

2. ARCHITECTURE AS ATMOSPHERIC MEDIA

Tange Lab and Cybernetics

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Much of the current debate and critical approaches to media ecology and ubiquitous computing echoes architectural discourse on the media-saturated urban environment from the 1960s. It was then that the rapid growth of telecommunication networks and the intensification of data traffic prompted architects to consider urban space in relation to technical media. For these architects, thinking about urban design became inseparable from thinking about communication and information technologies, and architectural criticism became contiguous with media theory. While an echo from the past is only part of the conversation in the present, the reverberations between Japanese architectural theory from the 1960s and current media theory are worth considering, if only to contextualize the historical specificity of the former and to gain a comparative perspective on the latter.

The current discussion of technical media in North America is increasingly inflected by ecological and environmental factors. Mark Hansen, for instance, has argued that twenty-first-century media—from social media to data mining to microsensor technologies that imperceptibly shape our social milieu—is more “elemental” or “atmospheric” than twentieth-century media, whose temporal vectors are directed toward the past and the present while directly addressing human users. Characterized by the anticipatory temporality of the future, and embedded in computational processes that operate below the thresholds of human perceptual experience, twenty-

first-century media, in contrast, offer new sensory affordances that radically reconfigure the relationship between humans and their environments. “Human experience is currently undergoing a fundamental transformation caused by the complex entanglement of humans within networks of media technologies that operate predominantly, if not almost entirely, outside the scope of human modes of awareness (consciousness, attention, sense perception, etc.),” argues Hansen.¹

What he calls the constitutive doubleness of these networked media thus derives from their dual capacity to mediate our sensory access to the world, and to affect this access by becoming constitutive of the very sensory data of the world. One of the most provocative points Hansen makes in this reformulation of media lies precisely in his characterization of media as atmospheric. Media has become our atmosphere, seamlessly blending into our surroundings, like the air that we breathe and that envelops us.

Although operating from a different perspective, John Durham Peters makes a similar observation in his recent book, *The Marvelous Cloud*. The ubiquity of digital devices, argues Peters, “invite[s] us to think of media as environmental, as part of the habitat.”² Contemporary technical media are again conceived as atmospheric and elemental, actively blurring the boundary between artificial and biological environments. Taking this observation as a point of departure, Peters calls attention to the conceptual affinity between medium and milieu: “*Medium* has always meant an element, environment, or vehicle in the middle of things.” Tracing the etymological root of the term “media” back to the ancient notion of natural environment, he then demonstrates how the instrumental understanding of an intermediate agent, articulated by eighteenth-century philosophy, paved the way for the modern understanding of media as man-made channels and processes of human communication: “The concepts of *medium* and *milieu* have long orbited each other, as twin offspring of Aristotelian material and the Latin word *medius*, middle.”³

Returning to this older connotation of media allows Peters to conceive of environments—from natural elements such as water and fire to cultural artifacts and infrastructures—as media, that is to say, as means and processes of communication not only for humans but also for nonhuman agents. While Hansen’s and Peters’s theoretical premises are different, they share a common ground: to rethink media as atmospheric, as an immediate given.

One discipline in which much thought has gone into this presupposed connection between media and milieu is architecture. Although the current discourse on atmospheric media in North America complicates our

understanding of the ubiquity of electronic media through the framework of the environmental given, the Japanese architectural discourse of the 1960s sheds a different light on this situation. It allows us to see how specific economic, political, and epistemic conditions contributed to this environmental understanding of media in the first place. The Japanese situation, in other words, shows that the connection between media and milieu is a historical construct.

This chapter will examine the historical connection between media and milieu articulated by Japanese architects at a time when the cybernetic concepts of communication, control, and feedback first entered architectural criticism. The aim here is to trace what might be called “the cybernetic turn” of Japanese architecture during the 1960s in order to tease out its relevance to the current discussion of atmospheric media. This moment unfolded in relation to several historical factors, including postwar high economic growth and governmental investment in the reconstruction of communication infrastructures devastated by the war.

At the center of this cybernetic turn was a group of architects who boldly reimaged urban space: Tange Kenzō and his students who worked in and graduated from Tange Lab at the University of Tokyo. Tange Lab was a birthplace of visionary architects, including those who called themselves Metabolist. Politically, it also functioned as an informal think tank that conducted government-commissioned research on the economic and social optimization of urban design and national land planning since the late 1940s. While technofuturistic images of Metabolist projects (such as Kurokawa’s capsule housing) tend to obscure the complex activities of Tange Lab and its participation in the rebuilding of Japan, the political importance of Tange Lab cannot be measured by its futurism alone. Rather, as architect and critic Yatsuka Hajime sharply argues, the legacy of Tange Lab is inseparable from the grand project of nation building, a project that harkens back to the imperial days of colonial urban planning.⁴ If that is the case, then, we need to take a nuanced look at Tange Lab’s cybernetic turn in the 1960s.

In the sections that follow, I will first sketch the general context surrounding Tange’s turn to cybernetics (“The Cybernetic Turn”) and his inheritance of the biopolitical vision of colonial urban planning (“The Biopolitical Vision of Colonial Urban Planning”). Next, I will explore the specific contexts within which architects at Tange Lab and their associates responded to cybernetics through the managerial discourse on the postindustrial information society and logistics (“The Information Revolution”). I will then address the postwar importation of communication theory and the artistic

uptake of interactivity, which informs the work of Isozaki Arata, a graduate of Tange Lab and architect whose vision of the responsive cybernetic environment anticipates the contemporary debate on atmospheric media (“The Cybernetic Environment”), before concluding with some thoughts on the relevance of this history to contemporary media theory.

The Cybernetic Turn

Among others, Marshall McLuhan’s idea that housing is a medium of communication best captures the mid-twentieth-century vision of atmospheric media.⁵ McLuhan famously defined media as a technological extension of the human body, whose historical impact is measurable through its capacity to alter our sensory perceptions. “For the ‘message’ of any medium of technology is the change of scale or pace or pattern that it introduces into human affairs.”⁶ The railroad, for instance, accelerated the scale of movement and transport. In so doing, it reshaped the contours of modern cities. Becoming an indispensable part of housing, the electric light also reconfigured living and working spaces by abolishing “the divisions of night and day, of inner and outer, and of the subterranean and the terrestrial.”⁷ Electric lighting was not, however, the only technological invention that altered our perception of the habitable environment: electronic media and information technologies had radically changed the way architects envisioned it.

As Mark Wigley notes, architects gave serious consideration to information networks accelerated by the proliferation of electronic media in the 1950s and 1960s. It is not an overstatement to say that architecture was at the core of media theory’s turn to information networks. Even McLuhan’s idea of electronic media as a prosthetic extension of the human nervous system owes to his encounter with architects.⁸ By the mid-1960s, architects and urban planners across continents were collectively developing a new paradigm of urban design based on insights gleaned from cybernetics and communication theory. Architects Constantinos Doxiadis and Jaqueline Tyrwhitt, for instance, gathered an interdisciplinary and international group of scholars—from Margaret Mead to Marshall McLuhan—in order to analyze urban planning in relation to information flow and communication networks. It was then that the very idea of the network became integral to architecture, and the Japanese architect Tange Kenzō was among those who partook in this international effort to rethink urban design through the lens of cybernetics.

According to Wigley, “Tange drew on cybernetics to discuss the influence of all the contemporary systems of communications—arguing, in McLuhanesque

fashion, that there has been a second industrial revolution, an information revolution that prosthetically extends the nervous system in the same way that the first one physically extended the body.”⁹ Popularized by the work of Norbert Wiener, cybernetics draws parallels between the information-processing machine and the human nervous system. Wiener did not simply draw a comparison between social organization and biological organization; he collapsed the two by redefining both through their internal communicative capacities to fight entropy or disorder through feedback loops.¹⁰ This structural parallel between the communicative capacities of the city and those of the living organism appeared frequently in Tange’s own writing in the 1960s.

Tange shared his vision of the city as a living organism endowed with its own nervous system at the Delos symposium organized by Doxiadis in 1966. His vision seems to have struck a chord with many who attended the meeting. This was partly because his idea had already been introduced to an international audience through the architectural journal *Ekistics* as early as 1961.¹¹ Having taught at MIT in 1959 and participated in various architectural symposia, Tange was familiar with the impact cybernetics had had on architecture, though it would be remiss to simply conclude that his vision of the city as a sentient organism was a direct result of his experience abroad. As we will see shortly, Tange’s appropriation of cybernetic metaphors was, in part, also a logical extension of the biopolitical discourse on colonial architecture and urban planning.¹²

Well before his participation in the Delos symposium, Tange frequently used the biological metaphors of blood circulation and the central nervous system to articulate his vision.¹³ In order to grow and maintain its healthy metabolic cycle, the city, in his view, required the constant circulation of energy and information to facilitate efficient communication among its organic parts. Tange set this biological analogy of energy and information circuits at the center of his urban planning.

For instance, Tange’s well-known but unrealized urban project, Plan for Tokyo 1960, hinges on the reconfiguration of transportation networks. These networks are organized along “the spinal axis” stretched across Tokyo Bay. This axis functions as the “central nervous system” of the city, as if to emulate the anatomical structure of the vertebrate animal.¹⁴ Similarly, in his essay “The Future of the Japanese Archipelago: The Formation of Tōkaidō Megalopolis” (1965), Tange presents a biological metaphor of the Japanese archipelago as a vertebrate animal that grows along the central urban “spinal” axis that links and networks several metropolises.

In the course of the 1960s, Tange updated this biological model of the city as a complex living organism—his favorite example was the vertebrate animal—to a cybernetic model of the city, adding the communicative elements of feedback and control to the static infrastructure of circulation. But if he did so, it is because the models of organism and communication provided by cellular biology and cybernetics were compatible. For Tange, urban planning was all about organizing space in order to maintain an effective communication or circulation of elements within the organism called city.¹⁵ Following Wiener, he argued that an organism strives toward organization through the communicative processes of information management and feedback. Tange applied this logic to his theory of urban design by highlighting the centrality of traffic, energy, and information networks.¹⁶

This thematization of circulation—of air, vehicles, and pedestrians—was not new. Rather, it was a central tenet of modern architecture and urbanism. In the late 1920s, designing efficient networks of transportation became one of the main objectives of modern architecture and urbanism. The idea was first promoted by the Congrès internationaux d'architecture moderne (International Congresses of Modern Architecture), an international association of architects founded by leading European figures such as Walter Gropius and Sigfried Giedion.¹⁷ This modernist idea of efficient circulation clearly influenced Tange, but he read it through the newly acquired lens of cybernetics and its organizational logic of feedback. He writes: "Organization is neither a perfect container for freedom nor a despotic mold. Rather, it is a living organism that voluntarily controls the process of feedback between freedom and order. I believe that a modern society is a highly developed form of a living organism. Its growth resembles an evolutionary process of development from plant to animal, to human, as it has developed its own nervous system within social organizations, and started to engage in brain activities."¹⁸ The modernist discourse on urbanism had long relied on organic, cellular, and evolutionary metaphors of the city.¹⁹ But Tange's organicist view of the city also has a more specific origin, namely the biopolitical vision of colonial urban planning.

The Biopolitical Vision of Colonial Urban Planning

While the cybernetic paradigm of organization brought a new way of imagining the environment, the political function of postwar Japanese architecture, especially that of Tange Lab, cannot be dissociated from the imperial project of expanding Japan's "living sphere" (*Lebensraum*) through colonial

urban planning. As Yatsuka suggests, the Metabolist and Tange's organicist vision of the city in the postwar period clearly inherits the earlier biopolitical vision of the colonial administrators and urban planners such as Gotō Shinpei.²⁰

Gotō, who served as the colonial administrator in Taiwan and Manchuria and oversaw a number of urban projects in the colonies as well as on the mainland, is often credited as the founding father of Japanese urban planning.²¹ In addition to serving in high-ranking positions, such as director-general of the Manchurian Railway Company, a linchpin of Japan's settler colonialist expansion in Northeast China, Gotō also served as the communications minister, the first chairman of the Urban Studies Association, and even the mayor of Tokyo. He is also known as an infamous proponent of the scientific management of colonies based on "biological principles" combined with biopolitical structures of governance such as centralized medical police. It is his experiments in colonial administration and city planning that Yatsuka highlights as an important precursor to Tange's and Metabolists' postwar urban projects of expanding Japan's "living sphere" after the loss of all of the overseas colonies. Even the seemingly technofuturistic projects of megastructures suspended in the sky and floating over the sea fit within the purview of this imperial paradigm of literally expanding the territory and its habitable environment.²²

Echoing Yatsuka's historical repositioning of Tange and Metabolism as direct heirs to colonial architecture and urban planning, Isozaki Arata and Sawaragi Noi have also noted that the wartime discourse on "the environment" (*kankyō*) was an important precursor to the postwar popularization of the term by Asada Takashi, another affiliate of Tange Lab.²³ Among other graduates of Tange Lab, Isozaki held the most critical stance toward Tange's commitment to nation building and his collaboration with the wartime regime, though, as we will see later, he too came to embrace the organizational logic of cybernetics.

When we look closely at the writings of Gotō and his biopolitical vision of the colonial administration, we begin to see how much Tange's postwar vision of the city as a living organism echoes an earlier Japanese discourse on urban planning and nation building. After all, Tange was not the first to deploy the metaphors of the "vertebrate animal" and the "central nervous system" to describe the organization of the city. Gotō had done so in his discussion of optimizing the communicative capacities of the administrative apparatuses of the empire during the 1910s, using the same metaphors

of the vertebrate animal and the nervous system in his discussion of the governance of Manchuria.²⁴

As if to anticipate Tange's postwar call for the self-regulating growth of the living city along the spinal axis of the centralized transportation network, Gotō argued for the organized growth of the empire through communication networks. "The current state of colonial Manchuria in the empire is characterized by its disunity, which is comparable to the de-centralized nerve ganglia of a lower form of animal life," writes Gotō. In his view, if the office of the Kwantung governor-general in Manchuria were to function as the "brain" of Japan's imperialist expansion in Asia, it had to unify its judiciary, police, civil engineering, and telecommunications apparatuses. Only then could these administrative apparatuses properly function as the "central nervous system" of the empire. And the Japanese empire, in his view, was analogous to the intelligent "vertebrate animal."²⁵

Given Tange's wartime contribution to the expansionist ideology of the empire—as demonstrated by his design for the Commemorative Building Project for the Construction of Greater East Asia (or the Greater East Asia Co-Prosperity Sphere Monument) of 1942—it is not surprising to find this similarity between his and Gotō's organicist visions.²⁶ While Tange spoke nothing of the empire—or his wartime involvement—his ambition to rebuild the city of Tokyo and to restructure the entire Japanese archipelago through the cybernetic paradigm of communication and control betrays a residual trace of the biopolitical rhetoric of governance that colonial administrators such as Gotō espoused and passed down to later generations of architects and urban planners.

That being said, however, I do not mean that Tange's view of urban design did not change from the wartime to the postwar period. Rather, I would argue that it mutated in a timely response to the infrastructural and discursive changes taking place around the conceptualization of the environment in the postwar years. His embrace of cybernetics was part of this timely response to these changes.

The Information Revolution

The cybernetic metaphor of the city so favored by Tange, in other words, did not simply follow the colonial discourse on urban planning but was prompted by the postwar debates on the information society, postindustrialization, and the logistics revolution. Promoted by a group of sociologists,

economists, architects, and policy makers (some of whom had a direct link to Tange Lab), the Japanese discourse on the information society (*jōhōka shakai* or *jōhō shakai*) applied the cybernetic logics of feedback and control to business, and saw logistics and automation as essential to the optimization of the economic productivity of the nation. This discourse critically inflected the way in which architects such as Tange interpreted cybernetics.

One of the characteristics of information society discourse, like its contemporary American counterpart, is an overtly optimistic outlook on computerization. For instance, according to Masuda Yoneji, a bureaucrat, futurologist, and the founder of the Institute for the Information Society, computer technology signaled the dawn of “computopia” (or computer-based utopia) and the arrival of “the information époque.” For Masuda, the information society is characterized by the rise of intellectual labor, economic synergy across industries, automation, and participatory democracy in which citizens actively engage in policy decision making through networked systems of communication feedback. He contends, “As the 21st century approaches . . . the possibilities of a universally opulent society being realized have appeared in the sense that [Adam] Smith envisioned it, and the information society (futurization society) that will emerge from the computer communications revolution will be a society that actually moves toward a universal society of plenty.”²⁷ Masuda’s optimism is echoed in much of the Japanese information society discourse of the 1970s.

In hindsight, we can see that the Japanese discourse on the information society was part of the governmental and corporate push toward postindustrialization. But in the early 1960s, when the idea of the information society first began to circulate, there was no definitive understanding of what the term meant. As Tessa Morris-Suzuki argues, “The term ‘information society’ is one which is more often used than defined.”²⁸ Even though the term circulated widely through a myriad of publications, the meaning of the term itself was not always clear to its users. For instance, in the book *Information Society: From Hard Society to Soft Society* (1969), Hayashi Yūjirō—an advisor to the influential Economic Planning Agency and the person who is often credited for the popularization of the term “information society”—lists a series of heterogeneous definitions of “information” excerpted from the work of prominent academics such as Umesao Tadao (an intellectual known for developing the idea of the information society in Japan), Miyagawa Tadao, and Fritz Machlup. Ultimately, however, he admits that there is no precise definition of “information society.” Referring to an international sympo-

sium organized by the Japan Techno-Economics Society (Kagaku Gijutsu to Keizai no Kai) and held in 1968, Hayashi explains that the conclusion he drew from the symposium was that the definition of “information society” remained ambiguous to both Japanese and American academics.²⁹

Similarly, in the opening chapter of the *Japan's Information Society: Its Vision and Challenges* (*Nihon no jōhōka shakai: Sono bijon to kadai*, 1969), edited by the Information Committee for the Economic Council (Keizai shingikai jōhō kenkyū iinkai, an advisory board for the prime minister composed of corporate and governmental representatives), the meaning of the keyword “informatization” (*jōhōka*) is ultimately left undefined: “The word *informatization* became popularly used in the past few years, but as is usual with a trendy neologism its meaning remains vague. . . . Certainly, the term *informatization* is often equated with computers but they are not the same thing.”³⁰

In spite of its vagueness concerning the key concept of informatization, the book nonetheless covers a wide range of topics, including the rise of the information industry (*jōhō sangyō*), the computerization of banking systems, strategies of business management, the impact of automation on the labor market, and the introduction of computers into educational institutions, as well as transformations in logistics and the distribution of commodities. And it is this last topic—logistics—that deserves special attention, as it holds a direct relevance to the research activities of Tange Lab.

Broadly defined, “logistics” concerns the management of movement, and the coordinated flow of both things and military operations. The term derives from military usage, but it has come to be associated with the post-Fordist capitalist mode of production and distribution through the expansion of the business logistics of the 1960s and 1970s. Business logistics also focuses on supply chain management, a field that grew rapidly amid the introduction of computers and operations research, the innovation of the containership and the corresponding reconfiguration of transport infrastructures, and the application of cybernetics to the manufacture and distribution of goods.

In Japan, this way of thinking about logistics began to circulate in the early 1960s, in popular books such as economist Hayashi Shūji's *A Revolution in Distribution* (*Ryūtsū kakumei*).³¹ Indeed, the 1960s was the time when operations research, systems theory, and the technocratic discourse of the information society all converged around a set of related issues: logistics, computerization, and the transportation and communication infrastructures of urban space. All of this left an indelible mark on Japanese architectural criticism and informed its embrace of cybernetics.³²

Moreover, if cybernetics can be broadly defined as “the field concerned with information flows *in all media*,”³³ architecture was cybernetic even before architectural criticism embraced its vocabulary. In this regard, Tange Lab’s systematic studies of information and energy flows in the 1950s and early 1960s warrant attention. For instance, in 1963 Tange Lab conducted a comprehensive analysis of “the connections between the more than 100 departments and bureaus of the government and the movement of 10,000 workers” inside the Tokyo Metropolitan Government Building.³⁴ Throughout the 1960s, Tange’s interest in the coordinated management of the flow of things as a key component of architecture and urban design coincided with the economic rationality of the information society discourse, and dovetailed with governmental investment in the studies of information traffic.

Given the close institutional ties between the postwar Japanese government and Tange Lab, it is not surprising to find this resonance between Tange’s theorization of urban design and information society discourse. For instance, two architects trained at Tange Lab—Shimokōbe Atsushi and Obayashi Jun’ichirō—went on to become powerful bureaucrats who worked for the Economic Planning Agency, the Ministry of Construction, and the National Land Agency. Shimokōbe’s and Obayashi’s research on industrial productivity had a direct impact on the Comprehensive National Development Plan (Zenkoku Sōgō Kaihatsu Keikaku) launched by the Economic Planning Agency in 1962, around the same time that Umesao Tadao’s essay on the information industry and Hayashi Shūji’s book on the logistics revolution were published.³⁵

Under the aegis of Shimokōbe, one of the masterminds behind the Comprehensive National Development Plan, several members of Tange Lab also participated in government-sponsored research activities on the impact of information technologies on urban space. In 1967, for instance, Shimokōbe appointed Kurokawa Kishō, a graduate of Tange Lab and a prominent member of the Metabolist group, to take part in an information network research group. In 1970, Shimokōbe edited and published a book, *Dialogues with Information Society: Information Networks for Future Japan*, and presented the outcome of a research project commissioned by the Economic Planning Agency (see fig. 2.1). We find Kurokawa’s name yet again listed among the participants of this research group, which included both government officials and corporate representatives from the telecommunications industry, such as the Nippon Telegraph and Telephone Public Corporation (NTT), Japan Broadcasting Corporation (NHK), and Dentsū.³⁶ In 1972, Kurokawa published

情報化社会との対話

未来日本の情報ネットワーク

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[FIG. 2.1] The cover of Shimokōbe Atsushi, *Jōhōshakai to no taiwa: Mirai Nihon no jōhō nettowāku* [Dialogues with information society: Information networks for future Japan] (Tokyo: Tōyō Keizai Shinhōsha, 1970).

The Future of Information Archipelago Japan, a book that echoed the title of Tange's 1965 essay "The Future of the Japanese Archipelago."³⁷ Kurokawa was also a participant of the futurology division of the Japan Techno-Economics Society, which published an official report titled *Developing a Super-Technological Society: Humans in Information Systems* in 1969. The book was edited by none other than Hayashi Yūjirō.³⁸

Tange Lab thus had close ties to the proponents of the information society and their government-sponsored research activities at a time when Japan was undergoing massive infrastructural transformations. The aforementioned essay by Tange ("The Future of the Japanese Archipelago") was also a direct result of Tange's lecture delivered at the Japan Center for Area Development Research, a foundation established and administered by the Ministry of Construction.³⁹ Throughout the 1950s and 1960s, Tange Lab carried out a number of similar statistical and theoretical research projects,

analyzing issues ranging from population density, the distribution of industrial resources, and transportation infrastructures to urban reconstruction and development. It is reasonable to assume that Tange Lab's emphasis on communication, information flow, and cybernetics directly paralleled the Japanese government and telecommunication industry's investment in the processes of informatization.⁴⁰ Tange's interest in cybernetics and electronic media, and his biological metaphors of the city as a living organism endowed with a central nervous system, develop different implications once we situate them within the historically specific context of Japan's postwar land development, economic reform, and logistics revolution. The futuristic vision of the Japanese archipelago as a self-organizing organism extending its tentacles of information networks did not simply emerge out of the discipline of architecture. Nor was it simply a continuation of the wartime discourse on colonial urban planning; rather, it was fostered within the expanded sphere of information society discourse.

As Tange and his students clearly understood, the logistics revolution in Japan went hand in glove with the proliferation of electronic media, and with it the connotation of communication infrastructure shifted from the visible networks of transportation to the invisible networks of information. This paradigmatic shift in their understanding of networks critically inflected the way in which these architects also understood the relationship between architecture and media. They frequently turned their attention to the ephemeral presence of wireless signals and invisible flows of data traffic crisscrossing urban space. To design the urban environment meant to pay attention not only to "hard" transportation networks but also to "soft" information pathways. In short, milieu became contiguous with media.

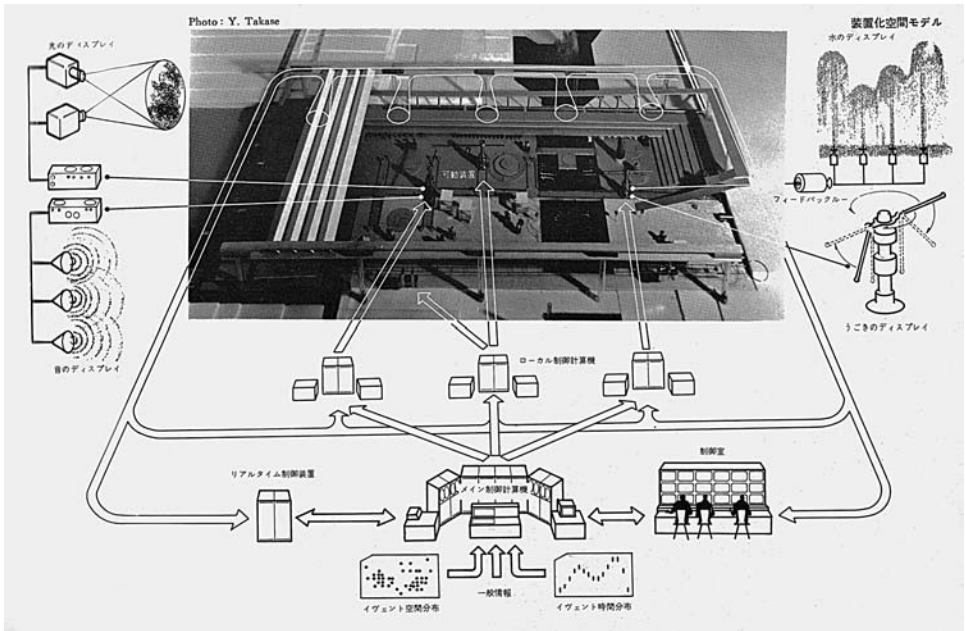
It is not surprising, then, to find frequent discussions of media in relation to urban design in the writings of architects associated with Tange Lab. Everything from community cable television to facsimile and computers, electronic media, and their environmental nature are mentioned repeatedly as being part of the challenges facing architects working in the age of the information society. Kurokawa, for instance, attributes his interest in the biological system of data processing to the architect's need to respond to the demand of the time: "I became interested in the vital mechanism, especially in the living organism's information systems since I predicted that the informational soft component of the human environment—namely, communication, transportation, and energy—rather than its hard component would become more prominent in the future."⁴¹

The work of Isozaki Arata, a graduate of Tange Lab who kept a critical distance from the Metabolist group but who also shared their interest in a biotechnical conception of the city, participated in this paradigm shift.⁴² Isozaki's theorization of the "cybernetic environment" and his exploration of the semiotic dimension of information networks suggest another important aspect of the cybernetic turn of Japanese architecture. In the last section, I will explore how Isozaki's work paralleled the postwar reception of communication theory in addition to cybernetics, and how he inflected both through the notions of interactivity or responsiveness, notions that were gaining traction within the avant-garde art world.

The Cybernetic Environment

Isozaki worked for Tange on several key projects, such as the Plan for Tokyo 1960 and Expo '70, the first world's fair held in Japan. If Shimokōbe, Obayashi, and Kurokawa represent the bureaucratic face of Tange Lab as a research institution, then Isozaki represents its artistic face. He was closely involved in the art world,⁴³ and was close to avant-garde artists such as Yamaguchi Katsuhiro, Yasumura Masunobu, Shinohara Ushio, and Arakawa Shūsaku.⁴⁴ He produced artworks and was interested in "happenings" and action painting. Isozaki was a member of the artist collective Group Environment (Enbairamento no Kai), which organized the landmark exhibition "From Space to Environment" (Kūkan kara kankyō e ten) in 1966. With Yamaguchi, he also founded the company Environmental Planning as he prepared to design the multimedia setup of the Festival Plaza at Expo '70.⁴⁵ He called this main attraction site a prototype of the cybernetic environment, one that relied on computer-programmed operations of multimedia devices and built-in sensor technologies.

Describing the Festival Plaza as a type of "soft architecture" or responsive environment, Isozaki designed it with the man-machine interface in mind.⁴⁶ Its multimedia setup included two giant robots that allegedly formed a feedback circuit with the mainframe computer placed inside the central control room. The ambitious plan for the Festival Plaza aimed to wire the robots with sensors that collected ambient data on changing sounds, light, and movement. This data was then supposed to be sent back to the control room computer, which would modulate the multimedia devices accordingly.⁴⁷ Although the Festival Plaza fell short of actualizing a fully interactive system modulated by the ambient data of the physical environment, it was still



[FIG. 2.2] The diagram of the Festival Plaza from *Kenchiku bunka* (January 1970).
Courtesy of Isozaki Arata.

visionary,⁴⁸ and one could read its architectural design as a precursor to our contemporary atmospheric media, which incessantly collect ambient data and modulate our environment.

The plan for the Festival Plaza, which was developed over two years, from 1967 to 1969, emphasized the elements of communicative interactivity and feedback. Isozaki and Tsukio Yoshio, an architect and computer programmer who helped design the plaza, envisioned this computer-controlled space as a type of “environment as a responsive field” (*ōtōba to shite no kankyō*, see fig. 2.2). Bridging the disciplines of architecture and computer science, the multimedia setup of the plaza fits the description of a responsive environment defined by computer artist Myron Krueger: an environment “in which a computer perceives the actions of those who enter and responds intelligently through complex visual and auditory displays.”⁴⁹ Isozaki’s design thus paralleled and, in part, anticipated the theorization of responsive, intelligent architecture equipped with artificial intelligence by architects such as Nicholas Negroponte.⁵⁰ Isozaki and Tsukio originally envisioned this responsive, cybernetic environment of the Festival Plaza as modulating its output according to the self-learning process of its main computer,

though this ambitious plan of having a fully operative artificial intelligence ultimately failed due to technical and economic limitations. Regardless of its practicality, however, what is crucial is the fact that the Festival Plaza signaled a new phase in the cybernetic turn of Japanese architecture. Here, architectural design literally merged with electronic media, creating a communication feedback loop between human participants and computers.

Indeed, in Japan in the 1960s, communication itself was a frequent focus of boundary-crossing artistic experiments—from multimedia installations to expanded cinema and video art. Arguably, buzzwords such as “information,” “feedback,” “participation,” “interactivity,” and “communication” that characterize Japanese art criticism of this decade all belong to the same cybernetic paradigm. Postwar Japanese avant-garde art’s investment in the notion of the environment, in particular, hinged on the desire to transform passive viewers into “active receivers of the message” sent by the artwork.⁵¹ It is here that we see an interesting twist in the postwar iteration of the concept of the environment, which played an important role in prewar and wartime architectural discourse and its articulation of the biopolitical management of the empire and its occupants. The term “environment” (*kankyō*) gained popularity in postwar Japan partly through the impact of avant-garde art movements such as Fluxus and the rise of intermedia and environmental art practices. Yet, to separate the architectural context of thinking about the environment from its avant-garde art context would be to miss a historical convergence of these two contexts around Tange Lab, and more specifically around Isozaki, who frequently collaborated with avant-garde artists such as Yamaguchi Katsuhiro.⁵²

As we saw earlier, even Tange Lab’s approach to the environment shifted from its biological understanding of the milieu to a cybernetic understanding of the communicative field. When transposed to the context of art, the communicative process of feedback also gained the added connotation of interactivity, resonating with the leftist critique of the unidirectionality of mass media.⁵³ Throughout the 1960s, the construction of multimedia installations and environmental artworks that allowed interactive and participatory experiences through feedback loops thus became the locus of experimentation among artists as well as architects in Japan.⁵⁴

Crucial to this collective investment in interactivity and participation was the postwar reception of communication theory. As media scholar Matsui Shigeru suggests, the loan word *komyunikeeshon* (communication) gained currency in Japan in the immediate postwar period, when scholars associated with the Institute for the Science of Thought (Shisō no Kagaku

Kenkyūkai) began introducing communication theory from the United States.⁵⁵ The institute, led by liberal intellectuals such as Tsurumi Shunsuke and Minami Hiroshi, was instrumental in popularizing the term and establishing the disciplines of communication studies and social psychology in Japan.⁵⁶ The Cold War political climate heavily conditioned this institutionalization of communication studies during the occupation era and after.

According to Tamura Norio, a communication studies scholar associated with the Institute for the Science of Thought, the journal *Shisō no kagaku* published a special issue, titled “Studies of Communication,” in 1948. Tamura also credits the work of Inokuchi Ichirō for the establishment of the “new” newspaper studies and communication science (*komyunikeeshon kagaku*) in Japan,⁵⁷ the latter based as it was on the American style of communications studies.⁵⁸ Noting UNESCO’s first General Conference (1946) and its promotion of communication research, Inokuchi contended that communication science could contribute to the maintenance of peace in the nuclear age.⁵⁹ In short, the timing of the Japanese reception of communication theory perfectly coincided with the Cold War campaign by the United States to promote mass communication research, a campaign couched in the rhetoric of liberal democracy. Tsurumi, for his part, argues that the English terms “communication” and “mass communication” were introduced to Japan around 1947.⁶⁰

By the early 1970s, however, the Institute for the Science of Thought tried to tackle this Cold War provenance of communication research. Tsurumi, for instance, cautioned against the danger of subordinating academic research to the interests of the military-industrial complex. Tsurumi writes, “In the midst of the superpowers’ arms race, research on communication history could easily be used for studying and testing the optimal communication methods within the military.”⁶¹ In order to steer the nascent discipline of communication studies away from Cold War military science, Tsurumi called for a more holistic framework for understanding communication, which went beyond the history of technical media. Referencing the work of Jacques Ellul, Aldous Huxley, Claude Lévi-Strauss, and Johan Huizinga, he argued that communication studies scholars must not let their research become “a technique that benefits the oppressor.”⁶²

The ideologically ambivalent position occupied by the Institute for the Science of Thought in the postwar Japanese period mirrors the political ambivalence Isozaki recognized in his own application of cybernetics to the Festival Plaza. In both cases, the emancipatory potential of communication is haunted by its ghostly provenance in military operations research.

Isozaki's turn to cybernetics was, moreover, underscored by a critique of architectural modernism. It is on this point that he went a step further than Tange. While both architects helped initiate the cybernetic turn of Japanese architecture, Isozaki's vision was more in tune with the avant-garde art context, and perhaps more representative of the new generation of architects who actively sought to expand the conceptual horizon of architecture through their engagement with technical media. Isozaki articulated his practice of urban design as a deconstructive gesture, an act of dismantling "architecture" that is akin to boundary-crossing approaches of the avant-garde art movement of the 1960s. When we place Isozaki's articulation of the cybernetic environment within this context, we also find nuanced differences in Tange's and Isozaki's cybernetic approaches to urban space. To better understand these differences, let us examine Isozaki's writings on cybernetics and urban design.

In his essay "Methods of Urban Design" (Toshi deza'in no hōhō, 1963), for instance, Isozaki articulates the main difference between Tange's vision of urban planning and his own. The difference is suggestive insofar as it indicates how the cybernetic paradigm embraced by Isozaki ultimately shifted the focus of urban design away from the hardware of transportation and communication infrastructures toward the software of responsive environments.

In this essay, Isozaki divides the history of urban design into four stages: the substantial, the functional, the structural, and the symbolic. His own practice belongs to the symbolic stage, and Tange's practice belongs to the structural stage. Isozaki cites Tange's conception of the "urban axis" in the Plan for Tokyo 1960 as an example. The notion of the urban axis reflects Tange's structural perspective, which privileges physical or visual "patterns" of the city.⁶³ By contrast, Isozaki argues that his approach to urban design is based on a simulated *model* instead of an existing *pattern* of the city. In short, the symbolic stage of architecture based on the cybernetic logic of simulation is distinct from and opposed to the structural stage of architecture based on the mechanical logic of coordination. Put differently, the structural approach extracts a pattern from the already existing city, while the symbolic approach generates a model conceived in and through technical media.

The idea of coordination was central to industrial modernity. From Le Corbusier to Bruno Taut, modernist architects and urban planners operated within the twin logics of coordination and organization. This mechanical model of urban design "concentrated entirely on the organization and coordination of elements or on the discovery of a structure to serve as an assembly

theory.”⁶⁴ What the modernist practice of urbanism lacked, in Isozaki’s view, was a model of feedback. Tange tried to incorporate the insight of cybernetics into his urban design, but his priority was still on structural organization and coordination, although filtered through a newer engagement with logistics and information society discourse. By contrast, Isozaki takes ephemeral networks of information to be the central element of urban design.

Isozaki’s interest in the ephemeral or informational dimension of the city is also evident in his earlier essay, “Space of Darkness” (*Yami no kūkan*, 1964), in which he discusses the importance of the man-machine interface that mediates our experience of the city. He uses the example of a pilot who flies an airplane at night. Because of the darkness, the pilot cannot trust his own vision and thus “must rely solely on signals received by flight instruments” in order to navigate the aircraft.⁶⁵ Isozaki extends this metaphor of the pilot to the daily experience of the contemporary city that is heavily networked with information and communication signals.⁶⁶ Inversely, the task of contemporary architects becomes how to design urban space without losing sight of these virtual networks of information and communication signals. For Isozaki, architecture’s turn toward cybernetics and methods of computer simulation comes naturally out of this understanding of the city as primarily an information environment.

Arguably, Isozaki’s emphasis on computer-generated models as the new basis of urban design is indicative of the historical moment within which he was writing. Simulation, as historian of science and technology Paul Edwards reminds us, was the reigning cultural logic of the Cold War era.⁶⁷ The era of simulation also signaled for Jean Baudrillard the end of the modernist order of mechanical reproduction. Writing around the same time as Isozaki, Baudrillard argued that the simulation of models—rather than serial products, which belonged to the second order of simulacra—ushered in the third order of simulacra that corresponded to the proliferation of codes.⁶⁸ Isozaki’s vision of urban design that privileged codes, signs, and simulated models is reflective of the time when cybernetics and information science changed the ways in which the relation between technical media and reality was understood in various fields.

Isozaki’s interest in the primacy of codes is best articulated in his essay “The Invisible City” (*Mienai toshi*, 1967), which also provides a theoretical framework for his design of the cybernetic environment of the Festival Plaza.⁶⁹ The essay begins by addressing the inadequacy of using the existing concept of urban space to understand cities such as Los Angeles and Tokyo.⁷⁰ The chaotic layout and sprawl of these cities prevents him from see-

ing their structure in a systematic manner. Lacking grid patterns and landmark structures, the urban space of the contemporary city is no longer representable through spatial coordinates. Instead of landmarks and grids, the city is grasped relationally, that is, by gauging constantly shifting “relations between objects.”⁷¹ Precisely because the experience of space is no longer connected to physical elements, however, the city becomes intelligible only when one pays attention to “an aggregate of various invisible signs and codes; flickering lights, acoustic sounds, telecommunications, traffic, activities, and trajectories of moving objects.” In place of measurements, these ephemeral signs, codes, and signals generate haptic sensations. The city dislodged from measurable space thus becomes subjective, relative, and environmental.⁷² Isozaki calls this “invisible city” composed of invisible networks of ephemeral signs, codes, and signals a “virtual structure.”⁷³

The term “invisible city” used in this essay seems to evoke Lewis Mumford’s theorization of urban space. Tracing a history of the reorganization of cities in the early 1960s, Mumford argues that invisible networks of communication and information systems represent and condition contemporary urban space: “The electric grid, not the stone age container, provides the new image of the invisible city and the many processes it serves and furthers. It is not merely the pattern of the city itself, but every institution, organization, and association composing the city, that will be transformed by this development.”⁷⁴ Taking a cue from Mumford’s observation of the invisible infrastructure of communication, Friedrich Kittler has also suggested that the modern city has long served as a model of media. “Ever since it had become impossible to survey cities from a cathedral tower or a castle, and ever since walls and fortifications have ceased to contain them, cities have been traversed and connected by a network of innumerable networks.” In a typically axiomatic tone, Kittler contends that “no matter whether these networks convey information or energy—that is, whether they are called ‘telephone,’ ‘radio,’ and ‘television,’ or ‘water supply,’ ‘electricity,’ and ‘highway’—they all are information (if only because every modern stream of energy needs a parallel control network).”⁷⁵ For Kittler, media is what stores, transmits, and processes information. In this broad definition of media, “media include old-fashioned things like books, familiar ones like cities, and new ones like computers.”⁷⁶ Isozaki would agree with Kittler, given how he too conceives of urban space as first and foremost networks of information.

Of course, to simply state that Isozaki and Kittler share the idea of the city as a medium of communication would be to overlook manifold historical

factors that affected postwar Japanese architectural criticism and practice, which I have traced in depth in this chapter. Nonetheless, a theoretical affinity between their approaches to architecture through the lens of media theory is worth noting, because the conflation of the city and media has become reality, or at least, so it appears in today's debates around ubiquitous computing and atmospheric media. As I noted at the beginning of this essay, the connection between milieu and media is a historical construct, yet this historicity gets lost if one takes this analogy between media and the city as a point of departure, as Kittler does. To graft a history of architecture onto the history of media theory is all the more necessary today, as the discipline of media studies increasingly directs its attention to the atmospheric, elemental, and ecological dimensions of media, and takes the environment as an ahistorical given.

Conclusion

In hindsight, Japanese architects' theorization of urban design through the conceptual frameworks of information networks, cybernetics, and communication theory points to an incipient theory of the city environment as atmospheric media. Like the critical stance video and multimedia installation artists took to go beyond the modernist adherence to medium specificity, the cybernetic model of communication embraced by these architects was meant to dismantle the modernist ideal of architecture. Cybernetics and its concomitant logic of feedback in particular played an enabling role by allowing young architects such as Isozaki to shift the weight of urban design away from the monumental permanence and the functionality of built structures toward the ephemerality of information flows and semiotic systems of codes and signs.

While there is no space in this chapter to elaborate, it is worth mentioning that this cybernetic turn in Japanese architecture paved the way for the subsequent, separate reception of French critical theory—in particular the structural semiotics that brought attention to the systematic understanding of signs and codes—in the 1970s and 1980s. In recent years, scholars have outlined the significant impact cybernetics and information theory had on the development of structuralism and semiotics.⁷⁷ Isozaki, for instance, became closely involved with the so-called New Academic circle, most notably through his collaboration with Asada Akira in the international *Any* conference series, along with architects and philosophers such as Peter Eisenman

and Jacques Derrida.⁷⁸ The early stages of the Japanese reception of structuralism and poststructuralism might thus be found in the cybernetic turn of architecture in the 1960s.

The cybernetic turn of Japanese architecture also points to the fact that the theorization of media, including architecture, is heavily determined by the political and technological conditions of the time in which it is produced. Theory, as we know, is never value-free or conflict-free. If what we mean by “media theory” implies a systematic way of thinking about mediation (not only technological, but also political, economic, and social), as well as the geneses of various apparatuses of communication, and the interrelations between these different media forms, then Japanese architectural discourse of the 1960s offers a productive site to rethink these issues. This was the moment when architectural discourse thought seriously about the atmospheric and environmental nature of electronic media, and reconceptualized urban space through networks of information and communication.

Historically, architecture has held close affinities with the notion of a system. Its propensity toward organization and unity—architectonics—has, for instance, made it a privileged metaphor of rational and systemic thinking in philosophy.⁷⁹ Japanese architectural criticism of the 1960s complicates the architectonic aspect of architectural design by introducing a new kind of systematicity based on cybernetics. Architecture changed from a practice of constructing buildings to a practice of designing a communication environment through information technologies. At that point, architecture became part of the communication network, or what Gregory Bateson once called “media ecology.”⁸⁰ It is here that we find a clear link between contemporary theories of atmospheric media and Japanese architectural criticism. Moreover, these early theorizations of architecture as media environment could provide some inspiration—or at the very least further contextualization—for contemporary scholars turning to the environment as the basis for their theorization of media.

NOTES

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Orit Halpern for their comments on this essay. Special thanks go to Isozaki Arata for allowing me to reproduce the diagram of the Festival Plaza.

1. Mark B. N. Hansen, *Feed-Forward: On the Future of Twenty-First-Century Media* (Chicago: University of Chicago Press, 2015), 5.
2. John Durham Peters, *The Marvelous Clouds: Toward a Philosophy of Elemental Media* (Chicago: University of Chicago Press, 2015), 4.
3. Peters, *Marvelous Clouds*, 34.
4. Yatsuka Hajime, “‘Metaborizumu Nekusasu’ to iu ‘kindai no chōkoku’” [‘The overcoming modernity called Metabolism Nexus’], in *Metaborizumu no mirai toshi* [Metabolism: The city of the future] (Tokyo: Mori Bijutsukan, 2011), 11. See also Yatsuka Hajime, *Metaborizumu Nekusasu* [Metabolism Nexus] (Tokyo: Ohmsha, 2011).
5. Marshall McLuhan, *Understanding Media: The Extensions of Man* (Cambridge, MA: MIT Press, 1994), 127.
6. McLuhan, *Understanding Media*, 8.
7. McLuhan, *Understanding Media*, 126.
8. Mark Wigley, “Network Fever,” in *New Media, Old Media: A History and Theory Reader*, ed. Wendy Hui Kyong Chun and Thomas Keenan (New York: Routledge, 2006), 377.
9. Wigley, “Network Fever,” 387.
10. Reinhold Martin, *The Organizational Complex: Architecture, Media, and Corporate Space* (Cambridge, MA: MIT Press, 2003), 21.
11. Wigley, “Network Fever,” 388. Wigley writes, “Doxiadis’s idea of network form had itself been informed by the earlier work of Tange.”
12. Following Michel Foucault, I use the term *biopolitics* to mean a modern regime of governance and regulatory techniques applied to control and manage the biological processes of the human population, or “man-as-species.” For more on this concept of biopolitics, see Michel Foucault, *“Society Must Be Defended”: Lectures at the Collège de France, 1975–1976*, ed. Mauro Bertani and Alessandro Fontana, trans. David Macey (New York: Picador, 2003); Michel Foucault, *Security, Territory, Population: Lectures at the Collège de France, 1977–1978*, ed. Michel Senellart, trans. Graham Burchell (New York: Palgrave Macmillan, 2007).
13. Tange Kenzō, *Nihon rettō no shrōraizō: 21 seiki e no kenchiku* [The future of the Japanese archipelago: The formation of Tōkaidō megalopolis] (Tokyo: Kōdansha, 1966), 32.
14. Tange Kenzō, *Kenchiku to toshi: Dezain oboegaki* [City as architecture: Notes on design] (Tokyo: Sekai Bunkusha, 1975; repr., Tokyo: Shōkokusha, 2011), 87.
15. Tange’s cybernetic turn can be seen as part of the epistemic paradigm, which Reinhold Martin has called the “organizational complex.”
16. Tange, *Nihon rettō no shrōraizō*, 34–35.
17. Eric Paul Mumford, *The CIAM Discourse on Urbanism, 1928–1960* (Cambridge, MA: MIT Press, 2000), 25.
18. Tange, *Nihon rettō no shrōraizō*, 42.
19. Martin, *Organizational Complex*, 57–61.
20. Yatsuka, *Metaborizumu nekusasu*, 19.

21. Kobayashi Hideo, *"Manshū" no rekishi* (Tokyo: Kōdansha Gendai Shinsho, 2008), 41–42. On the activities of the South Manchuria Railway Company's research department, see also Kobayashi Hideo, *Mantetsu chōsabu: "Ganso shinku tanku" no tanjō to hōkai* (Tokyo: Heibonsha, 2005).
22. Yatsuka, *Metaborizumu nekusasu*, 19; and Yatsuka, "Metaborizumu," 13.
23. See Sawaragi Noi, *Sensō to banpaku* (Tokyo: Bijutsu Shuppansha, 2005); Isozaki Arata, "Tange Kenzō no 'kenchiku=toshi=kokka' kyōdōtai to shite no Nihon," in *Sanshutsu sareta modanizumu: "Nihon" to iu mondai kikō* (Tokyo: Iwanami Shoten, 2005), 173–202. It is worth noting that Yatsuka studied with Tange and worked with Isozaki. For more on the relation between the postwar notion of the environment and architecture, see Yuriko Furuhashi, "Multimedia Environments and Security Operations: Expo '70 as a Laboratory of Governance," *Grey Room* 54 (winter 2014): 56–79.
24. Gotō Shinpei, *Seiden: Gotō Shinpei, Mantetsu jidai, 1906–1908* (Tokyo: Fujiwara Shoten, 2005), 4:149.
25. Gotō, *Seiden*, 4:149.
26. This was an unrealized project, though some of its elements are preserved in his postwar design of the Hiroshima Peace Memorial Park. On the connection between these two projects, see Lisa Yoneyama, *Hiroshima Traces: Time, Space, and the Dialectics of Memory* (Berkeley: University of California Press, 1999); and Hyunjung Cho, "Hiroshima Peace Memorial Park and the Making of Japanese Postwar Architecture," *Journal of Architectural Education* 66, no. 1 (2012): 72–83.
27. Masuda Yoneji, *The Information Society as Post-Industrial Society* (Tokyo: Institute for the Information Society, 1980), 147.
28. Tessa Morris-Suzuki, *Beyond Computopia: Information, Automation, and Democracy in Japan* (London: Kegan Paul, 1988), 8.
29. Hayashi Yūjirō, *Jōhōka shakai: Haado na shakai kara sofuto na shaka e* [Information society: From hard society to soft society] (Tokyo: Kōdansha Gendai Shinsho, 1969), 49.
30. Keizai shingikai jōhō kenkyū iinkai, *Nihon no Jōhōka shakai: Sono bijon to kadai* [Japan's information society: Its vision and challenges] (Tokyo: Daiyamondo Sha, 1969), 5.
31. Hayashu Shūji, *Ryūtsū kakumei: Seihin, keiro, oyobi shōhisha* [A revolution in distribution: Products, pathways, and consumers] (Tokyo: Chūō Kōron Shinsho, 1962).
32. For more on this, see Morris-Suzuki, *Beyond Computopia*, chapters 4–6.
33. Katherine Hayles, "Cybernetics," in *Critical Terms for Media Studies*, ed. W. J. T. Mitchell and Mark B. N. Hansen (Chicago: University of Chicago Press, 2010), 145; italics in source.
34. Toyokawa Saikaku, "The Core System and Social Scale: Design Methodology at the Tange Laboratory," trans. Watanabe Hiroshi, in *Kenzō Tange: Architecture for the World*, ed. Seng Kuan and Yukio Lippit (Zürich: Lars Müller Publishers and the President and Fellows of Harvard College, 2012), 25.
35. Toyokawa Saikaku, *Gunzō to shite no Tange Kenkyūshitsu: Sengo Nihon kenchiku toshi shi no meinsutoriimu* [The Tange Lab as a group: The mainstream of postwar Japanese architecture and the history of urban design] (Tokyo: Ohmsha, 2012), 44. On

Tange Lab's impact on social and economic policies, see also Toyokawa, "Core System and Social Scale," 15–28.

36. Shimokōbe Atsushi, ed., *Jōhōshakai to no taiwa: Mirai Nihon no jōhō nettowaaku* [Dialogues with information society: Information networks for future Japan] (Tokyo: Tōyō Keizai Shinhōsha, 1970), iii. See also Rem Koolhaas and Hans Ulrich Obrist, eds., *Project Japan: Metabolism Talks . . .* (Cologne, Ger.: Taschen, 2011), 638.

37. Kurokawa Kishō, *Jōhō rettō Nihon no shōrai* [The future of information archipelago Japan] (Tokyo: Dai San Bunmei Sha, 1972), 1–2. Kurokawa argues that he became first interested in the concept of information around 1958, when he began to formulate the "metabolic" conception of the city as a living organism.

38. See Hayashi Yūjirō and Kagaku Gijutsu to Keizai no Kai, eds., *Chō gijutsu shakai e no tenkai: Jōhōka shisutemu no ningen* [Developing a supertechnological society: Humans in the information system] (Tokyo: Daiyamondo Sha, 1969).

39. Yatsuka, *Metaborizumu nekusasu*, 320.

40. Toyokawa, *Gunzō to shite no Tange kenkyūshitsu*, 314.

41. Kurokawa, *Jōhō rettō Nihon no shōrai*, 2.

42. Isozaki often describes the difference between his view of urban design and that of the Metabolist group as a difference between the image of "ruin" and the image of utopia. On his discussion of the future city as a ruin, see Isozaki Arata, "Haikyo ron," in *Kigō no umi ni ukabu "shima"* [Islands in the sea of signs] (Tokyo: Iwanami Shoten, 2013), 24–40.

43. Isozaki participated in landmark art exhibitions, including *Shikisai to kūkan ten* [Color and space, 1966]; *Kūkan kara kankyō e ten* (From space to environment, 1966); and the Fourteenth Milan Triennale (1968). He also worked as an exhibition space designer for *Okamoto Tarō ten* (Okamoto Tarō exhibition, 1964).

44. Isozaki Arata, "Aatisuto-Aakitekuto no jidai: Osaka banpaku nosōzōryoku o hokan shita aato shin" [The era of an artist-architect: Art scenes that supplemented the imagination of the world's fair in Osaka], interview with Arata Isozaki, by Yasuko Imura, Yuriko Furuhata, and Shigeru Matsui, *Tokyo Geijutsu Daigaku Eizōkenkyū Kiyō* (October 2012): 36–80.

45. Isozaki notes that they established this company in order to receive public funding. Isozaki Arata, in discussion with the author, June 2013.

46. In his essay "Sofuto aakitekuchua," published in *Kenchiku bunka* in 1970, Isozaki described the computer-programmed cybernetic environment of the Festival Plaza as "soft architecture," a phrase he borrowed from Warren Brodey's work. See Warren M. Brodey, "The Design of Intelligent Environment: Soft Architecture," *Landscape* 17, no. 1 (autumn 1967): 8–12.

47. Isozaki Atelier, "Sofuto aakitekuchua: Ōtōba to shite no kankyō," *Kenchiku bunka* 279 (January 1970): 73. Moreover, the model for this tightly networked two-way communication environment was the mission control center at NASA, which he had visited in 1967. See Isozaki Arata and Hino Naohiko, "Taaningu pointo: Kūkan kara kankyō e," *10+1* 48 (2007): 203.

48. While the published materials of the Festival Plaza, such as the article "Sofuto aakitekuchua" in *Kenchiku bunka* (1970), indicate that the robots were responsive, Tsukio Yoshio notes that the plaza's computerized system of control was imperfect and

did not actualize the original plan of creating a fully interactive environment. Tsukio Yoshio in discussion with the author and Matsui Shigeru on November 12, 2015.

49. Myron W. Krueger, "Responsive Environments," in *The New Media Reader*, ed. Noah Wardrip-Fruin and Nick Montfort (Cambridge, MA: MIT Press, 2003), 379.

50. For more information on Negroponte's and Krueger's work, see Nicholas Negroponte, *Soft Architecture Machines* (Cambridge, MA: MIT Press, 1976); Krueger, "Responsive Environments," 379–89.

51. Isozaki Arata and Tōno Yoshiaki, "'Kankyō' ni tsuite," in "Kūkan kara kankyō e," special issue, *Bijutsu techō* [Art notebook] 275 (November 1966): 100.

52. Isozaki and Yamaguchi set up a company called Kakyō Keikaku (Environmental Planning) during their participation in Expo '70. See Isozaki and Hino, "Taaning pointō," *10+1* 48 (2007): 197.

53. For more on this, see Miryam Sas's contribution to this volume.

54. The use of video was particularly important for creating feedback loops. See David Joselit, *Feedback: Television against Democracy* (Cambridge, MA: MIT Press, 2007); and on multiscreen environments, see Fred Turner, *The Democratic Surround: Multimedia and American Liberalism from World War II to the Psychedelic Sixties* (Berkeley: University of California Press, 2014). On intermedia and environmental art experiments in Japan, see also Miryam Sas, "By Other Hands: Environment and Apparatus in 1960s Intermedia," in *The Oxford Handbook of Japanese Cinema*, ed. Miyao Daisuke (Oxford: Oxford University Press, 2014), 383–415.

55. Matsui Shigeru, "Fukusei gijutsu no tenkai to media geijutsu no seiritsu: 1950 nendai no Nihon ni okeru terebi, shakai shinrigaku, gendai geijutsu no sougo shintō" [The development of reproduction technology and the establishment of media arts: Interpenetrations among television, social psychology, and contemporary art of the 1950s], *Eizō media gaku: Tokyo geijutsu daigaku daigakuin eizō kenkyūka kiyō* 2 (March 2012): 46.

56. Andrew E. Barshay, "Postwar Social and Political Thought, 1945–90," in *Modern Japanese Thought*, ed. Bob Tadashi Wakabayashi (Cambridge: Cambridge University Press, 1998), 305.

57. Tamura Norio, "'Atarashii Shinbungaku' no tanjō to 'Masu komi' ron no eikyō: Inokuchi Ichirō ni hajimaru sengo no 'Amerikashu' kenkyū no inyū" [The birth of "new newspaper science" and the impact of mass communication theory: The postwar introduction of the "American" style of research that began with Inokuchi Ichirō], *Komyunikēshon kagaku* 35 (2012): 123–33.

58. Inokuchi Ichirō, *Masu komyunikēshon: Dono youni taishū e hataraki kakeru ka* [Mass communication: How to influence the masses] (Tokyo: Kōbunsha, 1951), 26.

59. Inokuchi, *Masu komyunikēshon*, 30–31. As evidenced in Inokuchi's implication of a nuclear threat, discourse surrounding the emergent discipline of communications studies in Japan clearly belonged to the Cold War context.

60. Tsurumi Shunsuke, "Komyunikēshon shi e no oboegaki" [Notes on the history of communication], in *Komyunikēshon shi: Kōza komyunikēshon* [The history of communication: A course on communication], ed. Etō Fumio, Tsurumi Shunsuke, Yamamoto Akira (Tokyo: Kenkyūsha, 1973), 2:17. See also Matsui, "Fukusei gijutsu no tenkai," 47;

and Ann Sherif, *Japan's Cold War: Media, Literature, and the Law* (New York: Columbia University Press, 2009), 44.

61. Tsurumi, "Komyunikēshon shi e no oboegaki," 19.

62. Tsurumi, "Komyunikēshon shi e no oboegaki," 19.

63. Isozaki, "Toshi dezain no hōhō" [Methods of urban design], in *Kūkan e* [To space] (Tokyo: Kajima Shuppankai, 1997), 106.

64. Isozaki Arata, "Invisible City," in *Architecture Culture, 1943–1968: A Documentary Anthology*, ed. Joan Ockman (New York: Columbia Books of Architecture, 1993), 405.

65. Isozaki Arata, "Yami no kūkan," in *Kūkan e* [To space] (Tokyo: Kajimashuppankai, 1997), 151.

66. Isozaki, "Yami no kūkan," 151.

67. Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: MIT Press, 1996), 14.

68. Jean Baudrillard, *Symbolic Exchange and Death* (London: Sage Publication, 1993), 56.

69. Isozaki Arata and Hino Naohiko, "Kūkan e, Omatsuri Hiroba, *Nihon no toshi kūkan*: 1960 nen dai ni okeru toshiron no hōhō o megutte," 10+1 45 (2006): 187–97.

70. Isozaki Arata, "Mienai toshi" [The invisible city], in *Kūkan e* [To space] (Tokyo: Kajima Shuppankai, 1997), 374. My translation. This first section of the essay has not been translated into English, though the second half of the essay has been translated under the same title, "Invisible City." See Isozaki, "Invisible City," 403–97.

71. Isozaki, "Mienai toshi," 378.

72. Isozaki, "Mienai toshi," 381.

73. Isozaki revisits this notion of the city as the invisible information environment in "Konpō saretā kankyō" [Packaged environments], in *Kūkan e* [To space] (Tokyo: Kajimashuppankai, 1997), 421.

74. Lewis Mumford, *The City in History* (New York: Harcourt, 1961), 567.

75. Friedrich Kittler, *The Truth of the Technological World: Essays on the Genealogy of Presence*, trans. Erik Butler (Stanford, CA: Stanford University Press, 2013), 139. Kittler's point, however, is that these information networks also existed in the past, well before modernity.

76. Kittler, *Technological World*, 144.

77. As Bernard Dionysius Geoghegan notes in his careful research on Roman Jakobson's and Lévi-Strauss's investments in information theory and cybernetics and their ties to the Rockefeller Foundation, MIT, and Harvard, French structuralism and semiotics are rooted in the mathematical theories of communication. See Bernard Dionysius Geoghegan, "From Information Theory to French Theory: Jakobson, Lévi-Strauss, and the Cybernetic Apparatus," *Critical Inquiry* 38 (autumn 2011): 96–126.

78. Isozaki and Asada were regular participants in the *Any* series of international conferences on architecture and philosophy, which Isozaki initiated with Peter Eisenman in 1999. For more on the *Any* conference series, see Isozaki Arata and Asada Akira, eds., *Any Kenchiku to tetsugaku o meguru sesshon, 1991–2008* [*Any: Sessions on architecture and philosophy, 1991–2008*] (Tokyo: Kajima Shuppan, 2010).

79. Jacques Derrida, "Architecture Where the Desire May Live," in *Rethinking Architecture: A Reader in Cultural Theory*, ed. Neil Leach (London: Routledge, 1997), 319.

See also Karatani Kōjin, *Inyu to shite no kenchiku* [Architecture as metaphor] (Tokyo: Kōdansha, 1989), a book translated into English as *Architecture as Metaphor: Language, Number, Money*, ed. Michael Speaks, trans. Sabu Kohso (Cambridge, MA: MIT, 1995). On Isozaki's interest in poststructuralism and deconstruction, see his conversation with Derrida, "Anywhere: Dikonsutorakushon to wa nanika" [Anywhere: What is deconstruction?], in *Any: Kenchiku to tetsugaku o meguru sesshon, 1991–2008* (Tokyo: Kajima Shuppan, 2010), 81–100.

80. Tracing the genealogy of the term *media ecology* (which has garnered much attention in recent years) through the work of the British social scientist and cyberneticist Gregory Bateson and the video art magazine *Radical Software*, William Kaizen has argued that media ecology is deeply intertwined with the cybernetic discourse of communication, and in particular with Bateson's theory of communication. See William Kaizen, "Steps to an Ecology of Communication: *Radical Software*, Dan Graham, and the Legacy of Gregory Bateson," *Art Journal* 67, no. 3 (fall 2008): 91.