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HIERARCHIES AND PANORAMIC ASPECTS OF ANNE TYNG'S URBAN PROJECTS AND THE CONTEMPORARY VISION OF THE CITY

Cristina Candito, João Cabeleira, Alessandro Meloni

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Abstract

This article focuses on Anne Tyng's Urban Hierarchy proposal considering the geometric reasoning, namely the helical structure and intrinsic progressions, as well as some coeval experiences and assumptions, especially regarding the developed visions revising urban standards and images. Starting from these two complementary paths, it is possible to fully comprehend the image of the formulated project, which is essentially based on the configuration of the helical megastructure and the infinite possibilities provided by the application of modularity and aggregation principles. Through the virtual reconstruction of this structure, combining clusters of houses and multiple hierarchical levels of pedestrian and vehicular traffic, it is possible to create different images. This process starts from the traditional terraced house to the multilevel panoramic vision (bilateral unit and its helicoidal aggregation), up to the view of the aggregate of the various units (spiral) in a potentially infinite arrangement based on the Divine Proportion.

Keywords

Urban design, Anne G. Tyng, Geometry, Unrealized projects modelling, Megastructures.

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1. INTRODUCTION

The design production of the American architect Anne Griswold Tyng, notoriously characterised by a vast interest in geometry, also finds its expression at the urban scale. The theoretical project of the Urban Hierarchy constitutes the basis for combining pure geometry with the hierarchical concept. This theory is developed from the traditional formula of the single house to its aggregation in a row, passing through a multilevel superimposition according to helical structures up to their juxtaposition and road connection. Tyng recognised the need to recreate her complex proposal in *maquettes*. The concept described through texts, drawings and photos of the *maquettes* is studied to reconstruct a 3D virtual model capable of simulating not only the geometry of the form but also the perceptive suggestions sought or latently aroused by the project.

Such hypotheses echo the theoretical and practical formulations of her epoch, demonstrating affinities with a broad set of experiences. Thus, a close connection between Anne Tyng's proposals and coeval urban visions is perceived by pursuing a multilayered environment and elaborating assumptions of infinite extension. Concerning this last aspect, Tyng bridges the three axes of the geometrical spatial regulation with the fourth dimension of time/movement, reflected both in the hypervaluation of urban circulation and the applied design matrix. When coordinated with the logic of coeval megastructures, in

the context of prompt economic, social and technological development of the second half of the 20th century, these proposals embodied the criticism of traditional cities, giving rise to speculation over humanities' spatial framework.

2. ANNE TYNG AND THE GEOMETRIC PROGRESSION

Anne Griswold Tyng (1920-2011) was born in China, and her parents were Episcopalian missionaries. She moved permanently to the United States in 1938 when she started attending the first School of Architecture, offering design training only to women in Cambridge (Massachusetts). Tyng continued her education at the Harvard Graduate School of Design, studying architecture under Walter Gropius and Marcel Breuer. Her training, inspired by the Bauhaus method, probably contributed to growing her interest in low-cost housing and the purest forms of the International style.

The close link between geometry and organic forms is described by Tyng through some publishing, drawings and projects, such as the Trenton Bath House (1955-1956) [1], the unrealised designs for the General Motors Exhibit 1964 (1960-1961) [2], and various residential projects [3].

This paper aims to expose the following concept: how the development of a theory based on a geometric progression leads to her idea of an organic urban form. This concept is expressed in a series of articles, and the premises can be found in the article *Urban Space Systems as Living Form*, published by Tyng in three parts in the "Journal of Royal Architects' Institute of Canada" between 1968 and 1969.

2.1. FROM HELICAL TO SPIRAL

In the first part [4], Tyng clarified the geometric fundamentals of her program. She claims to establish a geometric progression of forms which begins with a first stage characterised by the simplicity of symmetric shapes transformed by a succession of processes defined as asymmetric. She identified, as the first stage, cube, tetrahedron and octahedron, three of the five Platonic polyhedra she named those "Bilateral forms". With the process of revolution, she obtained dodecahedron and icosahedron, and called "Rotational forms", underlining the presence of the Divine Proportion ratios (1:1.618).

The last illustration of this first article, in which the third and fourth stages are represented, is particularly interesting. Anne Tyng based the geometric scheme of the third stage – the Helical (Fig. 1a) – on the Divine Proportion. She analysed the plan and elevations of the dodecahedron and applied the Euclidean transformations of rotation and translation to define a helical line made of straight segments. She considered the apparent contour of the plan drawing of a dodecahedron, coinciding with the plane figure of the decagon, whose side (Φ_2) is related to the radius of the sphere circumscribed to the dodecahedron (Φ_3) according to the Golden ratio. Finally, Tyng identified the vertical increment (Φ) as the pitch of the spiral through the elevation drawing related to the Golden ratio with the side Φ_2 ($\Phi_3:\Phi_2 = \Phi_2:\Phi$).

These elements defined the proportional relationships and the main characteristics of the helical broken line. Tyng enriched this configuration by introducing a second helix characterised by the same logic but a mirror image of the latter. The final result was a double helix (fig. 1a, fuchsia and black) with characteristics attributable to the molecular structure of DNA, as Tyng herself pointed out.

The fourth and last stage was the "Spiral Extension of Rotation" (Fig. 1b), which provided a proportional increase in the radius of rotation of the helical forms, using again the Divine Proportion to obtain a three-dimensional version of the Golden spiral. This geometric construction was brought by elevating cubes translated by the exact height as the previous cube with an edge in continuity, on the squares of the planimetric scheme of the Golden spiral. The three-dimensional Golden spiral passed through the vertex in common between two contiguous cubes, resulting in a helix with a variable pitch according to the progressive height of the cubes.

2.2. GEOMETRIC PROGRESSIONS IN NATURE AND ARCHITECTURE

In the second article [5], Tyng illustrated the proportional applications of those premises in architecture, citing some well-known examples, such as the Great Pyramid of Giza and the Greek Temple as a proportional relation-

ship between humankind and the universe. She mentioned the theoretical implication of the history of the Golden section in mathematics and architecture from ancient to contemporary times (Campanus of Novara, Pacioli, Leonardo, Kepler, Zeysing, Moessel, Hambridge, Matila Ghyka and Le Corbusier). The singular properties of the Divine Proportion were linked with the Fibonacci series, in which each number is the sum of the two preceding ones (1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89…).

Tyng also cited the recurrence of this proportion in natural forms, which may appear as a progression in the life forms corresponding to the geometric progression toward complexity and upscaling. She also connected these features to Carl Jung's concept of psychic "individuation", the principle of synchronicity expressed in the balance of the conscious and unconscious mind.

In the third and last article, Tyng continued to describe the psychological implication of archetypes linked to artistic creation as a spontaneous action, quoting Paul Klee. She explained that archetypes perform «the function of the skeleton structure which the flesh-forms are hung throughout history in the different periods of changing art forms» [6]. In this respect, she used the progression to interpret the succession of different phases during the history of architecture, mentioning characteristic typologies from Proto-Renaissance (bilateral) to High Renaissance (rotational) Baroque (helical) and Rococo (spiral).

To explain these four phases, Tyng recalled urban examples. In the ancient urban space system of Zähringer new towns (conceived during the 12th century in Southern Germany and Switzerland by the Dukes of Zähringen) [7], Tyng recognised the presence of the harmonic proportions derived from the Fibonacci series (2 : 3 and 3 : 5) in road widths and bilateral axiality in the market thoroughfare; and the ring-wall enclosure represented the rotational dimension. Tyng also cited the "Mill Creek Redevelopment Area Plan" (1954) designed by Tyng herself with Louis Kahn, Louis E. McAllister, and Kenneth Day. In this plan, the axial green-way was perpendicular to the pedestrian way connecting the institutional elements of churches and schools in the greater neighborhood.

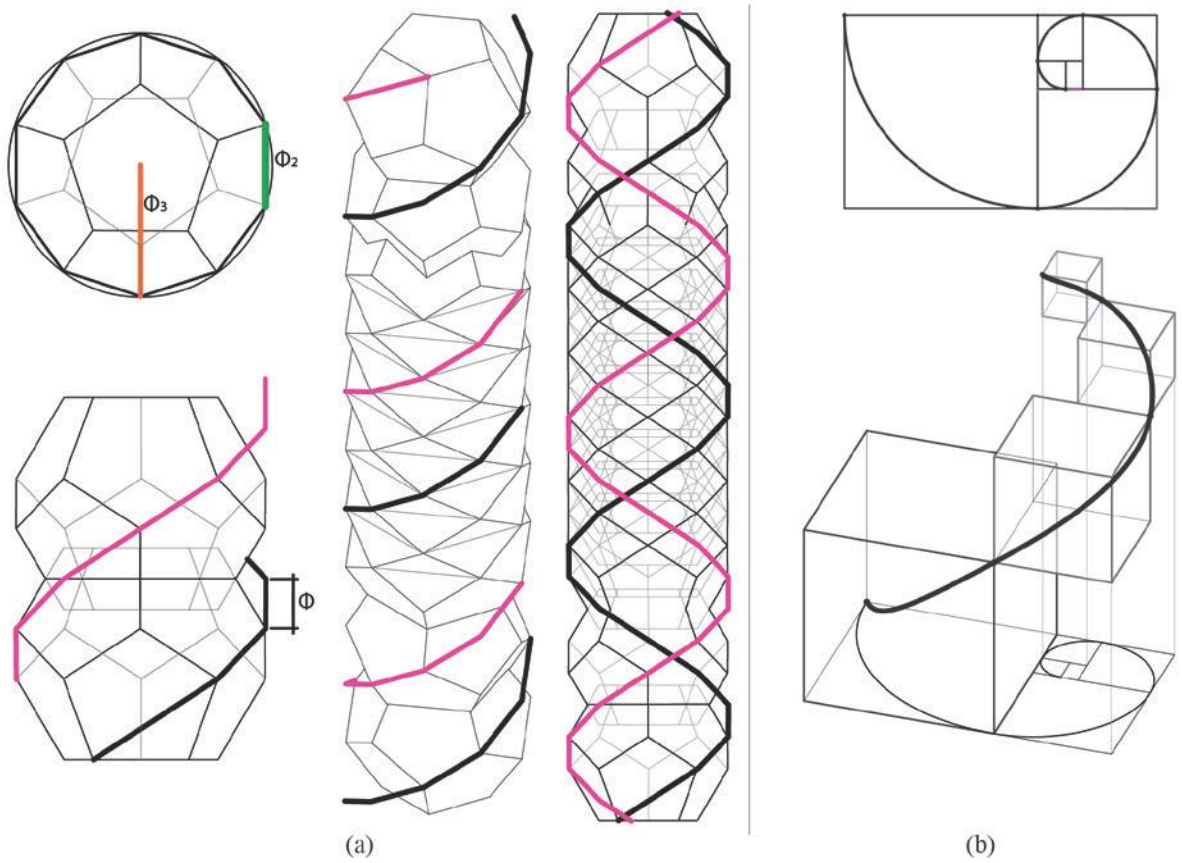

Fig. 1. *Tyng's connection between rotation and Divine Proportion. (a) Helical Extension of rotation ($Φ_3$: $Φ_2$ = $Φ_2$: Φ); (b) Spiral Extension of Rotation. Source: redrawing based on [4].*

The geometry of the helical structure built on the dodecahedron and the three-dimensional transposition of the Golden spiral was included in one of her most noted articles: *The Geometric Extension of Consciousness*, published in the Italian magazine "Zodiac" in the same year (1969) [8]. This focused on the concept of recognition of progressively complex geometric expressions of organic and spatial form.

3. FORM AND REPRESENTATION OF THE URBAN HIERARCHY

3.1. URBAN FORMS

The shape of the two helical structures, described in geometric terms through the translation of the dodecahedron, became the geometric code through which Tyng formulated the Urban Hierarchy (1969-1971). This large-scale design was later extensively exposed in another of her fundamental texts: *Resonance between Eye and Archetype* [9].

The compositional and formal characteristics of the Urban Hierarchy project can be described starting from the basic unit, referred to as the bilateral logic (Fig. 2a), which is represented in the plan by the already cited regular decagon (Fig. 1a). This decagon coincided with the outline of a regular dodecahedron and featured a crown of terraced houses. A star-shaped band with blunt tips also delimited an inner void. As can be understood from the physical model made by Tyng, this star represented the view of two parallel non-intersecting paths obtained by rotational procedures. These helical structures coincided with vehicular ways capable of distributing the different levels of the layered structure of a block.

At some levels, individual blocks were connected in groups of 4 to 8 elements, whose distribution constituted an urban nucleus, offering essential services such as an elementary school (Fig. 2b). Larger-scale connectivity was realised through a highway consisting of a spiral ramp that roughly follows the path of the Golden spiral and related in multiple ways with the outer edges of the blocks it served (Fig. 2c). This spiral structure could be replicated according to axial symmetries in the two directions of the plane (Fig. 2d), obtaining a bilateral hierarchy on a larger scale again.

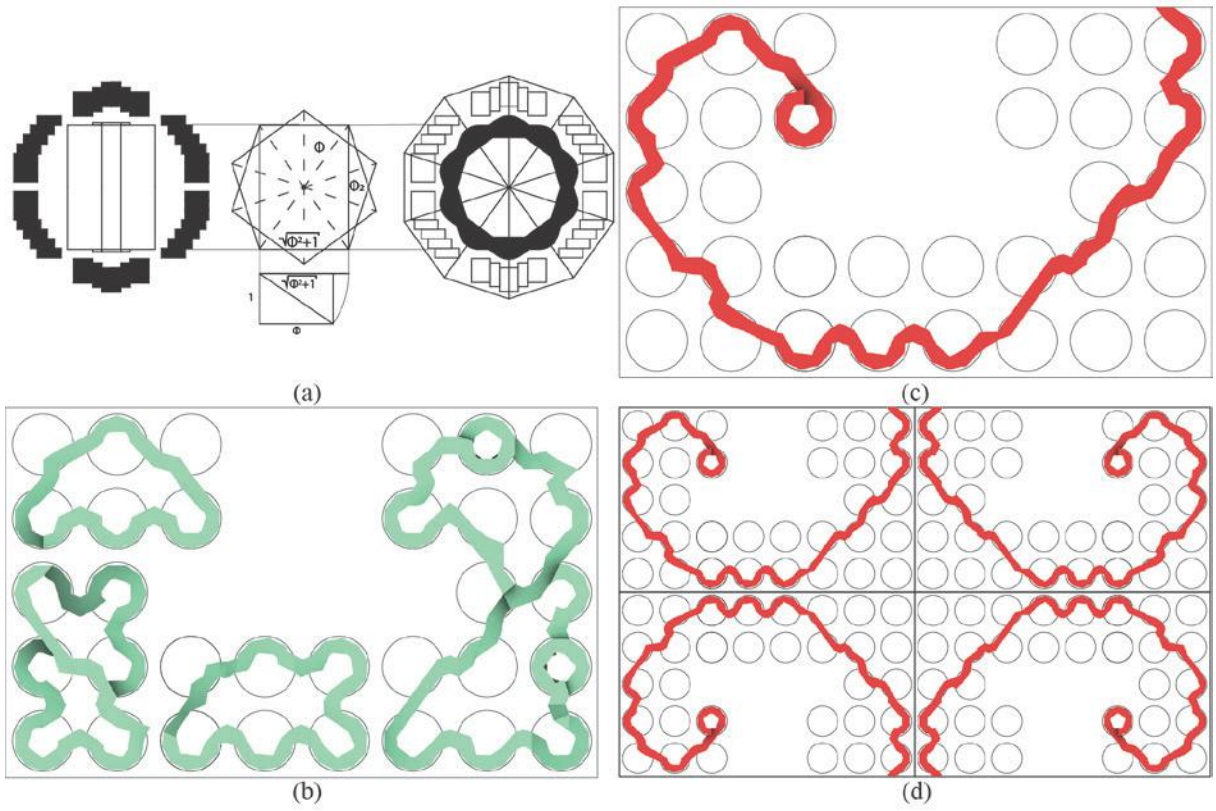

Fig. 2. *Tyng's Urban Hierarchy: (a) Bilateral; (b) Helical; (c) Spiral; (d) Bilateral Hierarchy. Source: images from the 3D model, based on [9], p. 64.*

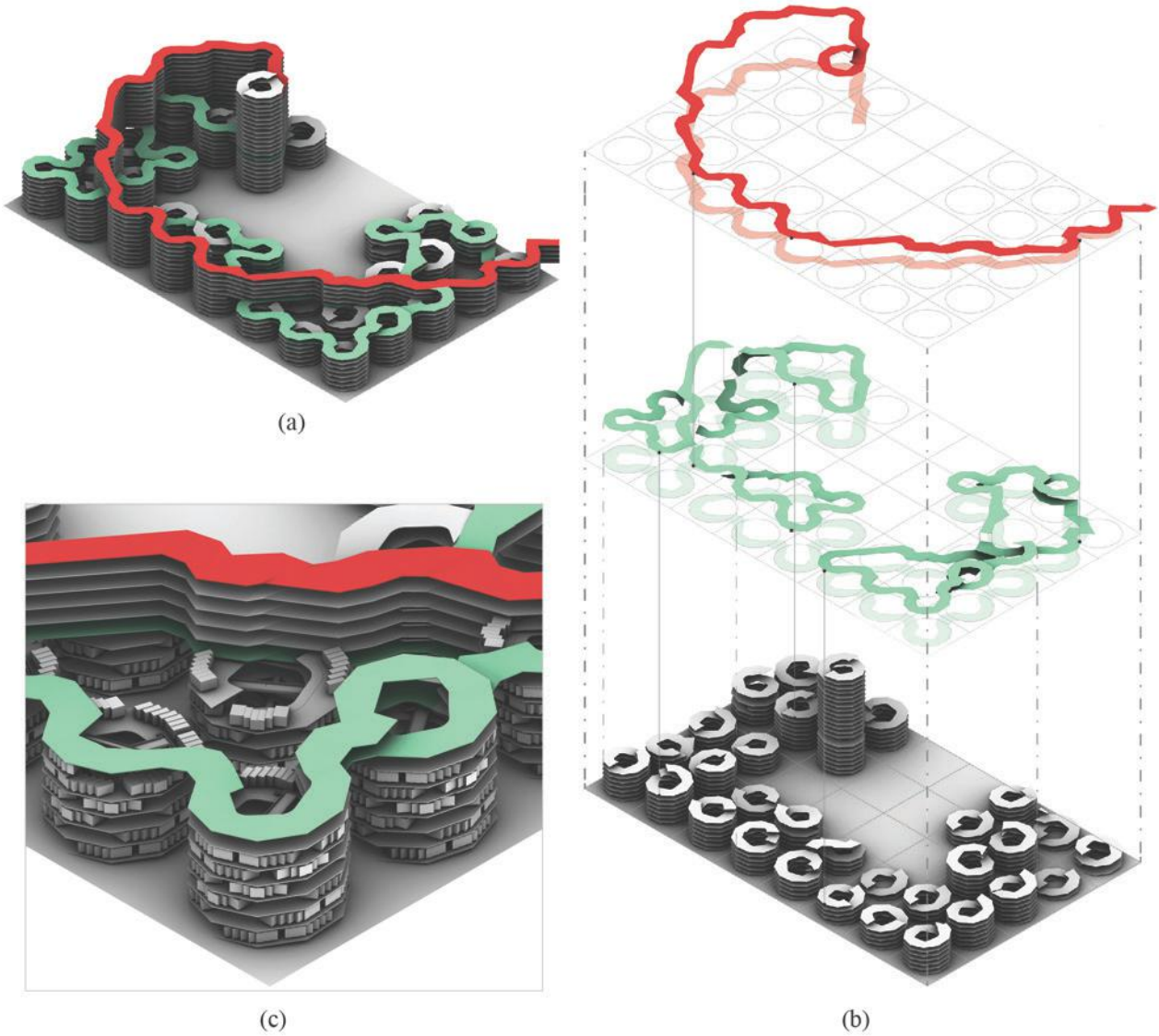

Fig. 3. *Urban Hierarchy reconstruction: 3D virtual model. (a) Isometry; (b) exploded isometry; (c) detail.*

As can be seen from an overall view of the virtual reconstruction of the model conceived by Tyng (Fig. 3a) and from its axonometric exploded view (Fig. 3b), the system appears to be made up of units distributed internally by double helices (grey) and connected in small groups by cyclic roads (green), in turn, connected by the highway (red).

The viability of the urban nuclei (green) appears in the plan to intersect the external bands of each unit involved, sometimes highlighting some circular rings coinciding with the entire perimeter of a single unit. By analysing the model to carry out its virtual reconstruction, it has been discovered that the connections between the viability of the urban cores and the highway were created precisely through those highlighted rings, which consist of travelling along the spiral of the single unit in order to overcome the differences in level created with the connections to the highway (Fig. 3c).

3.2. URBAN IMAGES

The Urban Hierarchy could be realised by two different levels of structure, which Tyng named the "low technology" of the traditional rowhouses and the "high technology" of the reinforced concrete platforms. The proposal was intended to avoid the exclusive conception of the International Style identified in the high-rise apartments and produce the houses' traditional esthetic combined with the necessity of the high density offered by the terraced platform, able to allow sun and light into

each house [9]. It is interesting to note how technology was interpreted from a level of perception, given the specific attention Tyng manifests in some architectural projects, such as her version for Bryn Mawr College's Erdman Hall (around 1960) designed for Kahn's firm and her unrealised project called "Four-Poster House" (around 1975-1988) [10]. In the Urban Hierarchy, Tyng linked her project with the traditional images of historical cities. As already mentioned, Tyng recognised the geometric progression in past urban examples, which can have inspired the Urban Hierarchy configuration. In Zähringen's new towns, for instance, she underlined the rotation of the ring-wall enclosure [6], which could be compared with the encircling roadway of a block.

The terraced building platforms of a single block (Fig. 4) were related to another traditional image: the "hill village" presented in urban history as an aggregation of houses that lean on a natural land elevation. Often built for defensive purposes, these urban structures took advantage of external exposure and were arranged along helicoidal paths, as in the terraced European villages with a medieval imprint. Tyng mentioned San Gimigna-

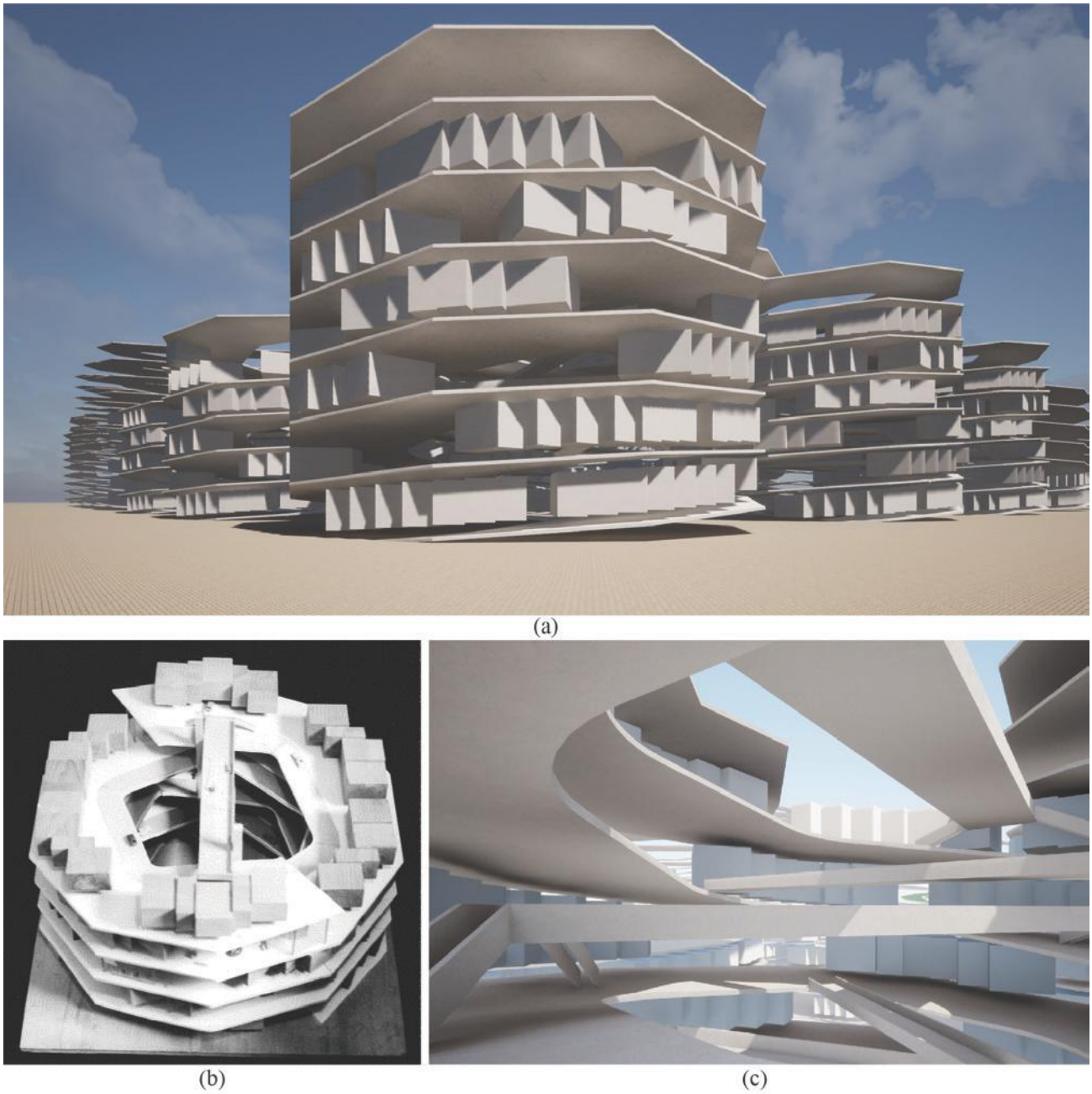

Fig. 4. *Urban Hierarchy: (a) 3D virtual model view; (b) Tyng's physical model (Anne Griswold Tyng Collection, 1932-2004. The Architectural Archives, University of Pennsylvania. Cataloging: 074.IV.B.50); (c) 3D virtual model view: internal view of a block.*

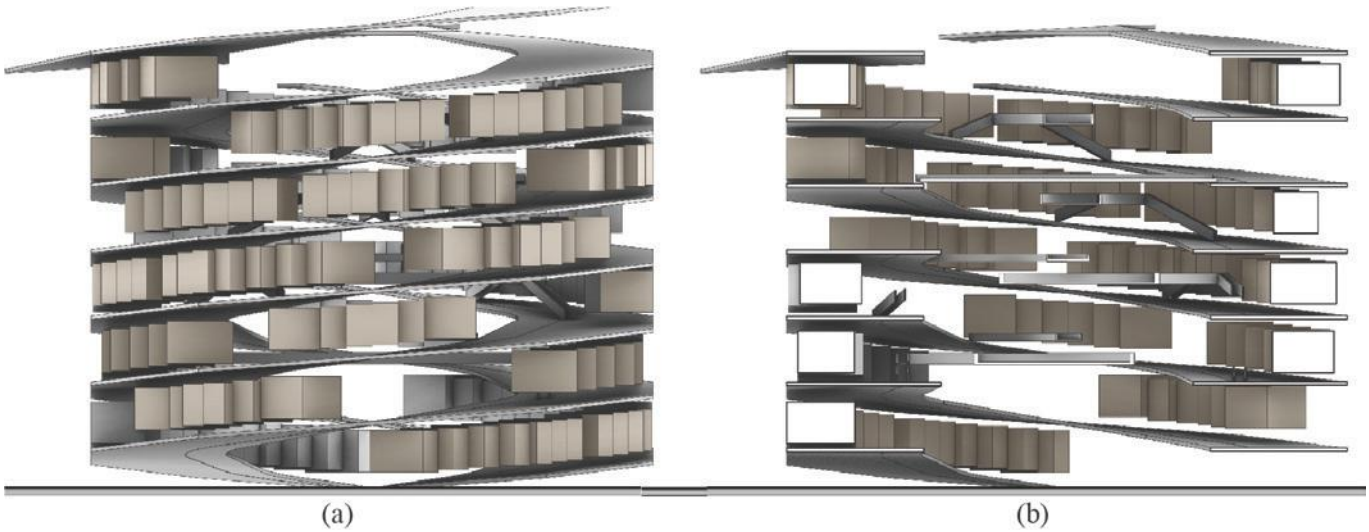

Fig. 5. *Urban Hierarchy reconstruction: 3D virtual model (single block). (a) front view; (b) section.*

no (Italy) as an example of this helical structure, emphasising the vitality of the intervention of the multilevel structures connected by curvilinear roads [6].

Tyng described the advantages of the terraced system distributed by the helical ramps as a possibility to let every house a direct relationship with the public space, reinforce the thresholds of human territoriality (Fig. 4c), also evoking the suggestive image of Rome's Spanish steps [9]. The conception might recall to mind the non-realised Spiral project by Daniel Libeskind and Cecil Balmond (1996) as an addition to the Victoria and Albert Museum in London [11], using the Fibonacci sequence.

The external view of the structure conceived by Tyng highlights the inclination of the ramps and the arrangement of the terraced houses, which, although repetitive, generate varied and dynamic views due to the slope and the different relative positions to the block (Fig. 5a). A similar image can be obtained from the section of the block which allows for perceiving the potential of the internal courtyard on each level (Fig. 5b). The houses appear suspended because Tyng decided on that kind of representation, and did not specify the type of structure, whether punctiform or masonry, which was always set back and not visible from the majority of global representations.

As a whole, the visionary structure of the different blocks connected by the cyclic roads, linking every group of blocks, and the spiral highway is presented as a dynamic and effective image (Fig. 6). Still, some crucial elements are not solved, such as the coexistence of roads and housing, the facilitated vertical pedestrian connections and the function and image of the spaces between the individual blocks.

Concerning the internal façade of the singular block, the houses appeared arranged around a central courtyard, forming a sort of larger house with them (Figs. 7a and 7b). Although the shared space consisted of a ring flow around a central void surrounded by helicoidal ramps, a pedestrian crossing path (yellow) recalled the pedestrian way of the cited Mill Creek and reconstructed in some way the integrity of the space as a piazza. From this path, houses appear as a traditional façade of row houses dynamically transformed thanks to the sloping terrain and the reciprocal translation in depth (Fig. 8a).

The piazza leads back to traditional places, such as the famous Lucca square, built in a Roman amphitheatre structure with an elliptical ring of houses. It is useful to add a more dynamic conception to the traditional images of plans, elevations and sections to represent the perception of the whole internal view. That conception derives from the idea of the internal court and is combined with the current forms of representation offered by the combination of the virtual model and the 360° panoramic photography. Bidimensional images do not easily represent this perception, as the approximate development, the equirectangular view (Fig. 8c), cannot simulate a natural form of visual perception. Then, re-

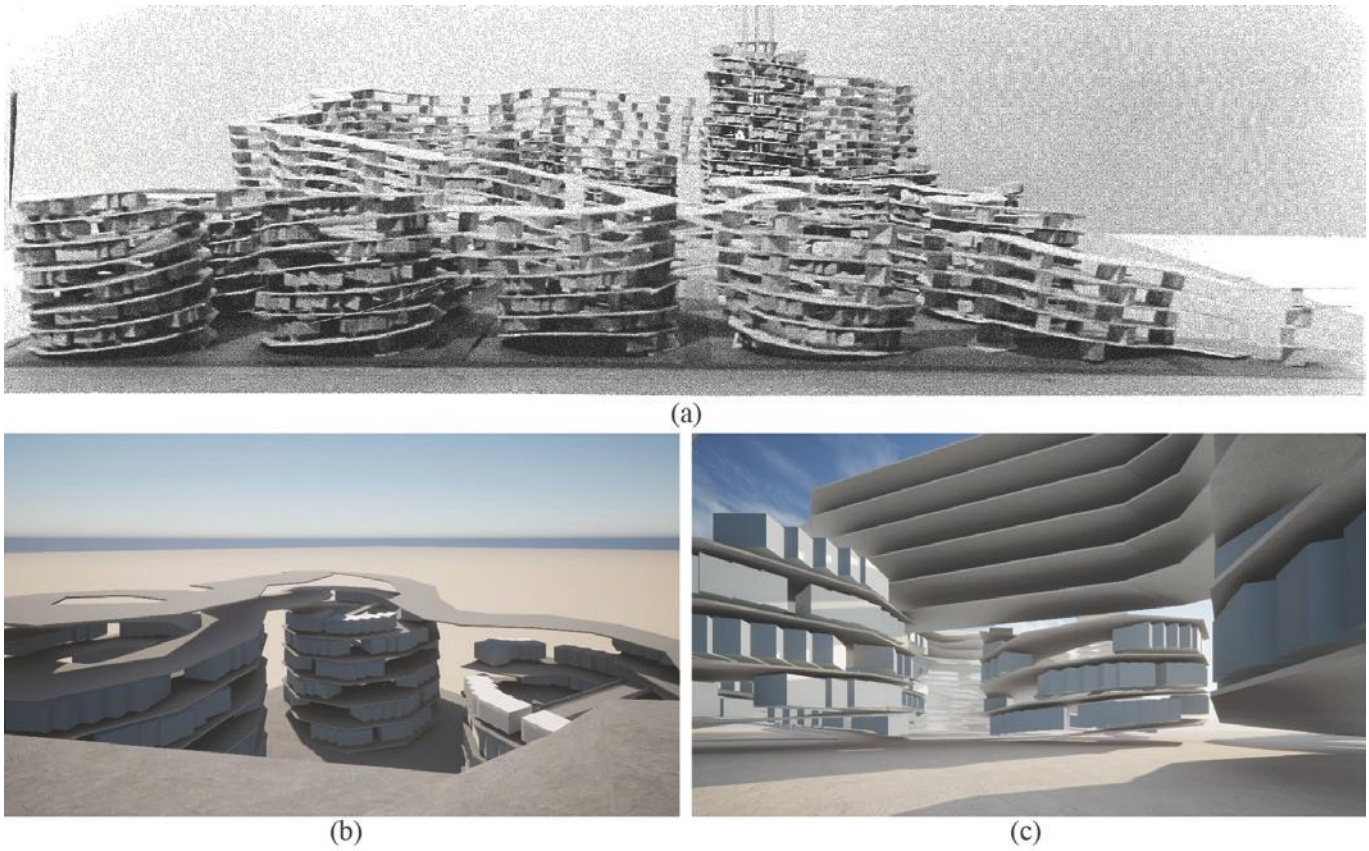

Fig. 6. *Urban Hierarchy. (a) Image of the Tyng's model (Anne Griswold Tyng Collection, 1932-2004. The Architectural Archives, University of Pennsylvania. Cataloging: 074.IV.B.50); (b) Reconstruction: 3D virtual model view from the highway; (c) Reconstruction: 3D virtual model view.*

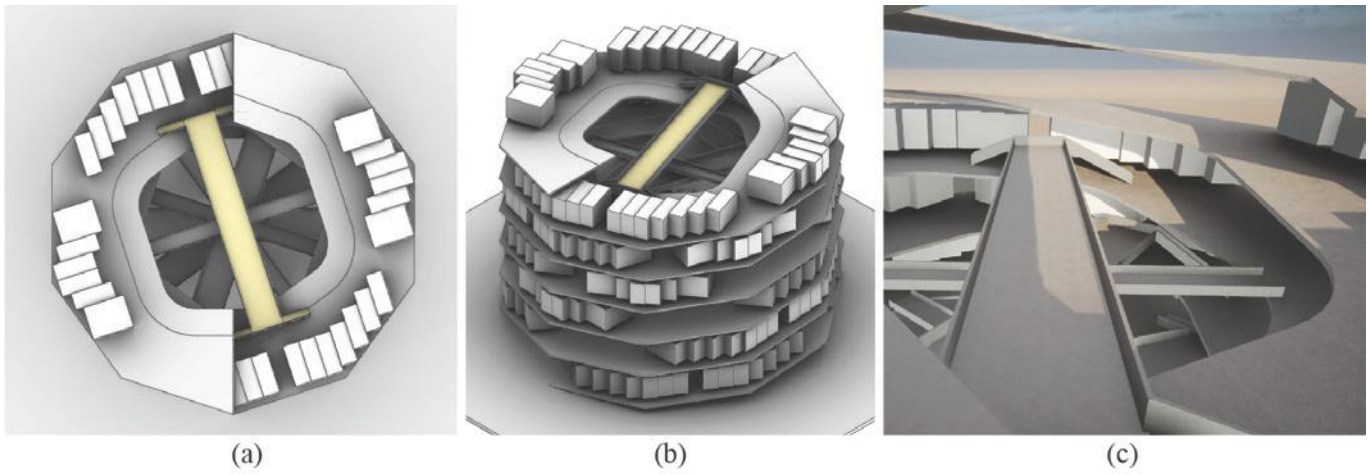

Fig. 7. *Urban Hierarchy reconstruction: 3D virtual model (single block). The pedestrian crossing path.*

sorting to an explorable three-dimensional perception of the same equirectangular view is necessary. This allows the observer to experience the perception of immersion in an enveloping space even if made up of stretches of fronts of terraced houses (360° exploration: see caption). Probably, this perception is what Tyng was looking for with the reconstruction of her projects in the tridimensional form through a physical model, evoking the mandala structure [12].

In 1976, Tyng participated in the Biscayne West Florida competition, adapting the Urban Hierarchy proposal of 1970, meeting the unusually high-density requirement of 135 dwelling units per acre in 11 stories of houses, and strengthening the triangular expression of pyramidal

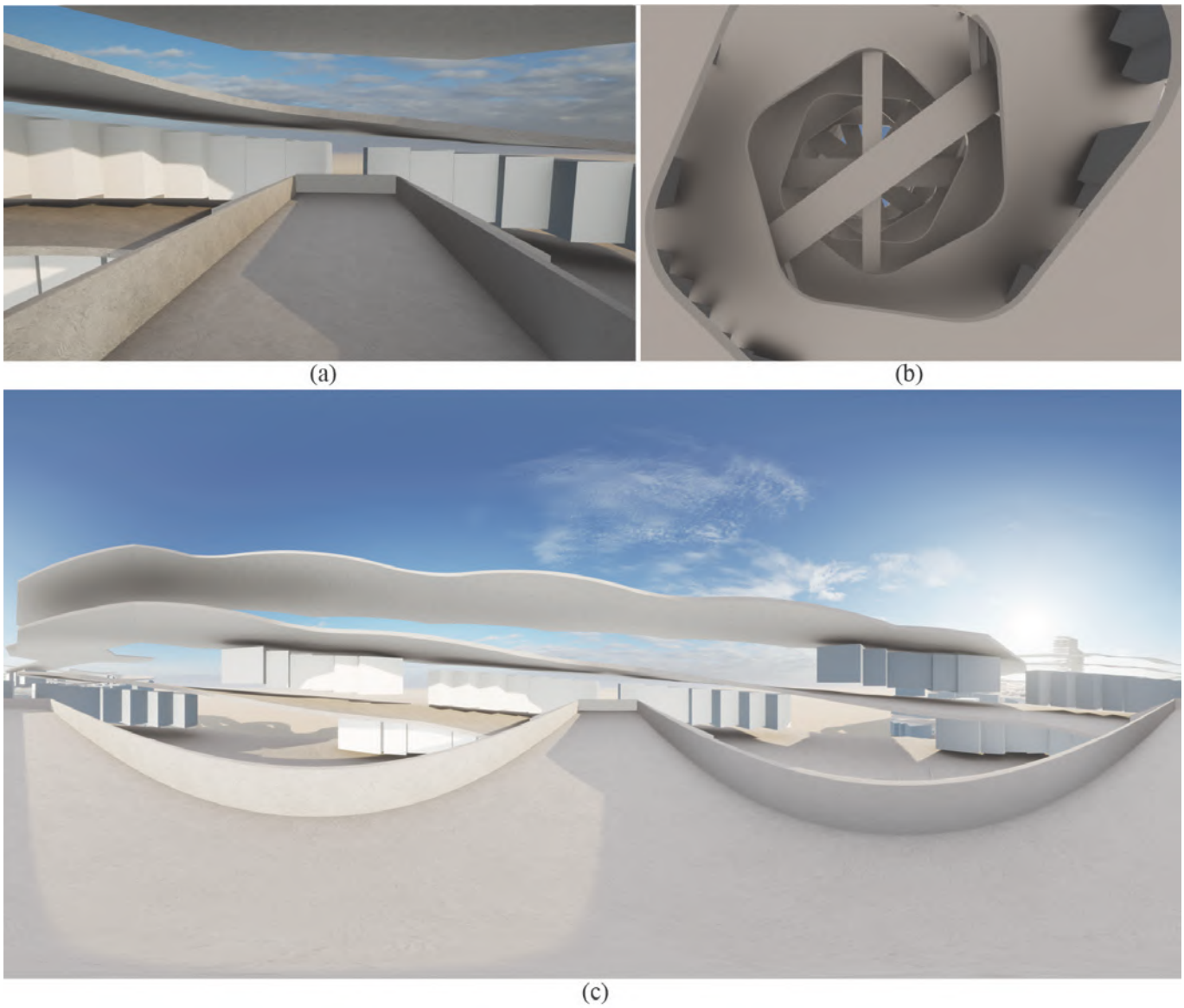

Fig. 8. *Urban Hierarchy reconstruction: 3D virtual model (single block). (a) frontal view of houses similar to traditional row houses façade; (b) upper view from the centre of the block; (c) equirectangular view of the 360° panoramic image of the virtual model (360° exploration: https://momento360.com/e/u/b7edb12e1411409f94837aabb526336b?utm_campaign=embed&utm_source=other&heading=0&pitch=0&field-of-view=75&size=medium&display-plan=true).*

form with the use of large flying buttresses integrated with the stair structure [9].

4. URBAN PLANNING AND COEVAL REFERENCES

Anne Tyng's Urban Hierarchy proposal follows the mid-twentieth-century experimentalism in reply to the systemic problems of the contemporary city. In the North American context with extensive suburban sprawl [13], intensified by the Highway Act of 1956 and leading to the contemporary Splintered city [14], visionary proposals explored the full potential of urban densification. Such proposals considered: new construction technologies, emerging programs, infrastructural requirements, and the desire to breakup urban archetypes, establishing a spatial framework suitable to contemporary society.

Despite this focus on Anne Tyng's North American context, coincident theoretical formulations, geometrical reasoning and architectural imagery are identified worldwide. However, WWII's urban collapse strongly determined the European and Japanese panoramas and envisioned reconstruction opportunities. Visions of great freedom, often bordering science fiction, reviewed pos-

tulates of the traditional city form, together with ways of doing, thinking and inhabiting the urban space. Therefore, the proposed megastructures [15] by groups such as Team X, the French Situationists or the Japanese Metabolists defined multifunctional and multilayered cities reformulating urban precepts.

Such a spirit of renovation can be perceived in Alison and Peter Smithson's proposal for the Berlin Hauptstadt (1957-1958). The scheme frees the city layout from the pre-war palimpsest, multiplying the ground through successive layers that hierarchise ways of moving, using and signifying. Similarly, the Alexandra Road Estate (1968-1972), designed by the Metropolitan Borough of Camden, has hierarchised the modalities of mechanical and pedestrian circulation, as well as categories of collective space. Raised from the ground, now occupied by car routes and parking lots, a new level for pedestrian space is established. Following this movement, the oblique elevations of the raised buildings (Fig. 9a) allow for more light, visibility and private open space, providing the image of a staggered composition.

Situationist proposals such as Constant's New Babylon (1959-1974) and Yona Friedman's Ville Spatiale (1958-1962) express a more radical desire for elevation. These uplifted and ever-changing megastructures configured antigravity mechanisms depicting an ideal urban environment. In both cases, the city is freed from the ground plan, from the pre-existing fabric now occupying the space above the city skyline.

However, if such proposals hold assumptions of transforming the urban sediment beneath, in an analogy to social transformation, the Japanese vision absolutely denies it, envisioning a world from scratch.

Japan's Metabolist experiments were materialised through proposals such as Kenzo Tange's Renewal of the Tsukiji District (1960), Arata Isosaky's Clusters-in-the-air (1960-1962), Yoji Watanabe's New Sky Building (1972), and Kisho Kurokawa's Nakagin Tower (1972). In addition, floating cities for Tokyo Bay, such as the Marine City (1960-1963) by Kikutake Kiyonori or the Neo Tokyo Plan (1959) by Kurokawa, revealed an extreme desire for environmental artificialisation. These dreamlike proposals also questioned the status quo of the inhabited space, and the human relation with the natural support, parallel to Archigram's Plug-in City (1962-1964).

The logic of such proposals was deeply attached to a scheme of vertical columns for access and supply, to which horizontal modules were tied up, launching through the air living and working units. That is the case of Kenzo Tange's Yamanashi Broadcasting and Press Centre (1966), whose three-dimensional network is ruled by vertical cores, interconnected horizontally (Fig. 9b). The layout would allow continued growth and densification of both the building and the city, providing a coherent image to the overall built environment. However, if here the general composition and induced movement follow an orthogonal spatial mesh (Fig. 9c), Tyng's urban Hierarchy induces oblique movements and relations (Fig. 6a). An aspect indelibly reflected in the elevation of each project: if Tange's design provides apparent stability through the reticulated compositional matrix, Tyng's model is profoundly dynamic, constantly raising our gaze, considering the obliquity of the helical ramps.

Closer to Anne Tyng's context, Moshe Safdie's Habitat (1967) reinvents the idea of the apartment building. The structure is generated by prefabricated concrete units, whose horizontal rotation and translation result in a multilayer modular image (Fig. 9d). Highlighting a multilayered system of circulation through suspended walkways and car routes underneath the building; the dwellings are provided with generous terraces, seeking qualities of the suburban house with open spaces, in a high-density context. A clear parallel with Tyng's sequencing of traditional rowhouses, her "low technology" feature, spread along the continuous line of the "high technology" concrete spiral [9].

Despite the conceptual affinities of the referred proposals with Tyng's work, none resorted to spiral or helical structures. Suppose we could historically invoke the minaret of the Great Mosque of Samarra (851) in its conical helical development (Fig. 10a). In that case, a contemporary exception can be identified in helicoid megastructures (1961), such as Kisho Kurokawa's reconstruction of Tokyo's Ginza neighbourhood, and the Tarpeian Rock Helicoid (1955), in Caracas, designed by Jorge Romero Gutiérres, Pedro Neuberger and Dirk Bornhorst.

In the context of Latin America's daring experimentation, the Tarpeian Rock Helicoid was conceived as a shopping centre along a double helix ramp for both descending and ascending movements (Fig. 10b), crowned by an exhibition hall [16]. The project takes advantage of the local topography, with the double helix developing around a hill, remodelling its profile to accommodate the new megastructure (Fig. 10c). Determined by the dominance of vehicular circulation, an inversion of Tyng's scheme is identified: the inner void is the below standing hill surrounded by the shopping spaces, whereas vehicle circulation takes place in its external perimeter. However, in terms of elevation, the obliquity of the ramp is not perceived as it is in Tyng's design (Fig. 4c). Since the ramps vary between straight and curved spans, dilating the spiral according to its attachment to the slope, the Tarpeian Rock Helicoid image seems, at a distance, very close to the overlapping of the horizontal layers.

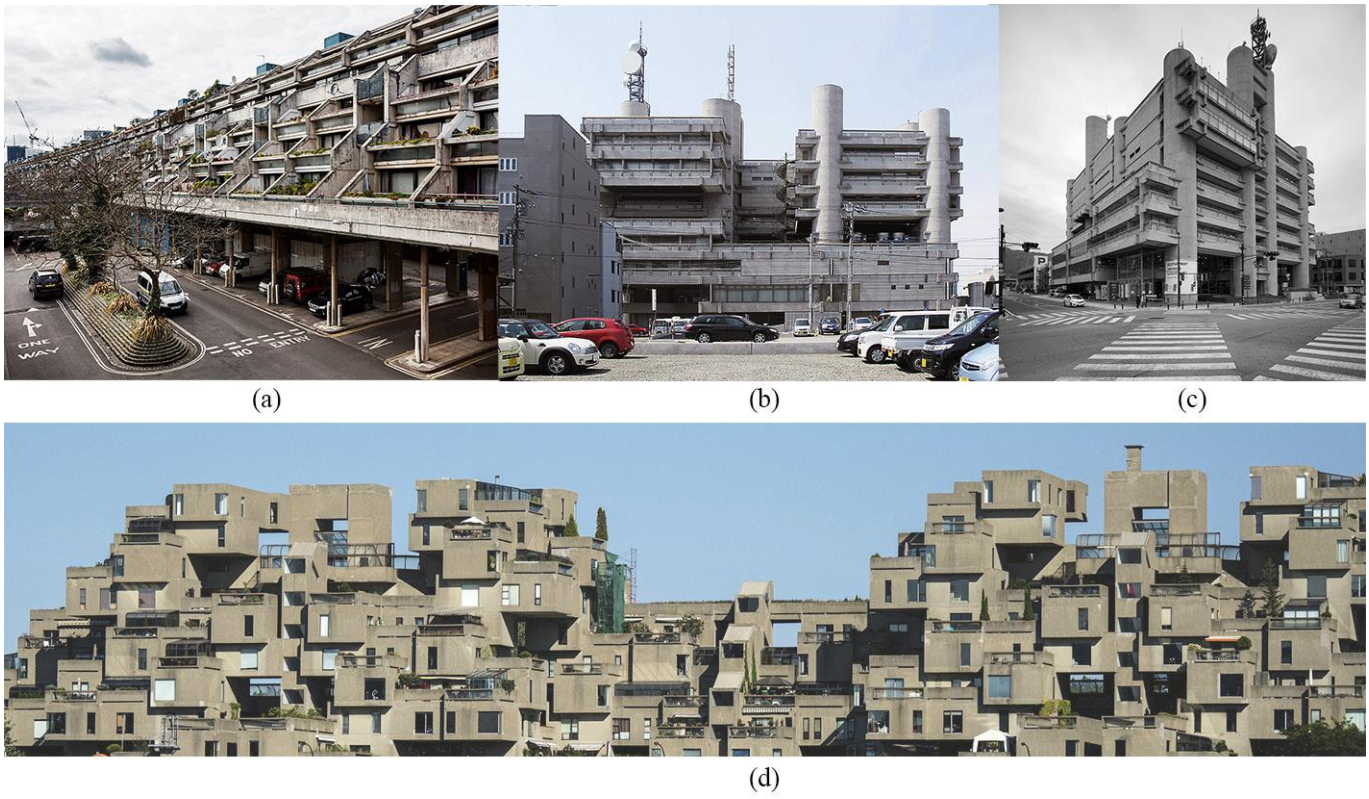

Fig. 9. *Built megastructures: Hierarchy, structural frame and modularity. Sources: (a) © Stefano Perego; (b) © Carlo Fumarola; (c) © John Barr; (d) © Luc Durocher.*

Fig. 10. *Spiral references: from Samarra to Caracas. Sources: (a) © Jorge Correia; (b) © proyectohelicoide.com; (c) © Pietro Paolini.*

5. CONCEPTUAL ASSUMPTIONS

As a reaction to the North American suburban expansion, Tyng's proposal aims to reverse the individuality expressed by the model of the isolated house, with a lawn and a garage, valuing a logic of collectiveness and high-density neighbourhoods [9, p. 59], based upon a multilevel hierarchy. These aspects were familiar to her joint proposal with Louis Kahn for the City Tower (1952), where urbanity is condensed into a polyhedral compound capable of ensuring continuous growth in the three axes of space regulation.

However, many of the referred proposals were not executed due to their radical collision with rooted patterns of inhabiting. In fact, at the time, such visionary schemes were strongly condemned by the down-to-earth discourses of Jane Jacobs's *The Death and Life of Great American Cities* (1961), defending neighbourhood logic provided by the ordinary street canon.

Motivated by accelerated technological development, the idea of a multilevel space is essential in such visionary solutions. This concept would free the city from its ground, multiplying strata to densify and systematise urbanity from its supply and circulation infrastructures until the configuration of housing, working and leisure spaces. A functional hierarchy is configured through a three-dimensional reasoning of space instead of a horizontal disposition of parts. A stratification based on structural cores which aggregate functions of displacement, supply and being. In its intricate relationship with technology, modularity is also a constant feature, displaying the rationalisation of means of production and building. The belief in industrialisation, standardisation and prefabrication, and modularity establishes new design and construction methods, as well as new formal vocabularies. This is an essential feature since modularity indelibly marks the image of such proposals, mainly through the staggering of elements, according to the hilltop configuration, and the mountain discourse explored by Tyng [9].

Nevertheless, the automobile marks the autonomy of circulation systems in relation to the built fabric and the emergence of new related programs. This can be traced in Le Corbusier's urban proposals, breaking up with the traditional standard of urban streets and housing units. In the same line of thought, Konstantin Melnikov's essays, such as the car parking bridge and the spiral car parking proposals (1920-1925), evidence interlocked and continuous ramps anticipating the desire for an everlasting movement and multilayered composition.

6. CONCLUSION

Anne Tyng's well-known interest in pure geometric forms develops into her theory based on a geometric progression that leads to recognising the logic of organic, architectural and urban forms, to the point of devising new ones capable of responding to the needs of the contemporary city.

The Urban Hierarchy structure attempts to explore a unified field theory of scales, combining pentagonal, helical, and Golden spiral forms. Through the geometric disposition, which combines clusters of houses and different hierarchical levels of pedestrian and vehicular traffic, it is possible to create different images starting from the traditional façade of the terraced house to the multilevel 360° vision (bilateral unit and its helicoidal aggregation), up to the view of the aggregate of the various units (spiral) in a potentially infinite arrangement based on the Divine Proportion.

Coeval practices and assumptions reinforce Tyng's pursuit of hierarchies in the urban layout. Hierarchies that can be summarised in multiple fronts, such as a formal hierarchy (hilltop citadel image through staggering and modularity), a functional hierarchy (by segregation of spaces for housing, work and leisure), an infrastructural hierarchy (essentially evident in the urban highway and the new 'street' standard), and a spatial hierarchy (comprising significance from the individual private space to the pedestrian court). They all are gathered under the logic of infinite expansion and the expression of a multilayered composition of worldly replication.

Authors contribution

The paper was elaborated as a team, but J.C. wrote chapters 4 and 5, C.C. wrote 2.1 and 3.2, and A.M. wrote 2.2 and 3.1. Modelling and Drawings are realised by the authors unless otherwise specified.

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