's worth of people and program. Nevertheless, it provides an approximation of the nature and character of spaces that could be possible.

The National Assembly Building at Dhaka in Bangladesh is a strong example of a building that could project a city. The scale is not the same as any of Soleri's arcologies, but it provides an analog for his work. The open central space is geometrically clear, in Kahn's case

octagonal. A collection of other structures and spaces are arranged symmetrically around the octagon and serve more private functions and reinforce the hierarchy of the central meeting place. Daylight is considered by Kahn, and large openings of platonic shapes provide the light. Large circles and squares are removed from the concrete walls so that light can penetrate the circulation spaces (Gast, 1998). The building from the exterior is viewed as a distinct object from its more natural surroundings. There is a weight to the building seen also in the work of Soleri.

Very similar analysis is possible with Kahn's slightly earlier (1961) Indian Institute of Management. This project lacks the symmetry that is present at Dhaka or in Soleri's prototypes, but achieves a Gestalt reading due to its repetition, solid masonry construction, and sense of order. A superimposition of circles and other platonic shapes as voids in the walls, like at Dhaka, provide daylight and frame views from the inside out. This Kahn project also shows how structures could aggregate. Soleri's arcologies all rely on the aggregation of smaller structures to create a unified megastructure. At the Indian Institute of Management, Kahn relies only on brick and void in order to articulate the exterior of the building. This restraint allows for the building to be read as a singular object, even though it is a collection of parts. A restrained material palette would likely be necessary in an arcological situation in order to minimize cost for such a large project.

Kahn's Salk Institute has many similarities with Soleri's more modular arcological proposals. Kahn arranges two bars parallel to each

other and perpendicular to the ocean with a public space in between them (Gast, 1998). The project is emblematic of Soleri's view of architecture as coherent with nature, only at a smaller scale. There is a clear distinction between the natural environment and the built one. The repeated modules are grouped together, creating a unified form, that is distinct from the landscape. The beauty of the ocean horizon is framed by the parallel bars, and best viewed in the shared outdoor space between them. The use of infill wood on the repeated module was also seen used similarly on the gallery/café building of Arcosanti. This type of detail is not present in the drawings of Arcosanti or any other prototypes of Soleri, but it can be inferred this level of detail and character would be applied in an arcology similarly to how Kahn utilized it in the Salk Building.

While these built Kahn projects demonstrate architectural similarity at the building scale, he did design one significant unrealized proposal specifically for a city. However, Kahn did not envision the city quite the same way as Soleri. Kahn's vision for central Philadelphia, Pennsylvania was car-free, like Soleri's arcologies, but not as radical. The cars would be relegated to the cities edge, housed in parking towers. This would leave a walkable city center with monumental buildings and outdoor spaces in a gridded pattern (Kahn & Latour, 1991). There is a significant difference in the physical and population densities of Soleri and Kahn's city proposals. However, this shows that both recognized the car as detrimental to life in the city. Kahn and Soleri's times in Europe likely helped to shape this shared view (Sully, 1970).

CONCLUSIONS

Paolo Soleri's vision for the city likely has some merit moving forward into the twenty-first century and beyond. This analysis of Soleri relative to his mentor, Frank Lloyd Wright, and a peer, Louis Kahn, serves to paint a more complete picture of his work and its potential. These comparisons provide more solid foundational knowledge on the motives and possibilities of arcology.

An understanding of the motives and rationale of Paolo Soleri is incomplete without looking to Wright. Soleri came to America to work for Frank Lloyd Wright out of admiration for his drawings and projects. He discovered a sensitivity towards the relationship between nature and the built environment through his experiences with Wright. His limited time there allowed for these ideas to pique his interest, but he was not completely indoctrinated by Wright. Soleri realized that Wright's process led to individual buildings in perfect harmony with nature, but an overall system that was cacophonous. This reaction to Wright's work launched his thinking on Arcology.

Arcologies remain hypothetical. They only exist in the drawings of Paolo Soleri. Arcosanti was too ambitious to be completed as designed. The merits of Arcology will remain in question until one is built. However, at Arcosanti there is enough built to start understanding what the architecture of an arcology might be like. The formal characteristics as well as the details at Arcosanti begin to suggest architectural cousins, so to speak. The monumental solid forms remind one of the Roman ruins, and to Louis Kahn. Both Soleri and Kahn studied these ancient

structures and developed their own methods of replicating the monumentality of them. Because of the limited built work of Soleri but his similar design proclivities, Kahn's work is as helpful an example for the architectural possibilities of arcology as Arcosanti.

Positioning Soleri as a rebellious mentee to Wright and a peer to Louis Kahn allows for a more nuanced study of arcologies in the future. Establishing these reference points creates a foothold for arcologies in the greater architecture and urban design context. Moving forward on this research it would be an interesting design proposition to attempt to envision the work of Louis Kahn at the scale of arcology. Would these buildings simply need to be scaled up? Or aggregated? Or both? What would the Exeter library be like ten or even twenty times larger? Are there any other architects that, like Kahn, could be helpful analogs? Le Corbusier's Chandigarh assembly building seems to be of a similar spirit to Soleri's work.

There will always be the question of feasibility with arcologies but architects should be just as concerned about its desirability. Detailed drawings, models, and virtual reality simulations are necessary to discover the nature of Paolo Soleri's cities. All one can do is speculate on the characteristics of arcologies, but this paper discussed the role Frank Lloyd Wright played in influencing Soleri and also revealed Louis Kahn as a potential surrogate architect for Soleri, serving to provide a more realistic, logical, technological, precedent for the future design of arcology.

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