The Nature of the Image: Olgyay and Olgyay's Architectural-Climatic Diagrams in the 1950s

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I know that beyond the mountains that close my present horizon, there is a broad valley; beyond that a still higher range of mountains; beyond that other mountains, range upon range, until we come to the Rockies; beyond that the Great Plains and the Mississippi; beyond that the Alleghenies; beyond that the eastern seaboard; beyond that the Atlantic Ocean; beyond that is Europe; beyond that is Asia. I know, furthermore, that if I go far enough I will come back to where I am now. In other words, I have a picture of the earth as round. I visualize it as a globe.
—Kenneth Boulding, *The Image: Knowledge in Life and Society*

It is likely—bordering on certain—that the existential interests of future men and women will focus on technical images.
—Vilém Flusser, *Into the Universe of Technical Images*

In his landmark 1966 essay "The Economics of the Coming Spaceship Earth," Kenneth Boulding, a pioneer in the field of environmental economics, began by claiming that "we are now in the middle of a long process of transition in the nature of the image which man has of himself and his environment" (1966: 3). Boulding was then working with a think tank called Resources for the Future and would soon become very influential through his innovative modeling of economies according to resource efficiency and environmental exter-

Public Culture 29:1 DOI 10.1215/08992363-3644433

nalities. In his invocation of the "nature of the image," he was only partially concerned with the kind of images that historians and cultural theorists encounter—constructed representations, physically manifest, usually in two dimensions; such images are cultural objects and also operate as historical evidence, documents of intentions to express, engage, critique, or otherwise intervene in cultural practices or social norms. Boulding was interested in something else, as his 1957 book *The Image: Knowledge in Life and Society* made clear. After describing his sense of himself located in space and time, and in the world of "personal relationships" and of "subtle intimations and emotions," he concluded: "What I have been talking about is knowledge. Knowledge, perhaps, is not a good word for this. Perhaps one would rather say my *Image* of the world. Knowledge has an implication of validity, of truth. What I am talking about is what I believe to be true; my subjective knowledge. It is this Image that largely governs my behavior. . . . *Behavior depends on the image*" (Boulding 1957: 5–6, italics in the original; Woodward 1989: 4).

This last principle, of the image as guide to behavior, was further developed in the "Spaceship Earth" essay. Boulding discussed contrasting images—of the past and a possible future—that he hoped would condition collective action.[1] "Early civilizations," he wrote in 1966, "imagined themselves to be living on a virtually illimitable plane." This conception of an endless frontier, where there was always somewhere to go if resources ran out or social structures failed, Boulding termed the "cowboy economy." He placed this image in stark contrast to the "spaceman" economy, in which, as he wrote, "man has been accustoming himself to the notion of the spherical earth and a closed sphere of human activity," the world as a closed system, "without unlimited reservoirs of anything" (Boulding 1966: 3, 9).

This closed system was itself most famously imaged in the period through the so-called Blue Marble photographs taken by Apollo astronauts starting in 1968, looking back at the earth from space—images that were widely published, from the *Whole Earth Catalog* to *Time* magazine. These images were immediately recognized as a new symbol and seen to provide a novel perspective on the human present and future (Kelsey 2011: 12; Jasanoff 2001). What Boulding believed to be true in 1957—his subjective sense of the earth as round—was by 1966 an objective imperative, an instigation for the development of new knowledge about the earth, its social and economic systems, and the implications of interconnectivity. Though scientists had long been producing images to facilitate inquiry into these complex dynamics, in the decades following World War II such efforts intensified and

1. In this sense Boulding appears to have been building on, though without attribution, Walter Lippmann's (1922) notion of the "pseudo-environment," a term Lippmann used in *Public Opinion* to describe the discrepancy between the world outside and the image in one's head.

pointed more explicitly to the need to adjust human behaviors toward managing a limited resource condition. The "Spaceship Earth" essay intended to articulate a new approach to how ways of being in the world could reflect and be reflected in the media ecology of this new collective self-conception. Images of the globe, mental or physically manifest, were thus also, as Boulding noted, concerned with the "state of the human bodies and minds included in the system" (1966: 9). At stake were the new ideas about the human that these images could invoke and the new social patterns and individual behaviors that they were seen to encourage.[2]

Although Boulding's call for a new image economy, representing new ideas about the relationship between "man and environment," was not directed at architects, it might as well have been. The postwar years saw extensive experimentation in how architectural practices could design a building with a more precise relationship to its surrounding ecological conditions—in the efficiency of production, in the use of solar power, and, the primary subject of this essay, in the alignment of the form, orientation, and materials of a building to its local climate. As part of these new methods, forms of representation were developed that sought to clarify the possible social, material, and economic relationships that would result from these innovations. It was through these images, as much as through the buildings that were constructed, that new design methods sought to conceptualize those relationships and encourage new ideas about how to live. The quasi-technical drawings, diagrams, and photographs produced as part of this methodological discourse encouraged designers to consider different criteria and also led to a new set of parameters for how architects could operate in a broad social milieu. Images, and diagrams in particular, were seen as instruments, tools for historical change.

This essay discusses some of the most widely distributed architectural-climatic diagrams of the period, produced by the Hungarian émigré architects Aladar and Victor Olgyay from the late 1940s to the early 1960s. Working at the newly founded Princeton Architectural Laboratory, the Olgyays produced a complex method to correlate a building to its climate—a method that engaged with a range of innovations in the architectural and environmental sciences and that relied on images and diagrams to communicate both facts and aspiration. The Olgyays assumed, as Boulding was simultaneously proposing, that the way in which we conceive of, imagine, and represent the relationship between humans and the environment is central to the social patterns, material conditions, and professional pro-

2. That new ideas about historical change also invoke new concepts of the human was one of the most potent insights in Dipesh Chakrabarty's recent influential essay "The Climate of History" (2009). Thus do current threats over catastrophic climate change reignite questions of how to frame and reconsider human relations to the biome.

cesses that allow us to live comfortably within it. Their diagrams provide evidence of an image in transition in both form and content, both message and medium. The human was placed in a new relationship to the planet, and the diagram was considered to be a form of effective professional and social communication. Though Boulding's reliance on a universal image of subjective knowledge seems today to border on mystification, his imperative to consider anew the representation of the relationship between economies and ecologies opens up a fertile ground for analysis, one made even more potent given the significance of the immediate postwar years in establishing persistent patterns of ecological devastation.[3] Indeed, concern over the role of images and visual narratives in encouraging socioenvironmental change has again come to the fore (Nixon 2011: 6; Caruth and Marzec 2014). Reexamining midcentury architectural-climatic diagrams and their rhetorical dynamics provides historical context for understanding how image making more generally has attempted to articulate the ways humans perceive their relation to the climate system.

The Good Life?

Many architectural and technical images in the postwar period resonated with the idea of the earth as a closed system and with the new ideas about the human this instigated. Indeed, Boulding was not the only one to use the term *spaceship earth*—it was invoked almost simultaneously by the economist Barbara Ward; by US ambassador to the United Nations Adlai Stevenson; by U Thant, the secretary-general of the United Nations; and by R. Buckminster Fuller in his 1969 book *Operating Manual for Spaceship Earth* (Ward 1966; Fuller 1968; Scott 2006; Höhler 2015).

The image of the Blue Marble, and of the earth as a closed system, was also anticipated in a number of ways during and right after World War II (Jasanoff 2001; Fleming 2007). Fuller, for example, made numerous illustrations attempting to represent the finite condition of global resources and the need to establish a more equitable system of energy access. In 1940, as part of a series of images published in *Fortune* magazine under the title "U.S. Industrialization," Fuller (1940: 7) mapped the distribution of human beings, energy use patterns,

3. Much of the recent discussion of the Anthropocene presents the 1940s and 1950s as a period of "great acceleration" that set in place the destructive patterns that are now coming back to haunt us in the form of climate change and other environmental catastrophes. Though this appellation of a supposed new era is problematic, the recognition of a metabolic rift in the postwar period is astute and has wide-ranging implications for the history of architecture and of other cultural practices (Steffen et al. 2015; Pfister 2010).

and what he termed the "energy slaves"—the resource and technological capacity to meet the needs of those humans—on which these use patterns relied (fig. 1). Though the map is not very precise, through representing both the bounded whole of the terrestrial landmass and the collection of human bodies that reside within it, the map effectively communicated social, geographic, and resource unevenness. It also suggested a tension: by posing this unevenness as a problem to be solved, the image operated as a critique. Fuller's map is early evidence that images of global systems were seen to have the capacity to intervene in the complicated nexus of social patterns and resource availability, and—though here still provisionally—to suggest design solutions. There were many other attempts to analyze and map global environmental and economic conditions as knowledge of these conditions increased dramatically after the war. Some were more specific than Fuller in considering how this knowledge could change architectural practices.

Figure 1 R. Buckminster Fuller and Philip Ragan, "World Energy," in *Fortune* (Fuller 1940). Courtesy of the Estate of R. Buckminster Fuller

At the same time, the basic premise that new kinds of architecture could lead to new, and better, ways of living was widespread in the decade following World War II, perhaps especially in the United States. Many significant developments in the period sought to transform building practices in order to facilitate changes in individual and social behaviors, leading to a robust milieu of innovation and experimentation and to a search for new and more potent forms of representation. Images, in other words, as much as buildings, were seen as effective means to encourage a modern lifestyle. In one well-known example, the Case Study House program—a series of designs and built projects organized by the journal *Arts and Architecture* from 1945 to 1966—was conceived explicitly to demonstrate how modern techniques and materials could open up new ways of living in the suburban environment (Entenza 1945; McCoy 1962; Macy and Bonnemaison 2003). It relied on images as much as on built projects. Now-iconic houses such as the Eames House—Case Study House #8, built in the Pacific Palisades of Los Angeles in 1949—deployed familiar tropes of

modern design, such as the open plan, the flat roof, and new materials and building techniques. These projects encouraged, as the British architect Peter Smithson would later write, “a wholly new kind of conversation” about how such innovations could bring “the good life” to the American public (Banham 1989: 183; González de Canales 2013). It was a life, significantly, that was imaged through perspectives, schematic drawings, and carefully staged and manipulated photographs (fig. 2). Journals, exhibitions, and demonstration houses used images to promote the idea that architectural innovations, paired with new technologies and new settlement patterns, could bring this good life to a wide swath of the American population (Colomina 2007; Friedman 2010).

Other kinds of life were also seen to be on the horizon. The premise that architectural techniques could expand and popularize opportunities for transforming the energy system underlay the little-known postwar interest in solar house heating. Solar houses were also designed with familiar modern strategies—large expanses of glass, open plans, new materials—though here such tropes were directed toward maximizing absorption of solar radiation. There were many relevant experiments in the decade after World War II, in contexts as diverse as the Department of Mechanical Engineering at the Massachusetts Institute of Technology (MIT) and the pages of the *Ladies' Home Journal* and the *Saturday Evening Post* (fig. 3) (Mock and Pratt 1945; Hamilton 1954; Barber 2013, 2014). Many architects and engineers became experts in diurnal and

Figure 2 Charles and Ray Eames, Case Study House #8 (Eames House), Pacific Palisades, CA, 1949. From *Vogue Magazine*, April 15, 1954 © Condé Nast

Figure 3 The MIT Solar House, from the *Saturday Evening Post*, 1949 (Barber 2016: 103)

seasonal solar paths, energy use patterns, and the thermal-insulative capacity of materials. The plans, diagrams, photographs, and other images they produced suggested, albeit still somewhat implicitly, a range of possible energy futures, with a variety of implications for the continuity of familiar lifestyles.

A more direct iteration of this new image economy appeared in a 1953 article in *Fortune*, "Power from the Sun." Here the author described the seemingly straightforward means by which solar power could best engage existing systems of production and decried the "socio-economic lethargy" that characterized attempts to integrate alternative resources into patterns of American life (Hodgins 1953: 134; President's Materials Policy Commission 1952).[4] Another kind of "global view" was imaged, in which solar radiation was mapped according to its various forms of absorption in oceanic and atmospheric systems, and the poor state of its engagement by industry was visually emphasized. Industrial and domestic use of solar power was also placed, in a set of accompanying pie charts, in comparison to fossil fuels so as to indicate the unused potential these alternative sources contained (fig. 4).

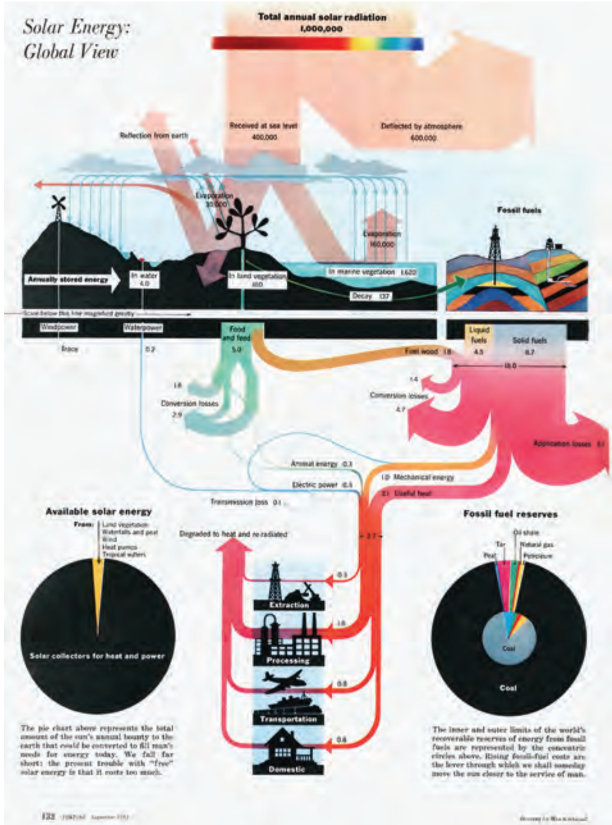

Figure 4 Max Gschwind, "Solar Energy: A Global View," an illustration for the *Fortune* article "Power from the Sun" (Barber 2016: 154)

Unlike Fuller's more general image as critique, in this later *Fortune* article direct implications were seen for the built environment and the lifestyles it facilitated. Alongside descriptions of recent experiments and summaries of industry analyses of global resource reserves, there was an image of a small house

4. The article was written by *Fortune* editor and writer Eric Hodgins, who had just returned to *Fortune* after an extended leave to participate in President Harry Truman's Materials Policy Commission: Hodgins was a commissioner and the editor of the group's five-volume report, *Resources for Freedom*. Hodgins was also the author of *Mr. Blandings Builds His Dream House* (1946), a sordid tale of an ad executive trying to build a house in the country. *Mr. Blandings* was made into a popular film, starring Myrna Loy and Cary Grant, in 1947; the film was remade in 1986 as *The Money Pit*, starring Tom Hanks and Shelley Long.

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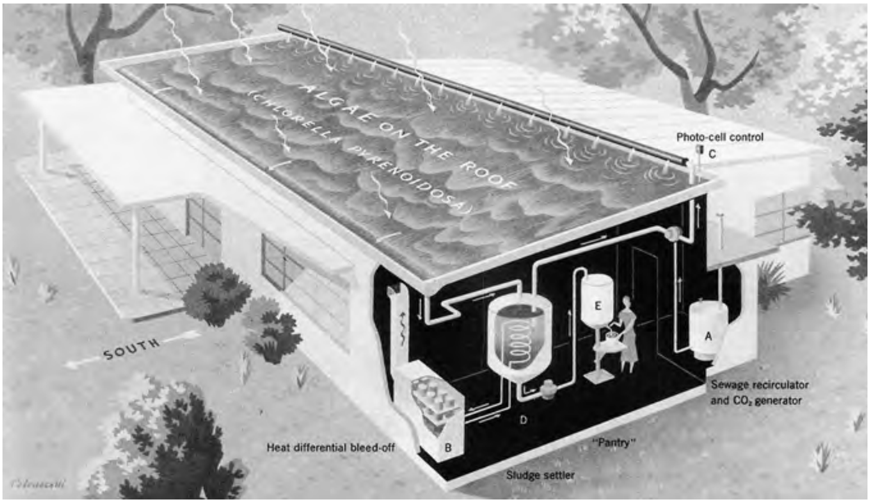


Figure 5 Antonio Petruccelli, "A Not So Utopian Future," also presented in the *Fortune* article (Barber 2016: 155)

under the heading "A Not So Utopian Future." The drawing of the house, the author noted, was done "in-house" for "Fortune's visually-minded readers." It imagined this simple-looking house as a complete survival system for a family of four (fig. 5). Solar energy would heat the house through south-facing windows; the house also had the capacity "to grow its own food, in the form of algae on its roof." A pantry workshop—an elaborate extension of the familiar technological innovations to the postwar kitchen—was the focus of the image. Here garbage was burned to charge the algae suspension and keep it growing; this algae was filtered, heated, and then made available as "a concentrated sludge, a dark-green paste with a pleasant grassy odor . . . [and] enough fresh organic matter . . . to supply the entire protein requirements for the family" (Hodgins 1953: 134).

The *Fortune* article not only suggests that there was widespread interest in exploring the potential for resource transformation embedded in new design and building practices, it also indicated that new ideas about the human necessarily accompanied these innovations. The description of the not-so-utopian house concludes with anticipation of "the internal metabolic adjustments by which we shall subsist contentedly on hydrolyzed sawdust and predigested, vitaminized algae" (ibid.). The premise that emergent concepts in design and technology would lead to new ways of living was here taken to a somewhat absurd, if not precisely satirical, extreme. Images were deployed to encourage new ways of thinking about familiar social patterns. In encountering the potential reconfiguration of "man and environment," the illustration of the not-so-utopian house also made clear, both "man" and "environment" would be subject to dramatic and heretofore unexpected transformations. Indeed, the most potent word in the quotation above is "contentedly"—sociobiotic conditions had the capacity to change so dramatically that future humans would be quite happy to live off of algae and sawdust.

These images of systems and houses, furthermore, can be placed alongside a wide range of quasi-technical images that were also attempting to rethink and re-present the prospects for civilization in the face of an uncertain energy, resource, and environmental future. Charts showing the anticipated decline of fossil fuel availability (Hubbert 1949; Ayres and Scarlott 1952); diagrams concerned with relating construction practices to new financing systems and the challenges of suburban expansion (Matter et al. 1944); maps outlining the relationship between transportation, electrical networks, and the factory production of building components (Kelly 1951), to name just a few, all operate as evidence of the state of transition of the image that humans had of themselves and their environment.

Eco-Images and Architectural Diagrams

Architects have long had an interest in the relationship of their design interventions to surrounding climatic conditions. Concerns over site, orientation to the sun, and the relationship of materials to heat and humidity are all embedded in vernacular design traditions and have been essential to the provision of human shelter for centuries. With the emergence of modern architectural techniques beginning in the nineteenth century, the relationship of a building to its climate, and the figuration of this relationship, underwent significant transformation. Diagrams in particular became a central site for disciplinary innovation. Indeed, some scholars have argued that the schematic, quasi-representational, and projective capacity of the diagram was essential to the more general turn to architectural modernity: Anthony Vidler (2000: 10–11) sees Jean-Nicolas-Louis Durand's drawings of building types at the end of the eighteenth century as generative of the modernist focus on function and abstraction; Sven-Olov Wallenstein (2009: 23) also cites Durand's drawings as transitional, moving the discipline from a focus on "expressing *sense*"—the aesthetic elaboration of contemporary thematics—to one whose task was to "find the optimal equation" amid a range of aesthetic, technological, and social factors. Others have emphasized how the diagram as an abstract figure was essential to the architectural expression of scientific management regimes that proliferated in the period of mass industrialization—organizing work flows, and also organizing human bodies, as factory buildings were optimized through innovations in design (Pai 2002: 165; Guillén 2008).

The diagram has a specific history in the postwar years, one that highlights the image as instigation toward certain kinds of human behavior. The use of visual tools to schematically draw together different kinds of social and environmental forces intensified, from the late 1940s, in many fields of inquiry, from biology to engineering to behavioral science. Such visual processes were often seen to be most useful when they integrated a range of heterogeneous inputs (Latour 1986; Knoblauch 2013). Architectural diagrams, though diverse in form and subject, tended to focus on the presentation of schematic ideas that could generate a variety of design solutions. In the 1940s and 1950s, architects interested in assessing the relationship between a building and its climate were searching for image-making methods that would help communicate new design principles to other architects. They used diagrams in an attempt to operate on the discipline, that is, in order to steer architects toward specific kinds of knowledge as they sought to develop new kinds of practice.

In the context of these more general patterns—both that of the architectural diagram broadly considered and that of the image as a means to encourage new kinds of social behavior—the architectural-climatic diagram stands out as especially potent evidence of the changing "nature of the image of man and environment," again, on two registers. Many such diagrams took the novel figuration of social and biotic systems as their explicit subject. A new kind of image was being created that imagined new ways for humans to exist amid global ecological systems. These diagrams were frequently proposed in contexts that emphasized how they could be a means to instigate change, according to processes, integrations, and aspirations that the image, however abstractly, sought to represent. These diagrams were a hybrid of a number of forms of visual communication: they exceeded, for example, the more general formal and organizational methods of other architectural diagrams in that they focused on considerations heretofore seen to be external to the design process. At the same time, in this expansive gesture they did not precisely engage either political or scientific forms of image-based attempts to instantiate new life conditions. In other words, unlike the Blue Marble, they were not images that intended to convince the viewer of a new ethicopolitical principle, and because they were not strictly scientific, they did not rely on the purported truth-value of science to clarify implicit proposals for behavioral change (Parak 2013: 2; Jasanoff 2010: 236).

Neither political, aesthetic, nor scientific, these architectural-climatic diagrams operate in a productive though awkward relationship to what media theorist Vilém Flusser has termed the "technical image." Such images started to multiply in the postwar period and began to enter into public discourse primarily as a means of distributing technical information, and usually claiming quasi-objective knowledge. Such images, Flusser proposed, tended to figure "relationships among things that no one would otherwise suspect." Although his focus was on images that were produced through technical means—photographs and images on screens—he also saw in the visual production of information a new class of images that "are intended to serve as models for action" (Flusser 2011 [1985]: 11). Thus a second transition: in mapping the new image of "man" and "environment," architectural-climatic diagrams are also evidence of the transition from an aspirational diagram expressing desire to a computational or data-driven image that claims to represent facts. Caught in this transition, many diagrams from the 1950s attempt both fact and aspiration; they intend, as Boulding's implicit image theory implies, to draw out of subjective experience some universal validity and to produce a new image of the world in order to influence new kinds of expertise.

While the diagram is the most potent, it was only one of many image types and forms of dissemination that sought to conceive of, refine, and communicate the possibilities of a design process more attuned to the vagaries of the climate system. Photographs, diagrams, plans and sections, expressive sketches, perspectives of a building, and a whole range of new kinds of charts, graphs, maps, and other technical images attempted to provide knowledge about how new design methods could improve the experience of the interior. In this sense the diagram points toward the broader challenge of rendering visible the relative invisibility of climate patterns and thus toward new design techniques, and specifically the drawings involved in conceptualizing an architectural project, as an important discursive site for developing and articulating this new kind of knowledge. Climate design techniques not only sought to provide novel engagements between interior and exterior climatic conditions, in other words, but also sought to facilitate a new image economy that could better describe emergent perspectives on the relationship between social patterns and biotic systems.

Designing with Climate

The Hungarian émigré architects Olgyay and Olgyay collectively spent their professional careers researching and modeling the dynamic between architecture and climate. Identical twins, they were born in Budapest in 1910 and trained at the Royal Hungarian Polytechnic. After spending time in Rome and London, they came to the United States in 1947 at the invitation of Marcel Breuer and held positions as research professors at Notre Dame, MIT, and then, from 1953 to 1963, the Princeton School of Architecture. It was there, in the Princeton Archi-

Figure 6 Images of the Princeton Architectural Laboratory in the 1950s. On the top row, from left, the Olgyays' experiments with different kinds of shading devices; students testing out their models in the Olgyay-built daylighting dome; and students in front of the lab. On the bottom row, an image of Fuller's early model of what would develop into his World Game; in the close-up, continents are visible; and the large compression sphere Fuller was also experimenting with at the lab. Robert Geddes Papers. Reproduced with permission of Princeton University

tectural Laboratory, that they refined their study of climate design methods and explored in detail the kinds of images needed to communicate this knowledge to architects. It was also at Princeton that they would have become familiar with early iterations of the spaceship earth concept—Fuller's frequent visits to the lab in the mid-1950s included the construction of the compression spheres that would become the basis for his most elaborate exploration of the closed world concept, the World Game of the mid-1960s (Scott 2009; Clarke 2013; Wigley 2015) (fig. 6). Though the Olgyays are not well known today, they were widely known in the postwar years, mostly for their two books *Solar Control and Shading Devices* (Olgyay and Olgyay 1957) and *Design with Climate: Bioclimatic Approach to Architectural Regionalism* (V. Olgyay 1963), both of which were in the curricula of architecture schools and on the reference shelves of design firms around the world.[5] In the period before mechanical systems of heating, ventilation, and air-

5. Given the recent resurgence of interest in architecture and climate, *Design with Climate* was reissued in 2015 by Princeton University Press, with a number of introductory articles by the Olgyays' students and colleagues. The Princeton Architectural Laboratory will be rededicated in spring 2016 with a new building and a focus on "embodied computation."

conditioning (HVAC) became affordable and widely available, the Olgyays were among the most important researchers studying the use of architectural means to mitigate climatic variance.

Though the Olgyays were concerned with the local and global dynamics of climate patterns, in the plans, diagrams, and methods they developed the figure of the human was central—literally, rendered in the middle of images intending to illustrate the challenges and benefits of a climatic architectural approach and, conceptually, as the figure of the new possibilities that these architectures could allow. The placement of this centralized figure is in sharp contrast to the perspectives and photographs of the various illustrations of the good life described above. The example in figure 7 draws the human figure surrounded by a range of heterogeneous factors—moral, historical, thermal, sonic, and spatial, among others. The role of architecture, this diagrams proposed, was to filter these factors and align them with human needs through new design strategies. "Man," Olgyay and Olgyay (1957: 5) wrote, "with his intimate physical and emotional needs, remains the module—the central measure—in all approaches. The success of every design must be measured by its total effect on the *human* environment." Versions of this diagram accompanied many of their architectural drawings and methodological proposals, serving both to illustrate the method itself and to clarify that their project was to produce a universal comfort zone, a designed condition seen to be most amenable to human habitation.

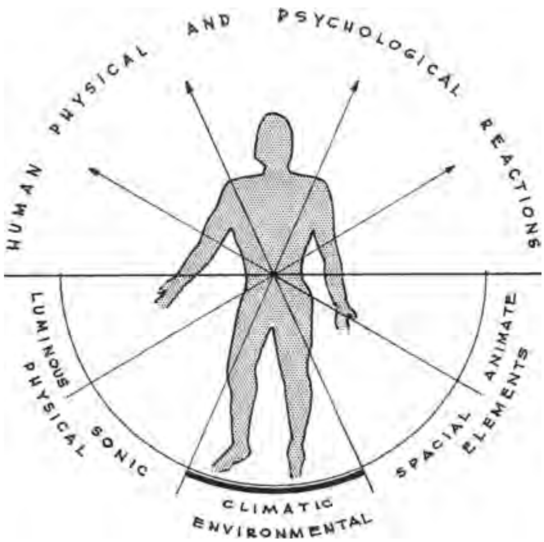


Figure 7 Victor Olgyay, "Man as the Central Measure in Architecture," from *Design with Climate: Bioclimatic Approach to Architectural Regionalism* (1963). Copyright © 1963 and 1991 by Princeton University Press/Author. Reprinted by permission

Also significant in the Olgyays' quotation is the slippage from "man . . . and his needs" to "the human environment," a shift that begins to hint at a rhetorical transformation from a gendered though univocal condition of the male subject to a more nuanced consideration of the human species as having identifiable and universal needs. "Man" and "humanism" were ciphers for a much wider reconsideration of the social and technological forces aimed at improving social conditions in the decades following World War II. Indeed, the notion was ubiquitous. Edward Steichen's exhibition *The Family of Man* (1955) was of the most straightforward. Opening at the Museum of Modern Art in 1955 and touring globally for the rest of the decade, images of individuals across a geographic and sociocultural spectrum were brought together to affirm a global consistency to the human condition (Turner 2012). In a similar vein, the German émigré psychoanalyst Erich Fromm (1955: 25) discussed the possibility of a "science of man" that, as he saw it, would better realize the potential of the species through "making the world a human one." In the invocations of man, humanism, and the imperatives of human rights, an idea about the human was asserted as able, through technology or the force of ideas, to have an impact on both environmental and social conditions.

In postwar architectural discussions, this interest in the universal condition of the human, and in how design could improve that condition, was also widespread. The Finnish architect Alvar Aalto (1997 [1950]: 113) spoke of "a broader, new purpose for architecture" now focused on the field's capacity to provide a "softening human touch" that, in the face of the potentially alienating forces of technology and scientific knowledge, could mediate the anxiety of the postwar world. Rudolf Wittkower's *Architectural Principles in the Age of Humanism* (1952) and Colin Rowe's essay "The Mathematics of the Ideal Villa" (1949) would also appeal to a universal conception of the human, derived from the Renaissance, as a means to encourage new ways of building. Rowe relied on diagrammatic analyses to establish a historical continuity up to the present. Simultaneously, the French-Swiss architect Le Corbusier (1955) proposed his Modulor system in the late 1940s, updating the Vitruvian man as a framework for modern design (Cinqualbre and Migayrou 2015) (fig. 8). The Olgyays' research into the dynamic between humans and climate participated in this reconstruction of universal architectural principles: Le Corbusier was the touchstone both for their figuration of the human and for their climatic architectural techniques.

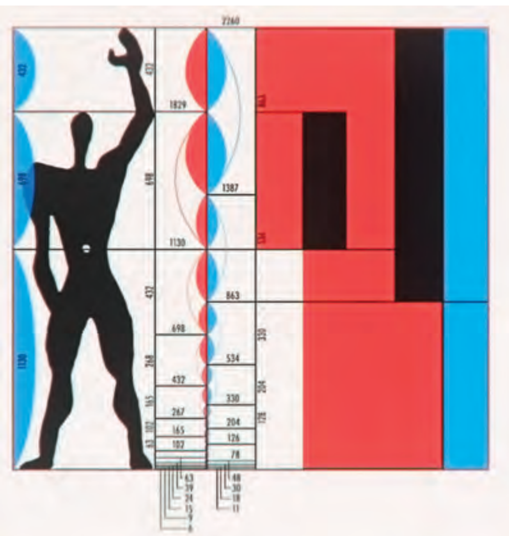


Figure 8 Le Corbusier, "Modulor," 1955. © FLC/ADAGP, Paris / Artists Rights Society (ARS), New York, 2016

The Olgyays' research also developed out of a widespread, albeit largely schematic, interest in a building's relationship to relevant environmental factors that pervaded the development of architectural modernism. In the interwar period this played out according to how a building design could maximize an inhabitant's exposure to light and air. Walter Gropius, Frank Lloyd Wright, Richard Neutra (1948), and many others were experimenting with new design parameters aimed at improving human health on these terms (Overy 2007). A diagram drawn by Gropius in 1928, for example, which circulated widely at the second of the International Congresses of Modern Architecture (Congrès Internationaux d'Architecture Moderne, CIAM) in Brussels in 1930, sought to identify the ideal building height, orientation, and site arrangement for solar exposure and induced ventilation (fig. 9). Gropius's (1955 [1931]) diagram also demonstrates the basic premise of integrating sociological, physiological, and technological knowledge into an explanatory drawing, as an attempt to elucidate methodological principles and encourage specific professional methods. Many other buildings and projects in the period—such as Neutra's open-air schools, Rudolf Schindler's shed-roof structures, Fuller's Dymaxion houses and early dome experiments, and even Mies van der Rohe's Villa Tugendhat, of 1928, where the all-glass south-facing wall could sink completely into the basement and open the living area to the exterior—were concerned with relating the building to climatic patterns and were often

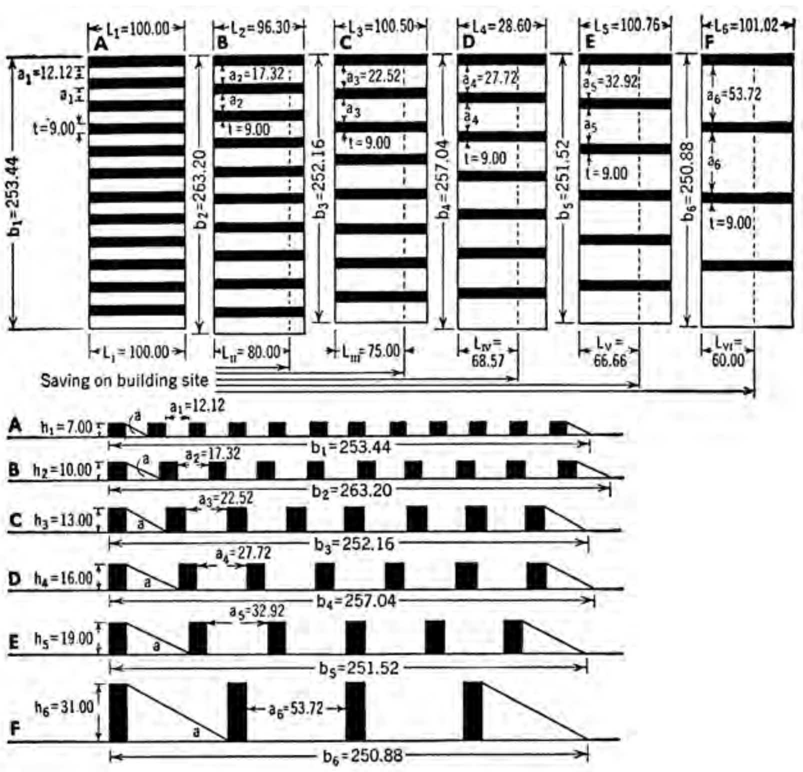


Figure 9 Walter Gropius, diagram from "Houses, Walk-Ups, or High Rise Apartment Blocks?" (1955 [1931]) Harvard Art Museums/Busch-Reisinger Museum, gift of Walter Gropius

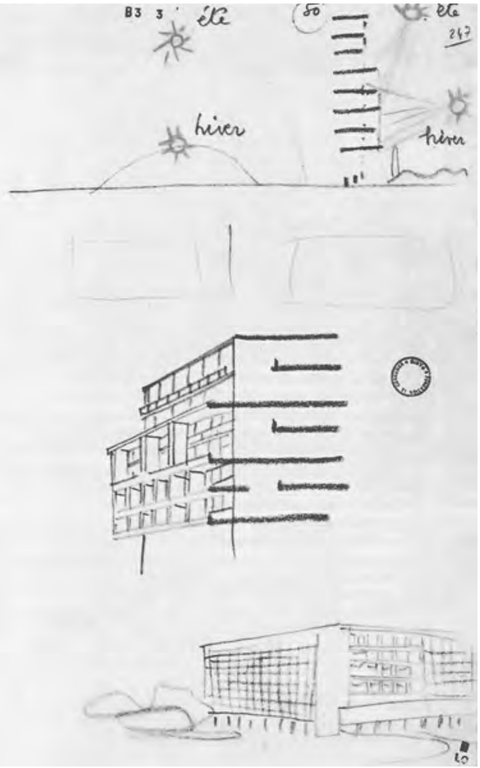


Figure 10 Le Corbusier, sketch for the Immeuble Clarté, 1928. © FLC/ ADAGP, Paris / Artists Rights Society (ARS), New York, 2016

accompanied by new means for representing these relationships (Porteous 2002: 52).

The Olgyays followed more directly on the climate design research of Le Corbusier. Attention to diurnal and seasonal solar patterns was a prominent factor for Le Corbusier early on, and many of his drawings from the 1920s and 1930s not only alluded to solar patterns but also imagined individuals enjoying the newly acclimatized spaces he hoped to create. Le Corbusier's approach to climate became more specific with the elaboration of the *brise-soleil*, or "sun-breaker," an external fin or louver that is attached to a facade to selectively modulate solar incidence on the interior (Siret 2004: 175).[6] Le Corbusier, by the late 1920s, had faced a number of disappointments with costly and cumbersome mechanical heating and cooling systems, and the *brise-soleil* was the result of a concerted attempt to develop a new, nonmechanical and thus design-based method to attend to a building's thermal conditions (Frampton 2001: 130). These shading devices, as the drawing at the top of figure 10 suggests, could block the sun in the summer and allow it in during the winter; different shading systems could accommodate different facade orientations and could be carefully keyed to solar angles at a given latitude. Capacity for user adjustability of the shading system was key, as it allowed inhabitants to control, to some extent, how and when solar radiation would enter the building, according to the season or to their desired temperature.

As architects around the world began to explore the new design tools of architectural modernism, the *brise-soleil* became a crucial design tool. In Brazil, then rapidly industrializing, the use of shading devices greatly facilitated the proliferation of modern styles (Mindlin 1956: 12). Similar design patterns developed through British architects working in West Africa and Singapore during and after the war, in Le Corbusier's work and that under his influence in India, and in the extensive embassy-building program initiated by the United States from the early 1950s (Jackson and Holland 2014; Chang 2016; Prakash 2002; Loeffler 1998). In

6. The historian Reyner Banham (1969: 158) called the *brise-soleil* "one of Le Corbusier's most masterful inventions." It was in fact "invented," or at least experimented with, by a number of architects, including most prominently the Greek architect Stamo Papadaki, before Le Corbusier attempted to claim it for his own through a series of articles and proclamations right after World War II.

all of these cases, architects produced buildings with dynamic shading systems that could manage climatic extremes or variability without recourse to expensive, fuel- and infrastructure-dependent mechanical systems. Indeed, it was largely through the use of *brise-soleil* that the so-called International Style took on a global dimension: in the 1930s and 1940s, as tradition often held at the metropoles, building practices in Brazil, West Africa, India, and other seemingly peripheral sites relied on modern styles both for efficiency in building methods and for the image of economic and social progress they implied. Important buildings throughout the global South developed these new design techniques and relied on emergent knowledge of climatic patterns in order to manage challenging conditions for their industrializing inhabitants (Tsiomis 2006; Collins and Guillén 2012).

Photographs and diagrams of seventy-seven of these climate-sensitive buildings from around the globe were collected in the section "Architectural Examples" in Olgyay and Olgyay's *Solar Control and Shading Devices* (1957). Not quite a history, these examples stand as a multivalent collection of the recent past: each spread contains photographs of the building, usually focused on the exterior, to suggest the formal variety that shading devices allowed. Each spread also had section and elevation drawings of the *brise-soleil* type that was deployed and one or more of a variety of possible technical graphs. In each case the enigmatic "sun mask," an important aspect of their method, was included, as seen at the center of figure 11. Focused on how these techniques could produce a more comfortable interior, the Olgyays' atlas of climatic buildings begins to translate the social, formal, and technological project of architectural modernism into a method for systematically rethinking the relationship between humans and the environment.

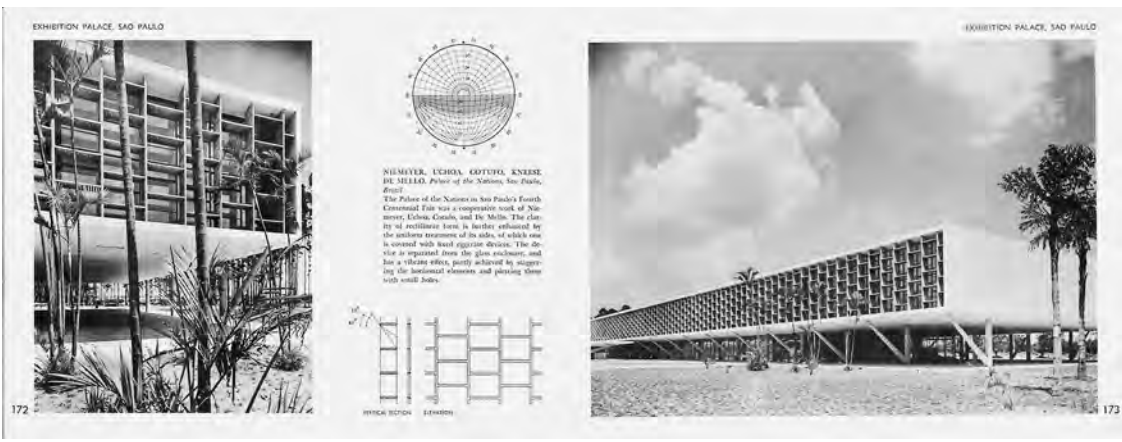


Figure 11 Oscar Niemeyer, Hélio Uchoa, Rafael Cotufo, and Eduardo Kneese de Mello, Palace of the Nations, São Paulo Fourth Centennial Fair, 1949. From Olgyay and Olgyay, *Solar Control and Shading Devices* (1957). The "sun mask" is at top in the center, showing how the shading system was developed in response to specific solar patterns. Reproduced with permission

Their design method was complex. It emerged both from the knowledge gained by collecting and analyzing these recent historical examples and through a number of early attempts to develop a means for representing the relationship between architecture and climatic data to make it accessible to architects. An early iteration appeared in Victor Olgyay's article "The Temperate House" (1951). Here images attempted to make the connection between increasingly specific knowledge about regional climate and the direct effect that this knowledge could have on the form and orientation of a building (fig. 12).[7] It took into account the relevant solar angles on each possible facade exposure, the use of shade trees, and the capacity of different materials to respond to these conditions in different ways. A

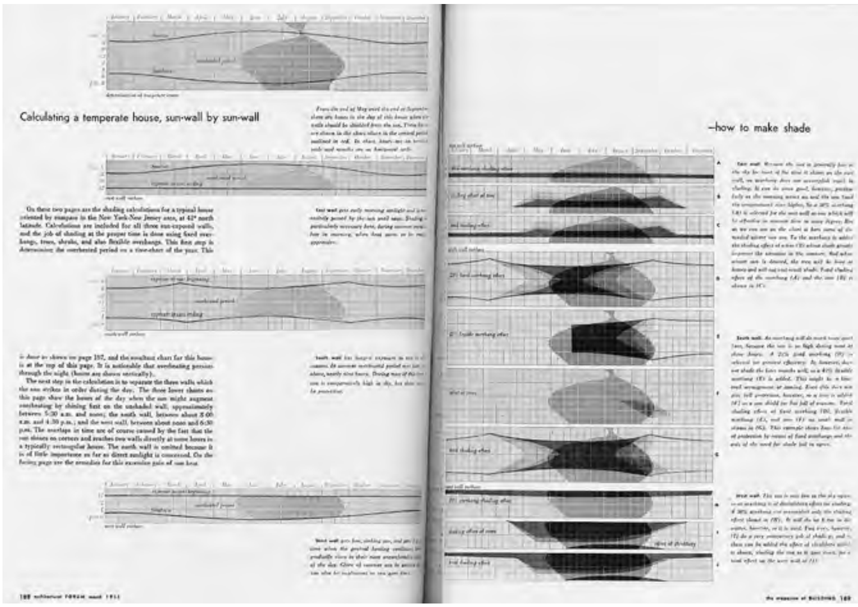


Figure 12 Spread from Victor Olgyay, "The Temperate House," in *Architectural Forum* (1951), reproduced with permission

7. The article developed out of the Olgyays' work with the army climatologist Paul Siple while they were all at MIT in the late 1940s. Siple was developing a series of charts, graphs, and other illustrations for a collaboration between the shelter magazine *House Beautiful* and the American Institute of Architects (AIA), called the Climate Control Project. Designing a house according to regional and microclimatic conditions was seen as part of a "common sense" approach to the "good modernism" that *House Beautiful* was promoting. Accompanying the magazine's articles, the AIA ran a series of "climatic analyses" of metropolitan regions; the Olgyays' method was an elaboration and refinement of Siple's (1950) attempt to make climate sensible to architects (Barber 2016).

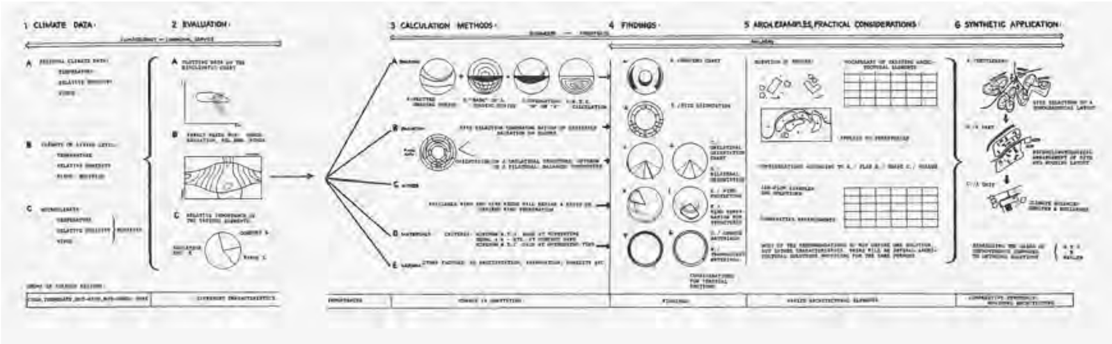
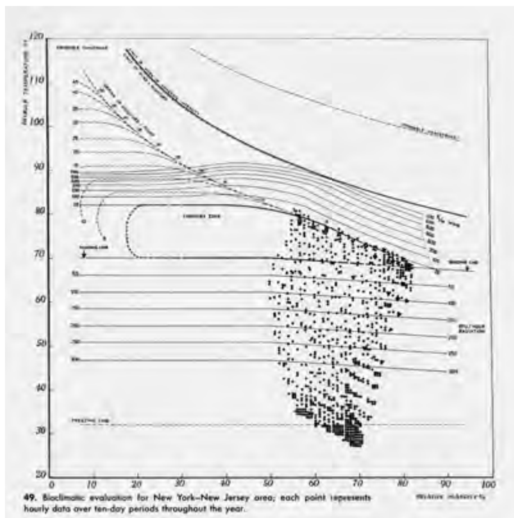


Figure 13 Aladar and Victor Olgyay, "Method of Climatic Interpretation in Housing." From Olgyay and Olgyay, *Solar Control and Shading Devices* (1957). Robert Geddes Papers. Reproduced with permission of Princeton University

shading system was also proposed to compensate for the inevitable complications amid these numerous factors. This sequential and diagrammatically informed methodological process developed through numerous publications before reaching its mature state in 1957.

The basic premise of the method, graphically summarized in figure 13, was to collect climatic data, evaluate it, integrate it into new diagrammatic representational methods, and then use these diagrams as parameters for formal, material, and site-related decisions in the design process. There were a number of phases. The first involved contacting climatologists to gather data on the building site in question. The second phase focused on evaluation and led to the development of new kinds of representational tools. Most prominent was their interpretation of the "bioclimatic chart," which mapped temperature averages and extremes, as well as factors of humidity and wind velocity (fig. 14). The *y*-axis on the chart is temperature, the *x*-axis is humidity; the upper dotted line, angled as it responds to both temperature and humidity, indicated a limit beyond which there is danger of sunstroke; the lower dotted line simply indicated freezing. The centerline was speculative, suggesting how a shading system could cut through these extremes and neutralize them—it sat at the bot-

Figure 14 Aladar and Victor Olgyay, "Bioclimatic Evaluation for New York–New Jersey Area." From Olgyay and Olgyay, *Solar Control and Shading Devices* (1957). Reproduced with permission



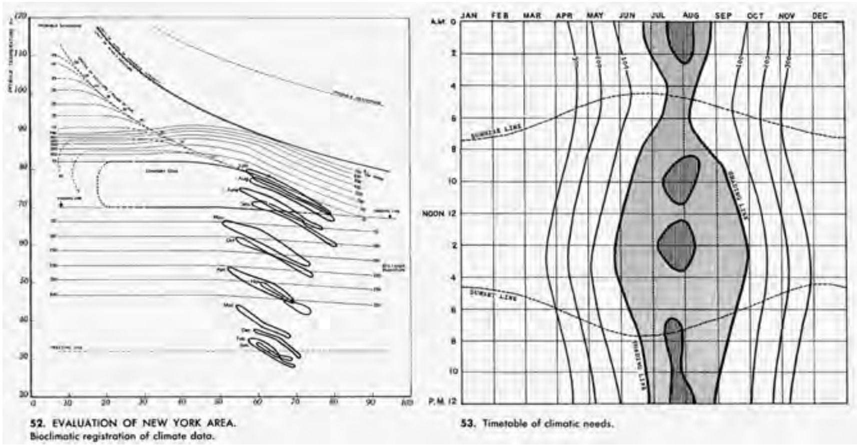


Figure 15 Aladar and Victor Olgyay, "Bioclimatic Registration of Climate Data" and "Timetable of Climatic Needs." From Olgyay and Olgyay, *Solar Control and Shading Devices* (1957). Reproduced with permission

tom of the "comfort zone."[8] The dots each represented hourly data points, different for each region. These data points were then translated into drawn shapes for each month, arranged across the graph to show their relative coextension with the comfort zone in a nonmanipulated state. An accompanying drawing interpreted this chart as a "timetable of climatic needs," with the dark areas in the center showing the overheated periods that required a focused shading approach (fig. 15) (Olgyay and Olgyay 1957: 81).

In the third phase, that of calculation, site-specific shading needs were translated again, this time onto a "sun mask." This diagram was derived from the relationship, in plan and section, to seasonal solar incidence: again, the darkened sector of the mask correlated to a specific approach to shading. In the case illustrated in figure 9, an egg-crate shading system on the sun-facing facade helped to keep the interior cool in the spring, summer, and fall. Other cases required other arrangements. The third phase also looked at orientation, wind, the effect of different materials on possible overheating, and a number of other issues that the Olgyays played out in detail elsewhere. The fourth phase then explored the findings of the calculations from phase 3, compared them, and evaluated the differ-

8. Both the bioclimatic chart and the comfort zone developed alongside early innovations in air-conditioning at the beginning of the twentieth century, though the Olgyays added much detail and focused their analytic potential toward design rather than mechanical strategies (Cooper 1998: 51–70; Murphy 2006: 19–34).

ences through a number of diagramming techniques. For example, the "timetable of climatic needs" could also be mapped onto orientation studies to determine the best building shape—a square, a long rectangle, or other variations. In this and other instances, data-driven analysis led to formal interpretations—sometimes intending to suggest balanced or harmonious patterns, sometimes intending to reflect how specific shapes were appropriate to specific climatic regions. Finally, the fifth and sixth phases began to lead the architect closer to familiar territory, including careful analysis of the historical examples provided in *Solar Control* and a number of analytic diagramming techniques intended to bring these factors to bear on the specific design needs of a given project.

The point of the method was the designed provision of a "comfort zone"—a careful correlation between building and climate so that interior conditions could be optimized for human habitation (Olgyay and Olgyay 1954: 4). To conceptualize this zone, the Olgyays assessed a wide range of physiological and biological data (Lee 1953). The zone, they readily admitted, "does not have any real boundaries . . . [however] the criterion was adopted that conditions wherein the average person will not experience the feeling of discomfort can constitute the perimeter of the comfort zone" (Olgyay and Olgyay 1957: 12). In the "schematic bioclimatic index" it becomes clear that designing a building according to these parameters, however vaguely defined, was quite a lofty goal (fig. 16). Distinct from the analytic version in figure 13, here the human is figured in the center, relaxing on a modern chaise longue, smoking a pipe, reading the newspaper, and completely at ease—without irritation, without having to experience any of the also possible climatic conditions that surround and threaten him. The human is imaged and imagined as a stable, protected figure. He—it is clearly a male figure—is solid in the experience of well-designed space, consistent across changes in the elements that the past, present, or future can bring. In 1957, this diagram suggests, the image of man's relationship to his environment is, more than anything, one of

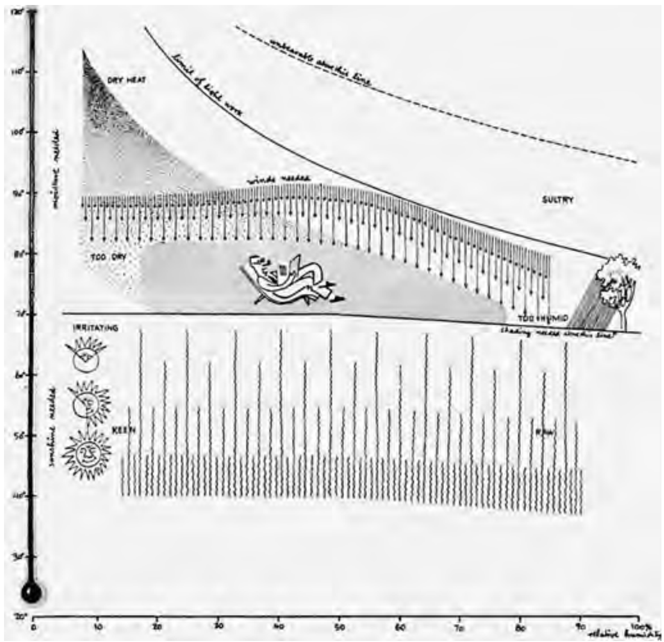


Figure 16 Aladar and Victor Olgyay, "Schematic Drawing of the Comfort Zone." From Olgyay and Olgyay, *Solar Control and Shading Devices* (1957). Reproduced with permission

stasis—a stasis that was, importantly, rendered as such through the intervention of carefully considered architectural methods.

What to make of this image of stasis and its potential effects? First of all, it becomes clear that all of these diagrams—expressive interpretations of technical knowledge—were drawn to identify and celebrate the new possible conditions for the human that a climate-focused architecture could bring about. On the one hand, a static climatic interior had long been the dream of modern architectural interventions—Le Corbusier, again, famously foresaw a time when "every building, around the globe, will be 18 degrees [Celsius—about 65 Fahrenheit]" (1991 [1930]: 66). On the other hand, the astounding complexity of the Olgyays' method is indicative of how difficult it was to design such a climate-sensitive interior and to manage thermal comfort before the widespread availability of mechanical conditioning systems.

Figure 17 Victor Olgyay, "Theoretical Approach to Balanced Shelter," from *Design with Climate: Bioclimatic Approach to Architectural Regionalism* (1963). Copyright © 1963 and 1991 by Princeton University Press / Author. Reprinted by permission

These diagrams are hybrids, concerned with both affect and instrumentality. As methodological diagrams they activate a disciplinary agenda and operate as an appeal to engage architecture as a site for the possibility of realigning a number of analogous relationships: that between the interior of a building and its site; between the inhabitants of a building and the weather outside; and between the analysis of climate, abstracted in figure 17 as a dome of protection, and the forms, materials, and orientations that can translate this balanced climatic dome into a real, built condition. Their formal language also tends toward reification of the potential for balance—for how they assume things should be—on these disciplinary terms. The images appeal to both the technological disposition and the aesthetic intentions of mid-century designers, encouraging them to realize the apparent promise of architecture as a shelter in this wide sense: as the provision of comfort that can, in turn, realize the potential of the human that inhabits it. Unlike the "not-so-utopian" house, this appears at first to be a utopian premise: an argument, in diagrammatic form, for containing the human and isolating the species from the unpredictability of the global ecological system. Though enmeshed in the pitfalls of a well-meaning humanism, their position between the aesthetic, the scientific, and the disciplinary still suggests a profound aspiration for encouraging transformation—for how this new quasi-technical perspective on the parameters of the design process can lead to new kinds of architectural expertise and new modes for inhabiting the globe. But still, what kind of aspiration is at play? What sort of future did these diagrams imagine?

The Predicament of Mankind

This question is complicated by the fact that, almost as soon as it was articulated, the Olgyays' specific "image of the relationship between man and his environment" began to dissemble. For one thing, their research had a mixed reception in postwar architectural culture. Although their method was taught in numerous schools and they were embraced by many prominent architects, their influence was limited by a pervasive concern that the technological determination of any aspect of a building design frustrated an architect's expressive voice (Neutra 1959; V. Olgyay 1962).[9] They were also working, at Princeton, amid an emergent architectural postmodernism in which new forms would be derived from historical examples rather than according to innovations in the understanding of complex building functions. The Olgyays' focus on design research, all the same, and their ability to garner independent funding from corporations, foundations, and nongovernmental organizations helped to reposition architecture in relationship to other departments in the university context. This was especially the case as the new field of architectural science tried to find a place alongside other forms of scientific research on the environment.

Here as well, their fit amid these other fields was awkward. In particular, their apparent dedication to the centralized figure of the human—their imaged percep-

9. They consulted, for example, on Breuer, Bernard Zehrfuss, and Pier Luigi Nervi's headquarters for the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in Paris, of 1958; Walter Gropius and the Architects Collaborative's 1963 proposal for the University of Baghdad; and Josep Lluis Sert's 1964 Peabody Terrace, among many other projects.

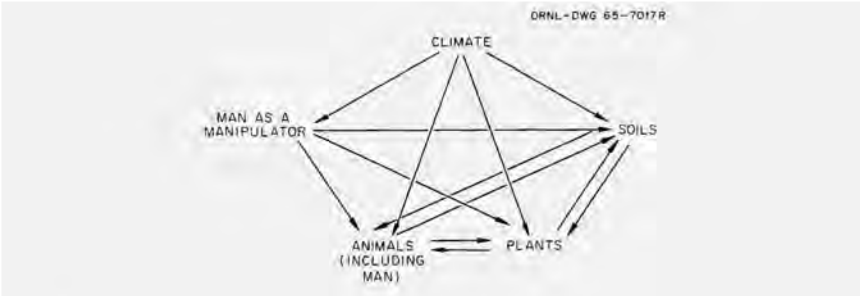


Figure 18 George Van Dyne, "An Ecosystem Is an Integrated Complex of Living and Non-living Components," from *Ecosystems, Systems Ecology, and Systems Ecologists* (1966)

tion of the static relationship of humans to their environment—was soon eclipsed in many adjacent discussions, as technical images proliferated. Just down the street from the Olgyays' lab, though apparently unknown to them, the Hungarian émigré physicist John von Neumann had been running, from the late 1940s until his death in 1957, the Meteorology Project. Based at the Princeton Institute for Advanced Study, and using the Electronic Numerical Integrator and Computer (ENIAC) system at the Aberdeen Proving Ground in Maryland, von Neumann and his colleagues were exploring computational methods of weather prediction. The project served, in part, to register the complexity of the climate system and the difficulty of representing and modeling it (Nebeker 1995: 135–51; Edwards 2010: 113–15).[10] Computational efforts to model climate, at Princeton and elsewhere, were facilitated through the increase in climate data that resulted from the International Geophysical Year, a global scientific initiative that, from 1957 to 1959, greatly expanded knowledge of earth, ocean, and atmospheric systems.[11] Related images of the relationship between "man and environment," also reliant on the availability of more and new kinds of data, were simultaneously being developed in the young science of ecology. Ecological analyses were interested in tracing "man's" capacity to disturb an existing set of interconnected energetic

10. The Meteorology Project ended in 1956, largely due to von Neumann's failing health and his involvement with the Atomic Energy Commission; many of the more prominent researchers went to MIT, where they worked with Jay Forrester and others, such as the "limits to growth" group, who were interested in using computation to model systems dynamics.

11. The now well-known Keeling curve, based on carbon monitoring at a Hawaii observatory that began during the International Geophysical Year, tracks the increase of carbon particulates from this period—one of the more potent recent iterations of the image that humans have of their relationship to the environment.

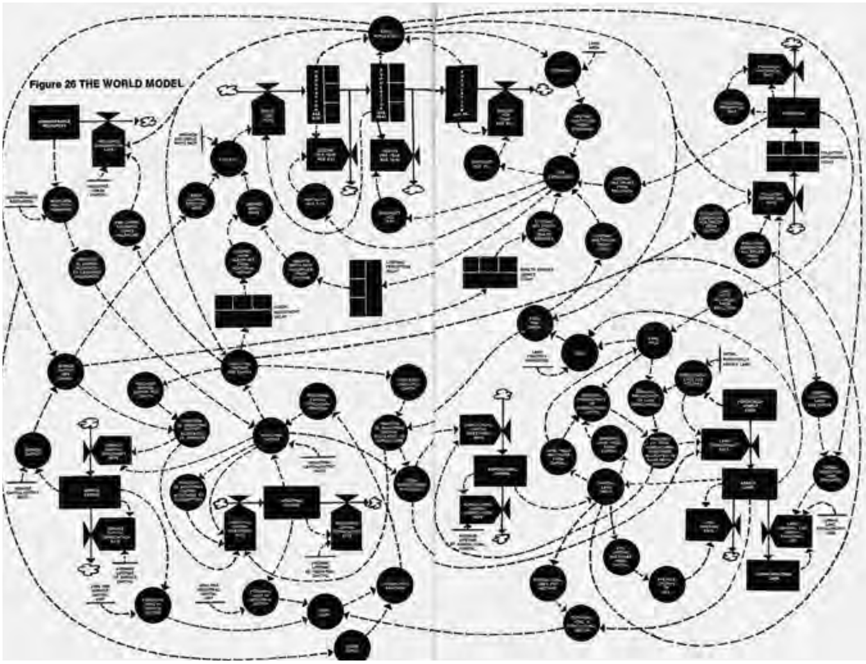


Figure 19 Donatella Meadows et al., "The World Model," from *Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (1974)

pathways. Chains of energy as they flowed through the ecosystem were in part the result of human influence; the impacts of these interventions by "man as a manipulator," as figure 18 shows, also affected humans in their animal state, that is, according to their biological needs (Van Dyne 1966: 3). Ecology, as it was schematically figured, relied on a dual positioning of "man," now decentered, and a new image of both species relations and entanglements with the biosphere.

By the early 1960s, new research, based on entering ever more data into increasingly powerful computers, also began to elaborate on alternatives to the premise that all ecosystems inherently worked toward a state of balance (Barbour 1996). Instead of a progression to a peak condition, such models conceived of the world in a state of constant flux and subject to human intervention. The "world model" imaged by the Club of Rome's Project on the Predicament of Mankind, working with the Systems Dynamics group at MIT in the 1960s, for example, presented a system of variable inputs and outputs, subject to bottlenecks and stoppages, with complex and, ultimately, unpredictable consequences (Meadows et al. 1974) (fig. 19). This "limits to growth" model would come to maturity simultaneous to, and in dialogue with, Boulding's conception of the closed sphere of spaceship earth. It would also come under much scrutiny, largely for its implicit assumptions about the technological capacities of emerging economies (Taylor and Buttel 1992). It was nonetheless symptomatic of a significant shift: of an environmentalism no longer focused on "the long-lost fellowship and intimacy between man and other living things" and concerned instead with producing models and images of ecological interdependence so as to increase technological efficiencies and, at least in some iterations, reduce social inequity (Worster 1977: 323). The world model in fact modeled, in new ways, a political approach—however fraught, partial, and biased—to socioenvironmental problems. Ultimately, much like the Olgyays' figure relaxing on the chaise, the world model imagined an idealized model of a steady state economy, in which government regulation would allow economic expansion to occur in concert with the beneficent management of environmental goods and bads (Daly 1977).

Also significant: Where was the figure of the human? One partial consequence of the integration of "man" into the flows of the global ecological system was the simultaneous disappearance of the human figure as a centralized focus. The proliferation of data, and of the technical images they informed, offered a model of the world that left the human figure behind, for better or worse. All of these parallel developments, though not empirically connected, appear to have conditioned the subtle shift from "man" and climate in the Olgyays' work of the 1950s to the "bioclimatic approach" in the subtitle to *Design with Climate* in 1963. The contours of their implicit political implications returns: How did these figurations of the human suggest possible futures, and what futures did they suggest? Again, the situation is complicated by contingent factors: their diagrammatic parameters for a comfort zone were themselves soon absorbed by building industry conglomerates concerned with regulating the effects of mechanical conditioning systems on a building's interior. In other words, the Olgyays' technoaesthetic attempt at imaging and imagining stasis refined the principles and the regulatory parameters of the fossil-fuel-generated HVAC systems that have heated and cooled buildings ever since—with momentous, though unintentional, impacts on the global climate system. The static human, comfortable in a globally consistent interior, can today be seen as an image of technocultural contestation.

Much can be read, then, into the architectural-climatic diagrams of the 1950s. Those discussed above are just a handful of the many images that circulated in architecture and other fields as professional and cultural actors struggled with understanding how the built environment, and images of it, could more effectively reflect human desires for new socioecological relationships. The conceptual frameworks that allowed the Olgyays' images to produce sense have also been compromised, so much so that it is difficult to extract their significance—not only because HVAC systems soon dominated architectural and engineering discussions about conditioning interior environments, but also because media theory would just as quickly shift from the content of the image to focus on the medium itself as the conveyor of significance. Indeed, Boulding identified a strong challenge to his general premise of the instrumental image in the work of Marshall McLuhan. Reviewing *The Gutenberg Galaxy* in 1965, perhaps as the "Spaceship Earth" essay was being written, Boulding's initial ambivalence about McLuhan's argument that the form of media, rather than the content of the image, structured social conditions ended up in dismissal. "It *is* the message," he wrote, "not the medium, which is important. . . . The message consists of the processing of information into knowledge, and not the mere transmission of information" (Boulding 1965: 272). Increase in knowledge, Boulding continued to maintain, was the key to more enlightened forms of human action and environmental intervention.

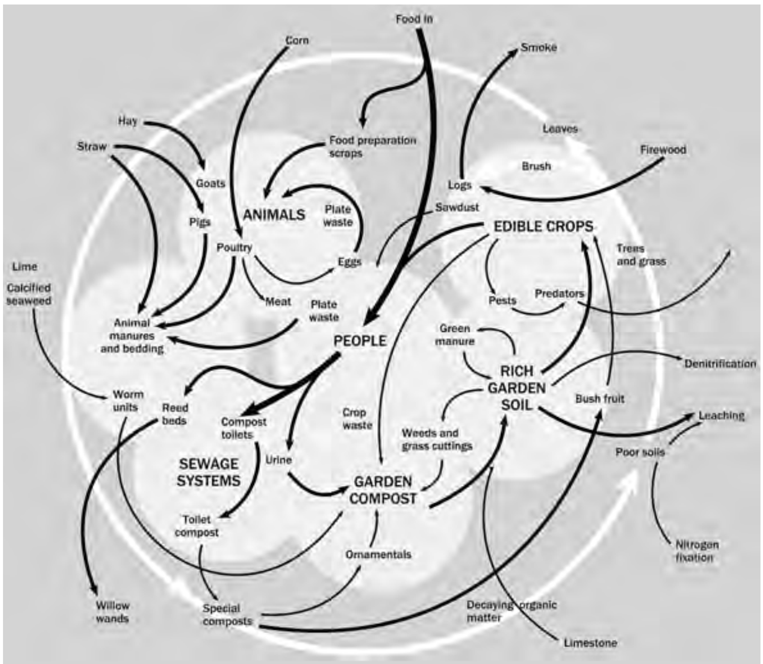


Figure 20 Centre for Alternative Technology, "Life Cycles," 1974. Redrawn by Stinson Lenz, 2015

Two afterimages from this 1950s discourse offer reflections and refractions of these changing ideas and expand on the transitional condition both of the perception of the man/environment relationship and of the image as instrument. This first is a diagram produced in the early 1970s by the Centre for Alternative Technology (CAT), one of the many radical collectives of the period. CAT occupied a quarry in Wales in 1973 and, as one of the leaders wrote in 1974, began experiments "to show the nature of the problem and show the ways of going forward" (CAT 2015; Borasi and Zardini 2007). The diagram in figure 20 attempts both, using the circle to imply a closed system and to refigure connections between humans and their natural and

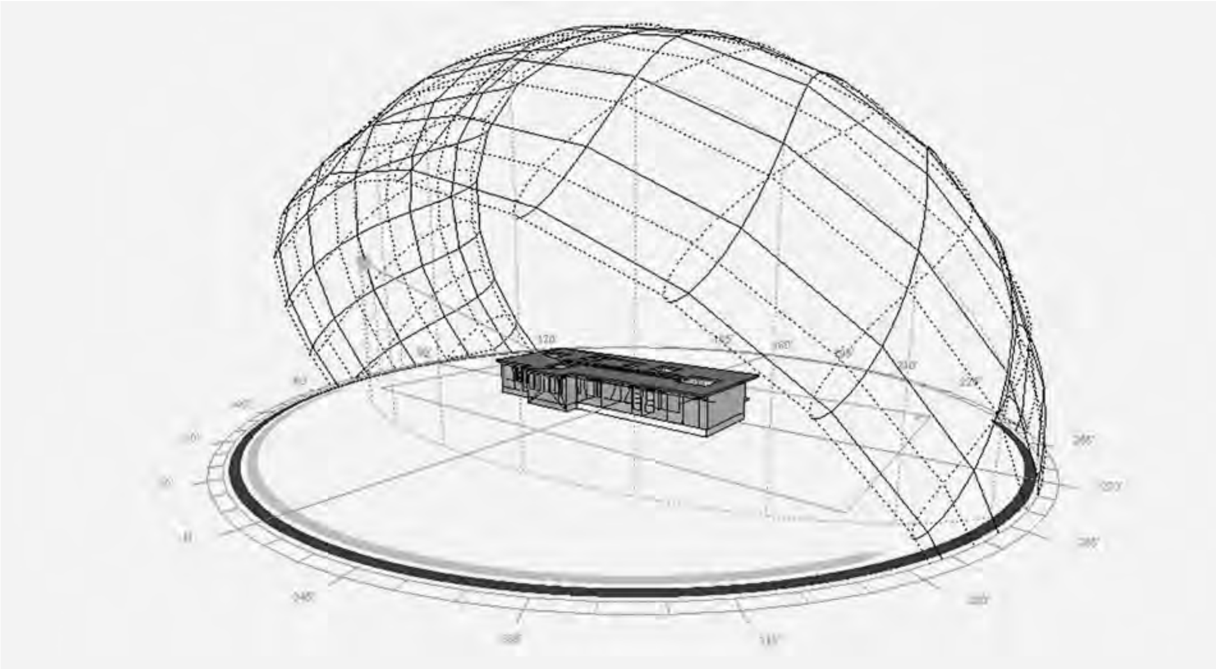


Figure 21 Screen shot from the climate design software Ecotect, now owned by Autodesk. Courtesy of Amrita Ghosh

sociopolitical context. There were many others like it, in the 1960s and 1970s, as architectural aspects of the global counterculture sought to legitimate and systematize their modes of thought and practice. Here the diagram still appeals to instrumentality, but more broadly attempts to influence new social patterns—it does not restrict itself to architecture. Indeed, it implicitly repositions architecture in much the same way that the "limits to growth" model implicitly repositioned technology—it is both nowhere and everywhere, not mentioned in the diagram, but seen by CAT as the means to attain the goals that the image represents. Amid this dizzying array of inputs into the "life cycle"—from pigs to flowers, sunlight to compost, with arrows pointing everywhere—the diagram expands the image of man and environment to contain a much more complex and entangled set of subjects and objects, both human and nonhuman. It is a different image of the human-ecology relationship, but one still caught up in a hope for the immediacy of humanistic effects and for the clarity of the image to lead to the relationships it suggests.

The second afterimage is a screen capture from the building performance software Ecotect, until recently one of the most sophisticated climate performance platforms available to contemporary architects (fig. 21). Developed in 1994 by a New Zealand architect, it is a direct and explicit digitization of the Olgyays' method (Marsh 2014). It takes into account climatic and environmental factors of the building site and provides parameters to maximize a building's performance. Which is to say, in part, that the Olgyays' method, incubated in architectural science departments for decades, has now been realized as an instrumental design tool, in which images are manipulated according to data inputs, material efficiencies, and designed optimizations, sometimes leading to increased energy efficiency in the built environment (Szokolay 1998). At the same time, the figural tension is missing—the computational claim to adequate knowledge of climate systems and of design techniques elides the premise that an architectural, or any other, image can directly influence human behavior. The aspiration is not toward imagining new ways of life but toward maximizing mechanical efficiency. Data overwhelm the entanglement of aesthetic, scientific, and political knowledge. At the same time this imperative for efficiency plays into the urgency of climate change as a technological and sociopolitical issue, framing building efficiency as unproblematically participating in solutions to a global problem. The imaged relationship between "man and environment" is flattened on this digital surface, across which "man" is attempting to control all possible factors and to build an environment more precisely reflecting the calculated needs of the species. Which is not to say that such performance softwares are not important tools, but rather to say that they accede to a form of technological determinism that resists the programming of other possible futures. This is also not to say that the human figure itself needs to be recovered as an image of a supposed environmental balance but rather to say that the tension between objective knowledge and aspiration, between data and desire, is in itself productive for social change.

Data has overtaken the image of the human as the conceptual framework for the architectural-climatic diagram. The Olgyays' diagrams stand as evidence of the difficult passage from one image of the world to another—the end point of which, despite the resurgence of relevant imagery, we have not yet managed to approach. Across the broad historical spectrum, the Olgyays' schematic bioclimatic index, amid their other diagrams, is revealed to also propose a not-so-utopian disposition—an image of species stasis that resisted, rather than facilitated, the transformative potential of socioecological dynamics. In the face of climate change and other environmental threats, questions about how images can affect social patterns are again of great interest. Despite their shortcomings or, indeed, perhaps because of their inadequacies—their quasi-technical and transitional condition, their inability to effectively draw things together—the Olgyays' diagrams figure human entanglements with the environment as a persistent challenge. Data, and the more precise knowledge of environmental conditions and of human behaviors that data purport, are not in themselves adequate to suggest transformations to those conditions and behaviors. By critically analyzing visual rhetorics that claim relevance to environmental change, and by implicitly reframing environmental challenges to recognize the inextricable connections between social patterns, cultural desires, technological possibilities, and climatic effects, these diagrams present a challenge to the seamlessness of data-based architectural-climatic models. They suggest that representational strategies can also reflect and facilitate new modes of existence, a prospect that will become increasingly vital in the environmentally threatened future.

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