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Structural Expressionism of a Tall Building as a Metaphor of National Identity: China as a Case Study

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Abstract In the 1960's the spread of expressionless architecture of tedious uniformity was restrained by emerging movements that encouraged a wide variety of expressions. Derived from contrasting movements, two of these expressions are especially compelling — structural expressionism and metaphors of national identity. Since an architectural concept combining this pair of expressions is nonexistent among the world's one hundred tallest buildings, the aim of this paper is to demonstrate that in the architectural concept of a tall building structural expressionism can be double-coded as a metaphor of national identity. With China as a case study, the qualitative method to test this premise was the development of a vision of a tall building merging these two means of expression. The results suggest that architectural concepts of tall buildings combining structural expressionism with metaphors of national identity can express the world's contrasting cultures with a variety of visually vivid structures.

Keywords: structural expressionism, tall building, architectural metaphor, national identity, China

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1. Introduction

In the middle of the twentieth century the postwar world was besieged by the proliferation of expressionless buildings of tedious uniformity. The resulting loss of identity made it difficult to recognize cities from different parts of the world. To counteract the homogenization brought about by the International Style, a pair of emerging architectural movements sought solutions with contrasting expressive means.

Nostalgic in its vision, Postmodernism sought the reintroduction of traditional means of expression while reinforcing local context. A contrasting movement, Late Modernism, looked to the future and its boundless opportunities in an interconnected world, seeking to express in an abstract language novel structures and forms with emerging technologies. Despite their differences, these movements coincided in their search for meaning in architecture, though with a range of seemingly incompatible expressive means. A pair of expressions stemming from these movements are especially compelling — metaphors of national identity and structural expressionism.

The term *structural expressionism* refers to the vivid communication of the inherent logic of external structural systems in a geometrically coherent manner based on the laws of physics resulting in pleasing architectural visual expressions (Al-Kodmany & Ali, 2016). *Structural architecture*, a closely related term, is "the art of building in which architecture, engineering, and aesthetics interact to make structure the central expressive element of design... built with economy, efficiency, discipline and order" (Goldsmith & Blaser, 1987). The two differ in that *structural expressionism* involves the visual vividness or exuberance of external structures, while s*tructural architecture*, being broader in scope, also includes minimalist external structures as well as internal structures and their resulting external non-structural expressions.

Another mode of expression is *architectural metaphor,* frequently intertwined with metaphor in language. "The essence of metaphor is understanding and experiencing one thing in terms of another" — the language metaphor "time is money" comes from the fact that both time and money can be wasted, saved, given, spent, invested, budgeted, put aside or lost (Lakoff & Johnson, 1980).

In the conceptual stage of the architectural design process the use of language, framed in either concrete metaphors or abstract metaphors, helps to promote creative thinking in the search for idea-solutions that aim to envision buildings with strong identities. *Concrete metaphors*, also known as *image metaphors*, share the visual appearance of tangible objects, as in the metaphorical schema BUILDINGS ARE SUNFLOWERS. Whereas *abstract metaphors*, also known as *conceptual metaphors*, suggest intangible qualities, as in the metaphorical schema BUILDINGS ARE SYMPHONIES (Casakin, 2019).

The abstract metaphor "architecture is a silent melody" suggests that architecture and music, though not sharing the tangible qualities of materiality and sound, do share

such intangible mathematical patterns as rhythm, proportion and harmony (Georgievich, 2016). The abstract metaphor "Notre-Dame cathedral is a vast symphony in stone" suggests that the two arts, as different as they are, do share such abstract qualities as scale, composition, structure, form, hierarchy, unity, variety, layering, ornamentation, contrast and texture (Gur & Sen, 2019). Despite their abstract dimensions, in architecture and music these qualities are double-coded in their capacity to elicit "extreme emotional arousal" (Jencks, 2013). Metaphor in architecture may allude to innumerable other factors, among them national identity.

The *national identity* of a country is defined by its characteristic culture, languages, ethnicities, religions, traditions, values, history, politics, economy, symbols and rituals. National identity is an imagined community with a strong sense of belonging to a particular territory with its interconnections and conflicts within a globalized world. "Sentimental attachment towards a particular nation can be built by emphasizing the nation's uniqueness from others" (Windari, 2021). National identity can be also defined by its architecture, including its tall buildings.

A *tall building* is defined by the Council on Tall Buildings and Urban Habitat (2023) as having a height of at least 50 meters. Tall buildings include the subcategories of s*upertall buildings,* with a height of at least 300 meters, and *megatall buildings*, with a height of at least 600 meters. Of the 236 completed supertall buildings in the world, four are megatalls (CTBUH, 2024A, 2024B).

In the 1960's architects were disconcerted by the apparent disarray in their profession. Architectural theorist Charles Jencks (1977, 1980) sought to establish order by classifying different currents into somewhat coherent wholes. Though his early taxonomy is often challenged in its details, its broad outline generally serves as a shared frame of reference among architects. Modernism, Late Modernism and Postmodernism are major architectural movements that emerged during the twentieth century.

The Modern Movement rose from the ashes of World War I, a clash stirred by the conflicting nationalisms of the warring states. Rooted in the optimism of the postwar years but disheartened by the horrors of the global conflict, Modernism sought to unburden architecture of all traces of a decadent past. In this heroic period the movement was inspired by the industrial revolution of the nineteenth century and its no-nonsense engineering esthetics of long-span structures of train sheds, as well as machines such as sleek ocean liners freed from the barnacles of decoration. With religious-like fervor Modernism sensed that its mission was to purge architecture of its impurities, in line with Mies van der Rohe's minimalist maxim "less is more." The movement sought clarity in an abstract architectural language that, ignoring national boundaries, could be shared globally. The tension between nationalism and internationalism came to express the confrontation between traditional architectural styles and the International Style, as the Modern Movement came to be known before World War II. In the war's aftermath, the International Style spread the world over and deteriorated into a pragmatic assembly-line of spiritless architecture. Years later, citing its rigid formality and tedious uniformity, Charles Jencks celebrated, though prematurely, the death of the Modern Movement (Larson, 2018).

Postmodernism, as Jencks defined the term initially, rejected the tenets of Modernism in as many fronts as possible — "less is a bore" — he countered. Looking for inspiration in the past, Postmodernism sought to reconnect with premodern architecture with its rich historical, vernacular, classical and eclectic heritage that had been rejected by the Modern Movement (Larson, 2018). To oppose Modernism's minimalism and clarity, Robert Venturi (1966) proposed the concepts of complexity, contradiction, ambiguity and paradox, as well as emphasizing the importance of a building's relation to its physical context, a concern often trivialized by the Modern Movement. Opposing Modernism's mute abstraction, Jencks (1977) was particularly influential in establishing in Postmodernism the role of architectural metaphor to communicate meaning, particularly of a building's cultural and national identity. However, a dark facet of Postmodernism was its veneer superficiality — the simulation of historical building styles with molded ornamental shapes of glass fiber resins and synthetic stucco faux finishes was an affront to Modernism's quest for the honest expression in the art of building (Armstrong & Kapp, 2022).

Looking to the future, Late Modernism was inspired by the tenets of Modernism, but with an important difference, it exalted exuberance rather than minimalism as a mode of expression. Freed from rectangular prisms confining the imagination, Late Modernism explored geometrical thinking outside the box. Structural expressionism became a privileged mode of expression, with stairs, ramps, elevators, service shafts and mechanical equipment often contributing to a high-tech sense of extroversion, rather than being hidden, as if shameful, within a box (Jencks, 1980).

The qualities of the three movements would in time tend to coalesce. João Rodolfo Stroeter (1994) envisioned that "there would be an intermediate synthesis which would provide a new tone to the architecture to come... more attentive and receptive to the riches of history as well as to architectural invention... bringing new possibilities to contemporary architecture."

The reinterpretation of the essence of historic architectural forms at monumental scales is a characteristic of this synthesis in contemporary high-rise architecture. Malaysia's national Islamic identity is expressed metaphorically by the Petronas Twin Towers' resemblance to minarets, traditional slender towers used to call the faithful to prayer — expressing a deep-rooted cultural concern for geometry, their symmetrical floor plans consist of a variety of different-sized squares interlocking with semi-

circles (Al-Kodmany & Ali, 2012). While discarding veneer cosmetic superficiality, the towers synthesize a Postmodern metaphor of national identity with Late Modern concerns with the serious art of building and, echoing Islamic culture, geometrical expression.

The architectural concept of the tall building developed for this paper is to be understood as a vision. "A Vision is a theoretical design concept for a building which either had no intention of being realized or is at an early stage of development" (CTBUH 2023). This vision is a theoretical design concept that does not have, among others, a specific site nor a developer.

This vision of a tall building is qualitative in nature. Its scope is limited to the interrelationship of two factors, architectural metaphor and structural expressionism, each of which is necessarily intertwined with other characteristics of the movements from which they proceed. The paper is also limited to the description of the qualitative structural principles as is appropriate in the architectural concept stage of the development of a tall building.

Defining an architectural concept is a priority at the start of the design process. An architectural concept defines a series of interrelated factors that may include, among others, metaphor, structure, culture, geometry, technology, three-dimensional massing, formal language, meaning, context and materials. An architectural concept plays a role similar to DNA in genetics in orchestrating coherent and consistent instructions that permit a design to emerge and evolve in a systematic manner (Eilouti, 2018A; 2018B).

On analyzing photographs of the external expressions of the completed one-hundred tallest buildings in the world, six belong, by virtue of their structural vividness, to the category of structural expressionism — of these, only one, the Bank of China Tower, is described as associating its structure with a symbol of national identity (CTBUH, 2024A). However, the evidence suggests that this description does not reflect the original architectural concept of the Bank of China Tower but instead is a later narrative. The difference between narrative and architectural concept, as well as the valuable lesson this tall building provides, will be discussed in a later section.

Perhaps because they are derived from seemingly incompatible architectural movements, structural expressionism and metaphor of national identity have not been brought together in the architectural concept of any of the one hundred tallest buildings in the world. The combination of seemingly unrelated streams of thought in concept generation has the potential of leading to innovative solutions (Jensen et al., 2009), a prime objective in this search.

To fill this knowledge gap, the purpose of this research is to demonstrate that an architectural concept of a tall building's structural expressionism can double as a metaphor of national identity.

2. Design criteria and methods

2.1. China as a case study

A specific country was needed as an example to illustrate a tall building with an expressive structure that was also a metaphor for its national identity. Of the one hundred tallest buildings in the world, 52 are in China (CTBUH, 2024A). This tendency remains strong to this day, of the one hundred tallest buildings completed worldwide during the year 2023, 48 are in China (CTBUH, 2024B). As it is the geographical context where a tall building was most likely to be built, China was selected as a case study for this paper.

2.2. A pair of precursors and a pair of metaphors

When expressing in a building the essence of national identity an architect uses metaphor, it should be of concepts readily identifiable with that culture. If a tall building were proposed as a metaphor of Chinese culture, how would an architect go about it? Would the use of traditional Chinese picturesque forms as concrete metaphors be suitable or is the alternative of an abstract metaphor a more favorable strategy? Should the concern of using innovative metaphors for the sake of novelty be topmost, or should traditional themes be strengthened?

Two of the tallest buildings in the world show the way. Shanghai's Jin Mao Tower and the TAIPEI 101 use the same pair of concepts, the pagoda and the number eight, to express cultural identity. The influence of pagodas is suggested in their elegantly stylized interpretations of these buildings' exteriors, while the number eight plays a more fundamental but less evident visual role in their expressions (Al-Kodmany & Ali, 2012).

Despite their great height, an observer senses the inspiration for the Shanghai and Taipei towers stems from traditional pagodas with their characteristic zigzag silhouettes of overhanging roofs in multi-story compositions marked by vigorous horizontals. Their stylization process firmly expresses these horizontal divisions, while the zigzag silhouette is expressed more subtly, doing away with the overhanging roofs.

The traditional pagoda temple is a concrete physical object that plays the leading role in the Taipei and Shanghai buildings, while a secondary role is played by the abstract number eight. The same pair of metaphors were selected for the tall building envisioned for this paper, but with a notable difference — their roles are reversed — the main expression is the abstract number eight, while the concrete pagoda plays a lesser role.

Being immaterial, numbers are the quintessential abstraction. Lacking concrete physical existence, they can be manipulated in complex and sophisticated ways for their own sake, as if inhabiting a parallel reality. Nonetheless, numbers are indispensable to describe the physical world.

Numbers can be represented with non-phonetical signs like the Arabic *8*, the Roman *VIII* and the binary *1000; or*

words in different languages such as *eight,* 八, आठ and *ocho* — without these signs numbers would be difficult to visualize unless they referred to concrete concepts: 8 pagodas, 4 dragons, 2 yuan.

Using a number that is significant to local culture can be developed as an abstract theme that can be made to resonate in a building. The number should be able to clearly integrate different features of the building in a coherent whole — the quantity of its component parts, its geometric forms, its proportions and its dimensions.

In Chinese secular tradition the number eight is considered auspicious. In its language the sound of the word eight is like the word for wealth or fortune. This belief heightens the appeal of a phone number, a license plate, a flight number, an address or an anniversary with at least one eight in it. The Olympic Games in Beijing were sought for the eighth year of the millennium, while the inaugural ceremony was programmed to begin on its eighth month, eighth day, eighth hour, eighth minute and eighth second.

Going back thousands of years, China has a rich spiritual history with its amalgam of faiths, rituals and traditional values. Beginning in the nineteenth century Chinese authorities began to restrain the practice of religion alleging its superstitious nature and the cause of the country's decline. This curtailing effort continued beyond the mid-twentieth century when the new authorities, tearing down temples and suppressing rituals, were finally successful in destroying most vestiges of the practice of religion (Johnson, 2017). At the same time, the authorities implemented experimental economic policies which were eventually reversed.

Subsequent policies were extraordinarily successful in bringing about an economic boom, lifting millions out of poverty. However, in the aftermath of general prosperity, an unforeseen "spiritual void" also became evident — material abundance left exposed the hollowness of the nation's soul. A religious revival ensued on a surprising scale. In its craving for meaning came the awareness that outdated beliefs and rituals could once again provide a system of values, purpose and faith (Osnos, 2014).

The use of the pagoda as a metaphor for this spiritual awakening is a secondary aim of this exploration. Pagodas are multi-faith expressions of devotion in China in that they serve throughout the country not only as Buddhist, Confucian and Taoist temples but also as houses of worship for the Muslim and the Christian faiths. The word *pagoda* is also a sign, but unlike the word *number*, it represents a concrete physical object rather than an abstract concept — a physical pagoda can be easily visualized without its corresponding sign.

2.3. Design criteria of tall building

Resonating with its significance in Chinese culture and acting as the interface between structural expressionism and national identity, the number eight as an abstract metaphor offers multiple possibilities of expression in this vision of a tall building. The building's aspect ratio would be 8:1, that is its height would be eight times its minimum structural width at ground level. In addition, the building's soaring volume would be made up of eight sections, each generated by a pair of superfloors initially limited to the form of regular octagons.

Another metaphorical expression deals with the building's height. Citing concerns as to the appropriate spatial scale of the city, as well as safety hazards such as fire rescue capabilities, the National Development and Reform Commission (2021) mandated that in China "super-high-rise buildings over 500 meters shall not be built." Nevertheless, the theoretical nature of this paper opens the reflection on the possibility of a taller building expressing the numerical metaphor of national identity. Thus, this paper envisions a megatall building with a metaphorical architectural height of 888 meters.

In concurrence with a growing trend, this megatall building would be multi-functional in nature. At the start of the millennium, among the tallest one-hundred buildings in the world, only 12 were of mixed-use. In 2023 there was an increase to 51 mixed-use buildings among the tallest hundred, more numerous than the total of all other single uses that include office, hotel and residential (CTBUH, 2024C).

Being mixed-use implies varying the floor plate areas due to the differing lease spans of the various functions. Considering the building's structural form, those functions with the largest lease spans tend to be placed nearest to the ground level. Also impacting the larger size of the floor plate areas as the building nears the ground is the need for a larger core due to the greater number of elevators and other services.

These factors suggest for a megatall building a stepped or tapered volume. This has an added advantage of reducing wind loads in comparison to a prismatic volume of equal floor area and height. The tapering of the building continuously varying its cross-sectional shape also helps to suppress massive vortex shedding, as much smaller vortices will be shed at different frequencies and at different heights, dramatically reducing fluctuating crosswind forces (Irwin et al., 2008).

Ground level would serve as the building's pedestrian entry from a generous exterior plaza with trees, water fountains, large-scale sculptures and amphitheaters. The plaza would have ample openings providing views and natural light to the spaces below. In the vast multi-level underground areas radiating from the megatall's footprint there would be retail shopping and eating areas leading to a peripheral public transportation hub serving the region.

At ground level a generous interior atrium space would open vertically around the building's core. This spaciousness would result from the building's ample footprint in relation to the limited lease spans in the perimeter of the diverse functions near ground level. As the building rises

there would be cultural activities such as museums and libraries followed higher up by educational and research facilities, offices, hotel accommodations and, finally, residential units. The building would be topped with a crown that includes a pagoda-inspired structure on top of an observation deck 800 meters above ground level.

2.4. Methods

The qualitative method to test this premise was the development of an architectural concept of a tall building where structural expressionism would be double coded as a metaphor of national identity. Based on the criteria previously defined, the architectural concept would be developed with study models, schematic drawings and written principles.

3. Results

Once the design criteria had been defined, the challenge was to find a way to satisfy them by finding an expressive external structural configuration that would also be a metaphor of China's national identity.

3.1. Structure and geometry of tall building

This exploration is based on the architectural expression of the twin structural principles of diagonal bracing and superstructures of tall buildings proposed by Myron Goldsmith, under the guidance of Mies van der Rohe, in his master's thesis at the Illinois Institute of Technology (Goldsmith, 1953; Goldsmith & Blaser, 1987). In addition, it applies the concept of the tube developed later by Fazlur Khan working closely with Goldsmith (Neveu & Saliklis, 2010). Since the sixties these concepts have been the basis of the structural expressionism of a great number of tall buildings all over the world (Al-Kodmany & Ali, 2016).

To efficiently resist gravity loads as well as wind and seismic forces, a superstructure made up of a tube within a tube configuration would include an exterior structure of a tapered braced tube tied together at appropriate intervals with multi-story trusses to an interior stepped tube.

Geometry was at the heart of the exploration. In accordance with the metaphorical number eight, a footprint of a regular octagon with its eight axes of symmetry approaches the ideal form for a tube. However, no satisfactory solution was found using only a series of ever smaller rotated regular octagons for the superfloors that would generate the tall building's exterior volume.

Thus, eight-pointed stars, resulting from a pair of overlapping squares, were introduced to alternate with regular octagons as the superfloors to generate the tall building's exterior volume. These two forms are inscribed within each other in ever decreasing sizes as the building rises in a mandala-like plan (Figure 1).

The 8 vertices of each octagonal superfloor coincide with the 8 *inner* vertices of a larger eight-pointed star superfloor below, as well as with the 8 *outer* vertices of a smaller eight-pointed star superfloor above. In this case, where up to three vertices of different superfloors coincide in plan view, they are joined by a vertical member (column) of the exterior trussed tube. Furthermore, diagonal members of the exterior trussed tube join non-coinciding vertices of subsequent superfloors.

The eight vertical sections of the building's height require *nine* generative superfloors. This number appeared at first to be dissonant with the numerical metaphor. However, as serendipity would have it, the eight vertical sections of the building's height in proportion to the nine generative superfloors, the fraction 8/9, equals 0.88888888.... This proportion further reinforces the metaphorical number eight in this megatall vision.

The vertices of the generative superfloors coincide with the vertices of the triangle-based primary structure of the exterior trussed tube. However, in a first study model vertical quadrilateral planes appeared where pairs of distinct triangular planes were expected. An apparent setback provided instead an opportunity. The braced tube would be expressed by these asymmetrical diamond shapes as the theme of the *vertical* planes.

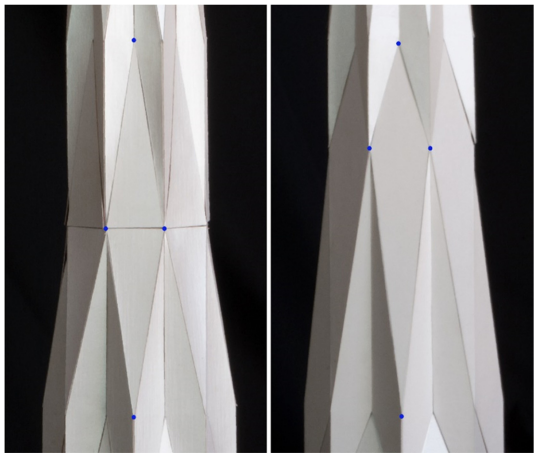
Pairs of *inclined* triangles had a similar fate, but this time intentionally so. In the first study model pairs of inclined triangles intersect awkwardly in that they are almost, but not quite, in the same plane (Figure 2a). To eliminate this dissonance, in the second study model the eight equal divisions of the building's height were modified into alternating dimensions, the taller dimension being $1+\sqrt{2}$ times the shorter one (Figure 2b).

With this change in the building's vertical rhythm, former pairs of inclined intersecting triangles became single inclined symmetrical diamond-shaped planes, similar to the theme of the vertical, though asymmetrical, diamond-shaped planes.

A concrete-steel composite system would make up most of the superstructure. Of the one hundred tallest buildings in China, 86 were built using concrete-steel



Figure 1. Plan views of the nine generative superfloors, alternating between octagons and eight-pointed stars. On the left, close to ground level, rising to the base of the crown on the right.



Figures 2a, 2b. On the left, uniform height between generative superfloors results in pairs of triangles of different slopes. On the right, adjusting heights between generative superfloors results in diamond-shaped planes.

composite structural systems (CTBUH, 2024A).

Where the vertices of the perimeter braced tube coincide with the vertices of the generative superfloors multi-story outrigger trusses tie the perimeter to the core. From the building's foundation rises an octagonal stepped *concrete* core limited in height due to the differential shortening with the exterior composite structure. From this intermediate height rises a trussed composite core all the way up to the base of the crown.

In each of the planes of the four shorter exterior divisions of the building's height secondary bracing further stiffen against lateral loads, analogous to the stiffening action of perimeter belt trusses in an orthogonal structure, though on a much larger scale.

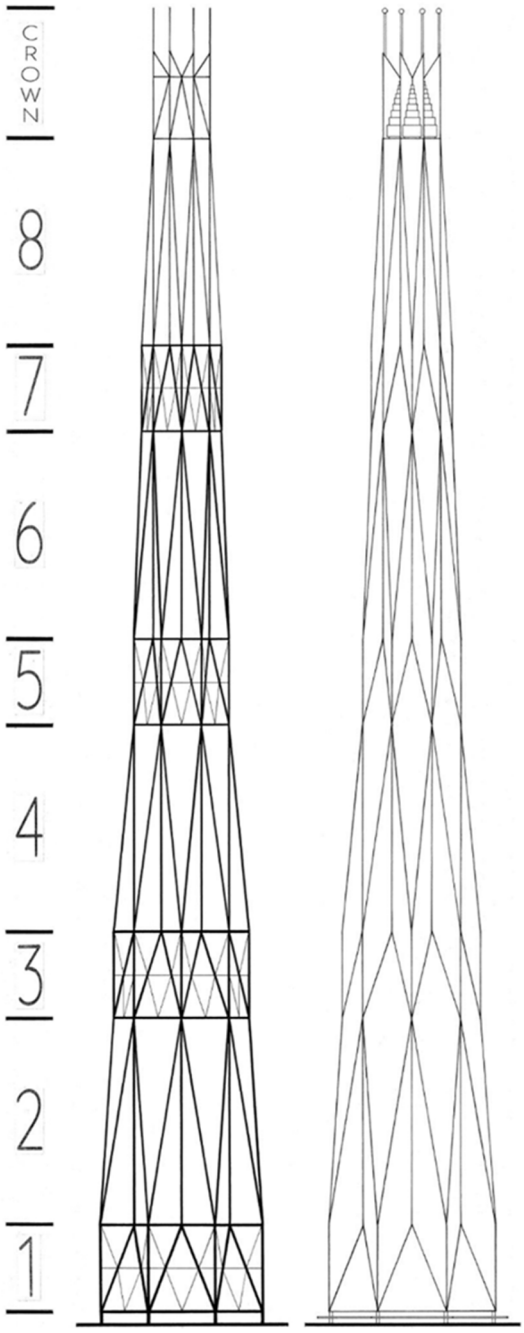
As "slenderness may be more indicative of a system's behavior than more generic parameters like height" (Bartolini & Kijewski-Correa, 2015), the suitability of the proposed structure is suggested by its conservative slenderness ratio of 8:1.

Further inspired by Myron Goldsmith's master's thesis (1953), the feasibility of initially constructing the superstructure without most of the floors could be explored. As the superstructure reached skyward, multiple construction fronts could open on top of each of the completed generative superfloors below. This would offer the potential of reducing construction time with important economic savings.

3.2. Skin and bones

The architectural intention could have been the expression of the intricacy of the superstructure and the increasing relative size of its component parts due to increased loads as the building neared the ground, thus explicitly expressing the nature of the structure (Figure 3a).

However, so as not to overburden an already visually elaborate form, a simplification rooted in Modernist minimalist legacy was deemed at this point a convenient restraint to Late Modern exuberance. Thus, a reflective glass skin would be placed *in front* of the structural skeleton, enclosing the building (Figure 3b).



Figures 3a, 3b. On the left (3a), the bones: view of perimeter superstructure. On the right (3b), the skin: view of the planes of the glass enclosure.

This emphasizes with greater clarity each of the exterior planes and the fractal geometrical nature of the exterior superstructure — the expression of the structure being more forceful, paradoxically, because of its veiled nature. Modernist minimalism is also a factor when

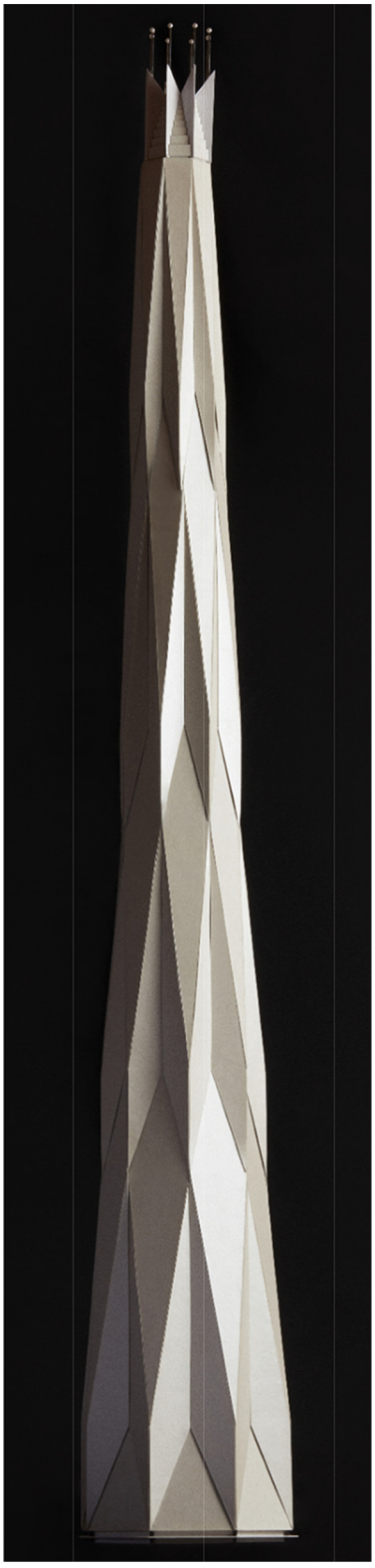
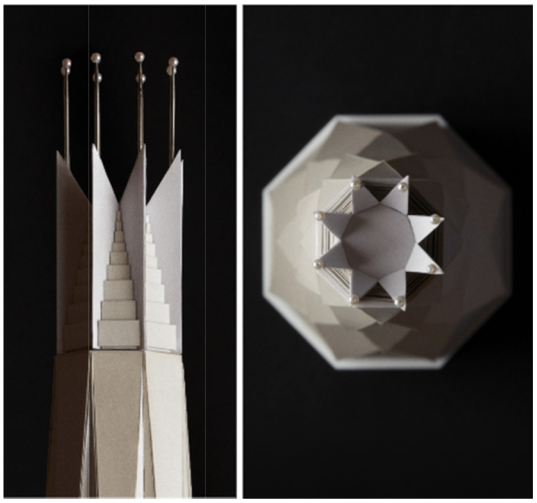


Figure 4. Chiaroscuros of different planes of model of megatall building.

placing the glass skin in front of the structure as issues of temperature differentials of the structure are avoided in the most straightforward manner.



Figures 5a, 5b. 88-meter-high crown with eight spires and an eight-tiered pagoda on top of an observation deck 800 meters above the ground.

Depending on changing light and weather conditions during the day, the building's crisp glass diamond-shaped planes would sparkle in the sun like a polished crystal, the different shades visually contrasting or fusing with each other and with the background sky (Figure 4).

On a cloudy day and in the evening twilight, the glass would appear more transparent allowing for the understated visual presence of the white structure just behind it. At night, as in an x-ray, interior lighting would emphasize the silhouetted bones of the superstructure.

The strong soaring verticality of the building's proportions is a counterpoint to its subtler virtual horizontals that define the eight vertical sections of the building's height. These eight sections, together with the building's crown considered as a ninth section, once again express the numerical metaphor, as the fraction 8/9 equals 0.88888888....

3.3. Spiritual vision

The concrete and abstract metaphors are further expressed in the 88-meter-tall crown where an octagonal eight-tiered pagoda intersects with the eight spires that rise from the building's perimeter, merging with the sky. The pagoda's privileged elevated position on top of the building echoes their traditional placement on hills or high ground serving as a metaphor for the growing spirituality of Chinese society (Figures 5a & 5b).

A spiritual connotation is also suggested by the number eight. A familiar symbol for Buddhism is a wheel with eight spokes representing the Eightfold Path to Holiness which includes the right view, the right intention, the right speech, the right action, the right livelihood, the right effort, the right mindfulness and the right concentration — virtues to be encouraged in a harmonious society.

Spiritual enlightenment is further suggested by the immateriality of the light reflected on the building's

diamond glass planes of ever-increasing vertical proportions as they reach upwards toward the sky.

4. Discussion

4.1. Architectural concept as a narrative

An architectural concept of a building should also serve as its narrative. The purpose of this paper was to develop an architectural concept that would establish, as in a metaphor, the relationship between a pair of apparently unrelated ideas, structural expressionism and national identity. The challenge was to find a solution that would meet these conditions in an architectural, structural, geometrical and metaphorical coherent manner. When the architectural concept was defined it included a study model, conceptual drawings and written criteria. The intention was to create an architectural concept with a narrative so strong that it would complement the image of the building. If successful, competing narratives would have difficulty gaining acceptance.

4.2. Conflict and lesson

The Bank of China Tower is an outstanding example of structural expressionism of a tall building. Of the one hundred completed tallest buildings in the world, it is the only one that is described by the Council on Tall Buildings and Urban Habitat as expressing its national identity by way of structural expressionism. “Designers looked to the form of bamboo shoots — as symbols of strength, growth, and prosperity — for inspiration” (CTBUH, 2024A). Does the bamboo narrative accurately reflect the architectural concept of the building?

At the beginning of its construction, the braced frame megastructure of the Bank of China Tower, conceived by the architect I.M. Pei, was praised as a logical, elegant and economical way to build considering Hong Kong's frequent typhoons and strong earthquakes. “The result is a structural configuration equal in its own right to the eloquence of the architectural design.” During the design process the building's structural expression had been adjusted by Pei following the recommendation of feng shui practitioners (Rastorfer, 1985). Not mentioned in this early article is the bamboo plant as the tower's inspiration.

After its design became public, adverse critics began to denounce the tower as being aggressive, sinister and demonic as well as associating the tower with negative feng shui, death rituals, bad luck, poverty and knife blades. Reacting to the barrage of negative criticism, Pei came up with a “post justified narrative,” emphasizing the tower's positive feng shui as well as its similarity to the bamboo plant in relation to the building's structural principles and to China's national identity (Day, 2015). “To win support for the stepped form among the tradition-conscious Chinese, Pei invoked an image of the trunk of a bamboo pushing upward with each joint: a metaphor for the search for strength and excellence” (Wiseman, 1990).

The architect's son assisted his father in the development of the architectural concept of the Hong Kong tower. “For all the talk of bamboo shoots and feng shui, Sandi Pei says the inspiration for the tower’s distinctive shape was less fanciful" (DeWolf, 2019). This suggests that I.M. Pei's *architectural concept* of the Bank of China Tower was most concerned with a logical and economical structure, focused on highlighting its expressive geometry, but without any stated intention at metaphorical cultural expression. The evidence suggests that the bamboo narrative was introduced later to fend off a barrage of negative criticism.

Pei's experience with the Bank of China Tower serves as a lesson to other architects concerned with architectural concept generation. Just as a cloud formation or a group of stars can be interpreted to resemble a variety of objects, a novel building form can be interpreted in ways that distract from the architect's intention and can be harmful to the building's image.

In this example Pei seems to have struggled to reclaim control of the narrative as he may not have anticipated the critics' fertile imagination in filling a narrative vacuum in such a disparaging manner. From an otherwise exceptional building the lesson is clear — in the process of concept generation architects of novel forms should consider developing them in conjunction with appropriate metaphors with strong narratives, otherwise risking that the public's imagination might wander in outlandish and detrimental ways.

4.3. Unifying themes

An architect with a metaphorical approach considers the cultural setting as a work of art in progress — like an unfinished painting or a jazz improvisation — developing the culture’s characteristic themes in the project at hand. With a metaphorical mindset and considering the country's cultural setting as a work of art in progress, the number eight and the pagoda can be developed endlessly as unifying themes in the architecture of China. Much like the contribution of different musical instruments playing harmoniously, each building could contribute in its own way certain unifying themes. A coherent image on an urban scale expressing regional and national identity would thus emerge.

4.4. Abstract metaphors of national identity

As in a painting, metaphor in architecture may vary in its means of expression. It may be representational, conveying a concrete object in a realistic manner, as occurs with allusions to existing architecture. It also may rely on varying degrees of abstraction where an object or a concept is suggested. Metaphor in architecture can also be totally abstract or non-representational in its expression, being as subtle as suggesting distinctive adjectives that describe a building that echo those adjectives in aspects of its geographical context (Rodriguez-Hourcadette, 2011).

The national identity of tall buildings expressed metaphorically poses its own challenges. Al-Kodmany and Ali (2012) observe that, "Traditional built environments offer limited forms that could inspire skyscraper design. Such environments have been mainly characterized by low-rise architecture, and consequently they contain limited applicability to vertical architecture." As an example, they cite the similarity of the Petronas Twin Towers to the traditional minaret, and wonder, "how many other vertical elements does Islamic architecture offer for tall building design?"

Local culture includes not only the natural and artificial setting of a proposed building, but also the intangible cultural heritage with its historical, artistic, musical, literary and spiritual dimensions that define a sense of place. "Skyscrapers of national significance should in particular be designed so that they retain the heart and soul of the city and the region" (Al-Kodmany & Ali, 2012). Cultural identity can be conveyed in ways other than referencing traditional architecture — perhaps the intangible soul of cultural heritage can best be expressed in tall buildings by means of abstract metaphors.

Abstract metaphors in architecture that express the intangible soul of a culture would most likely be novel forms with little resemblance to traditional cultural forms. But if a building's essence, its DNA as defined by its architectural concept, accurately abstracts the heart and soul of a nation then it would contribute to the richness of the visual identity of that culture. Tradition need not be static; it may evolve with novel expressions that mirror its unique identity.

By their nature, abstract metaphors in architecture are understated and enigmatic. They are slow to reveal themselves as is fitting for architectural works with long lifespans. An abstract architectural metaphor comes alive when intertwined with the collective imagination — observers might wonder about the meaning of a building, only to have its veiled metaphor disclosed by informed locals. From then on, seeing a building in a new light, observers cannot return to their former state of unawareness or disregard the mystery that has been revealed to them.

4.5. Architectural DNA

Because of its generally abstract nature, the vision of the tall building proposed for this paper may not appear at first to be Chinese. The way it looks, its phenotype in genetic terms, has no precedent in any Chinese cultural artifact, including its traditional architecture. However, in its genotype, in its DNA, it cannot be more expressive of Chinese culture. This vision of a tall building could not have been conceived for anywhere else but China.

4.6. Synthesis

As suggested by Stroeter (1994), synthesis in contemporary architecture results from the harmonious weaving of contrasting strands — Postmodern threads of the riches of history, context and metaphor; entwined with Late Modern inventiveness in structure, geometry and technology; further interwoven with Modernist functionalism, clarity, honesty and rationality.

The vision of the tall building developed for this paper aims to do all this. Exalting paradox, this synthesis is the coming together of opposites, not as weakened compromises, but in such a way that the contrasts create vital tension, much like the multicolored threads of an exquisite cloth. It revels in the resolution of dissimilar traits — Modernist minimalism in contrast to Late Modern exuberance, or a Late Modern vision of the future in tension with a Postmodern concern with cultural tradition, or a Postmodern metaphor of national identity in tension with a Late Modern abstraction in an international context.

5. Conclusion

In the mid twentieth century lack of meaning in architecture characterized worldwide tediousness of the expressionless boxes of the International Style. In this state of dissatisfaction emerged two contrasting movements, Late Modernism and Postmodernism, that, despite their differences, coincided in their search for meaning in architecture, though with a range of seemingly incompatible expressive means.

Late Modernism's structural expressionism and Postmodernism's metaphor of cultural identity remain important expressive characteristics of these architectural movements. Perhaps because they stem from contrasting movements there is no example among the world's tallest hundred buildings of an architectural concept combining these two means of expression.

The purpose of this research was to fill this knowledge gap by developing an architectural concept of a tall building combining structural expressionism with metaphors of national identity. This endeavor was carried out with the vision that the combination of seemingly unrelated streams of thought in concept generation may derive in innovative solutions. As the concept of this vision of the tall building evolved, other characteristics from the architectural movements of Modernism, Postmodernism and Late Modernism were incorporated so that the tall building's expression became multi-layered in meaning.

A metaphor of national identity, whether it be concrete or abstract, helps to anchor a building to the uniqueness of its cultural context in a mutually reinforcing symbiosis. For its part, structural expressionism visually highlights the technical means that counteract the place-specific seismic, wind and gravity forces acting on a building. Rather than being separate components in a unified composition, in the vision of the tall building developed for this paper structural expressionism is double-coded as a metaphor of national identity.

By using Chinese cultural identity as a case study, this

exploration suggests that in tall buildings a wide variety of modes of structural expressionism could convey through metaphor the national identities of the most varied cultures. An ample field of exploration in academic research and professional practice of the architectural expression of tall buildings could thus follow.

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References

Al-Kodmany, K. and Ali, M.M. (2012) "Skyscrapers and placemaking - Supporting local culture and identity." International Journal of Architectural Research, July, pp. 43-64.

Al-Kodmany, K. and Ali, M.M. (2016) "An overview of structural and aesthetic developments in tall buildings using exterior bracing and diagrid systems." International Journal of High-Rise Buildings, Dec., pp. 271-291.

Armstrong, P.J. and Kapp, P.H. (2022) "Preserving the past or past preserving - Sustaining the legacy of postmodern museum architecture." Built Heritage 6, 12, pp. 1-19.

Bartolini, A. and Kijewski-Correa, T. (2015) "A uniform vernacular for structural systems in modern tall buildings." CTBUH New York Conference, pp. 551-552.

Casakin, H. (2019) "Metaphors as discourse interaction devices in architectural design." Buildings 9, 2: 52, pp. 1-14.

CTBUH, Council on Tall Buildings and Urban Habitat (2023) "Height criteria for measuring & defining tall buildings." https://cloud.ctbuh.org/CTBUH_HeightCriteria.pdf

CTBUH, Council on Tall Buildings and Urban Habitat (2024A) "Tallest buildings." https://www.skyscrapercenter.com/buildings

CTBUH, Council on Tall Buildings and Urban Habitat (2024B) "Countries by number of 300m+ buildings." https://www.skyscrapercenter.com/countries?list=buildings-300

CTBUH, Council on Tall Buildings and Urban Habitat (2024C) "Year in review - Tall trends of 2023." https://www.skyscrapercenter.com/year-in-review/2023

Day, K. (2015) Fengshui as a narrative of localisation - Case studies of contemporary architecture in Hong Kong and Shanghai. PhD Thesis, Swinburne School of Design, Melbourne.

DeWolf, C. (2019) "Hong Kong's modern heritage, part xi - The Bank of China tower." Zolima City Mag, Hong Kong. Https://zolimacitymag.com/hong-kongs-modern-heritage-part-xi-the-bank-of-china-tower/

Eilouti, B. (2018A) "Concept evolution in architectural design - An octonary framework." Frontiers of Architectural Research, Volume 7, Issue 2, June, pp. 180-196.

Eilouti, B. (2018B) "Concept as the DNA for Morphogenesis: A Case Study of Contemporary Architecture. Handbook of Research on Form and Morphogenesis in Modern Architectural Contexts, Chapter 14, pp. 283-309.

Georgievich, V.V. (2016) "Is architecture a frozen music or a moving melody?" Philosophica Cinema, pp. 1-3.

Goldsmith, M. (1953) "The tall building: the effects of scale." Master's thesis, Illinois Institute of Technology, Chicago.

Goldsmith, M. and Blaser, W. (1987) Buildings and concepts. Rizzoli, New York.

Gur, M. and Sen, E. (2019). "Visualizing music as a basic design assignment in architectural education." European Journal of Educational Research, Volume 8, Issue 1, pp. 123-139.

Irwin, P.; Kilpatrick, J. and Frisque, A. (2008) "Friend or foe, wind at height." Proc, CTBUH 8th World Congress, Dubai, pp. 1-7.

Jencks, C. (1977) The language of post-modern architecture. Rizzoli International Publications, New York.

Jencks, C. (1980) Late modern architecture and other essays. Rizzoli International Publications, New York.

Jencks, C. (2013) "Architecture becomes music." The Architectural Review, London, Vol. 233, Iss. 1395, May, pp. 91-108.

Jensen, D.; Weaver, J.; Wood, K.; Linsey, J. and Wood, J. (2009) "Techniques to enhance concept generation and develop creativity." Proc. American Society for Engineering Education, pp. 1-22.

Johnson, I. (2017) The souls of China - The return of religion after Mao. Pantheon Books, New York.

Lakoff, G. and Johnson, M. (1980) Metaphors we live by. The University of Chicago Press, Chicago.

Larson, M.S. (2018) Behind the postmodern facade: Architectural change in late twentieth-century America. University of California Press, Berkely.

NDRC, National Development and Reform Commission (2021) Notice on strengthening infrastructure construction project management to ensure project safety and quality. https://www.ndrc.gov.cn/xxgk/zcfb/ghxwj/202107/t20210706_1285472.html

Neveu, M.J. and Saliklis E.P. (2010) "Myron Goldsmith: The development of the diagonally braced tube." Proc. 1st International Conference on Structures and Architecture, pp. 821-826.

Osnos, E. (2014) Age of ambition - Chasing fortune, truth and faith in the new China. Farrar, Straus and Giroux; New York.

Rastorfer, D. (1985) "The logic of eccentricity." Architectural Record, Sep. pp. 137-143.

Rodriguez-Hourcadette, A. (2011) Metaphor in contemporary architecture of Canada. https://www.amazon.ca/Metaphor-Contemporary-Architecture-Rodriguez-Hourcadette-ebook/dp/ B00993663O

Stroeter, J.R. (1994) Teorías sobre la arquitectura. Trillas, México.

Venturi, R. (1966) Complexity and contradiction in architecture. The Museum of Modern Art, New York.

Windari, T. (2021) "National identity attachment and its variables." Journal of International Women's Studies: Vol. 22: Iss. 3, pp. 81-95. https://vc.bridgew.edu/cgi/viewcontent.cgi?article=2413& amp;context=jiws

Wiseman, C. (1990) I.M. Pei - A profile in American architecture. Harry N. Abrams, New York.