

Metabolism: Restructuring the Modern City

ZHONGJIE LIN

University of North Carolina at Charlotte

Visionary plans of cities often serve as vehicles of their authors' social ideals. This is more conspicuous in societies that undergo dramatic transitions politically, economically, or aesthetically. Italy in the early Renaissance, France during the period of great revolution and Europe as a whole in the turn of the twentieth century provided some of the best examples of such utopian projects. Japanese society in the late 1950s and 1960s turned out to be another fertile land for visionary city planning, which was closely associated with the Metabolist Movement. Japan's explosive economic growth and dynamic urbanization during this period, interwoven with complex political and cultural re-orientations after the end of World War II, stimulated the architects to create radical urban schemes. They envisioned the sea and the sky as human habitats of the future, and proposed that cities would grow in the same way as the evolution of an organism. Through their schemes, the Metabolists not only set off to re-structure the rapidly expanding cities, but aspired to seek an alternative social order for the world.

At the root of the Metabolist urban utopias was a particular notion of "city as process," which stood in opposition to the Modernist paradigm of urbanism. Inspired by the rapid expansion and unpredictable changes characteristic of contemporary cities, the Metabolists envisioned no physical destination of the city's development, but rather created patterns "which can be followed consistently from present into the distant future."¹ They approached the city as a living organism consisting of elements with different "metabolic cycles": some were persistent while others were ephemeral. To accommodate the city's growth and regeneration, they advanced

transformable technologies based on prefabricated components and the replacement of obsolete parts according to their metabolic cycles. This notion of growth and change at the scale of a city ultimately overthrew traditional theories of city planning and demanded a redefinition of several critical relationships in design: order/disorder, collective/individual, stability/transience, regularity/spontaneity, and totality/fragmentation. Therefore, an investigation of the Metabolist urban utopias and their representations will shed a new light on our pursuit of new approaches to urbanism in the present day.

Focusing on the particular notion of the city as process, this paper examines the Metabolists' essential ideas about urban growth and city design. I will analyze the Metabolist concepts such as the "metabolic cycle" and the "artificial terrain," and discuss their design and political implications in the modern society. Based on the reciprocal relationship between physical environment and social structure, I want to argue that the Metabolist urban concepts were shaped by a deep cultural concern and a profound awareness of technological progress. Their visionary projects were in fact the architects' response to the particular urban and cultural crises in postwar Japan, and embodied the architects' ideals of the modern society.

A New Order for the City, a Dream of a New Society

The Metabolist movement was launched in 1960, when a group of young architects and designers published their futurist manifestos entitled *Metabolism: the Proposals for New Urbanism* on the occasion of the World Design Conference in Tokyo.² The initial members

included architects Kiyonori Kikutake, Masato Otaka, Fumihiko Maki, Noriaki Kurakawa, the architectural critic Noboru Kawazoe, the industrial designer Ekuo Kenji, and the graphic designer Kiyoshi Awazu. Though they never became formal members of Metabolism, Kenzo Tange and Arata Isozaki were also actively involved in the movement. Their urban projects exhibited strong proximity to the Metabolist concepts. Especially, Tange was acknowledged as the mentor of these younger architects and virtually the creator of the Metabolist group by chairing the program committee of the World Design Conference. His Plan for Tokyo, also completed in 1960, represented a sophisticated synthesis of the Metabolist urban concepts on a more comprehensive scale. It served as a polemical alternative to the official plans of Tokyo, and posed itself to fundamentally transform the urban structure of this mega-city for the imminent arrival of the post-industrial age.

The Metabolist projects, which often proposed the sea and the sky as human habitats, appear wholly impracticable at first glance. However, they were not simply illusive fantasies that architectural historians have tended to portray them as. Just as the Modernist precursors like Bruno Taut and Le Corbusier, Tange and his disciples were inspired by the prospect that a revolution of architecture and a radical reconstruction of cities, more than anything else, would lead to a new order for the modern society. The Metabolists looked at the existing big cities as cancers of the society. In their point of view, the confusing urban structure of Tokyo, with its labyrinth-like street system, was the embodiment of the relics of Japan's old-fashioned feudal system. It hindered the continuing development of the city. The Metabolists thus dreamed of new cities which, once built, would provide the environment for the true order they saw as inherent in an advanced industrial society. What they sought was not an improvement of the city, however comprehensive, but a revolution in the way it was built and operated.

The renowned architectural historian Teiji Itoh once recalled his conversation with Isozaki some 30 years ago. The ambitious young architect had told him:

"Tokyo is hopeless. I am no longer going to consider architecture that is below 30-meters in height. ... I am leaving everything below 30 meters to

others. If they think they can unravel the mess in this city, let them try. I will think about the architecture and the city in the air above 30 meters. An empty lot of about 10 square meters is all I need on the ground. I will erect a column there, and that column will be both a structural column and a channel for vertical circulation."³

This was how Isozaki's famous scheme "City in the Air" came about. [Fig. 1] At that time, the building code in Tokyo prescribed that no structure could be built higher than 31 meters. This height limit was set after the 1923 Great Kanto Earthquake that destroyed the majority of the city. However, even after another comprehensive destruction in WWII, no effective measure was taken to fundamentally improve the physical layout of the city. Tokyo's medieval urban layout remained, which was characterized by numerous zigzag alleys and high-density low-rise buildings. Isozaki determined that he would not accept the constraint of building height as a premise in design. However, instead of erasing the old city as Le Corbusier did in his Voisin Plan for Paris, Isozaki decided to leave it alone. What he did was to erect several cores, each occupying only "10 square meters" or so on the ground and housing vertical circulation and other necessary equipments. When the cores rose over the 31-meter level, cantilevered members began to grow horizontally from the cores in various directions. They carried the useable spaces, such as housing and offices, forming self-contained human habitats in the sky. The whole image was like a few gigantic trees standing out from a dense forest of shrubs.

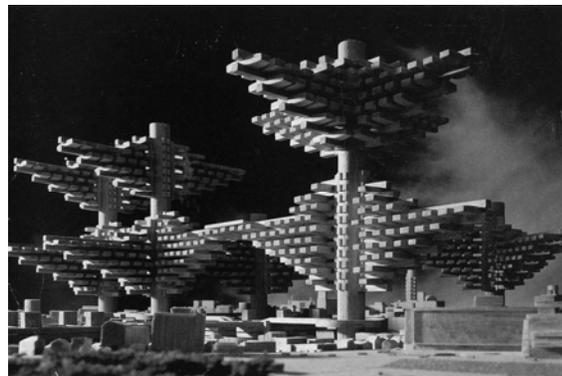


Fig. 1 Arata Isozaki, City in the Air, 1961

Isozaki's uncompromised attitude was shared by all the Metabolists. Facing the confusion and chaos of a rapidly changing society, these architects called for drastic operations to create a new pattern for modern cities that would eventually revolutionize the existing social structure. It was based on such utopian idea that they developed a series of urban design concepts, starting from the notion of city as an organic process, which constituted Metabolism's most significant contribution to contemporary urbanism.

City as Process

The classical utopian schemes were always presented as already completed. Their structures formed a perfect whole that gave no hint of development or change. The same applied to concepts of ideal city. Although they provided plans for total transformation and often acquired a wealth of brilliant detail, they gave no indication that society does evolve. It was in this sense that Robert Fishman claimed: "The ideal city has no history; indeed, it is an escape from history."⁴

The Metabolists, however, suggested that cities should be able to evolve over time. They declared that their proposals were in fact created for change. This notion laid the foundation of their city designs, and was evident in the name of the group, "Metabolism."⁵ In contrast to the general conceptions that viewed the city as a passive object, the Metabolists considered it as a living and mutable entity, with an inherent aptitude for change. To the Metabolists, the primary characteristic of the contemporary city lay exactly in its capacity of ceaseless transformations, just like any organism in the nature.

The Metabolist concepts of the city as process thus stood in stark contrast with the conventional methodology of "master planning," which tended to envision a final, stable state of the city, and regarded the task of city planning as providing the best layout of the city with a reasonable zoning. The Metabolists, however, suggested that there should be no physical destination for a city, as it continued to grow and renew itself. The transformation of city has been accelerated in the modern age. Under this circumstance, any blueprint for the city would become irrelevant. Instead of a master plan, the Metabolists saw

any given cluster as self-developing, self-regenerating, i.e. as a metabolic structure that would be a unity in each stage of its growth.

The notion of city as process practically underlay the majority of the Metabolist urban schemes. Kikutake claimed that his Marine City could accommodate any future external growth and internal regenerations.⁶ On one hand, the towers that served as the main structure of the city could continue to grow as population increased. The model of Marine City intentionally showed a cluster of tower-shaped communities in different stages of growth. [Fig. 2] On the other hand, the individual living cells attached on the towers would conduct a process of self-renewal: new cells would be added; old ones might die; and when the cells became obsolete, they would be replaced. Kurokawa's scheme of Helix City embodied the same idea. Inspired by the recent biological discovery of DNA structure, the architect proposed a double helix structure for the city and anticipated that it would perform the organic process of duplicating itself, just like DNA does.

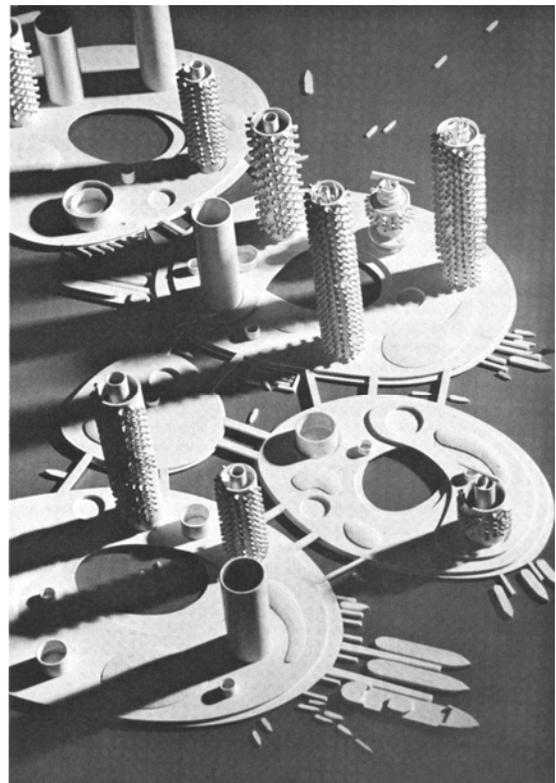


Fig. 2 Kiyonori Kikutake, Marine City, 1959

In the Tokyo Bay Plan, Tange presented the concept of city as process in a different way: the linear city. [Fig. 3] He compared his linear project to a vertebrate with a central spine as its main structure. The spine would continue to extend as the creature grew, while maintaining an organic whole.⁷ Tange envisioned that the linear city would extend gradually from the existing center of Tokyo across the bay, and reach Chiba on the opposite shore in twenty years.

By stressing the change and transformation of the city, the Metabolists introduced the fourth dimension into the city planning, in which the dynamic elements of time played a crucial part. Their schemes anticipated change and sought to structure it. They thus transcended the ideal city proposals in the past by demanding incompleteness, open-endedness and fluidity. These characters were expected to provide a sort of vitality that was missing in the existing cities.



Fig. 3 Kenzo Tange, Plan for Tokyo, 1960

The analogy of a city to an organism that the Metabolists invoked was not without precedent. The Scottish urban theorist Patrick Geddes had articulated this city/organism analogy in his *Cities in Evolution* in 1915.⁸ With this biological concept, he studied the city's sophisticated relationships to both history and the region.⁹ Ernest Burgess, a socialist of the Chicago

School, had also written an article entitled "The Growth of the City" (1925), in which he described the unplanned growth patterns of the city as "Metabolism."¹⁰ Applied this concept in the study of the urban population patterns in Chicago, he suggested that many questions could be answered by "thinking of urban growth as a resultant of organization and disorganization analogous to the anabolic and katabolic processes of metabolism in the body."¹¹

However, Kawazoe declared that what distinguished the Metabolist concept of the city from their Western counterparts lay in the notion of reproduction. He argued that the Marxist understanding of metabolism centered on the exchange of matter between man and nature as represented by production. Reproduction, however, with its emphasis on renewal as well as propagation, was based on "information, tradition and culture, as symbolized by the genes."¹² As opposed to the European "organic-body" analogy, the Metabolists insisted that their theory could not be reduced to a purely biological model. Rather, the city as process demanded a historical and cultural accountability that was particularly attributed to Japan.

It must be the dramatic urban transformation in Tokyo in the postwar years that have stirred the strongest sense of city as ever-changing entity. Though burned into ash in the war, Tokyo revived at a speed that had hardly been seen before. Its population soared from less than three million to nearly ten million in fifteen years. Large areas of rural field in the periphery were soon transformed to new urban districts. The city became larger and more prosperous than ever before. On the other hand, the prosperity from 1955 contributed to significant changes in urban life, including the popularization of motors and TV. The frequent replacement of merchandise and the accelerated movement speed led to a new urban culture centered on consumption. Kawazoe wrote:

"Movements within the city of Tokyo are rapid and drastic. Buildings that were here yesterday are gone today, and the morrow will surely bring more. There is probably no other city in the world where the rate of change is so startling. Within this movement exist the excitement, the joy, and the sadness of the city. And from this movement will doubtless spring the buds of a new culture."¹³

The Metabolists, who observed these dramatic changes, could not help but seeing the city in the image of an organism, in a constant process of change and evolution, and projecting this image to its future development.

The observations of rapid change in the contemporary world, however, were combined with a special sensation towards Japan's cultural tradition. It indicated a different dimension embodied in the Metabolist concept of the city as process. In an article published in *Architectural Design* in 1964, Günter Nitschke noted that the Eastern philosophy, originating from China and most prominently presented in the book of *I Ching* [Book of Transformation], tended to see the world in the constant mutation of all things.¹⁴ This complex notion of "change" has deeply influenced the Japanese life since ancient times, and been reflected in various works of arts, including language (Kanji), religion (Zen and Shintoism), and architecture (Tea House). Especially, the periodic reconstruction of Ise Shrine presented the dialectic relationship between eternity and ephemerality in a striking way. Every twenty years, the grand shrine in Ise is to be torn down, and a new one is built on an immediately adjacent site, never changing more than minor details. This symbolic rebuilding, celebrating the fundamental idea of transformation and regeneration in Shintoism, became the critical source of inspiration for Metabolism. The first ritual reconstruction of Ise after World War II had sent a strong political message. It was regarded as the symbol that Japan had regained its political and cultural autonomy. Architects thus looked to this tradition for new inspirations. The Metabolists, in particular, were enthusiastic in incorporating this idea of transformation and regeneration in their urban schemes. This influence was manifest in Tange and Kawazoe's monograph entitled *Ise: Prototype of Japanese Architecture*, published in 1965.¹⁵ They tried to combine this unique tradition with current urban conditions to create a new design approach that could cope with the rapid growth and unpredictable changes characteristic of the contemporary city.

Metabolic Cycles

In order to accommodate the growth and regeneration of the modern city, the Metabolists set out to establish a system that

would give due consideration to future growth. The key of establishing such a system was to distinguish between elements of different durations in the city, which they called the "metabolic cycles." The Metabolists saw the city as composed of two types of objects: some were inclined to change and the other tended to be more stable. The large-scale urban infrastructure and the reformation of natural topography, such as dams, harbors, and highways, required a longer period of time, while small-scale construction like houses and the everyday articles were in a shorter cycle of change. The modern consumption society has made this distinction more conspicuous than ever before. Corresponding to the different "metabolic cycles," the Metabolist pushed elements in the city to two extremes of scale, often consisting of a megastructure and numerous individual cells. For instance, Kikutake's Tower-shaped City was characterized by the contrast of a tower structure and individual housing units that were plugged on it; Otaka and Maki's enormous artificial ground, spanning over Shinjuku station, served as a "permanent" platform upon which the commercial, business and entertain clusters could grow.

The differentiation between the "permanent" and the "transient" elements became possible because of the modern building technology of prefabrication. While the megastructures should be constructed on site, the cells were intended to be prefabricated so that they would be installed on the megastructures with ease, and could be moved or replaced whenever needed. In so doing, the megastructures and the cells would maintain a highly flexible relation.

Japanese building tradition provided inspirations from another perspective. Japan's wood architecture had long been an important influence on modern architecture, and impressed many Modernist for its simplicity in form and clarity in structural logic. However, no attempt had been made before to apply its design principles on the scale of a city. Kikutake, who had been involved in several restoration projects of historic structures, was particularly inspired by the replaceability of components in wood construction. He studied the relationship between the major structure and small wood members, as well as the joints that connected the two. From this point, Kikutake developed the concept of the so-

called "system of replacements," which applied to various scales of design from a house to a whole city.¹⁶ To him, the relationship between a megastructural city and its housing units made little difference from the relationship between the wood framework of a Buddhist temple and its components like bracket sets or slide windows. They maintained relative independence, and had different "metabolic cycles."



Fig. 4 Noriaki Kurokawa, Nakagin Building, Tokyo, 1972

The design approach based on different "metabolic cycles" was employed by the Metabolists in several projects. Especially, the combination of megastructure and cell, a dramatic representation of the Metabolists' concept of city as process, has become the trademark of the group. Although it has never been realized as a city, some managed to carry out this concept symbolically in building projects, prominently among them Kurokawa's Nakagin Building and Tange's Shizuoka Shinbun Building. [Fig. 4] They were both intended as experiments of the Metabolist concepts proposed for a larger scale. Ironically, their constructions remained regular reinforced concrete structure, and the cells are indeed unmovable and irreplaceable. Without any support of both technical and social ratification,

they became isolated monuments to showcase the aesthetics of "incompleteness."¹⁷

Artificial Terrain

The combination of megastructure and cell indicated the Metabolists' understanding of relationship between the collective and the individual. These architects were obviously aware of the conflict between, on one hand, the mass production and standardization in modern society that their schemes relied on, and on the other hand, the social values of freedom and democracy that they were equally concerned about. However, they insisted that the modern production pattern left enough room for individual opinions and tastes, and they by no means wanted to build a homogeneous society. Aiming to reconcile a general spatial order with maximum personal freedom, the Metabolists based their schemes on the concept of "artificial terrain." Kurokawa's Agricultural City, envisioning a whole community built on an enormous concrete slab elevated over the natural land, exemplified this approach.

The concept of artificial terrain was apparently inspired by Le Corbusier's early schemes for South American and African cities. Particularly, his 1931 project for Algiers called "Plan Obus," envisioning a massive bookcase-like structure carrying 180,000 dwelling units and an elevated super highway, served as a direct model for a number of Metabolist projects. Tange appropriated this idea in his Boston Bay scheme of 1959 and later the Plan for Tokyo. The Boston project was characterized by multi-level concrete platforms supported by two triangular megastructures. [Fig. 5] In addition to various public spaces, these artificial grounds would provide "ample room for unrestrained choices on the part of the residents."¹⁸ Although housing units would be assembled from factory-built components, the details and decorations of the houses were also left to the discretion of the residents. Therefore, Tange claimed that this project had the "significance of enabling the residents to identify themselves with their location within the over-all system."¹⁹

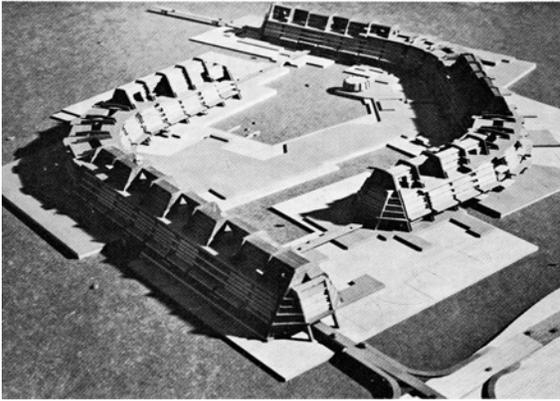


Fig. 5 Kenzo Tange, Boston Bay Project, 1959

Through the concept of artificial terrain, the Metabolists defined a new relationship between the nature and the human being. Starting from the idea that the land does not belong to any individual, the objective of creating artificial sites was, first of all, to liberate the land as public property and cause it to revert to its natural state. It also allowed architects to create new forms of dwelling, often based on construction of *pilotis* or artificial islands on the sea. More importantly, the artificial terrain would provide a generic framework upon which human creativity could be brought to play in a variety of individual constructions. The artificial terrain and the individual housing units constituted the fundamental components in a Metabolist city. While the former would be built with public investment and designed by the city architect, the latter would be the outcome of individual activities and reflected the diverse needs and tastes of human beings. The houses should be made up of prefabricated components, but there would be many different ways of combinations in installing these prefabricated parts, which allowed people to express their individuality.²⁰

The Metabolists' urban concepts, emphasizing individual creativity and freedom in movement, seemed to coincide with the ideas of the Situationist International in Europe. There is no doubt that the Metabolists, like the Situationists, viewed freedom and individuality as fundamental human values. However, they were equally, if not more, concerned about rationality in the shaping of modern society. Just as the artificial land was the foundation of all the individual constructions, planning should be the foundation of freedom and individual creativity. The Metabolists tried to strike a

balance between the rational system of planning and the spontaneous creations. This task was obviously difficult due to the inherent contradiction between these two. Just as Peter Smithson observed, "from the time of Le Corbusier's Algiers project onwards, the romance of the idea of 'each man building his own house' on man-made platforms stands unsupported by a demonstration of how it is to be done."²¹ In the Metabolist cities, the paradox between the need for centralized authority and the striving for individuality always existed. This, to some extent, explains the fact that almost none of their urban schemes were realized.

Conclusion

Although the actual attainability of their planning approach remained problematic, the Metabolists' urban visions represented efforts to introduce a new urbanism to the imminent post-industrial city, channeling its growth both spatially and temporally. The megastructural forms they proposed in the 1960s appear inflexible and dated nowadays, but many themes they broached become astonishingly timely: the observation of urban transformation, the appreciation of incompleteness, the concern of relationship between the collective and the individual, and the biological conception of urbanism. They confirm the meaning of such utopian speculations: their value lies not in the relation to present practice but to a possible future. They overstep the immediate reality to depict visions that provide new insights and inspire people to move on.

What has changed dramatically in the last few decades is the rate of technological change, occurring at a speed and scale that had never been experienced in the past. It is in this sense that the Metabolist theory of "city as process" remains provocative in studying the emerging phenomena of urbanism, as the accelerating flows of population, materials, and information within the cities of a new electronic era have widened the gap between "permanent" and "transient" elements. The networks carrying flows of information now reach every part of the world, creating a virtual but truly unified community, which has revolutionized the conceptions of space as well as the social structure in reality. This undoubtedly affords new considerations of the Metabolist utopian projects.

Endnotes

- ¹ Noboru Kawazoe, "City of the Future," *Zodiac* 9 (1961): 100.
- ² Kiyonori Kikutake et al, *Metabolism: the Proposals for New Urbanism* (Tokyo: Bijutsu shūpansha, 1960).
- ³ Teiji Itoh, "Moratorium and Invisibility," in David Stewart ed., *Arata Isozaki: Architecture 1960/1990*, exhibition catalogue of "Arata Isozaki: Architecture 1960/1990" (Tokyo, 1991), 90.
- ⁴ Robert Fishman, *Urban utopias in the twentieth century: Ebenezer Howard, Frank Lloyd Wright, Le Corbusier* (Cambridge: MIT Press, 1982), 95.
- ⁵ In fact, the literal translation of metabolism in Japanese, *shinchin taisha*, embodied the idiomatic sense of "out with the old, in with the new." It reflected the architects' notion of a city capable of continuous growth and renewal.
- ⁶ Kikutake had been trained as a medical student before turning to architecture. This might have in part contributed to his notion of city as organism. See David Stewart, "Irony and Its Fulfillment," in Isozaki Arata, *Arata Isozaki: Four Decades of Architecture* (New York: Universal Publications, 1998), 19.
- ⁷ Kenzo Tange, *A Plan for Tokyo, 1960: Toward a Structural Reorganization* (Tokyo: Shikenchikusha, 1961), 13.
- ⁸ Patrick Geddes, *Cities in Evolution: An Introduction to the Town Planning Movement and to the Study of Civics* (London: William & Norgate, 1915).
- ⁹ Trained as a biologist, Geddes was an ardent advocate of the theory of evolution. This had fundamentally influenced his urban thinking. He was also well known for introducing the concept of "region" to town planning, and arguably the first planner to recognize the importance of historic city centers. His urban theory combined all these concerns and corresponded to the geographical, historical, and spiritual aspects of the city. For a detailed study of Geddes' urban theory, see Volker M. Welter, *Biopolis: Patrick Geddes and the City of Life* (Cambridge: MIT Press, 2002).
- ¹⁰ Erness Burgess, "The Growth of the City: An Introduction to a Research Project," in Robert Park et al eds., *The City* (Chicago: University of Chicago Press, 1925), 47-62.
- ¹¹ Burgess, 53.
- ¹² Noboru Kawazoe, "Thirty Years of Metabolism," in *Thesis, Wissenschaftliche Zeitschrift der Bauhaus-Universität Weimar*, 44 (1998): 146-151; originally published in the Japanese journal *Approach* 116 (Tokyo, 1991).
- ¹³ Noboru Kawazoe, "A New Tokyo: In, on, or above the Sea?" in *This is Japan* 9 (1962): 65.
- ¹⁴ Günter Nitschke, "The Metabolists in Japan," *Architectural Design* (Oct. 1964): 509-524. Laotse, *I Ching*, trans. Richard Wilhelm (Princeton: Bollinggen, 1967).
- ¹⁵ Kenzo Tange and Noboru Kawazoe, *Ise: Prototype of Japanese Architecture* (Cambridge: MIT Press, 1965).
- ¹⁶ Kiyonori Kikutake, "On the Notion of Replaceability," *World Architecture* 32 (1995): 26-27.
- ¹⁷ The same can be said to Tange's Yamanashi TV and Broadcasting Center in Kofu, on which Reyner Banham later commented: "a monolithic statue commemorating an ideal of adaptability that was practically impossible to realize in built fact." Reyner Banham, *Megastructure: Urban Future of the Recent Past* (New York: Harper & Row, 1976), 111.
- ¹⁸ Kenzo Tange, "Towards Urban Design," in *Japan Architect* (Jan. 1971), 31.
- ¹⁹ Ibid.
- ²⁰ Noboru Kawazoe, "City of the Future," *Zodiac* 9 (1961): 100.
- ²¹ Peter Smithson, "Reflections on Tange Kenzo's Tokyo Bay Plan," *Architectural Design* 34 (1964): 480.